Red Hat JBoss Fuse 6.2

Apache Camel Component Reference

Configuration reference for Camel components

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Abstract

Apache Camel has over 100 components and each component is highly configurable. This guide describes the settings for each of the components.

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CHAPTER 1. COMPONENTS OVERVIEW

Abstract

This chapter provides a summary of all the components available for Apache Camel.

1.1. LIST OF COMPONENTS

Table of components

The following components are available for use with Apache Camel.

Table 1.1. Apache Camel Components

Component	Endpoint URI	Artifact ID	Description
ActiveMQ	**activemq:[queue:|topic:]*DestinationName***	**activemq-core**	For JMS Messaging with Apache ActiveMQ.
AHC	**ahc:http[s]://*Hostname*[:*Port*][/*ResourceUri*]**	**camel-ahc**	Calls external HTTP servers using the Async Http Client library.
AHC-WS	**ahc-ws[s]://*Hostname*[:*Port*][/*ResourceUri*]**	**camel-ahc-ws**	Calls external WebSocket servers using the Async Http Client library.
AMQP	**amqp:[queue:|topic:]*DestinationName*[?*Options*]]**	**camel-amqp**	For messaging with the AMQP protocol.
APNS	**apns:notify[?*Options*]** **apns:consumer[?*Options*]**	**camel-apns**	For sending notifications to Apple iOS devices.
Atmosphere-WebSocket	**atmosphere-websocket:///*RelativePath*[?*Options*]**	**camel-atmosphere-websocket**	Accepts connections from external WebSocket clients using Atmosphere.
Atom	**atom://*AtomUri*[?*Options*]**	**camel-atom**	Working with Apache Abdera for atom integration, such as consuming an atom feed.

Component	Endpoint URI	Artifact ID	Description
Avro	**avro:http://*Hostname*[:*Port*][?*Options*]**	**camel-avro**	Working with Apache Avro for data serialization.
AWS-CW	**aws-cw://*Namespace*[?*Options*]**	**camel-aws**	For sending metrics to Amazon CloudWatch.
AWS-DDB	**aws-ddb://*TableName*[?*Options*]**	**camel-aws**	For working with Amazon's DynamoDB (DDB).
AWS-SDB	**aws-sdb://*DomainName*[?*Options*]**	**camel-aws**	For working with Amazon's SimpleDB (SDB).
AWS-SES	**aws-ses://*From*[?*Options*]**	**camel-aws**	For working with Amazon's Simple Email Service (SES).
AWS-S3	**aws-s3://*BucketName*[?*Options*]**	**camel-aws**	For working with Amazon's Simple Storage Service (S3).
AWS-SNS	**aws-sns://*TopicName*[?*Options*]**	**camel-aws**	For Messaging with Amazon's Simple Notification Service (SNS).
AWS-SQS	**aws-sqs://*QueueName*[?*Options*]**	**camel-aws**	For Messaging with Amazon's Simple Queue Service (SQS).
Bean	**bean:*BeanID*[?methodName=*Method*]**	**camel-core**	Uses the Bean Binding to bind message exchanges to beans in the Registry. Is also used for exposing and invoking POJO (Plain Old Java Objects).

Component	Endpoint URI	Artifact ID	Description
Bean Validation	**bean-validator:*Something*[?*Options*]**	**camel-bean-validator**	Validates the payload of a message using the Java Validation API (JSR 303 and JAXP Validation) and its reference implementation Hibernate Validator.
Browse	**browse:** *Name*	**camel-core**	Provdes a simple **BrowsableEndpoint** which can be useful for testing, visualisation tools or debugging. The exchanges sent to the endpoint are all available to be browsed.
Cache	**cache://*CacheName*[?*Options*]**	**camel-cache**	The cache component enables you to perform caching operations using EHCache as the Cache Implementation.
Class	**class:*ClassName*[?method=*MethodName*]**	**camel-core**	Uses the Bean binding to bind message exchanges to beans in the registry. Is also used for exposing and invoking POJOs (Plain Old Java Objects).
CMIS	**cmis:*CmisServerUrl*[?*Options*]**	**camel-cmis**	Uses the Apache Chemistry client API to interface with CMIS supporting CMS.
Cometd	**cometd://*Hostname*[:*Port*]/*ChannelName*[?*Options*]**	**camel-cometd**	A transport for working with the jetty implementation of the cometd/bayeux protocol.
Context	**context:*CamelContextId*:*LocalEndpointName***	**camel-context**	Refers to an endpoint in a different **CamelContext**.

Component	Endpoint URI	Artifact ID	Description
ControlBus	**controlbus:*Command*[?*Options*]**	**camel-core**	ControlBus *Enterprise Integration Pattern* that allows you to send messages to endpoints for managing and monitoring your Camel applications.
CouchDB	**couchdb:http://*Hostname*[:*Port*]/*Database*[?*Options*]://*Name*[?*Options*]**	**camel-couchdb**	Allows you to treat CouchDB instances as a producer or consumer of messages.
Crypto	**crypto:sign:*Name*[?*Options*] crypto:verify:*Name*[?*Options*]**	**camel-crypto**	Sign and verify exchanges using the Signature Service of the Java Cryptographic Extension.
CXF	**cxf://*Address*[?*Options*]**	**camel-cxf**	Working with Apache CXF for web services integration.
CXF Bean	**cxf:*BeanName***	**camel-cxf**	Proceess the exchange using a JAX WS or JAX RS annotated bean from the registry.
CXFRS	**cxfrs:bean:*RsEndpoint*[?*Options*]**	**camel-cxf**	Provides integration with Apache CXF for connecting to JAX-RS services hosted in CXF.
DataFormat	**dataformat:*Name*:(marshal|unmarshal)[?*Options*]**	**camel-core**	Enables you to marshal or unmarshal a message in one of the standard Camel data formats, by sending it to an endpoint.
DataSet	**dataset:*Name*[?*Options*]**	**camel-core**	For load & soak testing the DataSet provides a way to create huge numbers of messages for sending to Components or asserting that they are consumed correctly.

Component	Endpoint URI	Artifact ID	Description
Direct	**direct:*EndpointID*[?*Options*]**	**camel-core**	Synchronous call (single-threaded) to another endpoint from *same* CamelContext.
Direct-VM	**direct-vm:*EndpointID*[?*Options*]**	**camel-core**	Synchronous call (single-threaded) to another endpoint in another CamelContext running in the same JVM.
Disruptor	**disruptor:*Name*[?*Options*] disruptor-vm:*Name*[?*Options*]**	**camel-disruptor**	Similar to a SEDA endpoint, but uses a Disruptor instead of a blocking queue.
DNS	**dns:*Operation***	**camel-dns**	Look up domain information and run DNS queries using DNSJava
Dropbox	**dropbox://[*Operation*][?*Options*]**	**camel-dropbox**	Sends or receives messages from Dropbox remote folders.
ElasticSearch	**elasticsearch:*ClusterName***	**camel-elasticsearch**	For interfacing with an ElasticSearch server.
EventAdmin	**eventadmin:topic**	**camel-eventadmin**	
Exec	**exec://*Executable*[?*Options*]**	**camel-exec**	Execute system command.
Fabric	**fabric:*ClusterID*[:*PublishedURI*][?*Options*]**	**fabric-camel**	Look up or publish a fabric endpoint.
Facebook	**facebook://[*Endpoint*][?*Options*]**	**camel-facebook**	Provides access to all of the Facebook APIs accessible using Facebook4J.
File2	**file://*DirectoryName*[?*Options*]**	**camel-core**	Sending messages to a file or polling a file or directory.

Component	Endpoint URI	Artifact ID	Description
Flatpack	**flatpack:[fixed|delim]:** *ConfigFile*	**camel-flatpack**	Processing fixed width or delimited files or messages using the FlatPack library
FOP	**fop:*OutputFormat***	**camel-fop**	Renders the message into different output formats using Apache FOP.
Freemarker	**freemarker:** *TemplateResource*	**camel-freemarker**	Generates a response using a Freemarker template.
FTP2	**ftp://[*Username*@]*Hostname*[:*Port*]/*Directoryname*[?*Options*]**	**camel-ftp**	Sending and receiving files over FTP.
GAuth	**gauth://*Name*[?*Options*]**	**camel-gae**	Used by web applications to implement a Google-specific OAuth consumer
GHTTP	**ghttp:///*Path*[?*Options*]** **ghttp://*Hostname*[:*Port*]/*Path*[?*Options*]** **ghttps://*Hostname*[:*Port*]/*Path*[?*Options*]**	**camel-gae**	Provides connectivity to the GAE URL fetch service and can also be used to receive messages from servlets.
GLogin	**glogin://*Hostname*[:*Port*][?*Options*]**	**camel-gae**	Used by Camel applications outside Google App Engine (GAE) for programmatic login to GAE applications.
GMail	**gmail://*Username*@gmail.com[?*Options*]** **gmail://*Username*@googlemail.com[?*Options*]**	**camel-gae**	Supports sending of emails via the GAE mail service.
GTask	**gtask://*QueueName***	**camel-gae**	Supports asynchronous message processing on GAE using the task queueing service as a message queue.

Component	Endpoint URI	Artifact ID	Description
Geocoder	**geocoder:*Address*:*Name*[?*Options*]** **geocoder:latlng:*Latitude*,*Longitude*[?*Options*]**	**camel-geocoder**	Looks up geocodes (latitude and longitude) for a given address, or performs reverse look-up.
GoogleDrive	**google-drive://*EndpointPrefix*/*Endpoint*[?*Options*]**	**camel-google-drive**	Provides access to the Google Drive file storage service.
Guava EventBus	**guava-eventbus:*BusName*[?*EventClass=ClassName*]**	**camel-guava-eventbus**	The Google Guava EventBus allows publish-subscribe-style communication between components without requiring the components to explicitly register with one another (and thus be aware of each other). This component provides integration bridge between Camel and Google Guava EventBus infrastructure.
Hazelcast	**hazelcast://*StoreType*:*CacheName*[?*Options*]**	**camel-hazelcast**	Hazelcast is a data grid entirely implemented in Java (single JAR). This component supports map, multimap, seda, queue, set, atomic number and simple cluster.
HBase	**hbase://*Table*[?*Options*]**	**camel-hbase**	For reading/writing from/to an HBase store (Hadoop database).
HDFS	**hdfs://*Hostname*[:*Port*][/*Path*][?*Options*]**	**camel-hdfs**	Reads from and writes to a Hadoop Distributed File System (HDFS) using Hadoop 1.x.
HDFS2	**hdfs2://*Hostname*[:*Port*][/*Path*][?*Options*]**	**camel-hdfs2**	Reads from and writes to a Hadoop Distributed File System (HDFS) using Hadoop 2.x.

Component	Endpoint URI	Artifact ID	Description
HL7	**mina:tcp://*Host*[:*Port*]**	**camel-hl7**	For working with the HL7 MLLP protocol and the HL7 model using the HAPI library.
HTTP	**http://*Hostname*[:*Port*][/*ResourceUri*]**	**camel-http**	For calling out to external HTTP servers, using Apache HTTP Client 3.x.
HTTP4	**http://*Hostname*[:*Port*][/*ResourceUri*]**	**camel-http4**	For calling out to external HTTP servers, using Apache HTTP Client 4.x.
iBATIS	**ibatis:*OperationName*[?*Options*]**	**camel-ibatis**	Performs a query, poll, insert, update or delete in a relational database using Apache iBATIS.
IMap	**imap://[*UserName*@]*Host*[:*Port*][?*Options*]**	**camel-mail**	Receiving email using IMap.
IRC	**irc:*Host*[:*Port*]/#*Room***	**camel-irc**	For IRC communication.
JavaSpace	**javaspace:jini://*Host*[?*Options*]**	**camel-javaspace**	Sending and receiving messages through JavaSpace.
JClouds	**jclouds:[*Blobstore*|*ComputService*]:*Provider***	**camel-jclouds**	For interacting with cloud compute & blobstore service via JClouds.
JCR	**jcr://*UserName*:*Password*@*Repository*/path/to/node**	**camel-jcr**	Storing a message in a JCR (JSR-170) compliant repository like Apache Jackrabbit.
JDBC	**jdbc:*DataSourceName*[?*Options*]**	**camel-jdbc**	For performing JDBC queries and operations.
Jetty	**jetty:http://*Host*[:*Port*][/*ResourceUri*]**	**camel-jetty**	For exposing services over HTTP.

Component	Endpoint URI	Artifact ID	Description
JGroups	**jgroups:*ClusterName*[?*Options*]**	**camel-jgroups**	Exchanges messages with JGroups clusters.
Jing	rng:*LocalOrRemoteResource* rnc:*LocalOrRemoteResource*	**camel-jing**	Validates the payload of a message using RelaxNG or RelaxNG compact syntax.
JMS	**jms:[temp:]|[queue:|topic:]*DestinationName*[?*Options*]**	**camel-jms**	Working with JMS providers.
JMX	**jmx://*Platform*[?*Options*]**	**camel-jmx**	For working with JMX notification listeners.
JPA	**jpa:[*EntityClassName*][?*Options*]**	**camel-jpa**	For using a database as a queue via the JPA specification for working with OpenJPA, Hibernate or TopLink.
Jsch	**scp://*Hostname*/*Destination***	**camel-jsch**	Support for the **scp** protocol.
JT400	**jt400://*User*:*Pwd*@*System*/*PathToDTAQ***	**camel-jt400**	For integrating with data queues on an AS/400 (aka System i, IBM i, i5, ...) system.
Kafka	**kafka://*Hostname*[:*Port*][?*Options*]**	**camel-kafka**	Sends or receives messages from an Apache Kafka message broker.
Kestrel	**kestrel://[*AddressList*/]*Queuename*[?*Options*]**	**camel-kestrel**	For producing to or consuming from Kestrel queues.
Krati	**krati://[*PathToDatastore*/][?*Options*]**	**camel-krati**	For producing to or consuming to Krati datastores.
Language	**language://*LanguageName*[:*Script*][?*Options*]**	**camel-core**	Executes language scripts.

Component	Endpoint URI	Artifact ID	Description
LDAP	**ldap:*Host*[:*Port*]?base=...[&scope=*Scope*]**	**camel-ldap**	Performing searches on LDAP servers (*Scope* must be one of **object|onelevel|subtree**).
LevelDB	N/A	**camel-leveldb**	A very lightweight and embeddable key-value database.
List	**list:*ListID***	**camel-core**	Provides a simple BrowsableEndpoint which can be useful for testing, visualisation tools or debugging. The exchanges sent to the endpoint are all available to be browsed.
Log	**log:*LoggingCategory*[?level=*LoggingLevel*]**	**camel-core**	Uses Jakarta Commons Logging to log the message exchange to some underlying logging system like log4j.
Lucene	**lucene:*SearcherName*:insert[?analyzer=*Analyzer*] lucene:*SearcherName*:query[?analyzer=*Analyzer*]**	**camel-lucene**	Uses Apache Lucene to perform Java-based indexing and full text based searches using advanced analysis/tokenization capabilities.
Master	**REVISIT**		
Metrics	**metrics:[meter|counter|histogram|timer]:*Metricname*[?*Options*]**	**camel-metrics**	Enables you to collect various metrics directly from Camel routes using the Metrics Java library.
MINA	**mina:tcp://*Hostname*[:*Port*][?*Options*] mina:udp://*Hostname*[:*Port*][?*Options*] mina:multicast://*Hostname*[:*Port*][?*Options*] mina:vm://*Hostname*[:*Port*][?*Options*]**	**camel-mina**	Working with Apache MINA.

Component	Endpoint URI	Artifact ID	Description
MINA2	**mina2:tcp://*Hostname*[:*Port*][?*Options*] mina2:udp://*Hostname*[:*Port*][?*Options*] mina2:vm://*Hostname*[:*Port*][?*Options*]**	**camel-mina2**	Working with Apache MINA 2.x.
Mock	**mock:*EndpointID***	**camel-core**	For testing routes and mediation rules using mocks.
MongoDB	**mongodb:*Connection*[?*Options*]**	**camel-mongodb**	Interacts with MongoDB databases and collections. Offers producer endpoints to perform CRUD-style operations and more against databases and collections, as well as consumer endpoints to listen on collections and dispatch objects to Camel routes.
MQTT	**mqtt:*Name***	**camel-mqtt**	Component for communicating with MQTT M2M message brokers
MSV	**msv:*LocalOrRemoteResource***	**camel-msv**	Validates the payload of a message using the MSV Library.
Mustache	**mustache:*TemplateName*[?*Options*]**	**camel-mustache**	Enables you to process a message using a Mustache template.
MVEL	**mvel:*TemplateName*[?*Options*]**	**camel-mvel**	Enables you to process a message using an MVEL template.
MyBatis	**mybatis:*StatementName***	**camel-mybatis**	Performs a query, poll, insert, update or delete in a relational database using MyBatis.
Nagios	**nagios://*Host*[:*Port*][?*Options*]**	**camel-nagios**	Sending passive checks to Nagios using JSendNSCA.

Component	Endpoint URI	Artifact ID	Description
Netty	**netty:tcp://localhost:99999[?*Options*]** **netty:udp://*Remotehost*:99999/[?*Options*]**	**camel-netty**	Enables you to work with TCP and UDP protocols, using the Java NIO based capabilities offered by Netty version 3.x.
Netty4	**netty4:tcp://localhost:99999[?*Options*]** **netty4:udp://*Remotehost*:99999/[?*Options*]**	**camel-netty4**	Enables you to work with TCP and UDP protocols, using the Java NIO based capabilities offered by Netty version 4.x.
Netty HTTP	**netty-http:http://*Hostname*[:*Port*][?*Options*]**	**camel-netty-http**	An extension to the Netty component, facilitating the HTTP transport, using Netty version 3.x.
Netty4 HTTP	**netty4-http:http://*Hostname*[:*Port*][?*Options*]**	**camel-netty4-http**	An extension to the Netty component, facilitating the HTTP transport, using Netty version 4.x.
Olingo2	**olingo2://*Endpoint*/*ResourcePath*[?*Options*]**	**camel-olingo2**	Communicates with OData 2.0 services using Apache Olingo 2.0.
Pax-Logging	**paxlogging:*Appender***	**camel-paxlogging**	Receives Pax Logging events in the context of an OSGi container.
POP	**pop3://[*UserName*@]*Host*[:*Port*][?*Options*]**	**camel-mail**	Receives email using POP3 and JavaMail.
Printer	**lpr://localhost[:*Port*]/default[?*Options*]** **lpr://*RemoteHost*[:*Port*]/path/to/printer[?*Options*]**	**camel-printer**	Provides a way to direct payloads on a route to a printer.
Properties	**properties://*Key*[?*Options*]**	**camel-properties**	Facilitates using property placeholders directly in endpoint URI definitions.

Component	Endpoint URI	Artifact ID	Description
Quartz	**quartz://[*GroupName*/]*TimerName*[?*Options*]** **quartz://*GroupName*/*TimerName*/*CronExpression***	**camel-quartz**	Provides a scheduled delivery of messages using the Quartz scheduler.
Quartz2	**quartz2://[*GroupName*/]*TimerName*[?*Options*]** **quartz2://*GroupName*/*TimerName*/*CronExpression***	**camel-quartz2**	Provides a scheduled delivery of messages using the Quartz Scheduler 2.x.
Quickfix	**quickfix-server:*ConfigFile*** **quickfix-client:*ConfigFile***	**camel-quickfix**	Implementation of the QuickFix for Java engine which allow to send/receive FIX messages.
RabbitMQ	**rabbitmq://*Hostname*[:*Port*]/*ExchangeName*[?*Options*]**	**camel-rabbitmq**	Enables you to produce and consume messages from a RabbitMQ instance.
Ref	**ref:*EndpointID***	**camel-core**	Component for lookup of existing endpoints bound in the Registry.
Restlet	**restlet:*RestletUrl*[?*Options*]**	**camel-restlet**	Component for consuming and producing Restful resources using Restlet.
RMI	**rmi://*RmiRegistryHost*:*RmiRegistryPort*/*RegistryPath***	**camel-rmi**	Working with RMI.
Routebox	**routebox:*routeboxName*[?*Options*]**	**camel-routebox**	
RSS	**rss:*Uri***	**camel-rss**	Working with ROME for RSS integration, such as consuming an RSS feed.

Component	Endpoint URI	Artifact ID	Description
RNC	**rnc:*LocalOrRemoteResource***	**camel-jing**	Validates the payload of a message using RelaxNG Compact Syntax.
RNG	**rng:*LocalOrRemoteResource***	**camel-jing**	Validates the payload of a message using RelaxNG.
Salesforce	**salesforce:*Topic*[?*Options*]**	**camel-salesforce**	Enables producer and consumer endpoints to communicate with Salesforce using Java DTOs.
SAP	**sap:[destination:*DestinationName*|server:*ServerName*]*rfcName*[?*Options*]**	**camel-sap**	Enables outbound and inbound communication to and from SAP systems using synchronous remote function calls, sRFC.
Chapter 124, *SAP NetWeaver*	**sap-netweaver:https://*Hostname*[:*Port*]/*Path*[?*Options*]**	**camel-sap-netweaver**	Integrates with the SAP NetWeaver Gateway using HTTP transports.
Schematron	**schematron://*Path*[?*Options*]**	**camel-schematron**	Validates XML documents using Schematron.
SEDA	**seda:*EndpointID***	**camel-core**	Used to deliver messages to a java.util.concurrent.BlockingQueue, useful when creating SEDA style processing pipelines within the same CamelContext.
SERVLET	**servlet://*RelativePath*[?*Options*]**	**camel-servlet**	Provides HTTP based endpoints for consuming HTTP requests that arrive at a HTTP endpoint and this endpoint is bound to a published Servlet.

Component	Endpoint URI	Artifact ID	Description
ServletListener	N/A	**camel-servletlistener**	Used for bootstrapping Camel applications in Web applications.
SFTP	**sftp://[*Username*@]*Hostname*[:*Port*]/*Directoryname*[?*Options*]**	**camel-ftp**	Sending and receiving files over SFTP.
Sip	**sip://User@*Hostname*[:*Port*][?*Options*] sips://User@*Hostname*[:*Port*][?*Options*]**	**camel-sip**	Publish/subscribe communication capability using the telecom SIP protocol. RFC3903 - Session Initiation Protocol (SIP) Extension for Event
SJMS	**sjms:[queue:|topic:]*destinationName*[?*Options*]**	**camel-sjms**	A JMS client for Camel that employs best practices for JMS client creation and configuration.
SMPP	**smpp://*UserInfo*@*Host*[:*Port*][?*Options*]**	**camel-smpp**	To send and receive SMS using Short Messaging Service Center using the JSMPP library.
SMTP	**smtp://[*UserName*@]*Host*[:*Port*][?*Options*]**	**camel-mail**	Sending email using SMTP and JavaMail.
SNMP	**snmp://*Hostname*[:*Port*][?*Options*]**	**camel-snmp**	Gives you the ability to poll SNMP capable devices or receive traps.
Solr	**solr://*Hostname*[:*Port*]/*Solr*[?*Options*]**	**camel-solr**	Uses the Solrj client API to interface with an Apache Lucene Solr server.
Splunk	**splunk://*Endpoint*[?*Options*]**	**camel-splunk**	Enables you to publish events and search for events in Splunk.
Spring Batch	**spring-batch:*Job*[?*Options*]**	**camel-spring-batch**	To bridge Camel and Spring Batch.

Component	Endpoint URI	Artifact ID	Description
Spring Event	**spring-event://dummy**	**camel-spring**	Publishes or consumes Spring ApplicationEvents objects in a Spring context.
Spring Integration	**spring-integration:*DefaultChannelName*[?*Options*]**	**camel-spring-integration**	The bridge component of Camel and Spring Integration.
Spring LDAP	**spring-ldap:*SpringLdapTemplate*[?*Options*]**	**camel-spring-ldap**	Provides a Camel wrapper for Spring LDAP.
Spring Redis	**spring-redis://*Hostname*[:*Port*][?*Options*]**	**camel-spring-redis**	Enables sending and receiving messages from Redis, which is an advanced key-value store, where keys can contain strings, hashes, lists, sets and sorted sets.
Spring Web Services	**spring-ws:[*MappingType*:]*Address*[?*Options*]**	**camel-spring-ws**	Client-side support for accessing web services, and server-side support for creating your own contract-first web services using Spring Web Services.
SQL	**sql:*SqlQueryString*[?*Options*]**	**camel-sql**	Performing SQL queries using JDBC.
SSH	**ssh:[*Username*[:*Password*]@]*Host*[:*Port*][?*Options*]**	**camel-ssh**	For sending commands to a SSH server.
StAX	**stax:*ContentHandlerClassName***	**camel-stax**	Process messages through a SAX ContentHandler.
Stomp	**stomp:queue:*Destination*[?*Options*]**	**camel-stomp**	For sending messages to or receiving messages from a Stomp compliant broker, such as Apache ActiveMQ.

Component	Endpoint URI	Artifact ID	Description
Stream	**stream:[in|out|err|header][?*Options*]**	**camel-stream**	Read or write to an input/output/error/file stream rather like Unix pipes.
String Template	**string-template:*TemplateURI*[?*Options*]**	**camel-stringtemplate**	Generates a response using a String Template.
Stub	**stub:*SomeOtherCamelUri***	**camel-core**	Allows you to stub out some physical middleware endpoint for easier testing or debugging.
Test	**test:*RouterEndpointUri***	**camel-spring**	Creates a Mock endpoint which expects to receive all the message bodies that could be polled from the given underlying endpoint.
Timer	**timer:*EndpointID*[?*Options*]**	**camel-core**	A timer endpoint.
Twitter	**twitter://[*Endpoint*][?*Options*]**	**camel-twitter**	A Twitter endpoint.
UrlRewrite	N/A	**camel-urlrewrite**	Enables you to plug URL rewrite functionality into the HTTP, HTTP4, Jetty, or AHC components.
Validation	**validator:*LocalOrRemoteResource***	**camel-spring**	Validates the payload of a message using XML Schema and JAXP Validation.
Velocity	**velocity:*TemplateURI*[?*Options*]**	**camel-velocity**	Generates a response using an Apache Velocity template.
Vertx	**vertx:*ChannelName*[?*Options*]**	**camel-vertx**	For working with the Vertx Event Bus.

Component	Endpoint URI	Artifact ID	Description
VM	**vm:*EndpointID***	**camel-core**	Used to deliver messages to a java.util.concurrent.BlockingQueue, useful when creating SEDA style processing pipelines within the same JVM.
Weather	**weather://*DummyName*[?*Options*]**	**camel-weather**	Polls weather information from Open Weather Map: a site that provides free global weather and forecast information.
Websocket	**websocket://*Hostname*[:*Port*]/*Path***	**camel-websocket**	Communicating with Websocket clients.
XML RPC	**xmlrpc://*ServerURI*[?*Options*]**	**camel-xmlrpc**	Provides a data format for XML, which allows serialization and deserialization of request messages and response message using Apache XmlRpc's bindary data format.
XML Security	N/A	**camel-xmlsecurity**	Generate and validate XML signatures as described in the W3C standard XML Signature Syntax and Processing.
XMPP	**xmpp:*Hostname*[:*Port*][/*Room*]**	**camel-xmpp**	Working with XMPP and Jabber.
XQuery	**xquery:*TemplateURI***	**camel-saxon**	Generates a response using an XQuery template.
XSLT	**xslt:*TemplateURI*[?*Options*]**	**camel-spring**	Enables you to process a message using an XSLT template.
Yammer	**yammer:[*function*][?*Options*]**	**camel-yammer**	Enables you to interact with the Yammer enterprise social network.

Component	Endpoint URI	Artifact ID	Description
Zookeeper	**zookeeper://*Hostname*[:*Port*]/*Path***	**camel-zookeeper**	Working with ZooKeeper cluster(s).

CHAPTER 2. ACTIVEMQ

ACTIVEMQ COMPONENT

The ActiveMQ component allows messages to be sent to a JMS Queue or Topic; or messages to be consumed from a JMS Queue or Topic using Apache ActiveMQ.

This component is based on the JMS Component and uses Spring's JMS support for declarative transactions, using Spring's **JmsTemplate** for sending and a **MessageListenerContainer** for consuming. All the options from the JMS component also apply for this component.

To use this component, make sure you have the **activemq.jar** or **activemq-core.jar** on your classpath along with any Apache Camel dependencies such as **camel-core.jar**, **camel-spring.jar** and **camel-jms.jar**.

TRANSACTED AND CACHING

See section *Transactions and Cache Levels* below on JMS page if you are using transactions with JMS as it can impact performance.

URI FORMAT

```
activemq:[queue:|topic:]destinationName
```

Where **destinationName** is an ActiveMQ queue or topic name. By default, the **destinationName** is interpreted as a queue name. For example, to connect to the queue, **FOO.BAR**, use:

```
activemq:FOO.BAR
```

You can include the optional **queue:** prefix, if you prefer:

```
activemq:queue:FOO.BAR
```

To connect to a topic, you must include the **topic:** prefix. For example, to connect to the topic, **Stocks.Prices**, use:

```
activemq:topic:Stocks.Prices
```

OPTIONS

See Options on the JMS component as all these options also apply for this component.

CONFIGURING THE CONNECTION FACTORY

The following test case shows how to add an ActiveMQComponent to the CamelContext using the **activeMQComponent()** method while specifying the brokerURL used to connect to ActiveMQ.

```
camelContext.addComponent("activemq", activeMQComponent("vm://localhost?
broker.persistent=false"));
```

CONFIGURING THE CONNECTION FACTORY USING SPRING XML

You can configure the ActiveMQ broker URL on the ActiveMQComponent as follows

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xsi:schemaLocation="
       http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.0.xsd
       http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

  <camelContext xmlns="http://camel.apache.org/schema/spring">
  </camelContext>


  <bean id="activemq" class="org.apache.activemq.camel.component.ActiveMQComponent">
    <property name="brokerURL" value="tcp://somehost:61616"/>
  </bean>

</beans>
```

USING CONNECTION POOLING

When sending to an ActiveMQ broker using Camel it's recommended to use a pooled connection factory to handle efficient pooling of JMS connections, sessions and producers. This is documented in the page ActiveMQ Spring Support.

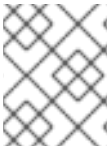
You can grab Jencks AMQ pool with Maven:

```
    <dependency>
      <groupId>org.apache.activemq</groupId>
      <artifactId>activemq-pool</artifactId>
      <version>5.3.2</version>
    </dependency>
```

And then setup the **activemq** component as follows:

```
     <bean id="jmsConnectionFactory" class="org.apache.activemq.ActiveMQConnectionFactory">
        <property name="brokerURL" value="tcp://localhost:61616" />
    </bean>

    <bean id="pooledConnectionFactory"
class="org.apache.activemq.pool.PooledConnectionFactory" init-method="start" destroy-
method="stop">
        <property name="maxConnections" value="8" />
        <property name="connectionFactory" ref="jmsConnectionFactory" />
    </bean>


    <bean id="jmsConfig" class="org.apache.camel.component.jms.JmsConfiguration">
        <property name="connectionFactory" ref="pooledConnectionFactory"/>
        <property name="concurrentConsumers" value="10"/>
    </bean>
```

```
<bean id="activemq" class="org.apache.activemq.camel.component.ActiveMQComponent">
    <property name="configuration" ref="jmsConfig"/>
</bean>
```



NOTE

Notice the **init** and **destroy** methods on the pooled connection factory. This is important to ensure the connection pool is properly started and shutdown.

The **PooledConnectionFactory** will then create a connection pool with up to 8 connections in use at the same time. Each connection can be shared by many sessions. There is an option named **maxActive** you can use to configure the maximum number of sessions per connection; the default value is **500**. From **ActiveMQ 5.7** onwards the option has been renamed to better reflect its purpose, being named as **maxActiveSessionPerConnection**. Notice the **concurrentConsumers** is set to a higher value than **maxConnections** is. This is okay, as each consumer is using a session, and as a session can share the same connection, we are in the safe. In this example we can have 8 * 500 = 4000 active sessions at the same time.

INVOKING MESSAGELISTENER POJOS IN A ROUTE

The ActiveMQ component also provides a helper Type Converter from a JMS MessageListener to a Processor. This means that the Bean component is capable of invoking any JMS MessageListener bean directly inside any route.

So for example you can create a MessageListener in JMS as follows:

```
public class MyListener implements MessageListener {
    public void onMessage(Message jmsMessage) {
        // ...
    }
}
```

Then use it in your route as follows

```
from("file://foo/bar").
  bean(MyListener.class);
```

That is, you can reuse any of the Apache Camel Components and easily integrate them into your JMS **MessageListener** POJO\!

USING ACTIVEMQ DESTINATION OPTIONS

Available as of ActiveMQ 5.6

You can configure the Destination Options in the endpoint uri, using the "destination." prefix. For example to mark a consumer as exclusive, and set its prefetch size to 50, you can do as follows:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="file://src/test/data?noop=true"/>
    <to uri="activemq:queue:foo"/>
  </route>
```

```
  <route>
    <!-- use consumer.exclusive ActiveMQ destination option, notice we have to prefix with destination.
-->
    <from uri="activemq:foo?
destination.consumer.exclusive=true&estination.consumer.prefetchSize=50"/>
    <to uri="mock:results"/>
  </route>
</camelContext>
```

CONSUMING ADVISORY MESSAGES

ActiveMQ can generate Advisory messages which are put in topics that you can consume. Such messages can help you send alerts in case you detect slow consumers or to build statistics (number of messages/produced per day, etc.) The following Spring DSL example shows you how to read messages from a topic.

```
<route>
 <from uri="activemq:topic:ActiveMQ.Advisory.Connection?mapJmsMessage=false" />
 <convertBodyTo type="java.lang.String"/>
 <transform>
     <simple>${in.body}&#13;</simple>
 </transform>
 <to uri="file://data/activemq/?fileExist=Append&ileName=advisoryConnection-
${date:now:yyyyMMdd}.txt" />
</route>
```

If you consume a message on a queue, you should see the following files under data/activemq folder :

advisoryConnection-20100312.txt advisoryProducer-20100312.txt

and containing string:

```
    ActiveMQMessage {commandId = 0, responseRequired = false, messageId = ID:dell-charles-
3258-1268399815140
    -1:0:0:0:221, originalDestination = null, originalTransactionId = null, producerId = ID:dell-charles-
    3258-1268399815140-1:0:0:0, destination = topic://ActiveMQ.Advisory.Connection, transactionId
= null,
    expiration = 0, timestamp = 0, arrival = 0, brokerInTime = 1268403383468, brokerOutTime =
1268403383468,
    correlationId = null, replyTo = null, persistent = false, type = Advisory, priority = 0, groupID = null,
    groupSequence = 0, targetConsumerId = null, compressed = false, userID = null, content = null,
    marshalledProperties = org.apache.activemq.util.ByteSequence@17e2705, dataStructure =
ConnectionInfo
    {commandId = 1, responseRequired = true, connectionId = ID:dell-charles-3258-1268399815140-
2:50,
    clientId = ID:dell-charles-3258-1268399815140-14:0, userName = , password = *****,
    brokerPath = null, brokerMasterConnector = false, manageable = true, clientMaster = true},
    redeliveryCounter = 0, size = 0, properties = {originBrokerName=master, originBrokerId=ID:dell-
charles-
    3258-1268399815140-0:0, originBrokerURL=vm://master}, readOnlyProperties = true,
readOnlyBody = true,
    droppable = false}
```

GETTING COMPONENT JAR

You need this dependency:

- **activemq-camel**

ActiveMQ is an extension of the JMS component released with the ActiveMQ project.

```
<dependency>
  <groupId>org.apache.activemq</groupId>
  <artifactId>activemq-camel</artifactId>
  <version>5.6.0</version>
</dependency>
```

CHAPTER 3. AHC

ASYNC HTTP CLIENT (AHC) COMPONENT

Available as of Camel 2.8

The **ahc:** component provides HTTP based endpoints for consuming external HTTP resources (as a client to call external servers using HTTP). The component uses the Async Http Client library.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-ahc</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
ahc:http://hostname[:port][/resourceUri][?options]
ahc:https://hostname[:port][/resourceUri][?options]
```

Will by default use port 80 for HTTP and 443 for HTTPS.

You can append query options to the URI in the following format, **?option=value&option=value&...**

AHCENDPOINT OPTIONS

Name	Default Value	Description
throwExceptionOnFailure	**true**	Option to disable throwing the **AhcOperationFailedException** in case of failed responses from the remote server. This allows you to get all responses regardless of the HTTP status code.
bridgeEndpoint	**false**	If the option is true, then the Exchange.HTTP_URI header is ignored, and use the endpoint's URI for request. You may also set the **throwExcpetionOnFailure** to be false to let the AhcProducer send all the fault response back.

transferException	**false**	If enabled and an Exchange failed processing on the consumer side, and if the caused **Exception** was send back serialized in the response as a **application/x-java-serialized-object** content type (for example using Jetty or Servlet Camel components). On the producer side the exception will be deserialized and thrown as is, instead of the **AhcOperationFailedException**. The caused exception is required to be serialized.
client	**null**	To use a custom **com.ning.http.client.AsyncHttpClient**.
clientConfig	**null**	To configure the **AsyncHttpClient** to use a custom **com.ning.http.client.AsyncHttpClientConfig**.
clientConfig.x	**null**	To configure additional properties of the **com.ning.http.client.AsyncHttpClientConfig** instance used by the endpoint. Note that configuration options set using this parameter will be merged with those set using the **clientConfig** parameter or the instance set at the component level with properties set using this parameter taking priority.
clientConfig.realm.x	**null**	**Camel 2.11:** To configure realm properties of the **com.ning.http.client.AsyncHttpClientConfig** The options which can be used are the options from **com.ning.http.client.Realm.RealmBuilder**. eg to set scheme, you can configure **"clientConfig.realm.scheme=DIGEST"**

binding	**null**	To use a custom **org.apache.camel.component.ahc.AhcBinding**.
sslContextParameters	**null**	**Camel 2.9:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the CAMEL:Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility. Note that configuring this option will override any SSL/TLS configuration options provided through the clientConfig option at the endpoint or component level.
bufferSize	**4096**	**Camel 2.10.3:** The initial in-memory buffer size used when transferring data between Camel and AHC Client.

AHCCOMPONENT OPTIONS

Name	Default Value	Description
client	**null**	To use a custom **com.ning.http.client.AsyncHttpClient**.
clientConfig	**null**	To configure the **AsyncHttpClient**s use a custom **com.ning.http.client.AsyncHttpClientConfig**.
binding	**null**	To use a custom **org.apache.camel.component.ahc.AhcBinding**.
sslContextParameters	**null**	**Camel 2.9:** To configure custom SSL/TLS configuration options at the component level. See Using the JSSE Configuration Utility for more details. Note that configuring this option will override any SSL/TLS configuration options provided through the clientConfig option at the endpoint or component level.

Notice that setting any of the options on the **AhcComponent** will propagate those options to **AhcEndpoint**s being created. However the **AhcEndpoint** can also configure/override a custom option. Options set on endpoints will always take precedence over options from the **AhcComponent**.

MESSAGE HEADERS

Name	Type	Description
Exchange.HTTP_URI	**String**	URI to call. Will override existing URI set directly on the endpoint.
Exchange.HTTP_PATH	**String**	Request URI's path, the header will be used to build the request URI with the HTTP_URI. If the path is start with "/", http producer will try to find the relative path based on the Exchange.HTTP_BASE_URI header or the **exchange.getFromEndpoint() .getEndpointUri();**
Exchange.HTTP_QUERY	**String**	URI parameters. Will override existing URI parameters set directly on the endpoint.
Exchange.HTTP_RESPONSE_CODE	**int**	The HTTP response code from the external server. Is 200 for OK.
Exchange.HTTP_CHARACTER_ENCODING	**String**	Character encoding.
Exchange.CONTENT_TYPE	**String**	The HTTP content type. Is set on both the IN and OUT message to provide a content type, such as **text/html**.
Exchange.CONTENT_ENCODING	**String**	The HTTP content encoding. Is set on both the IN and OUT message to provide a content encoding, such as **gzip**.

MESSAGE BODY

Camel will store the HTTP response from the external server on the OUT body. All headers from the IN message will be copied to the OUT message, so headers are preserved during routing. Additionally Camel will add the HTTP response headers as well to the OUT message headers.

RESPONSE CODE

Camel will handle according to the HTTP response code:

- Response code is in the range 100..299, Camel regards it as a success response.
- Response code is in the range 300..399, Camel regards it as a redirection response and will throw a **AhcOperationFailedException** with the information.
- Response code is 400+, Camel regards it as an external server failure and will throw a **AhcOperationFailedException** with the information. The option, **throwExceptionOnFailure**, can be set to **false** to prevent the **AhcOperationFailedException** from being thrown for failed response codes. This allows you to get any response from the remote server.

AHCOPERATIONFAILEDEXCEPTION

This exception contains the following information:

- The HTTP status code
- The HTTP status line (text of the status code)
- Redirect location, if server returned a redirect
- Response body as a **java.lang.String**, if server provided a body as response

CALLING USING GET OR POST

The following algorithm is used to determine if either **GET** or **POST** HTTP method should be used: 1. Use method provided in header. 2. **GET** if query string is provided in header. 3. **GET** if endpoint is configured with a query string. 4. **POST** if there is data to send (body is not null). 5. **GET** otherwise.

CONFIGURING URI TO CALL

You can set the HTTP producer's URI directly form the endpoint URI. In the route below, Camel will call out to the external server, **oldhost**, using HTTP.

```
from("direct:start")
    .to("ahc:http://oldhost");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://activemq.apache.org/camel/schema/spring">
  <route>
    <from uri="direct:start"/>
    <to uri="ahc:http://oldhost"/>
  </route>
</camelContext>
```

You can override the HTTP endpoint URI by adding a header with the key, **Exchange.HTTP_URI**, on the message.

```
from("direct:start")
    .setHeader(Exchange.HTTP_URI, constant("http://newhost"))
    .to("ahc:http://oldhost");
```

CONFIGURING URI PARAMETERS

The **ahc** producer supports URI parameters to be sent to the HTTP server. The URI parameters can either be set directly on the endpoint URI or as a header with the key **Exchange.HTTP_QUERY** on the message.

```
from("direct:start")
    .to("ahc:http://oldhost?order=123&detail=short");
```

Or options provided in a header:

```
from("direct:start")
        .setHeader(Exchange.HTTP_QUERY, constant("order=123&detail=short"))
    .to("ahc:http://oldhost");
```

HOW TO SET THE HTTP METHOD (GET/POST/PUT/DELETE/HEAD/OPTIONS/TRACE) TO THE HTTP PRODUCER

The HTTP component provides a way to set the HTTP request method by setting the message header. Here is an example;

```
from("direct:start")
        .setHeader(Exchange.HTTP_METHOD, constant("POST"))
    .to("ahc:http://www.google.com")
        .to("mock:results");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://activemq.apache.org/camel/schema/spring">
  <route>
    <from uri="direct:start"/>
    <setHeader headerName="CamelHttpMethod">
       <constant>POST</constant>
    </setHeader>
    <to uri="ahc:http://www.google.com"/>
    <to uri="mock:results"/>
  </route>
</camelContext>
```

CONFIGURING CHARSET

If you are using **POST** to send data you can configure the **charset** using the **Exchange** property:

```
exchange.setProperty(Exchange.CHARSET_NAME, "iso-8859-1");
```

URI PARAMETERS FROM THE ENDPOINT URI

In this sample we have the complete URI endpoint that is just what you would have typed in a web browser. Multiple URI parameters can of course be set using the **&** character as separator, just as you would in the web browser. Camel does no tricks here.

```
// we query for Camel at the Google page
template.sendBody("ahc:http://www.google.com/search?q=Camel", null);
```

URI PARAMETERS FROM THE MESSAGE

```
Map headers = new HashMap();
headers.put(Exchange.HTTP_QUERY, "q=Camel&lr=lang_en");
// we query for Camel and English language at Google
template.sendBody("ahc:http://www.google.com/search", null, headers);
```

In the header value above notice that it should **not** be prefixed with **?** and you can separate parameters as usual with the **&** char.

GETTING THE RESPONSE CODE

You can get the HTTP response code from the AHC component by getting the value from the Out message header with **Exchange.HTTP_RESPONSE_CODE**.

```
Exchange exchange = template.send("ahc:http://www.google.com/search", new Processor() {
        public void process(Exchange exchange) throws Exception {
            exchange.getIn().setHeader(Exchange.HTTP_QUERY, constant("hl=en&q=activemq"));
        }
});
Message out = exchange.getOut();
int responseCode = out.getHeader(Exchange.HTTP_RESPONSE_CODE, Integer.class);
```

CONFIGURING ASYNCHTTPCLIENT

The **AsyncHttpClient** client uses a **AsyncHttpClientConfig** to configure the client. See the documentation at Async Http Client for more details.

The example below shows how to use a builder to create the **AsyncHttpClientConfig** which we configure on the **AhcComponent**.

```
// create a client config builder
AsyncHttpClientConfig.Builder builder = new AsyncHttpClientConfig.Builder();
// use the builder to set the options we want, in this case we want to follow redirects and try
// at most 3 retries to send a request to the host
AsyncHttpClientConfig config = builder.setFollowRedirects(true).setMaxRequestRetry(3).build();

// lookup AhcComponent
AhcComponent component = context.getComponent("ahc", AhcComponent.class);
// and set our custom client config to be used
component.setClientConfig(config);
```

In Camel **2.9**, the AHC component uses Async HTTP library 1.6.4. This newer version provides added support for plain bean style configuration. The **AsyncHttpClientConfigBean** class provides getters and setters for the configuration options available in **AsyncHttpClientConfig**. An instance of **AsyncHttpClientConfigBean** may be passed directly to the AHC component or referenced in an endpoint URI using the **clientConfig** URI parameter.

Also available in Camel **2.9** is the ability to set configuration options directly in the URI. URI parameters

starting with "clientConfig." can be used to set the various configurable properties of **AsyncHttpClientConfig**. The properties specified in the endpoint URI are merged with those specified in the configuration referenced by the "clientConfig" URI parameter with those being set using the "clientConfig." parameter taking priority. The **AsyncHttpClientConfig** instance referenced is always copied for each endpoint such that settings on one endpoint will remain independent of settings on any previously created endpoints. The example below shows how to configure the AHC component using the "clientConfig." type URI parameters.

```
from("direct:start")
    .to("ahc:http://localhost:8080/foo?
clientConfig.maxRequestRetry=3&clientConfig.followRedirects=true")
```

SSL SUPPORT (HTTPS)

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.9, the AHC component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the AHC component.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);

AhcComponent component = context.getComponent("ahc", AhcComponent.class);
component.setSslContextParameters(scp));
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
      id="sslContextParameters">
    <camel:keyManagers
        keyPassword="keyPassword">
      <camel:keyStore
          resource="/users/home/server/keystore.jks"
          password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>...
...
  <to uri="ahc:https://localhost/foo?sslContextParameters=#sslContextParameters"/>
...
```

- Jetty
- HTTP
- HTTP4

CHAPTER 4. AHC-WS

ASYNC HTTP CLIENT (AHC) WEBSOCKET CLIENT COMPONENT

Available as of Camel 2.14

The **ahc-ws** component provides Websocket based endpoints for a client communicating with external servers over Websocket (as a client opening a websocket connection to an external server). The component uses the Chapter 3, *AHC* component that in turn uses the Async Http Client library.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-ahc-ws</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
ahc-ws://hostname[:port][/resourceUri][?options]
ahc-wss://hostname[:port][/resourceUri][?options]
```

Will by default use port 80 for ahc-ws and 443 for ahc-wss.

AHC-WS OPTIONS

As the AHC-WS component is based on the AHC component, you can use the various configuration options of the AHC component.

WRITING AND READING DATA OVER WEBSOCKET

An ahc-ws endpoint can either write data to the socket or read from the socket, depending on whether the endpoint is configured as the producer or the consumer, respectively.

CONFIGURING URI TO WRITE OR READ DATA

In the route below, Camel will write to the specified websocket connection.

```
from("direct:start")
    .to("ahc-ws://targethost");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct:start"/>
    <to uri="ahc-ws://targethost"/>
  </route>
</camelContext>
```

–

In the route below, Camel will read from the specified websocket connection.

```
from("ahc-ws://targethost")
    .to("direct:next");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="ahc-ws://targethost"/>
    <to uri="direct:next"/>
  </route>
</camelContext>
```

CHAPTER 5. AMQP

AMQP

The AMQP component supports the AMQP protocol via the Qpid project.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-ampq</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
amqp:[queue:|topic:]destinationName[?options]
```

You can specify all of the various configuration options of the JMS component after the destination name.

CHAPTER 6. APNS

APNS COMPONENT

Available as of Camel 2.8

The **apns** component is used for sending notifications to iOS devices. The apns components use javapns library. The component supports sending notifications to Apple Push Notification Servers (APNS) and consuming feedback from the servers.

The consumer is configured with a default polling time of 3600 seconds. It is advisable to consume the feedback stream from Apple Push Notification Servers regularly at larger intervals to avoid flooding the servers.

The feedback stream gives information about inactive devices. This information can be consumed infrequently (every two or three hours) if your mobile application is not heavily used.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-apns</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

To send notifications:

```
apns:notify[?options]
```

To consume feedback:

```
apns:consumer[?options]
```

OPTIONS

PRODUCER

Property	Default	Description
tokens		Empty by default. Configure this property in case you want to statically declare tokens related to devices you want to notify. Tokens are separated by comma.

CONSUMER

Property	Default	Description
delay	**3600**	Delay in seconds between each poll.
initialDelay	**10**	Seconds before polling starts.
timeUnit	**SECONDS**	Time Unit for polling.
userFixedDelay	**true**	If **true**, use fixed delay between pools, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.

You can append query options to the URI in the following format, **?option=value&option=value&...**

COMPONENT

The **ApnsComponent** must be configured with a **com.notnoop.apns.ApnsService**. The service can be created and configured using the **org.apache.camel.component.apns.factory.ApnsServiceFactory**. See further below for an example. For further information, see the test source code.

EXCHANGE DATA FORMAT

When Camel fetches feedback data corresponding to inactive devices, it retrieves a List of InactiveDevice objects. Each InactiveDevice object on the retrieved list will be set as the In body, and then processed by the consumer endpoint.

MESSAGE HEADERS

Camel Apns uses these headers.

Property	Default	Description
CamelApnsTokens		Empty by default.
CamelApnsMessageType	**STRING, PAYLOAD**	If you choose PAYLOAD as the message type, the message will be considered an APNS payload and sent as is. If you choose STRING, the message will be converted to an APNS payload

APNSSERVICEFACTORY BUILDER CALLBACK

ApnsServiceFactory comes with an empty callback method that can be used to configure or replace the default **ApnsServiceBuilder** instance. The method has the following format:

```
protected ApnsServiceBuilder configureServiceBuilder(ApnsServiceBuilder serviceBuilder);
```

It is used in the following way:

```
ApnsServiceFactory proxiedApnsServiceFactory = new ApnsServiceFactory(){

  @Override
  protected ApnsServiceBuilder configureServiceBuilder(ApnsServiceBuilder serviceBuilder) {
    return serviceBuilder.withSocksProxy("my.proxy.com", 6666);
  }

};
```

SAMPLES

CAMEL XML ROUTE

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:camel="http://camel.apache.org/schema/spring"
       xsi:schemaLocation="
        http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.5.xsd
        http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

 <!-- Replace by desired values -->
 <bean id="apnsServiceFactory"
class="org.apache.camel.component.apns.factory.ApnsServiceFactory">

  <!-- Optional configuration of feedback host and port -->
  <!-- <property name="feedbackHost" value="localhost" /> -->
  <!-- <property name="feedbackPort" value="7843" /> -->

  <!-- Optional configuration of gateway host and port -->
  <!-- <property name="gatewayHost" value="localhost" /> -->
  <!-- <property name="gatewayPort" value="7654" /> -->

  <!-- Declaration of certificate used -->
              <!-- from Camel 2.11 onwards you can use prefix: classpath:, file: to refer to load the
certificate from classpath or file. Default it classpath -->
  <property name="certificatePath" value="certificate.p12" />
  <property name="certificatePassword" value="MyCertPassword" />

  <!-- Optional connection strategy - By Default: No need to configure -->
  <!-- Possible options: NON_BLOCKING, QUEUE, POOL or Nothing -->
  <!-- <property name="connectionStrategy" value="POOL" /> -->
  <!-- Optional pool size -->
  <!-- <property name="poolSize" value="15" /> -->

  <!-- Optional connection strategy - By Default: No need to configure -->
```

```
  <!-- Possible options: EVERY_HALF_HOUR, EVERY_NOTIFICATION or Nothing (Corresponds to
NEVER javapns option) -->
  <!-- <property name="reconnectionPolicy" value="EVERY_HALF_HOUR" /> -->
 </bean>

 <bean id="apnsService" factory-bean="apnsServiceFactory" factory-method="getApnsService" />

 <!-- Replace this declaration by wanted configuration -->
 <bean id="apns" class="org.apache.camel.component.apns.ApnsComponent">
  <property name="apnsService" ref="apnsService" />
 </bean>

 <camelContext id="camel-apns-test" xmlns="http://camel.apache.org/schema/spring">
        <route id="apns-test">
              <from uri="apns:consumer?initialDelay=10&elay=3600&imeUnit=SECONDS" />
              <to uri="log:org.apache.camel.component.apns?showAll=true&ultiline=true" />
              <to uri="mock:result" />
        </route>
 </camelContext>

</beans>
```

CAMEL JAVA ROUTE

CREATE CAMEL CONTEXT AND DECLARE APNS COMPONENT PROGRAMMATICALLY

```
    protected CamelContext createCamelContext() throws Exception {
        CamelContext camelContext = super.createCamelContext();

        ApnsServiceFactory apnsServiceFactory = new ApnsServiceFactory();
        apnsServiceFactory.setCertificatePath("classpath:/certificate.p12");
        apnsServiceFactory.setCertificatePassword("MyCertPassword");

        ApnsService apnsService = apnsServiceFactory.getApnsService(camelContext);

        ApnsComponent apnsComponent = new ApnsComponent(apnsService);
        camelContext.addComponent("apns", apnsComponent);

        return camelContext;
    }
```

APNSPRODUCER - IOS TARGET DEVICE DYNAMICALLY CONFIGURED VIA HEADER: "CAMELAPNSTOKENS"

```
    protected RouteBuilder createRouteBuilder() throws Exception {
        return new RouteBuilder() {
            public void configure() throws Exception {
                from("direct:test")
                    .setHeader(ApnsConstants.HEADER_TOKENS, constant(IOS_DEVICE_TOKEN))
```

```
                .to("apns:notify");
            }
        }
    }
```

APNSPRODUCER - IOS TARGET DEVICE STATICALLY CONFIGURED VIA URI

```
protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            from("direct:test").
            to("apns:notify?tokens=" + IOS_DEVICE_TOKEN);
        }
    };
}
```

APNSCONSUMER

```
from("apns:consumer?initialDelay=10&delay=3600&timeUnit=SECONDS")
    .to("log:com.apache.camel.component.apns?showAll=true&multiline=true")
    .to("mock:result");
```

SEE ALSO

- Component
- Endpoint
- Blog about using APNS (in french)

CHAPTER 7. ATMOSPHERE-WEBSOCKET

ATMOSPHERE WEBSOCKET SERVLET COMPONENT

Available as of Camel 2.14

The **atmosphere-websocket:** component provides Websocket based endpoints for a servlet communicating with external clients over Websocket (as a servlet accepting websocket connections from external clients). The component uses the Chapter 128, *SERVLET* component and uses the Atmosphere library to support the Websocket transport in various Servlet containers (e..g., Jetty, Tomcat, ...).

Unlike the Chapter 159, *Websocket* component that starts the embedded Jetty server, this component uses the servlet provider of the container.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-atmosphere-websocket</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
atmosphere-websocket:///relative path[?options]
```

READING AND WRITING DATA OVER WEBSOCKET

An atmopshere-websocket endpoint can either write data to the socket or read from the socket, depending on whether the endpoint is configured as the producer or the consumer, respectively.

CONFIGURING URI TO READ OR WRITE DATA

In the route below, Camel will read from the specified websocket connection.

```
from("atmosphere-websocket:///servicepath")
    .to("direct:next");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="atmosphere-websocket:///servicepath"/>
    <to uri="direct:next"/>
  </route>
</camelContext>
```

In the route below, Camel will read from the specified websocket connection.

```
from("direct:next")
    .to("atmosphere-websocket:///servicepath");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct:next"/>
    <to uri="atmosphere-websocket:///servicepath"/>
  </route>
</camelContext>
```

CHAPTER 8. ATOM

ATOM COMPONENT

The **atom:** component is used for polling atom feeds.

Apache Camel will poll the feed every 500 milliseconds by default. **Note:** The component currently supports only polling (consuming) feeds.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-atom</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
atom://atomUri[?options]
```

Where **atomUri** is the URI to the Atom feed to poll.

OPTIONS

Property	Default	Description
splitEntries	**true**	If **true** Apache Camel will poll the feed and for the subsequent polls return each entry poll by poll. If the feed contains 7 entries then Apache Camel will return the first entry on the first poll, the 2nd entry on the next poll, until no more entries where as Apache Camel will do a new update on the feed. If **false** then Apache Camel will poll a fresh feed on every invocation.

filter	**true**	Is only used by the split entries to filter the entries to return. Apache Camel will default use the **UpdateDateFilter** that only return new entries from the feed. So the client consuming from the feed never receives the same entry more than once. The filter will return the entries ordered by the newest last.
lastUpdate	**null**	Is only used by the filter, as the starting timestamp for selection never entries (uses the **entry.updated** timestamp). Syntax format is: **yyyy-MM-ddTHH:MM:ss**. Example: **2007-12-24T17:45:59**.
throttleEntries	**true**	**Camel 2.5:** Sets whether all entries identified in a single feed poll should be delivered immediately. If **true**, only one entry is processed per **consumer.delay**. Only applicable when **splitEntries** is set to **true**.
feedHeader	**true**	Sets whether to add the Abdera Feed object as a header.
sortEntries	**false**	If **splitEntries** is **true**, this sets whether to sort those entries by updated date.
consumer.delay	**500**	Delay in millis between each poll.
consumer.initialDelay	**1000**	Millis before polling starts.
consumer.userFixedDelay	**false**	If **true**, use fixed delay between pools, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.

You can append query options to the URI in the following format, **?option=value&option=value&...**

EXCHANGE DATA FORMAT

Apache Camel will set the In body on the returned **Exchange** with the entries. Depending on the **splitEntries** flag Apache Camel will either return one **Entry** or a **List<Entry>**.

Option	Value	Behavior
splitEntries	**true**	Only a single entry from the currently being processed feed is set: **exchange.in.body(Entry)**
splitEntries	**false**	The entire list of entries from the feed is set: **exchange.in.body(List<Entry>)**

Apache Camel can set the **Feed** object on the in header (see **feedHeader** option to disable this):

MESSAGE HEADERS

Apache Camel atom uses these headers.

Header	Description
CamelAtomFeed	Apache Camel 2.0: When consuming the **org.apache.abdera.model.Feed** object is set to this header.

SAMPLES

In the following sample we poll James Strachan's blog:

```
from("atom://http://macstrac.blogspot.com/feeds/posts/default").to("seda:feeds");
```

In this sample we want to filter only good blogs we like to a SEDA queue. The sample also shows how to set up Apache Camel standalone, not running in any container or using Spring.

```
@Override
protected CamelContext createCamelContext() throws Exception {
    // First we register a blog service in our bean registry
    SimpleRegistry registry = new SimpleRegistry();
    registry.put("blogService", new BlogService());

    // Then we create the camel context with our bean registry
    context = new DefaultCamelContext(registry);

    // Then we add all the routes we need using the route builder DSL syntax
    context.addRoutes(createMyRoutes());

    // And finally we must start Camel to let the magic routing begins
    context.start();

    return context;
}
```

```
/**
 * This is the route builder where we create our routes using the Camel DSL syntax
 */
protected RouteBuilder createMyRoutes() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            // We pool the atom feeds from the source for further processing in the seda queue
            // we set the delay to 1 second for each pool.
            // Using splitEntries=true will during polling only fetch one Atom Entry at any given time.
            // As the feed.atom file contains 7 entries, using this will require 7 polls to fetch the entire
            // content. When Camel have reach the end of entries it will refresh the atom feed from URI
source
            // and restart - but as Camel by default uses the UpdatedDateFilter it will only deliver new
            // blog entries to "seda:feeds". So only when James Strachan updates his blog with a new
entry
            // Camel will create an exchange for the seda:feeds.
            from("atom:file:src/test/data/feed.atom?
splitEntries=true&consumer.delay=1000").to("seda:feeds");

            // From the feeds we filter each blot entry by using our blog service class
            from("seda:feeds").filter().method("blogService", "isGoodBlog").to("seda:goodBlogs");

            // And the good blogs is moved to a mock queue as this sample is also used for unit testing
            // this is one of the strengths in Camel that you can also use the mock endpoint for your
            // unit tests
            from("seda:goodBlogs").to("mock:result");
        }
    };
}

/**
 * This is the actual junit test method that does the assertion that our routes is working
 * as expected
 */
@Test
public void testFiltering() throws Exception {
    // create and start Camel
    context = createCamelContext();
    context.start();

    // Get the mock endpoint
    MockEndpoint mock = context.getEndpoint("mock:result", MockEndpoint.class);

    // There should be at least two good blog entries from the feed
    mock.expectedMinimumMessageCount(2);

    // Asserts that the above expectations is true, will throw assertions exception if it failed
    // Camel will default wait max 20 seconds for the assertions to be true, if the conditions
    // is true sooner Camel will continue
    mock.assertIsSatisfied();

    // stop Camel after use
    context.stop();
}

/**
```

```
 * Services for blogs
 */
public class BlogService {

    /**
     * Tests the blogs if its a good blog entry or not
     */
    public boolean isGoodBlog(Exchange exchange) {
        Entry entry = exchange.getIn().getBody(Entry.class);
        String title = entry.getTitle();

        // We like blogs about Camel
        boolean good = title.toLowerCase().contains("camel");
        return good;
    }

}
```

CHAPTER 9. AVRO

AVRO COMPONENT

Available as of Camel 2.10

This component provides a dataformat for avro, which allows serialization and deserialization of messages using Apache Avro's binary dataformat. Moreover, it provides support for Apache Avro's rpc, by providing producers and consumers endpoint for using avro over netty or http.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-avro</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

APACHE AVRO OVERVIEW

Avro allows you to define message types and a protocol using a json like format and then generate java code for the specified types and messages. An example of how a schema looks like is below.

```
{"namespace": "org.apache.camel.avro.generated",
 "protocol": "KeyValueProtocol",

 "types": [
     {"name": "Key", "type": "record",
      "fields": [
          {"name": "key",    "type": "string"}
      ]
     },
     {"name": "Value", "type": "record",
      "fields": [
          {"name": "value",    "type": "string"}
      ]
     }
 ],

 "messages": {
     "put": {
         "request": [{"name": "key", "type": "Key"}, {"name": "value", "type": "Value"} ],
         "response": "null"
     },
     "get": {
         "request": [{"name": "key", "type": "Key"}],
         "response": "Value"
     }
 }
}
```

You can easily generate classes from a schema, using maven, ant etc. More details can be found at the Apache Avro documentation.

However, it doesn't enforce a schema first approach and you can create schema for your existing classes. **Since 2.12** you can use existing protocol interfaces to make RCP calls. You should use interface for the protocol itself and POJO beans or primitive/String classes for parameter and result types. Here is an example of the class that corresponds to schema above:

```
package org.apache.camel.avro.reflection;

public interface KeyValueProtocol {
    void put(String key, Value value);
    Value get(String key);
}

class Value {
    private String value;
    public String getValue() { return value; }
    public void setValue(String value) { this.value = value; }
}
```

Note: Existing classes can be used only for RPC (see below), not in data format.

USING THE AVRO DATA FORMAT

Using the avro data format is as easy as specifying that the class that you want to marshal or unmarshal in your route.

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
    <route>
        <from uri="direct:in"/>
        <marshal>
            <avro instanceClass="org.apache.camel.dataformat.avro.Message"/>
        </marshal>
        <to uri="log:out"/>
    </route>
</camelContext>
```

An alternative can be to specify the dataformat inside the context and reference it from your route.

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
     <dataFormats>
        <avro id="avro" instanceClass="org.apache.camel.dataformat.avro.Message"/>
    </dataFormats>
    <route>
        <from uri="direct:in"/>
        <marshal ref="avro"/>
        <to uri="log:out"/>
    </route>
</camelContext>
```

In the same manner you can umarshal using the avro data format.

USING AVRO RPC IN CAMEL

As mentioned above Avro also provides RPC support over multiple transports such as http and netty. Camel provides consumers and producers for these two transports.

```
avro:[transport]:[host]:[port][?options]
```

The supported transport values are currently http or netty.

Since 2.12 you can specify message name right in the URI:

```
avro:[transport]:[host]:[port][/messageName][?options]
```

For consumers this allows you to have multiple routes attached to the same socket. Dispatching to correct route will be done by the avro component automatically. Route with no messageName specified (if any) will be used as default.

When using camel producers for avro ipc, the "in" message body needs to contain the parameters of the operation specified in the avro protocol. The response will be added in the body of the "out" message.

In a similar manner when using camel avro consumers for avro ipc, the requests parameters will be placed inside the "in" message body of the created exchange and once the exchange is processed the body of the "out" message will be send as a response.

Note: By default consumer parameters are wrapped into array. If you've got only one parameter, **since 2.12** you can use **singleParameter** URI option to receive it direcly in the "in" message body without array wrapping.

AVRO RPC URI OPTIONS

Name	Version	Description
protocolClassName		The class name of the avro protocol.
singleParameter	2.12	If true, consumer parameter won't be wrapped into array. Will fail if protocol specifies more then 1 parameter for the message
protocol		Avro procol object. Can be used instead of **protocolClassName** when complex protocol needs to be created. One cane used #name notation to refer beans from the Registry
reflectionProtocol	2.12	If protocol object provided is reflection protocol. Should be used only with **protocol** parameter because for **protocolClassName** protocol type will be autodetected

AVRO RPC HEADERS

Name	Description
CamelAvroMessageName	The name of the message to send. In consumer overrides message name from URI (if any)

EXAMPLES

An example of using camel avro producers via http:

```
        <route>
            <from uri="direct:start"/>
            <to uri="avro:http:localhost:{{avroport}}?
protocolClassName=org.apache.camel.avro.generated.KeyValueProtocol"/>
            <to uri="log:avro"/>
        </route>
```

In the example above you need to fill **CamelAvroMessageName** header. **Since 2.12** you can use following syntax to call constant messages:

```
        <route>
            <from uri="direct:start"/>
            <to uri="avro:http:localhost:{{avroport}}/put?
protocolClassName=org.apache.camel.avro.generated.KeyValueProtocol"/>
            <to uri="log:avro"/>
        </route>
```

An example of consuming messages using camel avro consumers via Netty:

```
        <route>
            <from uri="avro:netty:localhost:{{avroport}}?
protocolClassName=org.apache.camel.avro.generated.KeyValueProtocol"/>
            <choice>
                <when>
                    <el>${in.headers.CamelAvroMessageName == 'put'}</el>
                    <process ref="putProcessor"/>
                </when>
                <when>
                    <el>${in.headers.CamelAvroMessageName == 'get'}</el>
                    <process ref="getProcessor"/>
                </when>
            </choice>
        </route>
```

Since 2.12 you can set up two distinct routes to perform the same task:

```
        <route>
            <from uri="avro:netty:localhost:{{avroport}}/put?
protocolClassName=org.apache.camel.avro.generated.KeyValueProtocol">
            <process ref="putProcessor"/>
        </route>
```

```
        <route>
            <from uri="avro:netty:localhost:{{avroport}}/get?
protocolClassName=org.apache.camel.avro.generated.KeyValueProtocol&singleParameter=true"/>
            <process ref="getProcessor"/>
        </route>
```

In the example above, get takes only one parameter, so **singleParameter** is used and **getProcessor** will receive Value class directly in body, while **putProcessor** will receive an array of size 2 with String key and Value value filled as array contents.

CHAPTER 10. AWS

10.1. INTRODUCTION TO THE AWS COMPONENTS

Camel Components for Amazon Web Services

The Camel Components for Amazon Web Services provide connectivity to AWS services from Camel.

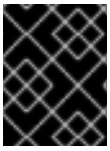
AWS service	Camel component	Camel Version	Component description
Simple Queue Service (SQS)	AWS-SQS	2.6	Supports sending and receiving messages using SQS
Simple Notification Service (SNS)	AWS-SNS	2.8	Supports sending messages using SNS
Simple Storage Service (S3)	AWS-S3	2.8	Supports storing and retrieving of objects using S3
Simple Email Service (SES)	AWS-SES	2.8.4	Supports sending emails using SES
SimpleDB	AWS-SDB	2.8.4	Supports storing retrieving data to/from SDB
DynamoDB	AWS-DDB	2.10.0	Supports storing retrieving data to/from DDB
CloudWatch	AWS-CW	2.10.3	Supports sending metrics to CloudWatch
Simple Workflow	AWS-SWF	2.13.0	Supports managing workflows with SWF

10.2. AWS-CW

CW Component

*Available as of Camel 2.11

The CW component allows messages to be sent to an Amazon CloudWatch metrics. The implementation of the Amazon API is provided by the AWS SDK.



PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon CloudWatch. More information are available at Amazon CloudWatch.

URI Format

```
aws-cw://namespace[?options]
```

The metrics will be created if they don't already exists. You can append query options to the URI in the following format, **?options=value&option2=value&...**

URI Options

Name	Default Value	Context	Description
amazonCwClient	**null**	Producer	Reference to a **com.amazonaws.services.cloudwatch.AmazonCloudWatch** in the Registry.
accessKey	**null**	Producer	Amazon AWS Access Key
secretKey	**null**	Producer	Amazon AWS Secret Key
name	**null**	Producer	The metric name which is used if the message header 'CamelAwsCwMetricName' is not present.
value	**1.0**	Producer	The metric value which is used if the message header 'CamelAwsCwMetricValue' is not present.
unit	**Count**	Producer	The metric unit which is used if the message header 'CamelAwsCwMetricUnit' is not present.
namespace	**null**	Producer	The metric namespace which is used if the message header 'CamelAwsCwMetricNamespace' is not present.

timestamp	**null**	Producer	The metric timestamp which is used if the message header 'CamelAwsCwMetricTimestamp' is not present.
amazonCwEndpoint	**null**	Producer	The region with which the AWS-CW client wants to work with.

REQUIRED CW COMPONENT OPTIONS

You have to provide the amazonCwClient in the Registry or your accessKey and secretKey to access the Amazon's CloudWatch.

Usage

Message headers evaluated by the CW producer

Header	Type	Description
CamelAwsCwMetricName	**String**	The Amazon CW metric name.
CamelAwsCwMetricValue	**Double**	The Amazon CW metric value.
CamelAwsCwMetricUnit	**String**	The Amazon CW metric unit.
CamelAwsCwMetricNamespace	**String**	The Amazon CW metric namespace.
CamelAwsCwMetricTimestamp	**Date**	The Amazon CW metric timestamp.
CamelAwsCwMetricDimensionName	**String**	**Camel 2.12:** The Amazon CW metric dimension name.
CamelAwsCwMetricDimensionValue	**String**	**Camel 2.12:** The Amazon CW metric dimension value.
CamelAwsCwMetricDimensions	**Map<String, String>**	**Camel 2.12:** A map of dimension names and dimension values.

Advanced AmazonCloudWatch configuration

If you need more control over the **AmazonCloudWatch** instance configuration you can create your own instance and refer to it from the URI:

```
from("direct:start")
.to("aws-cw://namepsace?amazonCwClient=#client");
```

The **#client** refers to a **AmazonCloudWatch** in the Registry.

For example if your Camel Application is running behind a firewall:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");
ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);

AmazonCloudWatch client = new AmazonCloudWatchClient(awsCredentials, clientConfiguration);

registry.bind("client", client);
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.

POM.XML

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.10 or higher).

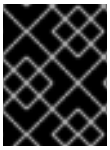
- AWS Component

10.3. AWS-DDB

DDB Component

Available as of Camel 2.10

The DynamoDB component supports storing and retrieving data from/to Amazon's DynamoDB service.



PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon DynamoDB. More information are available at Amazon DynamoDB.

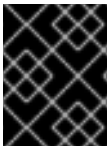
URI Format

```
aws-ddb://domainName[?options]
```

You can append query options to the URI in the following format, ?options=value&option2=value&...

URI Options

Name	Default Value	Context	Description
amazonDDBClient	**null**	Producer	Reference to a **com.amazonaws.services.dynamodb.AmazonDynamoDB** in the Registry.
accessKey	**null**	Producer	Amazon AWS Access Key
secretKey	**null**	Producer	Amazon AWS Secret Key
amazonDdbEndpoint	**null**	Producer	The region with which the AWS-DDB client wants to work with.
tableName	**null**	Producer	The name of the table currently worked with.
readCapacity	**0**	Producer	The provisioned throughput to reserve for reading resources from your table
writeCapacity	**0**	Producer	The provisioned throughput to reserved for writing resources to your table
consistentRead	**false**	Producer	Determines whether or not strong consistency should be enforced when data is read.
operation	**PutAttributes**	Producer	Valid values are BatchGetItems, DeleteItem, DeleteTable, DescribeTable, GetItem, PutItem, Query, Scan, UpdateItem, UpdateTable.



REQUIRED DDB COMPONENT OPTIONS

You have to provide the amazonDDBClient in the Registry or your accessKey and secretKey to access the Amazon's DynamoDB.

Usage

Message headers evaluated by the DDB producer

Header	Type	Description
CamelAwsDdbBatchItems	**Map<String, KeysAndAttributes>**	A map of the table name and corresponding items to get by primary key.
CamelAwsDdbTableName	**String**	Table Name for this operation.
CamelAwsDdbKey	**Key**	The primary key that uniquely identifies each item in a table.
CamelAwsDdbReturnValues	**String**	Use this parameter if you want to get the attribute name-value pairs before or after they are modified(NONE, ALL_OLD, UPDATED_OLD, ALL_NEW, UPDATED_NEW).
CamelAwsDdbUpdateCondition	**Map<String, ExpectedAttributeValue>**	Designates an attribute for a conditional modification.
CamelAwsDdbAttributeNames	**Collection<String>**	If attribute names are not specified then all attributes will be returned.
CamelAwsDdbConsistentRead	**Boolean**	If set to true, then a consistent read is issued, otherwise eventually consistent is used.
CamelAwsDdbItem	**Map<String, AttributeValue>**	A map of the attributes for the item, and must include the primary key values that define the item.
CamelAwsDdbExactCount	**Boolean**	If set to true, Amazon DynamoDB returns a total number of items that match the query parameters, instead of a list of the matching items and their attributes.
CamelAwsDdbStartKey	**Key**	Primary key of the item from which to continue an earlier query.
CamelAwsDdbHashKeyValue	**AttributeValue**	Value of the hash component of the composite primary key.

CamelAwsDdbLimit	**Integer**	The maximum number of items to return.
CamelAwsDdbScanRangeKeyCondition	**Condition**	A container for the attribute values and comparison operators to use for the query.
CamelAwsDdbScanIndexForward	**Boolean**	Specifies forward or backward traversal of the index.
CamelAwsDdbScanFilter	**Map<String, Condition>**	Evaluates the scan results and returns only the desired values.
CamelAwsDdbUpdateValues	**Map<String, AttributeValueUpdate>**	Map of attribute name to the new value and action for the update.

Message headers set during BatchGetItems operation

Header	Type	Description
CamelAwsDdbBatchResponse	**Map<String,BatchResponse>**	Table names and the respective item attributes from the tables.
CamelAwsDdbUnprocessedKeys	**Map<String,KeysAndAttributes>**	Contains a map of tables and their respective keys that were not processed with the current response.

Message headers set during DeleteItem operation

Header	Type	Description
CamelAwsDdbAttributes	**Map<String, AttributeValue>**	The list of attributes returned by the operation.

Message headers set during DeleteTable operation

Header	Type	Description
CamelAwsDdbProvisionedThroughput	**ProvisionedThroughputDescription**	The value of the ProvisionedThroughput property for this table
CamelAwsDdbCreationDate	**Date**	Creation DateTime of this table.

CamelAwsDdbTableItemCount	**Long**	Item count for this table.
CamelAwsDdbKeySchema	**KeySchema**	The KeySchema that identifies the primary key for this table.
CamelAwsDdbTableName	**String**	The table name.
CamelAwsDdbTableSize	**Long**	The table size in bytes.
CamelAwsDdbTableStatus	**String**	The status of the table: CREATING, UPDATING, DELETING, ACTIVE

Message headers set during DescribeTable operation

Header	Type	Description
CamelAwsDdbProvisionedThroughput	{{ProvisionedThroughputDescription}	The value of the ProvisionedThroughput property for this table
CamelAwsDdbCreationDate	**Date**	Creation DateTime of this table.
CamelAwsDdbTableItemCount	**Long**	Item count for this table.
CamelAwsDdbKeySchema	{{KeySchema	The KeySchema that identifies the primary key for this table.
CamelAwsDdbTableName	**String**	The table name.
CamelAwsDdbTableSize	**Long**	The table size in bytes.
CamelAwsDdbTableStatus	**String**	The status of the table: CREATING, UPDATING, DELETING, ACTIVE
CamelAwsDdbReadCapacity	**Long**	ReadCapacityUnits property of this table.
CamelAwsDdbWriteCapacity	**Long**	WriteCapacityUnits property of this table.

Message headers set during GetItem operation

Header	Type	Description
CamelAwsDdbAttributes	**Map<String, AttributeValue>**	The list of attributes returned by the operation.

Message headers set during PutItem operation

Header	Type	Description
CamelAwsDdbAttributes	**Map<String, AttributeValue>**	The list of attributes returned by the operation.

Message headers set during Query operation

Header	Type	Description
CamelAwsDdbItems	**List<java.util.Map<String,AttributeValue>>**	The list of attributes returned by the operation.
CamelAwsDdbLastEvaluatedKey	**Key**	Primary key of the item where the query operation stopped, inclusive of the previous result set.
CamelAwsDdbConsumedCapacity	**Double**	The number of Capacity Units of the provisioned throughput of the table consumed during the operation.
CamelAwsDdbCount	**Integer**	Number of items in the response.

Message headers set during Scan operation

Header	Type	Description
CamelAwsDdbItems	**List<java.util.Map<String,AttributeValue>>**	The list of attributes returned by the operation.
CamelAwsDdbLastEvaluatedKey	**Key**	Primary key of the item where the query operation stopped, inclusive of the previous result set.
CamelAwsDdbConsumedCapacity	**Double**	The number of Capacity Units of the provisioned throughput of the table consumed during the operation.

CamelAwsDdbCount	**Integer**	Number of items in the response.
CamelAwsDdbScannedCount	**Integer**	Number of items in the complete scan before any filters are applied.

Message headers set during UpdateItem operation

Header	Type	Description
CamelAwsDdbAttributes	**Map<String, AttributeValue>**	The list of attributes returned by the operation.

Advanced AmazonDynamoDB configuration

If you need more control over the **AmazonDynamoDB** instance configuration you can create your own instance and refer to it from the URI:

```
from("direct:start")
.to("aws-ddb://domainName?amazonDDBClient=#client");
```

The **#client** refers to a **AmazonDynamoDB** in the Registry.

For example if your Camel Application is running behind a firewall:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");
ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);

AmazonDynamoDB client = new AmazonDynamoDBClient(awsCredentials, clientConfiguration);

registry.bind("client", client);
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.

POM.XML

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.10 or higher).

- AWS Component

10.4. AWS-S3

S3 Component

Available as of Camel 2.8

The S3 component supports storing and retrieving objetcs from/to Amazon's S3 service.

PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon S3. More information are available at Amazon S3.

URI Format

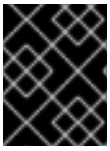
```
aws-s3://bucket-name[?options]
```

The bucket will be created if it don't already exists. You can append query options to the URI in the following format, ?options=value&option2=value&...

URI Options

Name	Default Value	Context	Description
amazonS3Client	**null**	Shared	Reference to a **com.amazonaws.services.sqs.AmazonS3** in the Registry.
accessKey	**null**	Shared	Amazon AWS Access Key
secretKey	**null**	Shared	Amazon AWS Secret Key
amazonS3Endpoint	**null**	Shared	The region with which the AWS-S3 client wants to work with.
region	**null**	Producer	The region who the bucket is located. This option is used in the **com.amazonaws.services.s3.model.CreateBucketRequest**.
deleteAfterRead	**true**	Consumer	Delete objects from S3 after it has been retrieved.

deleteAfterWrite	**false**	Producer	**Camel 2.11.0** Delete file object after the S3 file has been uploaded
maxMessagesPerPoll	10	Consumer	The maximum number of objects which can be retrieved in one poll. Used in in the **com.amazonaws.services.s3.model.ListObjectsRequest**.
policy	**null**	Shared	*Camel 2.8.4*: The policy for this queue to set in the **com.amazonaws.services.s3.AmazonS3#setBucketPolicy()** method.
storageClass	**null**	Producer	*Camel 2.8.4*: The storage class to set in the **com.amazonaws.services.s3.model.PutObjectRequest** request.
prefix	**null**	Consumer	*Camel 2.10.1*: The prefix which is used in the **com.amazonaws.services.s3.model.ListObjectsRequest** to only consume objects we are interested in.
multiPartUpload	**false**	Producer	**Camel 2.15.0:** If **true**, Camel uploads the file in multi-part format, where the part size can be specified by the **partSize** option.
partSize	**25 * 1024 * 1024**	Producer	**Camel 2.15.0:** Specifies the **partSize** used in multi-part upload. Default is 25 MB.



REQUIRED S3 COMPONENT OPTIONS

You have to provide the amazonS3Client in the Registry or your accessKey and secretKey to access the Amazon's S3.

Batch Consumer

This component implements the Batch Consumer.

This allows you for instance to know how many messages exists in this batch and for instance let the Aggregator aggregate this number of messages.

Usage

Message headers evaluated by the S3 producer

Header	Type	Description
CamelAwsS3Key	**String**	The key under which this object will be stored.
CamelAwsS3ContentLength	**Long**	The content length of this object.
CamelAwsS3ContentType	**String**	The content type of this object.
CamelAwsS3ContentControl	**String**	The content control of this object.
CamelAwsS3ContentDisposition	**String**	The content disposition of this object.
CamelAwsS3ContentEncoding	**String**	The content encoding of this object.
CamelAwsS3ContentMD5	**String**	The md5 checksum of this object.
CamelAwsS3LastModified	**java.util.Date**	The last modified timestamp of this object.
CamelAwsS3StorageClass	**String**	*Camel 2.8.4:* The storage class of this object.
CamelAwsS3CannedAcl	**String**	**Camel 2.11.0:** The canned acl that will be applied to the object. see **com.amazonaws.services.s3.model.CannedAccessControlList** for allowed values.

CamelAwsS3Acl	**com.amazonaws.services.s3.model.AccessControlList**	**Camel 2.11.0:** a well constructed Amazon S3 Access Control List object. see **com.amazonaws.services.s3.model.AccessControlList** for more details

Message headers set by the S3 producer

Header	Type	Description
CamelAwsS3ETag	**String**	The ETag value for the newly uploaded object.
CamelAwsS3VersionId	**String**	The **optional** version ID of the newly uploaded object.

Message headers set by the S3 consumer

Header	Type	Description
CamelAwsS3Key	**String**	The key under which this object is stored.
CamelAwsS3BucketName	**String**	The name of the bucket in which this object is contained.
CamelAwsS3ETag	**String**	The hex encoded 128-bit MD5 digest of the associated object according to RFC 1864. This data is used as an integrity check to verify that the data received by the caller is the same data that was sent by Amazon S3.
CamelAwsS3LastModified	**Date**	The value of the Last-Modified header, indicating the date and time at which Amazon S3 last recorded a modification to the associated object.
CamelAwsS3VersionId	**String**	The version ID of the associated Amazon S3 object if available. Version IDs are only assigned to objects when an object is uploaded to an Amazon S3 bucket that has object versioning enabled.

CamelAwsS3ContentType	**String**	The Content-Type HTTP header, which indicates the type of content stored in the associated object. The value of this header is a standard MIME type.
CamelAwsS3ContentMD5	**String**	The base64 encoded 128-bit MD5 digest of the associated object (content - not including headers) according to RFC 1864. This data is used as a message integrity check to verify that the data received by Amazon S3 is the same data that the caller sent.
CamelAwsS3ContentLength	**Long**	The Content-Length HTTP header indicating the size of the associated object in bytes.
CamelAwsS3ContentEncoding	**String**	The **optional** Content-Encoding HTTP header specifying what content encodings have been applied to the object and what decoding mechanisms must be applied in order to obtain the media-type referenced by the Content-Type field.
CamelAwsS3ContentDisposition	**String**	The **optional** Content-Disposition HTTP header, which specifies presentational information such as the recommended filename for the object to be saved as.
CamelAwsS3ContentControl	**String**	The **optional** Cache-Control HTTP header which allows the user to specify caching behavior along the HTTP request/reply chain.

Advanced AmazonS3 configuration

If your Camel Application is running behind a firewall or if you need to have more control over the **AmazonS3** instance configuration, you can create your own instance:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");

ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);
```

```
AmazonS3 client = new AmazonS3Client(awsCredentials, clientConfiguration);

registry.bind("client", client);
```

and refer to it in your Camel aws-s3 component configuration:

```
from("aws-s3://MyBucket?amazonS3Client=#client&delay=5000&maxMessagesPerPoll=5")
.to("mock:result");
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.

POM.XML

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **$\{camel-version\}** must be replaced by the actual version of Camel (2.8 or higher).

- AWS Component

10.5. AWS-SDB

SDB Component

Available as of Camel 2.8.4

The sdb component supports storing and retrieving data from/to Amazon's SDB service.

PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon SDB. More information are available at Amazon SDB.

URI Format

```
aws-sdb://domainName[?options]
```

You can append query options to the URI in the following format, ?options=value&option2=value&...

URI Options

Name	Default Value	Context	Description

amazonSDBClient	**null**	Producer	Reference to a **com.amazonaws.services.simpledb.AmazonSimpleDB** in the Registry.
accessKey	**null**	Producer	Amazon AWS Access Key
secretKey	**null**	Producer	Amazon AWS Secret Key
amazonSdbEndpoint	**null**	Producer	The region with which the AWS-SDB client wants to work with.
domainName	**null**	Producer	The name of the domain currently worked with.
maxNumberOfDomains	**100**	Producer	The maximum number of domain names you want returned. The range is 1 * to 100.
consistentRead	**false**	Producer	Determines whether or not strong consistency should be enforced when data is read.
operation	**PutAttributes**	Producer	Valid values are BatchDeleteAttributes, BatchPutAttributes, DeleteAttributes, DeleteDomain, DomainMetadata, GetAttributes, ListDomains, PutAttributes, Select.

REQUIRED SDB COMPONENT OPTIONS

You have to provide the amazonSDBClient in the Registry or your accessKey and secretKey to access the Amazon's SDB.

Usage

Message headers evaluated by the SDB producer

Header	Type	Description

CamelAwsSdbAttributes	**Collection<Attribute>**	List of attributes to be acted upon.
CamelAwsSdbAttributeNames	**Collection<String>**	The names of the attributes to be retrieved.
CamelAwsSdbConsistentRead	**Boolean**	Determines whether or not strong consistency should be enforced when data is read.
CamelAwsSdbDeletableItems	**Collection<DeletableItem>**	A list of items on which to perform the delete operation in a batch.
CamelAwsSdbDomainName	**String**	The name of the domain currently worked with.
CamelAwsSdbItemName	**String**	The unique key for this item
CamelAwsSdbMaxNumberOfDomains	**Integer**	The maximum number of domain names you want returned. The range is 1 * to 100.
CamelAwsSdbNextToken	**String**	A string specifying where to start the next list of domain/item names.
CamelAwsSdbOperation	**String**	To override the operation from the URI options.
CamelAwsSdbReplaceableAttributes	**Collection<ReplaceableAttribute>**	List of attributes to put in an Item.
CamelAwsSdbReplaceableItems	**Collection<ReplaceableItem>**	A list of items to put in a Domain.
CamelAwsSdbSelectExpression	**String**	The expression used to query the domain.
CamelAwsSdbUpdateCondition	**UpdateCondition**	The update condition which, if specified, determines whether the specified attributes will be updated/deleted or not.

Message headers set during DomainMetadata operation

Header	Type	Description

CamelAwsSdbTimestamp	**Integer**	The data and time when metadata was calculated, in Epoch (UNIX) seconds.
CamelAwsSdbItemCount	**Integer**	The number of all items in the domain.
CamelAwsSdbAttributeNameCount	**Integer**	The number of unique attribute names in the domain.
CamelAwsSdbAttributeValueCount	**Integer**	The number of all attribute name/value pairs in the domain.
CamelAwsSdbAttributeNameSize	**Long**	The total size of all unique attribute names in the domain, in bytes.
CamelAwsSdbAttributeValueSize	**Long**	The total size of all attribute values in the domain, in bytes.
CamelAwsSdbItemNameSize	**Long**	The total size of all item names in the domain, in bytes.

Message headers set during GetAttributes operation

Header	Type	Description
CamelAwsSdbAttributes	**List<Attribute>**	The list of attributes returned by the operation.

Message headers set during ListDomains operation

Header	Type	Description
CamelAwsSdbDomainNames	**List<String>**	A list of domain names that match the expression.
CamelAwsSdbNextToken	**String**	An opaque token indicating that there are more domains than the specified MaxNumberOfDomains still available.

Message headers set during Select operation

Header	Type	Description

CamelAwsSdbItems	**List<Item>**	A list of items that match the select expression.
CamelAwsSdbNextToken	**String**	An opaque token indicating that more items than MaxNumberOfItems were matched, the response size exceeded 1 megabyte, or the execution time exceeded 5 seconds.

Advanced AmazonSimpleDB configuration

If you need more control over the **AmazonSimpleDB** instance configuration you can create your own instance and refer to it from the URI:

```
from("direct:start")
.to("aws-sdb://domainName?amazonSDBClient=#client");
```

The **#client** refers to a **AmazonSimpleDB** in the Registry.

For example if your Camel Application is running behind a firewall:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");
ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);

AmazonSimpleDB client = new AmazonSimpleDBClient(awsCredentials, clientConfiguration);

registry.bind("client", client);
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.

POM.XML

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.8.4 or higher).

- AWS Component

10.6. AWS-SES

SES Component

Available as of Camel 2.8.4

The ses component supports sending emails with Amazon's SES service.

PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon SES. More information are available at Amazon SES.

URI Format

```
aws-ses://from[?options]
```

You can append query options to the URI in the following format, ?options=value&option2=value&...

URI Options

Name	Default Value	Context	Description
amazonSESClient	**null**	Producer	Reference to a **com.amazonaws.services.simpleemail.AmazonSimpleEmailService** in the Registry.
accessKey	**null**	Producer	Amazon AWS Access Key
secretKey	**null**	Producer	Amazon AWS Secret Key
amazonSESEndpoint	**null**	Producer	The region with which the AWS-SES client wants to work with.
subject	**null**	Producer	The subject which is used if the message header 'CamelAwsSesSubject' is not present.
to	**null**	Producer	List of destination email address. Can be overriden with 'CamelAwsSesTo' header.

returnPath	**null**	Producer	The email address to which bounce notifications are to be forwarded, override it using 'CamelAwsSesReturnPath' header.
replyToAddresses	**null**	Producer	List of reply-to email address(es) for the message, override it using 'CamelAwsSesReplyToAddresses' header.

REQUIRED SES COMPONENT OPTIONS

You have to provide the amazonSESClient in the Registry or your accessKey and secretKey to access the Amazon's SES.

Usage

Message headers evaluated by the SES producer

Header	Type	Description
CamelAwsSesFrom	**String**	The sender's email address.
CamelAwsSesTo	**List<String>**	The destination(s) for this email.
CamelAwsSesSubject	**String**	The subject of the message.
CamelAwsSesReplyToAddresses	**List<String>**	The reply-to email address(es) for the message.
CamelAwsSesReturnPath	**String**	The email address to which bounce notifications are to be forwarded.
CamelAwsSesHtmlEmail	**Boolean**	**Since Camel 2.12.3** The flag to show if email content is HTML.

Message headers set by the SES producer

Header	Type	Description
CamelAwsSesMessageId	**String**	The Amazon SES message ID.

Advanced AmazonSimpleEmailService configuration

If you need more control over the **AmazonSimpleEmailService** instance configuration you can create your own instance and refer to it from the URI:

```
from("direct:start")
.to("aws-ses://example@example.com?amazonSESClient=#client");
```

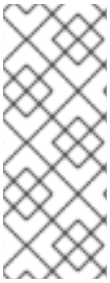
The **#client** refers to a **AmazonSimpleEmailService** in the Registry.

For example if your Camel Application is running behind a firewall:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");
ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);
AmazonSimpleEmailService client = new AmazonSimpleEmailServiceClient(awsCredentials,
clientConfiguration);

registry.bind("client", client);
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.



POM.XML

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-aws</artifactId>
   <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.8.4 or higher).

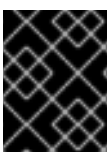
- AWS Component

10.7. AWS-SNS

SNS Component

Available as of Camel 2.8

The SNS component allows messages to be sent to an Amazon Simple Notification Topic. The implementation of the Amazon API is provided by the AWS SDK.



PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon SNS. More information are available at Amazon SNS.

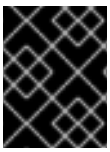
URI Format

```
aws-sns://topicName[?options]
```

The topic will be created if they don't already exists. You can append query options to the URI in the following format, **?options=value&option2=value&...**

URI Options

Name	Default Value	Context	Description
amazonSNSClient	**null**	Producer	Reference to a **com.amazonaws.services.sns.AmazonSNS** in the Registry.
accessKey	**null**	Producer	Amazon AWS Access Key
secretKey	**null**	Producer	Amazon AWS Secret Key
subject	**null**	Producer	The subject which is used if the message header 'CamelAwsSnsSubject' is not present.
amazonSNSEndpoint	**null**	Producer	The region with which the AWS-SNS client wants to work with.
policy	**null**	Producer	**Camel 2.8.4**: The policy for this queue to set in the **com.amazonaws.services.sns.model.SetTopicAttributesRequest**.



REQUIRED SNS COMPONENT OPTIONS

You have to provide the amazonSNSClient in the Registry or your accessKey and secretKey to access the Amazon's SNS.

Usage

Message headers evaluated by the SNS producer

Header	Type	Description
CamelAwsSnsSubject	**String**	The Amazon SNS message subject. If not set, the subject from the **SnsConfiguration** is used.

Message headers set by the SNS producer

Header	Type	Description
CamelAwsSnsMessageId	**String**	The Amazon SNS message ID.

Advanced AmazonSNS configuration

If you need more control over the **AmazonSNS** instance configuration you can create your own instance and refer to it from the URI:

```
from("direct:start")
.to("aws-sns://MyTopic?amazonSNSClient=#client");
```

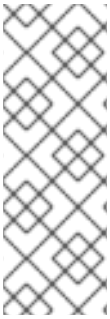
The **#client** refers to a **AmazonSNS** in the Registry.

For example if your Camel Application is running behind a firewall:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");
ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);
AmazonSNS client = new AmazonSNSClient(awsCredentials, clientConfiguration);

registry.bind("client", client);
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.



POM.XML

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **$\{camel-version\}** must be replaced by the actual version of Camel (2.8 or higher).

- AWS Component

10.8. AWS-SQS

SQS Component

Available as of Camel 2.6

The sqs component supports sending and receiving messages to Amazon's SQS service.

PREREQUISITES

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon SQS. More information are available at Amazon SQS.

URI Format

```
aws-sqs://queue-name[?options]
```

The queue will be created if they don't already exists. You can append query options to the URI in the following format, ?options=value&option2=value&...

URI Options

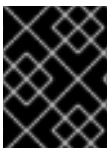
Name	Default Value	Context	Description
amazonSQSClient	**null**	Shared	Reference to a **com.amazonaws.services.sqs.AmazonSQS** in the Registry.
accessKey	**null**	Shared	Amazon AWS Access Key
secretKey	**null**	Shared	Amazon AWS Secret Key
amazonSQSEndpoint	**null**	Shared	The region with which the AWS-SQS client wants to work with. Only works if Camel creates the AWS-SQS client, i.e., if you explicitly set amazonSQSClient, then this setting will have no effect. You would have to set it on the client you create directly.

attributeNames	**null**	Consumer	A list of attributes to set in the **com.amazonaws.services.sqs.model.ReceiveMessageRequest**.
concurrentConsumers	**1**	Consumer	**Camel 2.15.0** Allows you to use multiple threads to poll the SQS queue to increase throughput.
defaultVisibilityTimeout	**null**	Shared	The visibility timeout (in seconds) to set in the **com.amazonaws.services.sqs.model.CreateQueueRequest**.
deleteAfterRead	**true**	Consumer	Delete message from SQS after it has been read
deleteIfFiltered	**true**	Consumer	**Camel 2.12.2,2.13.0** Whether or not to send the DeleteMessage to the SQS queue if an exchange fails to get through a filter. If 'false' and exchange does not make it through a Camel filter upstream in the route, then don't send DeleteMessage.
maxMessagesPerPoll	**null**	Consumer	The maximum number of messages which can be received in one poll to set in the **com.amazonaws.services.sqs.model.ReceiveMessageRequest**.

visibilityTimeout	**null**	Shared	The duration (in seconds) that the received messages are hidden from subsequent retrieve requests after being retrieved by a ReceiveMessage request to set in the **com.amazonaws.services.sqs.model.SetQueueAttributesRequest**. This only make sense if its different from **defaultVisibilityTimeout**. It changes the queue visibility timeout attribute permanently.
messageVisibilityTimeout	**null**	Consumer	**Camel 2.8:** The duration (in seconds) that the received messages are hidden from subsequent retrieve requests after being retrieved by a ReceiveMessage request to set in the **com.amazonaws.services.sqs.model.ReceiveMessageRequest**. It does **NOT** change the queue visibility timeout attribute permanently.
extendMessageVisibility	**false**	Consumer	**Camel 2.10:** If enabled then a scheduled background task will keep extending the message visibility on SQS. This is needed if it taks a long time to process the message. If set to true **defaultVisibilityTimeout** must be set. See details at Amazon docs.

maximumMessageSize	**null**	Shared	**Camel 2.8:** The maximumMessageSize (in bytes) an SQS message can contain for this queue, to set in the **com.amazonaws.services.sqs.model.SetQueueAttributesRequest**.
messageRetentionPeriod	**null**	Shared	**Camel 2.8:** The messageRetentionPeriod (in seconds) a message will be retained by SQS for this queue, to set in the **com.amazonaws.services.sqs.model.SetQueueAttributesRequest**.
policy	**null**	Shared	**Camel 2.8:** The policy for this queue to set in the **com.amazonaws.services.sqs.model.SetQueueAttributesRequest**.
delaySeconds	**null**	Producer	**Camel 2.9.3:** Delay sending messages for a number of seconds.
waitTimeSeconds	**0**	Producer	**Camel 2.11:** Duration in seconds (0 to 20) that the ReceiveMessage action call will wait until a message is in the queue to include in the response.
receiveMessageWaitTimeSeconds	**0**	Shared	**Camel 2.11:** If you do not specify WaitTimeSeconds in the request, the queue attribute ReceiveMessageWaitTimeSeconds is used to determine how long to wait.

queueOwnerAWSAccountId	**null**	Shared	**Camel 2.12:** Specify the queue owner aws account id when you need to connect the queue with different account owner.
region	**null**	Shared	**Camel 2.12.3:** Specify the queue region which could be used with **queueOwnerAWSAccountId** to build the service URL.
redrivePolicy	**null**	Shared	**Camel 2.15.0:** Specify the policy that sends a message to DeadLetter queue. See detail at Amazon docs.



REQUIRED SQS COMPONENT OPTIONS

You have to provide the amazonSQSClient in the Registry or your accessKey and secretKey to access the Amazon's SQS.

Batch Consumer

This component implements the Batch Consumer.

This allows you for instance to know how many messages exists in this batch and for instance let the Aggregator aggregate this number of messages.

Usage

Message headers set by the SQS producer

Header	Type	Description
CamelAwsSqsMD5OfBody	**String**	The MD5 checksum of the Amazon SQS message.
CamelAwsSqsMessageId	**String**	The Amazon SQS message ID.
CamelAwsSqsDelaySeconds	**Integer**	Since **Camel 2.11**, the delay seconds that the Amazon SQS message can be see by others.

Message headers set by the SQS consumer

Header	Type	Description
CamelAwsSqsMD5OfBody	**String**	The MD5 checksum of the Amazon SQS message.
CamelAwsSqsMessageId	**String**	The Amazon SQS message ID.
CamelAwsSqsReceiptHandle	**String**	The Amazon SQS message receipt handle.
CamelAwsSqsAttributes	**Map<String, String>**	The Amazon SQS message attributes.

Advanced AmazonSQS configuration

If your Camel Application is running behind a firewall or if you need to have more control over the AmazonSQS instance configuration, you can create your own instance:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");

ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);

AmazonSQS client = new AmazonSQSClient(awsCredentials, clientConfiguration);

registry.bind("client", client);
```

and refer to it in your Camel aws-sqs component configuration:

```
from("aws-sqs://MyQueue?amazonSQSClient=#client&delay=5000&maxMessagesPerPoll=5")
.to("mock:result");
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.

POM.XML

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **$\{camel-version\}** must be replaced by the actual version of Camel (2.6 or higher).

JMS-style Selectors

SQS does not allow selectors, but you can effectively achieve this by using the Camel Filter EIP and setting an appropriate **visibilityTimeout**. When SQS dispatches a message, it will wait up to the visibility timeout before it will try to dispatch the message to a different consumer unless a DeleteMessage is received. By default, Camel will always send the DeleteMessage at the end of the route, unless the route ended in failure. To achieve appropriate filtering and not send the DeleteMessage even on successful completion of the route, use a Filter:

```
from("aws-sqs://MyQueue?
amazonSQSClient=#client&defaultVisibilityTimeout=5000&deleteIfFiltered=false")
.filter("${header.login} == true")
.to("mock:result");
```

In the above code, if an exchange doesn't have an appropriate header, it will not make it through the filter AND also not be deleted from the SQS queue. After 5000 miliseconds, the message will become visible to other consumers.

- AWS Component

10.9. AWS-SWF

SWF Component

Available as of Camel 2.13

The Simple Workflow component supports managing workflows from Amazon's Simple Workflow service.

NOTE

You must have a valid Amazon Web Services developer account, and be signed up to use Amazon Simple Workflow. More information are available at Amazon Simple Workflow.

URI Format

```
aws-swf://<workflow|activity>[?options]
```

You can append query options to the URI in the following format, ?options=value&option2=value&...

URI Options

Name	Default Value	Context	Description
amazonSWClient	**null**	All	A reference to a com.amazonaws.services.simpleworkflow.AmazonSimpleWorkflowClient in the Registry.
accessKey	**null**	All	Amazon AWS Access Key.

secretKey	**null**	All	Amazon AWS Secret Key.
sWClient.XXX	**null**	All	Properties to set on AmazonSimpleWorkflow Client in use.
clientConfiguration.XXX	**null**	All	Properties to set on ClientConfiguration in use.
startWorkflowOptions.XXX	**null**	Workflow/Producer	Properties to set on useStartWorkflowOptions in use.
operation	**START**	Workflow/Producer	The operation to perform on the workflow. Supported operations are: **SIGNAL**, **CANCEL**, **TERMINATE**, **GET_STATE**, **START**, **DESCRIBE**, **GET_HISTORY**.
domainName	**null**	All	The workflow domain to use.
activityList	**null**	Activity/Consumer	The list name to consume activities from.
workflowList	**null**	Workflow/Consumer	The list name to consume workflows from.
eventName	**null**	All	The workflow or activity event name to use.
version	**null**	All	The workflow or activity event version to use.
signalName	**null**	Workflow/Producer	The name of the signal to send to the workflow.
childPolicy	**null**	Workflow/Producer	The policy to use on child workflows when terminating a workflow.
terminationReason	**null**	Workflow/Producer	The reason for terminating a workflow.

stateResultType	**Object**	Workflow/Producer	The type of the result when a workflow state is queried.
terminationDetails	**null**	Workflow/Producer	Details for terminating a workflow.
dataConverter	**JsonDataConverter**	All	An instance of **com.amazonaws.services.simpleworkflow.flow.DataConverter** to use for serializing/deserializing the data.
activitySchedulingOptions	**null**	Activity/Producer	An instance of **ActivitySchedulingOptions** used to specify different timeout options.
activityTypeExecutionOptions	**null**	Activity/Consumer	An instance of **ActivityTypeExecutionOptions**.
activityTypeRegistrationOptions	**null**	Activity/Consumer	An instance of **ActivityTypeRegistrationOptions**.
workflowTypeRegistrationOptions	**null**	Workflow/Consumer	An instance of **WorkflowTypeRegistrationOptions**.

NOTE

You have to provide the amazonSWClient in the Registry or your accessKey and secretKey to access the Amazon's Simple Workflow Service.

Usage

Message headers evaluated by the SWF Workflow Producer

A workflow producer allows interacting with a workflow. It can start a new workflow execution, query its state, send signals to a running workflow, or terminate and cancel it.

Header	Type	Description

CamelSWFOperation	**String**	The operation to perform on the workflow. Supported operations are: SIGNAL, CANCEL, TERMINATE, GET_STATE, START, DESCRIBE, GET_HISTORY.
CamelSWFWorkflowId	**String**	A workflow ID to use.
CamelAwsDdbKeyCamelSWFRunId	**String**	A worfklow run ID to use.
CamelSWFStateResultType	**String**	The type of the result when a workflow state is queried.
CamelSWFEventName	**String**	The workflow or activity event name to use.
CamelSWFVersion	**String**	The workflow or activity event version to use.
CamelSWFReason	**String**	The reason for terminating a workflow.
CamelSWFDetails	**String**	Details for terminating a workflow.
CamelSWFChildPolicy	**String**	The policy to use on child workflows when terminating a workflow.

Message headers set by the SWF Workflow Producer

Header	Type	Description
CamelSWFWorkflowId	**String**	The worfklow ID used or newly generated.
CamelAwsDdbKeyCamelSWFRunId	**String**	The worfklow run ID used or generated.

Message headers set by the SWF Workflow Consumer

A workflow consumer represents the workflow logic. When it is started, it will start polling workflow decision tasks and process them. In addition to processing decision tasks, a workflow consumer route, will also receive signals (send from a workflow producer) or state queries. The primary purpose of a workflow consumer is to schedule activity tasks for execution using activity producers. Actually activity tasks can be scheduled only from a thread started by a workflow consumer.

Header	Type	Description

CamelSWFAction	**String**	Indicates what type is the current event: CamelSWFActionExecute, CamelSWFSignalReceivedAction or CamelSWFGetStateAction.
CamelSWFWorkflowReplaying	**boolean**	Indicates whether the current decision task is a replay or not.
CamelSWFWorkflowStartTime	**long**	The time of the start event for this decision task.

Message headers set by the SWF Activity Producer

An activity producer allows scheduling activity tasks. An activity producer can be used only from a thread started by a workflow consumer ie, it can process synchronous exchanges started by a workflow consumer.

Header	Type	Description
CamelSWFEventName	**String**	The activity name to schedule.
CamelSWFVersion	**String**	The activity version to schedule.

Message headers set by the SWF Activity Consumer

Header	Type	Description
CamelSWFTaskToken	**String**	The task token that is required to report task completion for manually completed tasks.

Advanced amazonSWClient configuration

If you need more control over the AmazonSimpleWorkflowClient instance configuration you can create your own instance and refer to it from the URI:

The **#client** refers to a AmazonSimpleWorkflowClient in the Registry.

For example if your Camel Application is running behind a firewall:

```
AWSCredentials awsCredentials = new BasicAWSCredentials("myAccessKey", "mySecretKey");
ClientConfiguration clientConfiguration = new ClientConfiguration();
clientConfiguration.setProxyHost("http://myProxyHost");
clientConfiguration.setProxyPort(8080);

AmazonSimpleWorkflowClient client = new AmazonSimpleWorkflowClient(awsCredentials,
clientConfiguration);

registry.bind("client", client);
```

Dependencies

Maven users will need to add the following dependency to their pom.xml.

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-aws</artifactId>
    <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.13 or higher).

CHAPTER 11. BEAN

BEAN COMPONENT

The **bean:** component binds beans to Apache Camel message exchanges.

URI FORMAT

```
bean:beanID[?options]
```

Where **beanID** can be any string which is used to lookup look up the bean in the Registry

OPTIONS

Name	Type	Default	Description
method	**String**	**null**	The method name from the bean that will be invoked. If not provided, Camel will try to determine the method itself. In case of ambiguity an exception will be thrown. See Bean Binding for more details.
cache	**boolean**	**false**	If enabled, Apache Camel will cache the result of the first Registry look-up. Cache can be enabled if the bean in the Registry is defined as a singleton scope.

You can append query options to the URI in the following format, **?option=value&option=value&...**

USING

The object instance that is used to consume messages must be explicitly registered with the Registry. For example, if you are using Spring you must define the bean in the Spring configuration, **spring.xml**; or if you don't use Spring, put the bean in JNDI.

```
// lets populate the context with the services we need
// note that we could just use a spring.xml file to avoid this step
JndiContext context = new JndiContext();
context.bind("bye", new SayService("Good Bye!"));

CamelContext camelContext = new DefaultCamelContext(context);
```

Once an endpoint has been registered, you can build routes that use it to process exchanges.

```
// lets add simple route
camelContext.addRoutes(new RouteBuilder() {
    public void configure() {
        from("direct:hello").to("bean:bye");
    }
});
```

A **bean:** endpoint cannot be defined as the input to the route; i.e. you cannot consume from it, you can only route from some inbound message Endpoint to the bean endpoint as output. So consider using a **direct:** or **queue:** endpoint as the input.

You can use the **createProxy()** methods on ProxyHelper to create a proxy that will generate BeanExchanges and send them to any endpoint:

```
Endpoint endpoint = camelContext.getEndpoint("direct:hello");
ISay proxy = ProxyHelper.createProxy(endpoint, ISay.class);
String rc = proxy.say();
assertEquals("Good Bye!", rc);
```

And the same route using Spring DSL:

```
    <route>
      <from uri="direct:hello">
      <to uri="bean:bye"/>
    </route>
```

BEAN AS ENDPOINT

Apache Camel also supports invoking Bean as an Endpoint. In the route below:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct:start"/>
    <to uri="myBean"/>
    <to uri="mock:results"/>
  </route>
</camelContext>

<bean id="myBean" class="org.apache.camel.spring.bind.ExampleBean"/>
```

What happens is that when the exchange is routed to the **myBean**, Apache Camel will use the Bean Binding to invoke the bean. The source for the bean is just a plain POJO:

```
public class ExampleBean {

    public String sayHello(String name) {
        return "Hello " + name + "!";
    }
}
```

Apache Camel will use Bean Binding to invoke the **sayHello** method, by converting the Exchange's In body to the **String** type and storing the output of the method on the Exchange Out body.

JAVA DSL BEAN SYNTAX

Java DSL comes with syntactic sugar for the Bean component. Instead of specifying the bean explicitly as the endpoint (i.e. **to("bean:beanName")**) you can use the following syntax:

```
// Send message to the bean endpoint
// and invoke method resolved using Bean Binding.
from("direct:start").beanRef("beanName");

// Send message to the bean endpoint
// and invoke given method.
from("direct:start").beanRef("beanName", "methodName");
```

Instead of passing name of the reference to the bean (so that Camel will lookup for it in the registry), you can specify the bean itself:

```
// Send message to the given bean instance.
from("direct:start").bean(new ExampleBean());

// Explicit selection of bean method to be invoked.
from("direct:start").bean(new ExampleBean(), "methodName");

// Camel will create the instance of bean and cache it for you.
from("direct:start").bean(ExampleBean.class);
```

BEAN BINDING

How bean methods to be invoked are chosen (if they are not specified explicitly through the **method** parameter) and how parameter values are constructed from the Message are all defined by the Bean Binding mechanism which is used throughout all of the various Bean Integration mechanisms in Apache Camel.

- Class component
- Bean Binding
- Bean Integration

CHAPTER 12. BEAN VALIDATOR

BEAN VALIDATOR COMPONENT

Available as of Apache Camel 2.3

The Validator component performs bean validation of the message body using the Java Bean Validation API (JSR 303). Camel uses the reference implementation, which is Hibernate Validator.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-bean-validator</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
bean-validator:label[?options]
```

or

```
bean-validator://label[?options]
```

Where **label** is an arbitrary text value describing the endpoint. You can append query options to the URI in the following format, **?option=value&option=value&...**

URI OPTIONS

The following URI options are supported:

Option	Default	Description
group	**javax.validation.groups.Default**	The custom validation group to use.
messageInterpolator	**org.hibernate.validator.engine.ResourceBundleMessageInterpolator**	Reference to a custom **javax.validation.MessageInterpolator** in the Registry.
traversableResolver	**org.hibernate.validator.engine.resolver.DefaultTraversableResolver**	Reference to a custom **javax.validation.TraversableResolver** in the Registry.

constraintValidatorFactory	**org.hibernate.validator.engine.ConstraintValidatorFactoryImpl**	Reference to a custom **javax.validation.ConstraintValidatorFactory** in the Registry.

OSGI DEPLOYMENT

To use Hibernate Validator in the OSGi environment use dedicated **ValidationProviderResolver** implementation, just as **org.apache.camel.component.bean.validator.HibernateValidationProviderResolver**. The snippet below demonstrates this approach. Keep in mind that you can use **HibernateValidationProviderResolver** starting from the Camel 2.13.0.

Example 12.1. Using HibernateValidationProviderResolver

```
from("direct:test")
  .to("bean-validator://ValidationProviderResolverTest?
validationProviderResolver=#myValidationProviderResolver");

...

<bean id="myValidationProviderResolver"
class="org.apache.camel.component.bean.validator.HibernateValidationProviderResolver"/>
```

If no custom **ValidationProviderResolver** is defined and the validator component has been deployed into the OSGi environment, the **HibernateValidationProviderResolver** will be automatically used.

EXAMPLE

Assumed we have a Java bean with the following annotations

CAR.JAVA

```
// Java
public class Car {

    @NotNull
    private String manufacturer;

    @NotNull
    @Size(min = 5, max = 14, groups = OptionalChecks.class)
    private String licensePlate;

    // getter and setter
}
```

and an interface definition for our custom validation group

OPTIONALCHECKS.JAVA

```
public interface OptionalChecks {
}
```

with the following Apache Camel route, only the **@NotNull** constraints on the attributes manufacturer and licensePlate will be validated (Apache Camel uses the default group **javax.validation.groups.Default**).

```
from("direct:start")
.to("bean-validator://x")
.to("mock:end")
```

If you want to check the constraints from the group **OptionalChecks**, you have to define the route like this

```
from("direct:start")
.to("bean-validator://x?group=OptionalChecks")
.to("mock:end")
```

If you want to check the constraints from both groups, you have to define a new interface first

ALLCHECKS.JAVA

```
@GroupSequence({Default.class, OptionalChecks.class})
public interface AllChecks {
}
```

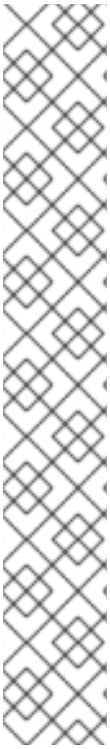
and then your route definition should looks like this

```
from("direct:start")
.to("bean-validator://x?group=AllChecks")
.to("mock:end")
```

And if you have to provide your own message interpolator, traversable resolver and constraint validator factory, you have to write a route like this

```
<bean id="myMessageInterpolator" class="my.ConstraintValidatorFactory" />
<bean id="myTraversableResolver" class="my.TraversableResolver" />
<bean id="myConstraintValidatorFactory" class="my.ConstraintValidatorFactory" />

from("direct:start")
.to("bean-validator://x?
group=AllChecks&messageInterpolator=#myMessageInterpolator&traversableResolver=#myTraversabl
eResolver&constraintValidatorFactory=#myConstraintValidatorFactory")
.to("mock:end")
```

It's also possible to describe your constraints as XML and not as Java annotations. In this case, you have to provide the file **META-INF/validation.xml** which could looks like this



VALIDATION.XML

```
<?xml version="1.0" encoding="UTF-8"?>
<validation-config
 xmlns="http://jboss.org/xml/ns/javax/validation/configuration"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://jboss.org/xml/ns/javax/validation/configuration">
 <default-provider>org.hibernate.validator.HibernateValidator</default-provider>
 <message-
interpolator>org.hibernate.validator.engine.ResourceBundleMessageInterpolator</mess
age-interpolator>
 <traversable-
resolver>org.hibernate.validator.engine.resolver.DefaultTraversableResolver</traversabl
e-resolver>
 <constraint-validator-
factory>org.hibernate.validator.engine.ConstraintValidatorFactoryImpl</constraint-
validator-factory>

 <constraint-mapping>/constraints-car.xml</constraint-mapping>
</validation-config>
```

and the **constraints-car.xml** file

CONSTRAINTS-CAR.XML

```
<?xml version="1.0" encoding="UTF-8"?>
<constraint-mappings xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://jboss.org/xml/ns/javax/validation/mapping validation-
mapping-1.0.xsd"
 xmlns="http://jboss.org/xml/ns/javax/validation/mapping">
 <default-package>org.apache.camel.component.bean.validator</default-package>

 <bean class="CarWithoutAnnotations" ignore-annotations="true">
  <field name="manufacturer">
   <constraint annotation="javax.validation.constraints.NotNull" />
  </field>

  <field name="licensePlate">
   <constraint annotation="javax.validation.constraints.NotNull" />

   <constraint annotation="javax.validation.constraints.Size">
    <groups>
     <value>org.apache.camel.component.bean.validator.OptionalChecks</value>
    </groups>
    <element name="min">5</element>
    <element name="max">14</element>
   </constraint>
  </field>
 </bean>
</constraint-mappings>
```

CHAPTER 13. BEANSTALK

BEANSTALK COMPONENT

Available in Camel 2.15

camel-beanstalk project provides a Camel component for job retrieval and post-processing of Beanstalk jobs.

You can find the detailed explanation of Beanstalk job life cycle at Beanstalk protocol.

DEPENDENCIES

Maven users need to add the following dependency to their **pom.xml**

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-beanstalk</artifactId>
  <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.15.0 or higher).

URI FORMAT

```
beanstalk://[host[:port]][/tube][?options]
```

You may omit either **port** or both **host** and **port**: for the Beanstalk defaults to be used (“localhost” and 11300). If you omit **tube**, Beanstalk component will use the tube with name “default”.

When listening, you may probably want to watch for jobs from several tubes. Just separate them with plus sign, e.g.

```
beanstalk://localhost:11300/tube1+tube2
```

Tube name will be URL decoded, so if your tube names include special characters like + or ?, you need to URL-encode them appropriately, or use the RAW syntax, see more details here.

By the way, you cannot specify several tubes when you are writing jobs into Beanstalk.

COMMON URI OPTIONS

Name	Default value	Description
jobPriority	1000	Job priority. (0 is the highest, see Beanstalk protocol)
jobDelay	0	Job delay in seconds.

jobTimeToRun	60	Job time to run in seconds. (when 0, the beanstalkd daemon raises it to 1 automatically, see Beanstalk protocol)

PRODUCER UIR OPTIONS

Producer behaviour is affected by the **command** parameter which tells what to do with the job, it can be

Name	Default value	Description
command	put	• **put** means to put the job into Beanstalk. Job body is specified in the Camel message body. Job ID will be returned in *beanstalk.jobId* message header. • **delete**, **release**, **touch** or **bury** expect Job ID in the message header *beanstalk.jobId*. Result of the operation is returned in *beanstalk.result* message header • **kick** expects the number of jobs to kick in the message body and returns the number of jobs actually kicked out in the message header *beanstalk.result*.

CONSUMER UIR OPTIONS

The consumer may delete the job immediately after reserving it or wait until Camel routes process it. While the first scenario is more like a “message queue”, the second is similar to “job queue”. This behavior is controlled by **consumer.awaitJob** parameter, which equals **true** by default (following Beanstalkd nature).

When synchronous, the consumer calls **delete** on successful job completion and calls **bury** on failure. You can choose which command to execute in the case of failure by specifying **consumer.onFailure** parameter in the URI. It can take values of **bury**, **delete** or **release**.

There is a boolean parameter **consumer.useBlockIO** which corresponds to the same parameter in JavaBeanstalkClient library. By default it is **true**.

Be careful when specifying **release**, as the failed job will immediately become available in the same tube and your consumer will try to acquire it again. You can **release** and specify *jobDelay* though.

Name	Default value	Description
onFailure	bury	Command to use when processing failed. You can choose among: bury, delete or release.
useBlockIO	true	Whether to use blockIO.
awaitJob	true	Whether to wait for job to complete before ack the job from beanstalk

The beanstalk consumer is a Scheduled Polling Consumer which means there is more options you can configure, such as how frequent the consumer should poll. For more details see Polling Consumer.

CONSUMER HEADERS

The consumer stores a number of job headers in the Exchange message:

Property	Type	Description
beanstalk.jobId	long	Job ID
beanstalk.tube	string	the name of the tube that contains this job
beanstalk.state	string	“ready” or “delayed” or “reserved” or “buried” (must be “reserved”)
beanstalk.priority	long	the priority value set
beanstalk.age	int	the time in seconds since the put command that created this job
beanstalk.time-left	int	the number of seconds left until the server puts this job into the ready queue
beanstalk.timeouts	int	the number of times this job has timed out during a reservation
beanstalk.releases	int	the number of times a client has released this job from a reservation
beanstalk.buries	int	the number of times this job has been buried

beanstalk.kicks	int	the number of times this job has been kicked

EXAMPLES

This Camel component lets you both request the jobs for processing and supply them to Beanstalkd daemon. Our simple demo routes may look like

```
from("beanstalk:testTube").
  log("Processing job #${property.beanstalk.jobId} with body ${in.body}").
  process(new Processor() {
    @Override
    public void process(Exchange exchange) {
      // try to make integer value out of body
      exchange.getIn().setBody( Integer.valueOf(exchange.getIn().getBody(classOf[String])) );
    }
  }).
  log("Parsed job #${property.beanstalk.jobId} to body ${in.body}");
```

```
from("timer:dig?period=30seconds").
  setBody(constant(10)).log("Kick ${in.body} buried/delayed tasks").
  to("beanstalk:testTube?command=kick");
```

In the first route we are listening for new jobs in tube “testTube”. When they are arriving, we are trying to parse integer value from the message body. If done successful, we log it and this successful exchange completion makes Camel component to *delete* this job from Beanstalk automatically. Contrary, when we cannot parse the job data, the exchange failed and the Camel component *buries* it by default, so that it can be processed later or probably we are going to inspect failed jobs manually.

So the second route periodically requests Beanstalk to *kick* 10 jobs out of buried and/or delayed state to the normal queue.

CHAPTER 14. BOX

BOX COMPONENT

Available as of Camel 2.14

The Box component provides access to all of the Box.com APIs accessible using box-java-sdk-v2. It allows producing messages to upload and download files, create, edit, and manage folders, etc. It also supports APIs that allow polling for updates to user accounts and even changes to enterprise accounts, etc.

Box.com requires the use of OAuth2.0 for all client application authentication. In order to use camel-box with your account, you'll need to create a new application within Box.com at https://app.box.com/developers/services/edit/. The Box application's client id and secret will allow access to Box APIs which require a current user. A user access token is generated and managed by the API for an end user. Alternatively the Camel application can register an implementation of com.box.boxjavalibv2.authorization.IAuthSecureStorage to provide an com.box.boxjavalibv2.dao.IAuthData OAuth token.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-box</artifactId>
  <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
box://endpoint-prefix/endpoint?[options]
```

Endpoint prefix can be one of:

- collaborations
- comments
- events
- files
- folders
- groups
- poll-events
- search
- shared-comments
- shared-files
- shared-folders

- shared-items
- users

BOX COMPONENT

The Box Component can be configured with the options below. These options can be provided using the component's bean property **configuration** of type **org.apache.camel.component.box.BoxConfiguration**. These options can also be specified in the endpoint URI.

Option	Type	Description
authSecureStorage	com.box.boxjavalibv2.authorization.IAuthSecureStorage	OAuth Secure Storage callback, can be used to provide and or save OAuth tokens. The callback may return null on first call to allow the component to login and authorize application and obtain an OAuth token, which can then be saved in the secure storage. For the component to be able to create a token automatically a user password must be provided.
boxConfig	com.box.boxjavalibv2.IBoxConfig	Custom Box SDK configuration, not required normally
clientId	String	Box application client ID
clientSecret	String	Box application client secret
connectionManagerBuilder	com.box.boxjavalibv2.BoxConnectionManagerBuilder	Custom Box connection manager builder, used to override default settings like max connections for underlying HttpClient.
httpParams	java.util.Map	Custom HTTP params for settings like proxy host
loginTimeout	int	amount of time the component will wait for a response from Box.com, default is 30 seconds
refreshListener	com.box.boxjavalibv2.authorization.OAuthRefreshListener	OAuth listener for token updates, if the Camel application needs to use the access token outside the route
revokeOnShutdown	boolean	Flag to revoke OAuth refresh token on route shutdown, default false. Will require a fresh refresh token on restart using either a custom IAuthSecureStorage or automatic component login by providing a user password

Option	Type	Description
sharedLink	String	Box shared link for shared-* endpoints, can be a link for a shared comment, file or folder
sharedPassword	String	Password associated with the shared link, MUST be provided with sharedLink
userName	String	Box user name, MUST be provided
userPassword	String	Box user password, MUST be provided if authSecureStorage is not set, or returns null on first call

PRODUCER ENDPOINTS:

Producer endpoints can use endpoint prefixes followed by endpoint names and associated options described next. A shorthand alias can be used for some endpoints. The endpoint URI MUST contain a prefix.

Endpoint options that are not mandatory are denoted by **[]**. When there are no mandatory options for an endpoint, one of the set of **[]** options MUST be provided. Producer endpoints can also use a special option **inBody** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message.

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelBox.<option>**. Note that the **inBody** option overrides message header, i.e. the endpoint option **inBody=option** would override a **CamelBox.option** header.

If a value is not provided for the option **defaultRequest** either in the endpoint URI or in a message header, it will be assumed to be **null**. Note that the **null** value will only be used if other options do not satisfy matching endpoints.

In case of Box API errors the endpoint will throw a RuntimeCamelException with a **com.box.restclientv2.exceptions.BoxSDKException** derived exception cause.

ENDPOINT PREFIX COLLABORATIONS

For more information on Box collaborations see https://developers.box.com/docs/#collaborations. The following endpoints can be invoked with the prefix **collaborations** as follows:

```
box://collaborations/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
createCollaboration	create	collabRequest, folderId	com.box.boxjavalibv2.dao.BoxCollaboration

Endpoint	Shorthand Alias	Options	Result Body Type
deleteCollaboration	delete	collabId, defaultRequest	
getAllCollaborations	allCollaborations	getAllCollabsRequest	java.util.List
getCollaboration	collaboration	collabId, defaultRequest	com.box.boxjavalibv2.dao.BoxCollaboration
updateCollaboration	update	collabId, collabRequest	com.box.boxjavalibv2.dao.BoxCollaboration

URI OPTIONS FOR COLLABORATIONS

Name	Type
collabId	String
collabRequest	com.box.boxjavalibv2.requests.requestobjects.BoxCollabRequestObject
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
folderId	String
getAllCollabsRequest	com.box.boxjavalibv2.requests.requestobjects.BoxGetAllCollabsRequestObject

ENDPOINT PREFIX EVENTS

For more information on Box events see https://developers.box.com/docs/#events. Although this endpoint can be used by producers, Box events are better used as a consumer endpoint using the **poll-events** endpoint prefix. The following endpoints can be invoked with the prefix **events** as follows:

```
box://events/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
getEventOptions	eventOptions	defaultRequest	com.box.boxjavalibv2.dao.BoxCollection
getEvents	events	eventRequest	com.box.boxjavalibv2.dao.BoxEventCollection

URI OPTIONS FOR EVENTS

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
eventRequest	com.box.boxjavalibv2.requests.requestobjects.BoxEventRequestObject

ENDPOINT PREFIX GROUPS

For more information on Box groups see https://developers.box.com/docs/#groups. The following endpoints can be invoked with the prefix **groups** as follows:

```
box://groups/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
createGroup		[groupRequest], [name]	com.box.boxjavalibv2.dao.BoxGroup
createMembership		[groupId, role, userId], [groupMembershipRequest]	com.box.boxjavalibv2.dao.BoxGroupMembership
deleteGroup	delete	defaultRequest, groupId	
deleteMembership	delete	defaultRequest, membershipId	
getAllCollaborations	allCollaborations	defaultRequest, groupId	com.box.boxjavalibv2.dao.BoxCollection
getAllGroups	allGroups	defaultRequest	com.box.boxjavalibv2.dao.BoxCollection
getMembership	membership	defaultRequest, membershipId	com.box.boxjavalibv2.dao.BoxGroupMembership
getMemberships	memberships	defaultRequest, groupId	com.box.boxjavalibv2.dao.BoxCollection
updateGroup	update	groupId, groupRequest	com.box.boxjavalibv2.dao.BoxGroup
updateMembership	update	[groupMembershipRequest], [role], membershipId	com.box.boxjavalibv2.dao.BoxGroupMembership

URI OPTIONS FOR GROUPS

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
groupId	String
groupMembershipRequest	com.box.boxjavalibv2.requests.requestobjects.BoxGroupMembershipRequestObject
groupRequest	com.box.boxjavalibv2.requests.requestobjects.BoxGroupRequestObject
membershipId	String
name	String
role	String
userId	String

ENDPOINT PREFIX SEARCH

For more information on Box search API see https://developers.box.com/docs/#search. The following endpoints can be invoked with the prefix **search** as follows:

```
box://search/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
search		defaultRequest, searchQuery	com.box.boxjavalibv2.dao.BoxCollection

URI OPTIONS FOR SEARCH

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
searchQuery	String

ENDPOINT PREFIX COMMENTS AND SHARED-COMMENTS

For more information on Box comments see https://developers.box.com/docs/#comments. The following endpoints can be invoked with the prefix **comments** or **shared-comments** as follows. The **shared-comments** prefix requires **sharedLink** and **sharedPassword** properties.

```
box://comments/endpoint?[options]
box://shared-comments/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addComment		[commentRequest], [commentedItemId, commentedItemType, message]	com.box.boxjavalibv2.dao.BoxComment
deleteComment	delete	commentId, defaultRequest	
getComment	comment	commentId, defaultRequest	com.box.boxjavalibv2.dao.BoxComment
updateComment	update	commentId, commentRequest	com.box.boxjavalibv2.dao.BoxComment

URI OPTIONS FOR COMMENTS AND SHARED-COMMENTS

Name	Type
commentId	String
commentRequest	com.box.boxjavalibv2.requests.requestobjects.BoxCommentRequestObject
commentedItemId	String
commentedItemType	com.box.boxjavalibv2.dao.IBoxType
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
message	String

ENDPOINT PREFIX FILES AND SHARED-FILES

For more information on Box files see https://developers.box.com/docs/#files. The following endpoints can be invoked with the prefix **files** or **shared-files** as follows. The **shared-files** prefix requires **sharedLink** and **sharedPassword** properties.

```
box://files/endpoint?[options]
box://shared-files/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type

Endpoint	Shorthand Alias	Options	Result Body Type
copyFile		fileId, itemCopyRequest	com.box.boxjavalibv2.dao.BoxFile
createSharedLink	create	fileId, sharedLinkRequest	com.box.boxjavalibv2.dao.BoxFile
deleteFile		defaultRequest, fileId	
downloadFile	download	[destination, listener], [listener, outputStreams], defaultRequest, fileId	java.io.InputStream
downloadThumbnail	download	extension, fileId, imageRequest	java.io.InputStream
getFile	file	defaultRequest, fileId	com.box.boxjavalibv2.dao.BoxFile
getFileComments	fileComments	defaultRequest, fileId	com.box.boxjavalibv2.dao.BoxCollection
getFileVersions	fileVersions	defaultRequest, fileId	java.util.List
getPreview	preview	extension, fileId, imageRequest	com.box.boxjavalibv2.dao.BoxPreview
getThumbnail	thumbnail	extension, fileId, imageRequest	com.box.boxjavalibv2.dao.BoxThumbnail
updateFileInfo	update	fileId, fileRequest	com.box.boxjavalibv2.dao.BoxFile
uploadFile	upload	fileUploadRequest	com.box.boxjavalibv2.dao.BoxFile
uploadNewVersion	upload	fileId, fileUploadRequest	com.box.boxjavalibv2.dao.BoxFile

URI OPTIONS FOR FILES AND SHARED-FILES

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
destination	java.io.File
extension	String

Name	Type
fileId	String
fileRequest	com.box.boxjavalibv2.requests.requestobjects.BoxFileRequestObject
fileUploadRequest	com.box.restclientv2.requestsbase.BoxFileUploadRequestObject
imageRequest	com.box.boxjavalibv2.requests.requestobjects.BoxImageRequestObject
itemCopyRequest	com.box.boxjavalibv2.requests.requestobjects.BoxItemCopyRequestObject
listener	com.box.boxjavalibv2.filetransfer.IFileTransferListener
outputStreams	java.io.OutputStream[]
sharedLinkRequest	com.box.boxjavalibv2.requests.requestobjects.BoxSharedLinkRequestObject

ENDPOINT PREFIX FOLDERS AND SHARED-FOLDERS

For more information on Box folders see https://developers.box.com/docs/#folders. The following endpoints can be invoked with the prefix **folders** or **shared-folders** as follows. The prefix **shared-folders** requires **sharedLink** and **sharedPassword** properties.

```
box://folders/endpoint?[options]
box://shared-folders/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
copyFolder		folderId, itemCopyRequest	com.box.boxjavalibv2.dao.BoxFolder
createFolder	create	folderRequest	com.box.boxjavalibv2.dao.BoxFolder
createSharedLink	create	folderId, sharedLinkRequest	com.box.boxjavalibv2.dao.BoxFolder
deleteFolder	delete	folderDeleteRequest, folderId	
getFolder	folder	defaultRequest, folderId	com.box.boxjavalibv2.dao.BoxFolder

Endpoint	Shorthand Alias	Options	Result Body Type
getFolderCollaborations	folderCollaborations	defaultRequest, folderId	java.util.List
getFolderItems	folderItems	folderId, pagingRequest	com.box.boxjavalibv2.dao.BoxCollection
updateFolderInfo	update	folderId, folderRequest	com.box.boxjavalibv2.dao.BoxFolder

URI OPTIONS FOR FOLDERS OR SHARED-FOLDERS

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
folderDeleteRequest	com.box.boxjavalibv2.requests.requestobjects.BoxFolderDeleteRequestObject
folderId	String
folderRequest	com.box.boxjavalibv2.requests.requestobjects.BoxFolderRequestObject
itemCopyRequest	com.box.boxjavalibv2.requests.requestobjects.BoxItemCopyRequestObject
pagingRequest	com.box.boxjavalibv2.requests.requestobjects.BoxPagingRequestObject
sharedLinkRequest	com.box.boxjavalibv2.requests.requestobjects.BoxSharedLinkRequestObject

ENDPOINT PREFIX SHARED-ITEMS

For more information on Box shared items see https://developers.box.com/docs/#shared-items. The following endpoints can be invoked with the prefix **shared-items** as follows:

```
box://shared-items/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
getSharedItem	sharedItem	defaultRequest	com.box.boxjavalibv2.dao.BoxItem

URI OPTIONS FOR SHARED-ITEMS

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject

ENDPOINT PREFIX USERS

For information on Box users see https://developers.box.com/docs/#users. The following endpoints can be invoked with the prefix **users** as follows:

```
box://users/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addEmailAlias		emailAliasRequest, userId	com.box.boxjavalibv2.dao.BoxEmailAlias
createEnterpriseUser	create	userRequest	com.box.boxjavalibv2.dao.BoxUser
deleteEmailAlias		defaultRequest, emailId, userId	
deleteEnterpriseUser		userDeleteRequest, userId	
getAllEnterpriseUser	allEnterpriseUser	defaultRequest, filterTerm	java.util.List
getCurrentUser	currentUser	defaultRequest	com.box.boxjavalibv2.dao.BoxUser
getEmailAliases	emailAliases	defaultRequest, userId	java.util.List
moveFolderToAnotherUser		folderId, simpleUserRequest, userId	com.box.boxjavalibv2.dao.BoxFolder
updateUserInformaiton	update	userId, userRequest	com.box.boxjavalibv2.dao.BoxUser
updateUserPrimaryLogin	update	userId, userUpdateLoginRequest	com.box.boxjavalibv2.dao.BoxUser

URI OPTIONS FOR USERS

Name	Type
defaultRequest	com.box.restclientv2.requestsbase.BoxDefaultRequestObject
emailAliasRequest	com.box.boxjavalibv2.requests.requestobjects.BoxEmailAliasRequestObject
emailId	String
filterTerm	String
folderId	String
simpleUserRequest	com.box.boxjavalibv2.requests.requestobjects.BoxSimpleUserRequestObject
userDeleteRequest	com.box.boxjavalibv2.requests.requestobjects.BoxUserDeleteRequestObject
userId	String
userRequest	com.box.boxjavalibv2.requests.requestobjects.BoxUserRequestObject
userUpdateLoginRequest	com.box.boxjavalibv2.requests.requestobjects.BoxUserUpdateLoginRequestObject

CONSUMER ENDPOINTS:

For more information on Box events see https://developers.box.com/docs/#events and for long polling see https://developers.box.com/docs/#events-long-polling. Consumer endpoints can only use the endpoint prefix **poll-events** as shown in the example next. By default the consumer will split the com.box.boxjavalibv2.dao.BoxEventCollection from every long poll and create an exchange for every com.box.boxjavalibv2.dao.BoxEvent. To make the consumer return the entire collection in a single exchange, use the URI option **consumer.splitResult=false**.

```
box://poll-events/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
poll		limit, streamPosition, streamType	com.box.boxjavalibv2.dao.BoxEvent by default, or com.box.boxjavalibv2.dao.BoxEventCollection when consumer.splitResult=false

URI OPTIONS FOR POLL-EVENTS

Name	Type
limit	Integer
streamPosition	Long
streamType	String
splitResult	boolean

MESSAGE HEADER

Any of the options can be provided in a message header for producer endpoints with **CamelBox.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the Box Java SDK. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint parameter.

TYPE CONVERTER

The Box component also provides a Camel type converter to convert GenericFile objects from File component to a **com.box.restclientv2.requestsbase.BoxFileUploadRequestObject** to upload files to Box.com. The target **folderId** for the upload can be specified in the exchange property **CamelBox.folderId**. If the exchange property is not specified the value defaults to**"0"** for the root folder ID.

USE CASES

The following route uploads new files to the user's root folder:

```
from("file:...")
 .to("box://files/upload/inBody=fileUploadRequest");
```

The following route polls user's account for updates:

```
from("box://poll-events/poll?streamPosition=-1&streamType=all&limit=100")
 .to("bean:blah");
```

The following route uses a producer with dynamic header options. The **fileId** property has the Box file id , so its assigned to the **CamelBox.fileId** header as follows:

```
from("direct:foo")
 .setHeader("CamelBox.fileId", header("fileId"))
 .to("box://files/download")
 .to("file://...");
```

CHAPTER 15. BROWSE

BROWSE COMPONENT

Available as of Apache Camel 2.0

The Browse component provides a simple BrowsableEndpoint which can be useful for testing, visualisation tools or debugging. The exchanges sent to the endpoint are all available to be browsed.

URI FORMAT

```
browse:someName
```

Where **someName** can be any string to uniquely identify the endpoint.

SAMPLE

In the route below, we insert a **browse:** component to be able to browse the Exchanges that are passing through:

```
from("activemq:order.in").to("browse:orderReceived").to("bean:processOrder");
```

We can now inspect the received exchanges from within the Java code:

```
private CamelContext context;

public void inspectRecievedOrders() {
    BrowsableEndpoint browse = context.getEndpoint("browse:orderReceived",
BrowsableEndpoint.class);
    List<Exchange> exchanges = browse.getExchanges();
    ...
    // then we can inspect the list of received exchanges from Java
    for (Exchange exchange : exchanges) {
        String payload = exchange.getIn().getBody();
        ...
    }
}
```

CHAPTER 16. CACHE

16.1. CACHE COMPONENT

Available as of Camel 2.1

The **cache** component enables you to perform caching operations using EHCache as the Cache Implementation. The cache itself is created on demand or if a cache of that name already exists then it is simply utilized with its original settings.

This component supports producer and event based consumer endpoints.

The Cache consumer is an event based consumer and can be used to listen and respond to specific cache activities. If you need to perform selections from a pre-existing cache, use the processors defined for the cache component.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-cache</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI format

```
cache://cacheName[?options]
```

You can append query options to the URI in the following format, **?option=value&option=#beanRef&...**

Options

The Cache component supports the following options:

Name	Default Value	Description
maxElementsInMemory	**1000**	The number of elements that may be stored in the defined cache

memoryStoreEvictionPolicy	**MemoryStoreEvictionPolicy.LFU**	The number of elements that may be stored in the defined cache. Options include • MemoryStoreEvictionPolicy.LFU - Least frequently used • MemoryStoreEvictionPolicy.LRU - Least recently used • MemoryStoreEvictionPolicy.FIFO - first in first out, the oldest element by creation time
overflowToDisk	**true**	Specifies whether cache may overflow to disk
eternal	**false**	Sets whether elements are eternal. If eternal, timeouts are ignored and the element never expires.
timeToLiveSeconds	**300**	The maximum time between creation time and when an element expires. Is used only if the element is not eternal
timeToIdleSeconds	**300**	The maximum amount of time between accesses before an element expires
diskPersistent	**false**	Whether the disk store persists between restarts of the Virtual Machine.
diskExpiryThreadIntervalSeconds	**120**	The number of seconds between runs of the disk expiry thread.
cacheManagerFactory	**null**	**Camel 2.8:** If you want to use a custom factory which instantiates and creates the EHCache **net.sf.ehcache.CacheManager**. *Type:* abstract org.apache.camel.component.cache.CacheManagerFactory

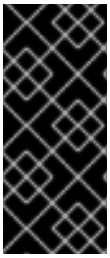
eventListenerRegistry	**null**	**Camel 2.8:** Sets a list of EHCache **net.sf.ehcache.event.CacheEventListener** for all new caches\- no need to define it per cache in EHCache xml config anymore. *Type:* org.apache.camel.component.cache.CacheEventListenerRegistry
cacheLoaderRegistry	**null**	**Camel 2.8:** Sets a list of **org.apache.camel.component.cache.CacheLoaderWrapper** that extends EHCache **net.sf.ehcache.loader.CacheLoader** for all new caches\- no need to define it per cache in EHCache xml config anymore. *Type:* org.apache.camel.component.cache.CacheLoaderRegistry
key	**null**	**Camel 2.10:** To configure using a cache key by default. If a key is provided in the message header, then the key from the header takes precedence.
operation	**null**	**Camel 2.10:** To configure using an cache operation by default. If an operation in the message header, then the operation from the header takes precedence.
objectCache	**false**	**Camel 2.10:** Whether to turn on allowing to store non serializable objects in the cache. If this option is enabled then overflow to disk cannot be enabled as well.
configurationFile		**Camel 2.13/2.12.3:** To configure the location of the **ehcache.xml** file to use, such as **classpath:com/foo/mycache.xml** to load from classpath. If no configuration is given, then the default settings from EHCache is used.
configuration		To use a custom **org.apache.camel.component.cache.CacheConfiguration** configuration.

Cache component options

Name	Default Value	Description
configuration		To use a custom **org.apache.camel.component.cache.CacheConfiguration** configuration.
cacheManagerFactory		To use a custom **org.apache.camel.component.cache.CacheManagerFactory**.
configurationFile		**Camel 2.13/2.12.3:** To configure the location of the **ehcache.xml** file to use, such as **classpath:com/foo/mycache.xml** to load from classpath. If no configuration is given, then the default settings from EHCache is used.

Message Headers Camel 2.8+

Header	Description
CamelCacheOperation	The operation to be performed on the cache. The valid options are • **CamelCacheGet** • **CamelCacheCheck** • **CamelCacheAdd** • **CamelCacheUpdate** • **CamelCacheDelete** • **CamelCacheDeleteAll**
CamelCacheKey	The cache key used to store the Message in the cache. The cache key is optional if the **CamelCacheOperation** is **CamelCacheDeleteAll**



HEADER CHANGES IN CAMEL 2.8

The header names and supported values have changed to be prefixed with **CamelCache** and use mixed case. This makes them easier to identify and keep separate from other headers. The **CacheConstants** variable names remain unchanged, just their values have been changed. Also, these headers are now removed from the exchange after the cache operation is performed.

The **CamelCacheAdd** and **CamelCacheUpdate** operations support additional headers:

Header	Type	Description
CamelCacheTimeToLive	**Integer**	*Camel 2.11:* Time to live in seconds.
CamelCacheTimeToIdle	**Integer**	*Camel 2.11:* Time to idle in seconds.
CamelCacheEternal	**Boolean**	*Camel 2.11:* Whether the content is eternal.

Cache Producer

Sending data to the cache involves the ability to direct payloads in exchanges to be stored in a pre-existing or created-on-demand cache. The mechanics of doing this involve

- setting the Message Exchange Headers shown above.
- ensuring that the Message Exchange Body contains the message directed to the cache

Cache Consumer

Receiving data from the cache involves the ability of the CacheConsumer to listen on a pre-existing or created-on-demand Cache using an event Listener and receive automatic notifications when any cache activity take place (i.e CamelCacheGet/CamelCacheUpdate/CamelCacheDelete/CamelCacheDeleteAll). Upon such an activity taking place

- an exchange containing Message Exchange Headers and a Message Exchange Body containing the just added/updated payload is placed and sent.
- in case of a CamelCacheDeleteAll operation, the Message Exchange Header CamelCacheKey and the Message Exchange Body are not populated.

Cache Processors

There are a set of nice processors with the ability to perform cache lookups and selectively replace payload content at the

- body
- token
- xpath level

Example 1: Configuring the cache

```
from("cache://MyApplicationCache" +
        "?maxElementsInMemory=1000" +
        "&memoryStoreEvictionPolicy=" +
           "MemoryStoreEvictionPolicy.LFU" +
        "&overflowToDisk=true" +
        "&eternal=true" +
        "&timeToLiveSeconds=300" +
        "&timeToIdleSeconds=true" +
        "&diskPersistent=true" +
        "&diskExpiryThreadIntervalSeconds=300")
```

Example 2: Adding keys to the cache

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
     from("direct:start")
     .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_OPERATION_ADD))
     .setHeader(CacheConstants.CACHE_KEY, constant("Ralph_Waldo_Emerson"))
     .to("cache://TestCache1")
   }
};
```

Example 2: Updating existing keys in a cache

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
     from("direct:start")
     .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_OPERATION_UPDATE))
     .setHeader(CacheConstants.CACHE_KEY, constant("Ralph_Waldo_Emerson"))
     .to("cache://TestCache1")
   }
};
```

Example 3: Deleting existing keys in a cache

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
     from("direct:start")
     .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_DELETE))
     .setHeader(CacheConstants.CACHE_KEY", constant("Ralph_Waldo_Emerson"))
     .to("cache://TestCache1")
   }
};
```

Example 4: Deleting all existing keys in a cache

```
RouteBuilder builder = new RouteBuilder() {
```

```
    public void configure() {
     from("direct:start")
     .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_DELETEALL))
     .to("cache://TestCache1");
    }
};
```

Example 5: Notifying any changes registering in a Cache to Processors and other Producers

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
     from("cache://TestCache1")
     .process(new Processor() {
        public void process(Exchange exchange)
             throws Exception {
          String operation = (String)
exchange.getIn().getHeader(CacheConstants.CACHE_OPERATION);
          String key = (String) exchange.getIn().getHeader(CacheConstants.CACHE_KEY);
          Object body = exchange.getIn().getBody();
          // Do something
        }
     })
   }
};
```

Example 6: Using Processors to selectively replace payload with cache values

```
RouteBuilder builder = new RouteBuilder() {
   public void configure() {
     //Message Body Replacer
     from("cache://TestCache1")
     .filter(header(CacheConstants.CACHE_KEY).isEqualTo("greeting"))
     .process(new CacheBasedMessageBodyReplacer("cache://TestCache1","farewell"))
     .to("direct:next");

    //Message Token replacer
    from("cache://TestCache1")
    .filter(header(CacheConstants.CACHE_KEY).isEqualTo("quote"))
    .process(new CacheBasedTokenReplacer("cache://TestCache1","novel","#novel#"))
    .process(new CacheBasedTokenReplacer("cache://TestCache1","author","#author#"))
    .process(new CacheBasedTokenReplacer("cache://TestCache1","number","#number#"))
    .to("direct:next");

    //Message XPath replacer
    from("cache://TestCache1").
    .filter(header(CacheConstants.CACHE_KEY).isEqualTo("XML_FRAGMENT"))
    .process(new CacheBasedXPathReplacer("cache://TestCache1","book1","/books/book1"))
    .process (new CacheBasedXPathReplacer("cache://TestCache1","book2","/books/book2"))
    .to("direct:next");
   }
};
```

Example 7: Getting an entry from the Cache

```
from("direct:start")
    // Prepare headers
    .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_OPERATION_GET))
    .setHeader(CacheConstants.CACHE_KEY, constant("Ralph_Waldo_Emerson")).
    .to("cache://TestCache1").
    // Check if entry was not found
    .choice().when(header(CacheConstants.CACHE_ELEMENT_WAS_FOUND).isNull()).
        // If not found, get the payload and put it to cache
        .to("cxf:bean:someHeavyweightOperation").
        .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_OPERATION_ADD))
        .setHeader(CacheConstants.CACHE_KEY, constant("Ralph_Waldo_Emerson"))
        .to("cache://TestCache1")
    .end()
    .to("direct:nextPhase");
```

Example 8: Checking for an entry in the Cache

Note: The CHECK command tests existence of an entry in the cache but doesn't place a message in the body.

```
from("direct:start")
    // Prepare headers
    .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_OPERATION_CHECK))
    .setHeader(CacheConstants.CACHE_KEY, constant("Ralph_Waldo_Emerson")).
    .to("cache://TestCache1").
    // Check if entry was not found
    .choice().when(header(CacheConstants.CACHE_ELEMENT_WAS_FOUND).isNull()).
        // If not found, get the payload and put it to cache
        .to("cxf:bean:someHeavyweightOperation").
        .setHeader(CacheConstants.CACHE_OPERATION,
constant(CacheConstants.CACHE_OPERATION_ADD))
        .setHeader(CacheConstants.CACHE_KEY, constant("Ralph_Waldo_Emerson"))
        .to("cache://TestCache1")
    .end();
```

Management of EHCache

EHCache has its own statistics and management from JMX.

Here's a snippet on how to expose them via JMX in a Spring application context:

```
<bean id="ehCacheManagementService" class="net.sf.ehcache.management.ManagementService"
init-method="init" lazy-init="false">
  <constructor-arg>
    <bean class="net.sf.ehcache.CacheManager" factory-method="getInstance"/>
  </constructor-arg>
  <constructor-arg>
    <bean class="org.springframework.jmx.support.JmxUtils" factory-method="locateMBeanServer"/>
  </constructor-arg>
```

```
  <constructor-arg value="true"/>
  <constructor-arg value="true"/>
  <constructor-arg value="true"/>
  <constructor-arg value="true"/>
</bean>
```

Of course you can do the same thing in straight Java:

```
ManagementService.registerMBeans(CacheManager.getInstance(), mbeanServer, true, true, true,
true);
```

You can get cache hits, misses, in-memory hits, disk hits, size stats this way. You can also change CacheConfiguration parameters on the fly.

Cache replication Camel 2.8+

The Camel Cache component is able to distribute a cache across server nodes using several different replication mechanisms including: RMI, JGroups, JMS and Cache Server.

There are two different ways to make it work:

1. You can configure **ehcache.xml** manually, or
2. You can configure these three options:
   - **cacheManagerFactory**
   - **eventListenerRegistry**
   - **cacheLoaderRegistry**

Configuring Camel Cache replication using the first option is a bit of hard work as you have to configure all caches separately. So in a situation when the all names of caches are not known, using **ehcache.xml** is not a good idea.

The second option is much better when you want to use many different caches as you do not need to define options per cache. This is because replication options are set per **CacheManager** and per **CacheEndpoint**. Also it is the only way when cache names are not know at the development phase.

NOTE

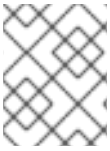
It might be useful to read the EHCache manual to get a better understanding of the Camel Cache replication mechanism.

Example: JMS cache replication

JMS replication is the most powerful and secured replication method. Used together with Camel Cache replication makes it also rather simple. An example is available on a separate page.

16.2. CACHEREPLICATIONJMSEXAMPLE

Example: JMS cache replication



NOTE

Please note, that this example is not finished yet. It is based on OSGi iTest instead of real life example. But no matter to that it is very good staring point for all Camel Cache Riders!

JMS replication is the most powerful and secured way. Used altogether with Camel Cache replication options is also the most easy way. This basic example is divided to few important steps that have to be made to get the cache replication to work.

The first step is to write your own implementation of **CacheManagerFactory**.

```
public class TestingCacheManagerFactory extends CacheManagerFactory {

[...]

    //This constructor is very useful when using Camel with Spring/Blueprint
    public TestingCacheManagerFactory(String xmlName,
            TopicConnection replicationTopicConnection, Topic replicationTopic,
            QueueConnection getQueueConnection, Queue getQueue) {
        this.xmlName = xmlName;
        this.replicationTopicConnection = replicationTopicConnection;
        this.replicationTopic = replicationTopic;
        this.getQueue = getQueue;
        this.getQueueConnection = getQueueConnection;
    }

    @Override
    protected synchronized CacheManager createCacheManagerInstance() {
        //Singleton
        if (cacheManager == null) {
            cacheManager = new WrappedCacheManager(getClass().getResourceAsStream(xmlName));
        }

        return cacheManager;
    }

    //Wrapping Ehcache's CacheManager to be able to add JMSCacheManagerPeerProvider
    public class WrappedCacheManager extends CacheManager {
        public WrappedCacheManager(InputStream xmlConfig) {
            super(xmlConfig);
            JMSCacheManagerPeerProvider jmsCMPP = new JMSCacheManagerPeerProvider(this,
                        replicationTopicConnection,
                        replicationTopic,
                        getQueueConnection,
                        getQueue,
                        AcknowledgementMode.AUTO_ACKNOWLEDGE,
                        true);
            cacheManagerPeerProviders.put(jmsCMPP.getScheme(), jmsCMPP);
            jmsCMPP.init();
        }
    }
}
```

Next step is to write your own implementation of **CacheLoaderWrapper**, the easiest one is:

```
public class WrappedJMSCacheLoader implements CacheLoaderWrapper {

[...]

    //This constructor is very useful when using Camel with Spring/Blueprint
    public WrappedJMSCacheLoader(QueueConnection getQueueConnection,
            Queue getQueue, AcknowledgementMode acknowledgementMode,
            int timeoutMillis) {
        this.getQueueConnection = getQueueConnection;
        this.getQueue = getQueue;
        this.acknowledgementMode = acknowledgementMode;
        this.timeoutMillis = timeoutMillis;
    }

    @Override
    public void init(Ehcache cache) {
        jmsCacheLoader = new JMSCacheLoader(cache, defaultLoaderArgument,
                getQueueConnection, getQueue, acknowledgementMode,
                timeoutMillis);
    }

    @Override
    public CacheLoader clone(Ehcache arg0) throws CloneNotSupportedException {
        return jmsCacheLoader.clone(arg0);
    }

    @Override
    public void dispose() throws CacheException {
        jmsCacheLoader.dispose();
    }

[...]

}
```

At the third step you can take care about Camel Cache options (prepare their values):

- cacheManagerFactory
- eventListenerRegistry
- cacheLoaderRegistry

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:camel="http://camel.apache.org/schema/spring"
       xsi:schemaLocation="
       http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
       http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

    <bean id="queueConnection1" factory-bean="amqCF" factory-method="createQueueConnection"
class="javax.jms.QueueConnection" />
    <bean id="topicConnection1" factory-bean="amqCF" factory-method="createTopicConnection"
class="javax.jms.TopicConnection" />
```

```
    <bean id="queue1" class="org.apache.activemq.command.ActiveMQQueue">
        <constructor-arg ref="getQueue" />
    </bean>
    <bean id="topic1" class="org.apache.activemq.command.ActiveMQTopic">
        <constructor-arg ref="getTopic" />
    </bean>

    <bean id="jmsListener1" class="net.sf.ehcache.distribution.jms.JMSCacheReplicator">
        <constructor-arg index="0" value="true" />
        <constructor-arg index="1" value="true" />
        <constructor-arg index="2" value="true" />
        <constructor-arg index="3" value="true" />
        <constructor-arg index="4" value="false" />
        <constructor-arg index="5" value="0" />
    </bean>

    <bean id="jmsLoader1" class="my.cache.replication.WrappedJMSCacheLoader">
        <constructor-arg index="0" ref="queueConnection1" />
        <constructor-arg index="1" ref="queue1" />
        <constructor-arg index="2" value="AUTO_ACKNOWLEDGE" />
        <constructor-arg index="3" value="30000" />
    </bean>

    <bean id="cacheManagerFactory1" class="my.cache.replication.TestingCacheManagerFactory">
        <constructor-arg index="0" value="ehcache_jms_test.xml" />
        <constructor-arg index="1" ref="topicConnection1" />
        <constructor-arg index="2" ref="topic1" />
        <constructor-arg index="3" ref="queueConnection1" />
        <constructor-arg index="4" ref="queue1" />
    </bean>

    <bean id="eventListenerRegistry1"
class="org.apache.camel.component.cache.CacheEventListenerRegistry">
        <constructor-arg>
            <list>
                <ref bean="jmsListener1" />
            </list>
        </constructor-arg>
    </bean>

    <bean id="cacheLoaderRegistry1"
class="org.apache.camel.component.cache.CacheLoaderRegistry">
        <constructor-arg>
            <list>
                <ref bean="jmsLoader1"/>
            </list>
        </constructor-arg>
    </bean>
</beans>
```

The final step is to define some routes using Cache component

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:camel="http://camel.apache.org/schema/spring"
       xsi:schemaLocation="
```

```
      http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
      http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

   <bean id="getQueue" class="java.lang.String">
      <constructor-arg value="replicationGetQueue" />
   </bean>

   <bean id="getTopic" class="java.lang.String">
      <constructor-arg value="replicationTopic" />
   </bean>

   <!-- Import the xml file explained at step three -->
   <import resource="JMSReplicationCache1.xml"/>

   <camelContext xmlns="http://camel.apache.org/schema/spring">
      <camel:endpoint id="fooCache1" uri="cache:foo?
cacheManagerFactory=#cacheManagerFactory1&ventListenerRegistry=#eventListenerRegistry1&acheL
oaderRegistry=#cacheLoaderRegistry1"/>

      <camel:route>
         <camel:from uri="direct:addRoute"/>
         <camel:setHeader headerName="CamelCacheOperation">
            <camel:constant>CamelCacheAdd</camel:constant>
         </camel:setHeader>
         <camel:setHeader headerName="CamelCacheKey">
            <camel:constant>foo</camel:constant>
         </camel:setHeader>
         <camel:to ref="fooCache1"/>
      </camel:route>

   </camelContext>

   <bean id="amqCF" class="org.apache.activemq.ActiveMQConnectionFactory">
      <property name="brokerURL" value="vm://localhost?broker.persistent=false"/>
   </bean>

   <bean id="activemq" class="org.apache.camel.component.jms.JmsComponent">
      <property name="connectionFactory">
         <ref bean="amqCF"/>
      </property>
   </bean>

</beans>
```

CHAPTER 17. CASSANDRA

CAMEL CASSANDRA COMPONENT

Available as of Camel 2.15

Apache Cassandra is an open source NoSQL database designed to handle large amounts on commodity hardware. Like Amazon's DynamoDB, Cassandra has a peer-to-peer and master-less architecture to avoid single point of failure and garanty high availability. Like Google's BigTable, Cassandra data is structured using column families which can be accessed through the Thrift RPC API or a SQL-like API called CQL.

This component aims at integrating Cassandra 2.0+ using the CQL3 API (not the Thrift API). It's based on Cassandra Java Driver provided by DataStax.

Maven users will need to add the following dependency to their **pom.xml**:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-cassandraql</artifactId>
    <version>x.y.z</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The endpoint can initiate the Cassandra connection or use an existing one.

URI	Description
cql:localhost/keyspace	Single host, default port, usual for testing
cql:host1,host2/keyspace	Multi host, default port
cql:host1,host2:9042/keyspace	Multi host, custom port
cql:host1,host2	Default port and keyspace
cql:bean:sessionRef	Provided Session reference
cql:bean:clusterRef/keyspace	Provided Cluster reference

To fine tune the Cassandra connection (SSL options, pooling options, load balancing policy, retry policy, reconnection policy...), create your own Cluster instance and give it to the Camel endpoint.

ENDPOINT OPTIONS

Option	Default	Description
clusterName		Cluster name
username and password		Session authentication
cql		CQL query. Can be overriden with a message header.
consistencyLevel		**ANY**, **ONE**, **TWO**, **QUORUM**, **LOCAL_QUORUM**...
prepareStatements	**true**	Use prepared statement (default) or not
resultSetConversionStrategy	**ALL**	How is ResultSet converted transformed into message body **ALL**, **ONE**, **LIMIT_10**, **LIMIT_100**...

MESSAGES

INCOMING MESSAGE

The Camel Cassandra endpoint expects a bunch of simple objects (**Object** or **Object[]** or **Collection<Object>**) which will be bound to the CQL statement as query parameters. If message body is null or empty, then CQL query will be executed without binding parameters.

Headers:

- **CamelCqlQuery** (optional, **String** or **RegularStatement**): CQL query either as a plain String or built using the **QueryBuilder**.

OUTGOING MESSAGE

The Camel Cassandra endpoint produces one or many a Cassandra Row objects depending on the **resultSetConversionStrategy**:

- **List<Row>** if **resultSetConversionStrategy** is **ALL** or **LIMIT_[0-9]+**
- Single **Row** if **resultSetConversionStrategy** is **ONE**
- Anything else, if **resultSetConversionStrategy** is a custom implementation of the **ResultSetConversionStrategy**

REPOSITORIES

Cassandra can be used to store message keys or messages for the idempotent and aggregation EIP.

Cassandra might not be the best tool for queuing use cases yet, read Cassandra anti-patterns queues and queue like datasets. It's advised to use LeveledCompaction and a small GC grace setting for these tables to allow tombstoned rows to be removed quickly.

IDEMPOTENT REPOSITORY

The **NamedCassandraIdempotentRepository** stores messages keys in a Cassandra table like this:

```
CREATE TABLE CAMEL_IDEMPOTENT (
  NAME varchar,   -- Repository name
  KEY varchar,    -- Message key
  PRIMARY KEY (NAME, KEY)
) WITH compaction = {'class':'LeveledCompactionStrategy'}
  AND gc_grace_seconds = 86400;
```

This repository implementation uses lightweight transactions (also known as Compare and Set) and requires Cassandra 2.0.7+.

Alternatively, the **CassandraIdempotentRepository** does not have a **NAME** column and can be extended to use a different data model.

Option	Default	Description
table	**CAMEL_IDEMPOTENT**	Table name
pkColumns	**NAME**, **KEY**	Primary key columns
name		Repository name, value used for **NAME** column
ttl		Key time to live
writeConsistencyLevel		Consistency level used to insert/delete key: **ANY**, **ONE**, **TWO**, **QUORUM**, **LOCAL_QUORUM**…
readConsistencyLevel		Consistency level used to read/check key: **ONE**, **TWO**, **QUORUM**, **LOCAL_QUORUM**…

AGGREGATION REPOSITORY

The **NamedCassandraAggregationRepository** stores exchanges by correlation key in a Cassandra table like this:

```
CREATE TABLE CAMEL_AGGREGATION (
  NAME varchar,        -- Repository name
  KEY varchar,         -- Correlation id
  EXCHANGE_ID varchar, -- Exchange id
  EXCHANGE blob,       -- Serialized exchange
  PRIMARY KEY (NAME, KEY)
) WITH compaction = {'class':'LeveledCompactionStrategy'}
  AND gc_grace_seconds = 86400;
```

Alternatively, the **CassandraAggregationRepository** does not have a **NAME** column and can be extended to use a different data model.

Option	Default	Description
table	**CAMEL_AGGREGATION**	Table name
pkColumns	**NAME**,**KEY**	Primary key columns
exchangeIdColumn	**EXCHANGE_ID**	Exchange Id column
exchangeColumn	**EXCHANGE**	Exchange content column
name		Repository name, value used for **NAME** column
ttl		Exchange time to live
writeConsistencyLevel		Consistency level used to insert/delete exchange: **ANY**, **ONE**, **TWO**, **QUORUM**, **LOCAL_QUORUM**…
readConsistencyLevel		Consistency level used to read/check exchange: **ONE**, **TWO**, **QUORUM**, **LOCAL_QUORUM**…

CHAPTER 18. CHUNK

CHUNK COMPONENT

Available as of Camel 2.15

The **chunk:** component allows for processing a message using a Chunk template. This can be ideal when using Templating to generate responses for requests.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
<groupId>org.apache.camel</groupId>
<artifactId>camel-chunk</artifactId>
<version>x.x.x</version> <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
chunk:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
encoding	**null**	Character encoding of the resource content.
themesFolder	**null**	Alternative folder to scan for a template name.
themeSubfolder	**null**	Alternative subfolder to scan for a template name if themeFolder parameter is set.
themeLayer	**null**	A specific layer of a template file to use as template.
extension	**null**	Alternative extension to scan for a template name if themeFolder and themeSubfolder are set.

Chunk component will look for a specific template in *themes* folder with extensions *.chtml* or *.cxml.* If you need to specify a different folder or extensions, you will need to use the specific options listed above.

CHUNK CONTEXT

Camel will provide exchange information in the Chunk context (just a **Map**). The **Exchange** is transferred as:

key	value
exchange	The **Exchange** itself.
exchange.properties	The **Exchange** properties.
headers	The headers of the In message.
camelContext	The Camel Context.
request	The In message.
body	The In message body.
response	The Out message (only for InOut message exchange pattern).

DYNAMIC TEMPLATES

Camel provides two headers by which you can define a different resource location for a template or the template content itself. If any of these headers is set then Camel uses this over the endpoint configured resource. This allows you to provide a dynamic template at runtime.

Header	Type	Description	Support Version
ChunkConstants.CHUNK_RESOURCE_URI	String	A URI for the template resource to use instead of the endpoint configured.	
ChunkConstants.CHUNK_TEMPLATE	String	The template to use instead of the endpoint configured.	

SAMPLES

For example you could use something like:

```
from("activemq:My.Queue").
to("chunk:template");
```

To use a Chunk template to formulate a response for a message for InOut message exchanges (where there is a **JMSReplyTo** header).

If you want to use InOnly and consume the message and send it to another destination you could use:

```
from("activemq:My.Queue").
to("chunk:template").
to("activemq:Another.Queue");
```

It's possible to specify what template the component should use dynamically via a header, so for example:

```
from("direct:in").
setHeader(ChunkConstants.CHUNK_RESOURCE_URI).constant("template").
to("chunk:dummy");
```

An example of Chunk component options use:

```
from("direct:in").
to("chunk:file_example?themeFolder=template&themeSubfolder=subfolder&extension=chunk");
```

In this example Chunk component will look for the file *file_example.chunk* in the folder *template/subfolder.*

THE EMAIL SAMPLE

In this sample we want to use Chunk templating for an order confirmation email. The email template is laid out in Chunk as:

```
Dear {$headers.lastName}, {$headers.firstName}

Thanks for the order of {$headers.item}.

Regards Camel Riders Bookstore
{$body}
```

CHAPTER 19. CLASS

CLASS COMPONENT

Available as of Apache Camel 2.4

The **class:** component binds beans to message exchanges. It works in the same way as the Bean component but instead of looking up beans from a Registry it creates the bean based on the class name.

URI FORMAT

```
class:className[?options]
```

Where **className** is the fully qualified class name to create and use as bean.

OPTIONS

Name	Type	Default	Description
method	**String**	**null**	The method name that bean will be invoked. If not provided, Apache Camel will try to pick the method itself. In case of ambiguity an exception is thrown. See Bean Binding for more details.
multiParameterArray	**boolean**	**false**	How to treat the parameters which are passed from the message body; if it is **true**, the In message body should be an array of parameters.

You can append query options to the URI in the following format, **?option=value&option=value&...**

USING

You simply use the **class** component just as the Bean component but by specifying the fully qualified classname instead. For example to use the **MyFooBean** you have to do as follows:

```
from("direct:start").to("class:org.apache.camel.component.bean.MyFooBean").to("mock:result");
```

You can also specify which method to invoke on the **MyFooBean**, for example **hello**:

```
from("direct:start").to("class:org.apache.camel.component.bean.MyFooBean?
method=hello").to("mock:result");
```

SETTING PROPERTIES ON THE CREATED INSTANCE

In the endpoint uri you can specify properties to set on the created instance, for example if it has a **setPrefix** method:

```
from("direct:start")
    .to("class:org.apache.camel.component.bean.MyPrefixBean?prefix=Bye")
    .to("mock:result");
```

And you can also use the **#** syntax to refer to properties to be looked up in the Registry.

```
from("direct:start")
    .to("class:org.apache.camel.component.bean.MyPrefixBean?cool=#foo")
    .to("mock:result");
```

Which will lookup a bean from the Registry with the id **foo** and invoke the **setCool** method on the created instance of the **MyPrefixBean** class.

NOTE

See more details at the Bean component as the **class** component works in much the same way.

- Bean
- Bean Binding
- Bean Integration

CHAPTER 20. CMIS

CMIS COMPONENT

Available as of Camel 2.11 The cmis component uses the Apache Chemistry client API and allows you to add/read nodes to/from a CMIS compliant content repositories.

URI FORMAT

```
cmis://cmisServerUrl[?options]
```

You can append query options to the URI in the following format, ?options=value&option2=value&...

URI OPTIONS

Name	Default Value	Context	Description
queryMode	**false**	Producer	If true, will execute the cmis query from the message body and return result, otherwise will create a node in the cmis repository
query	**String**	Consumer	The cmis query to execute against the repository. If not specified, the consumer will retrieve every node from the content repository by iterating the content tree recursively
username	**null**	Both	Username for the cmis repository
password	**null**	Both	Password for the cmis repository
repositoryId	**null**	Both	The Id of the repository to use. If not specified the first available repository is used
pageSize	**100**	Both	Number of nodes to retrieve per page

readCount	**0**	Both	Max number of nodes to read
readContent	**false**	Both	If set to true, the content of document node will be retrieved in addition to the properties

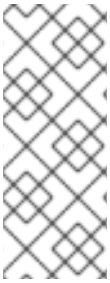
USAGE

MESSAGE HEADERS EVALUATED BY THE PRODUCER

Header	Default Value	Description
CamelCMISFolderPath	/	The current folder to use during the execution. If not specified will use the root folder
CamelCMISRetrieveContent	**false**	In **queryMode** this header will force the producer to retrieve the content of document nodes.
CamelCMISReadSize	**0**	Max number of nodes to read.
cmis:path	**null**	If **CamelCMISFolderPath** is not set, will try to find out the path of the node from this cmis property and it is name
cmis:name	**null**	If **CamelCMISFolderPath** is not set, will try to find out the path of the node from this cmis property and it is path
cmis:objectTypeId	**null**	The type of the node
cmis:contentStreamMimeType	**null**	The mimetype to set for a document

MESSAGE HEADERS SET DURING QUERYING PRODUCER OPERATION

Header	Type	Description
CamelCMISResultCount	**Integer**	Number of nodes returned from the query.



POM.XML

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-cmis</artifactId>
  <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.11 or higher).

CHAPTER 21. COMETD

COMETD COMPONENT

The **cometd:** component is a transport for working with the jetty implementation of the cometd/bayeux protocol. Using this component in combination with the dojo toolkit library it's possible to push Apache Camel messages directly into the browser using an AJAX based mechanism.

URI FORMAT

```
cometd://host:port/channelName[?options]
```

The **channelName** represents a topic that can be subscribed to by the Apache Camel endpoints.

EXAMPLES

```
cometd://localhost:8080/service/mychannel
cometds://localhost:8443/service/mychannel
```

where **cometds:** represents an SSL configured endpoint.

OPTIONS

Name	Default Value	Description
resourceBase		The root directory for the web resources or classpath. Use the protocol file: or classpath: depending if you want that the component loads the resource from file system or classpath. Classpath is required for OSGI deployment where the resources are packaged in the jar
baseResource		**Camel 2.7:** The root directory for the web resources or classpath. Use the protocol file: or classpath: depending if you want that the component loads the resource from file system or classpath. Classpath is required for OSGI deployment where the resources are packaged in the jar
timeout	**240000**	The server side poll timeout in milliseconds. This is how long the server will hold a reconnect request before responding.

interval	**0**	The client side poll timeout in milliseconds. How long a client will wait between reconnects
maxInterval	**30000**	The max client side poll timeout in milliseconds. A client will be removed if a connection is not received in this time.
multiFrameInterval	**1500**	The client side poll timeout, if multiple connections are detected from the same browser.
jsonCommented	**true**	If **true**, the server will accept JSON wrapped in a comment and will generate JSON wrapped in a comment. This is a defence against Ajax Hijacking.
logLevel	**1**	**0**=none, **1**=info, **2**=debug.
sslContextParameters		**Camel 2.9:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility.
crossOriginFilterOn	**false**	**Camel 2.10:** If **true**, the server will support for cross-domain filtering
allowedOrigins	*	**Camel 2.10:** The origins domain that support to cross, if the **crosssOriginFilterOn** is **true**
filterPath		**Camel 2.10:** The filterPath will be used by the CrossOriginFilter, if the **crosssOriginFilterOn** is **true**
disconnectLocalSession	**true**	**Camel 2.10.5/2.11.1: (Producer only)**: Whether to disconnect local sessions after publishing a message to its channel. Disconnecting local session is needed as they are not swept by default by CometD, and therefore you can run out of memory.

You can append query options to the URI in the following format, **?option=value&option=value&...**

Here is some examples of how to pass the parameters.

For file (when the Webapp resources are located in the Web Application directory) **cometd://localhost:8080?resourceBase=file./webapp**. For classpath (when the web resources are packaged inside the Webapp folder) **cometd://localhost:8080?resourceBase=classpath:webapp**.

AUTHENTICATION

Available as of Camel 2.8

You can configure custom **SecurityPolicy** and **Extension**'s to the **CometdComponent** which allows you to use authentication as documented here

SETTING UP SSL FOR COMETD COMPONENT

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.9, the Cometd component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the Cometd component. You need to configure SSL on the **CometdComponent** class.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

TrustManagersParameters tmp = new TrustManagersParameters();
tmp.setKeyStore(ksp);

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);
scp.setTrustManagers(tmp);

CometdComponent commetdComponent = getContext().getComponent("cometds",
CometdComponent.class);
commetdComponent.setSslContextParameters(scp);
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
      id="sslContextParameters">
    <camel:keyManagers
```

```
        keyPassword="keyPassword">
      <camel:keyStore
          resource="/users/home/server/keystore.jks"
          password="keystorePassword"/>
    </camel:keyManagers>
    <camel:trustManagers>
      <camel:keyStore
          resource="/users/home/server/keystore.jks"
          password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>

  <bean id="cometd" class="org. apache. camel. component.cometd.CometdComponent">
    <property name="sslContextParameters" ref="sslContextParameters"/>
  </bean>
  ...
  <to uri="cometds://127.0.0.1:443/service/test?baseResource=file:./target/test-
classes/webapp&timeout=240000&interval=0&maxInterval=30000&multiFrameInterval=1500&jsonCom
mented=true&logLevel=2&sslContextParameters=#sslContextParameters"/>...
```

CHAPTER 22. CONTEXT

CONTEXT COMPONENT

Available as of Camel 2.7

The **context** component allows you to create new Camel Components from a CamelContext with a number of routes which is then treated as a black box, allowing you to refer to the local endpoints within the component from other CamelContexts.

It is similar to the Routebox component in idea, though the Context component tries to be really simple for end users; just a simple convention over configuration approach to refer to local endpoints inside the CamelContext Component.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-context</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
context:camelContextId:localEndpointName[?options]
```

Or you can omit the "context:" prefix.

```
camelContextId:localEndpointName[?options]
```

- **camelContextId** is the ID you used to register the CamelContext into the Registry.
- **localEndpointName** can be a valid Camel URI evaluated within the black box CamelContext. Or it can be a logical name which is mapped to any local endpoints. For example if you locally have endpoints like **direct:invoices** and **seda:purchaseOrders** inside a CamelContext of id **supplyChain**, then you can just use the URIs **supplyChain:invoices** or **supplyChain:purchaseOrders** to omit the physical endpoint kind and use pure logical URIs.

You can append query options to the URI in the following format, **?option=value&option=value&...**

EXAMPLE

In this example we'll create a black box context, then we'll use it from another CamelContext.

DEFINING THE CONTEXT COMPONENT

First you need to create a CamelContext, add some routes in it, start it and then register the CamelContext into the Registry (JNDI, Spring, Guice or OSGi etc).

This can be done in the usual Camel way from this test case (see the createRegistry() method); this example shows Java and JNDI being used...

```
// lets create our black box as a camel context and a set of routes
DefaultCamelContext blackBox = new DefaultCamelContext(registry);
blackBox.setName("blackBox");
blackBox.addRoutes(new RouteBuilder() {
    @Override
    public void configure() throws Exception {
        // receive purchase orders, lets process it in some way then send an invoice
        // to our invoice endpoint
        from("direct:purchaseOrder").
          setHeader("received").constant("true").
          to("direct:invoice");
    }
});
blackBox.start();

registry.bind("accounts", blackBox);
```

Notice in the above route we are using pure local endpoints (**direct** and **seda**). Also note we expose this CamelContext using the **accounts** ID. We can do the same thing in Spring via

```
<camelContext id="accounts" xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct:purchaseOrder"/>
    ...
    <to uri="direct:invoice"/>
  </route>
</camelContext>
```

USING THE CONTEXT COMPONENT

Then in another CamelContext we can then refer to this "accounts black box" by just sending to **accounts:purchaseOrder** and consuming from **accounts:invoice**.

If you prefer to be more verbose and explicit you could use **context:accounts:purchaseOrder** or even **context:accounts:direct://purchaseOrder** if you prefer. But using logical endpoint URIs is preferred as it hides the implementation detail and provides a simple logical naming scheme.

For example if we wish to then expose this accounts black box on some middleware (outside of the black box) we can do things like...

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <!-- consume from an ActiveMQ into the black box -->
    <from uri="activemq:Accounts.PurchaseOrders"/>
    <to uri="accounts:purchaseOrders"/>
  </route>
  <route>
    <!-- lets send invoices from the black box to a different ActiveMQ Queue -->
    <from uri="accounts:invoice"/>
```

```
    <to uri="activemq:UK.Accounts.Invoices"/>
  </route>
</camelContext>
```

NAMING ENDPOINTS

A context component instance can have many public input and output endpoints that can be accessed from outside it's CamelContext. When there are many it is recommended that you use logical names for them to hide the middleware as shown above.

However when there is only one input, output or error/dead letter endpoint in a component we recommend using the common posix shell names **in**, **out** and **err**

CHAPTER 23. CONTROLBUS COMPONENT

CONTROLBUS COMPONENT

Available as of Camel 2.11

The **controlbus:** component provides easy management of Camel applications based on the Control Bus EIP pattern. For example, by sending a message to an Endpoint you can control the lifecycle of routes, or gather performance statistics.

```
controlbus:command[?options]
```

Where **command** can be any string to identify which type of command to use.

COMMANDS

Command	Description
route	To control routes using the **routeId** and **action** parameter.
language	Allows you to specify a Language to use for evaluating the message body. If there is any result from the evaluation, then the result is put in the message body.

OPTIONS

Name	Default Value	Description
routeId	**null**	To specify a route by its **id**.

action	**null**	To denote an action that can be either: **start**, **stop**, or **status**. To either start or stop a route, or to get the status of the route as output in the message body. You can use **suspend** and **resume** from **Camel 2.11.1** onwards to either suspend or resume a route. And from **Camel 2.11.1** onwards you can use **stats** to get performance statics returned in XML format; the **routeId** option can be used to define which route to get the performance stats for, if **routeId** is not defined, then you get statistics for the entire CamelContext.
async	**false**	Whether to execute the control bus task asynchronously. **Important:** If this option is enabled, then any result from the task is **not** set on the Exchange. This is only possible if executing tasks synchronously.
loggingLevel	**INFO**	Logging level used for logging when task is done, or if any exceptions occurred during processing the task.

You can append query options to the URI in the following format, **?option=value&option=value&...**

SAMPLES

USING ROUTE COMMAND

The route command allows you to do common tasks on a given route very easily, for example to start a route, you can send an empty message to this endpoint:

```
template.sendBody("controlbus:route?routeId=foo&action=start", null);
```

To get the status of the route, you can do:

```
String status = template.requestBody("controlbus:route?routeId=foo&action=status", null,
String.class);
```

GETTING PERFORMANCE STATISTICS

Available as of Camel 2.11.1

This requires JMX to be enabled (is by default) then you can get the performance statics per route, or for the CamelContext. For example to get the statics for a route named foo, we can do:

```
String xml = template.requestBody("controlbus:route?routeId=foo&action=stats", null, String.class);
```

The returned statics is in XML format. Its the same data you can get from JMX with the **dumpRouteStatsAsXml** operation on the **ManagedRouteMBean**.

To get statics for the entire CamelContext you just omit the routeId parameter as shown below:

```
String xml = template.requestBody("controlbus:route?action=stats", null, String.class);
```

USING SIMPLE LANGUAGE

You can use the Simple language with the control bus, for example to stop a specific route, you can send a message to the **"controlbus:language:simple"** endpoint containing the following message:

```
template.sendBody("controlbus:language:simple", "${camelContext.stopRoute('myRoute')}");
```

As this is a void operation, no result is returned. However, if you want the route status you can do:

```
String status = template.requestBody("controlbus:language:simple",
"${camelContext.getRouteStatus('myRoute')}", String.class);
```

Notice: its easier to use the **route** command to control lifecycle of routes. The **language** command allows you to execute a language script that has stronger powers such as Groovy or to some extend the Simple language.

For example to shutdown Camel itself you can do:

```
template.sendBody("controlbus:language:simple?async=true", "${camelContext.stop()}");
```

Notice we use **async=true** to stop Camel asynchronously as otherwise we would be trying to stop Camel while it was in-flight processing the message we sent to the control bus component.

NOTE

You can also use other languages such as Groovy, etc.

- ControlBus EIP
- JMX Component
- Using JMX with Camel

CHAPTER 24. COUCHDB

CAMEL COUCHDB COMPONENT

Available as of Camel 2.11

The **couchdb:** component allows you to treat CouchDB instances as a producer or consumer of messages. Using the lightweight LightCouch API, this camel component has the following features:

- As a consumer, monitors couch changesets for inserts, updates and deletes and publishes these as messages into camel routes.
- As a producer, can save or update documents into couch.
- Can support as many endpoints as required, eg for multiple databases across multiple instances.
- Ability to have events trigger for only deletes, only inserts/updates or all (default).
- Headers set for sequenceId, document revision, document id, and HTTP method type.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-couchdb</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
couchdb:http://hostname[:port]/database?[options]
```

Where **hostname** is the hostname of the running couchdb instance. Port is optional and if not specified then defaults to 5984.

OPTIONS

Property	Default	Description
deletes	**true**	document deletes are published as events
updates	**true**	document inserts/updates are published as events
heartbeat	**30000**	how often to send an empty message to keep socket alive in millis

createDatabase	**true**	create the database if it does not already exist
username	**null**	username in case of authenticated databases
password	**null**	password for authenticated databases

HEADERS

The following headers are set on exchanges during message transport.

Property	Value
CouchDbDatabase	the database the message came from
CouchDbSeq	the couchdb changeset sequence number of the update / delete message
CouchDbId	the couchdb document id
CouchDbRev	the couchdb document revision
CouchDbMethod	the method (delete / update)

Headers are set by the consumer once the message is received. The producer will also set the headers for downstream processors once the insert/update has taken place. Any headers set prior to the producer are ignored. That means for example, if you set CouchDbId as a header, it will not be used as the id for insertion, the id of the document will still be used.

MESSAGE BODY

The component will use the message body as the document to be inserted. If the body is an instance of String, then it will be marshalled into a GSON object before insert. This means that the string must be valid JSON or the insert / update will fail. If the body is an instance of a com.google.gson.JsonElement then it will be inserted as is. Otherwise the producer will throw an exception of unsupported body type.

SAMPLES

For example if you wish to consume all inserts, updates and deletes from a CouchDB instance running locally, on port 9999 then you could use the following:

```
from("couchdb:http://localhost:9999").process(someProcessor);
```

If you were only interested in deletes, then you could use the following

```
from("couchdb:http://localhost:9999?updates=false").process(someProcessor);
```

If you wanted to insert a message as a document, then the body of the exchange is used

```
from("someProducingEndpoint").process(someProcessor).to("couchdb:http://localhost:9999")
```

CHAPTER 25. CRYPTO (DIGITAL SIGNATURES)

CRYPTO COMPONENT FOR DIGITAL SIGNATURES

Available as of Apache Camel 2.3

Using Apache Camel cryptographic endpoints and Java's Cryptographic extension it is easy to create Digital Signatures for Exchanges. Apache Camel provides a pair of flexible endpoints which get used in concert to create a signature for an exchange in one part of the exchange's workflow and then verify the signature in a later part of the workflow.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-crypto</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

INTRODUCTION

Digital signatures make use Asymmetric Cryptographic techniques to sign messages. From a (very) high level, the algorithms use pairs of complimentary keys with the special property that data encrypted with one key can only be decrypted with the other. One, the private key, is closely guarded and used to 'sign' the message while the other, public key, is shared around to anyone interested in verifying your messages. Messages are signed by encrypting a digest of the message with the private key. This encrypted digest is transmitted along with the message. On the other side the verifier recalculates the message digest and uses the public key to decrypt the the digest in the signature. If both digest match the verifier knows only the holder of the private key could have created the signature.

Apache Camel uses the Signature service from the Java Cryptographic Extension to do all the heavy cryptographic lifting required to create exchange signatures. The following are some excellent sources for explaining the mechanics of Cryptography, Message digests and Digital Signatures and how to leverage them with the JCE.

- Bruce Schneier's Applied Cryptography
- Beginning Cryptography with Java by David Hook
- The ever insightful, Wikipedia Digital_signatures

URI FORMAT

As mentioned Apache Camel provides a pair of crypto endpoints to create and verify signatures

```
crypto:sign:name[?options]
crypto:verify:name[?options]
```

- **crypto:sign** creates the signature and stores it in the Header keyed by the constant **Exchange.SIGNATURE**, i.e. **"CamelDigitalSignature"**.
- **crypto:verify** will read in the contents of this header and do the verification calculation.

In order to correctly function, sign and verify need to share a pair of keys, sign requiring a **PrivateKey** and verify a **PublicKey** (or a **Certificate** containing one). Using the JCE is is very simple to generate these key pairs but it is usually most secure to use a KeyStore to house and share your keys. The DSL is very flexible about how keys are supplied and provides a number of mechanisms.

Note a **crypto:sign** endpoint is typically defined in one route and the complimentary **crypto:verify** in another, though for simplicity in the examples they appear one after the other. It goes without saying that both sign and verify should be configured identically.

OPTIONS

Name	Type	Default	Description
algorithm	**String**	**DSA**	The name of the JCE Signature algorithm that will be used.
alias	**String**	**null**	An alias name that will be used to select a key from the keystore.
bufferSize	**Integer**	**2048**	the size of the buffer used in the signature process.
certificate	**Certificate**	**null**	A Certificate used to verify the signature of the exchange's payload. Either this or a Public Key is required.
keystore	**KeyStore**	**null**	A reference to a JCE Keystore that stores keys and certificates used to sign and verify.
provider	**String**	**null**	The name of the JCE Security Provider that should be used.
privateKey	**PrivatKey**	**null**	The private key used to sign the exchange's payload.
publicKey	**PublicKey**	**null**	The public key used to verify the signature of the exchange's payload.

secureRandom	**secureRandom**	**null**	A reference to a **SecureRandom** object that wil lbe used to initialize the Signature service.
password	**char[]**	**null**	The password for the keystore.
clearHeaders	**String**	**true**	Remove camel crypto headers from Message after a verify operation (value can be **"true"**/{{"false"}}).

1) RAW KEYS

The most basic way to way to sign and verify an exchange is with a KeyPair as follows.

```
from("direct:keypair").to("crypto:sign://basic?privateKey=#myPrivateKey", "crypto:verify://basic?
publicKey=#myPublicKey", "mock:result");
```

The same can be achieved with the Spring XML Extensions using references to keys

```
<route>
    <from uri="direct:keypair"/>
    <to uri="crypto:sign://basic?privateKey=#myPrivateKey" />
    <to uri="crypto:verify://basic?publicKey=#myPublicKey" />
    <to uri="mock:result"/>
</route>
```

2) KEYSTORES AND ALIASES.

The JCE provides a very versatile KeyStore for housing pairs of PrivateKeys and Certificates keeping them encrypted and password protected. They can be retrieved from it by applying an alias to the retrieval apis. There are a number of ways to get keys and Certificates into a keystore most often this is done with the external 'keytool' application. This is a good example of using keytool to create a KeyStore with a self signed Cert and Private key.

The examples use a Keystore with a key and cert aliased by 'bob'. The password for the keystore and the key is 'letmein'

The following shows how to use a Keystore via the Fluent builders, it also shows how to load and initialize the keystore.

```
from("direct:keystore").to("crypto:sign://keystore?keystore=#keystore&alias=bob&password=letmein",
"crypto:verify://keystore?keystore=#keystore&alias=bob", "mock:result");
```

Again in Spring a ref is used to lookup an actual keystore instance.

```
<route>
```

```
    <from uri="direct:keystore"/>
    <to uri="crypto:sign://keystore?keystore=#keystore&lias=bob&assword=letmein" />
    <to uri="crypto:verify://keystore?keystore=#keystore&lias=bob" />
    <to uri="mock:result"/>
</route>
```

3) CHANGING JCE PROVIDER AND ALGORITHM

Changing the Signature algorithm or the Security provider is a simple matter of specifying their names. You will need to also use Keys that are compatible with the algorithm you choose.

```
KeyPairGenerator keyGen = KeyPairGenerator.getInstance("RSA");
keyGen.initialize(512, new SecureRandom());
keyPair = keyGen.generateKeyPair();
PrivateKey privateKey = keyPair.getPrivate();
PublicKey publicKey = keyPair.getPublic();

// we can set the keys explicitly on the endpoint instances.
context.getEndpoint("crypto:sign://rsa?algorithm=MD5withRSA",
DigitalSignatureEndpoint.class).setPrivateKey(privateKey);
context.getEndpoint("crypto:verify://rsa?algorithm=MD5withRSA",
DigitalSignatureEndpoint.class).setPublicKey(publicKey);
from("direct:algorithm").to("crypto:sign://rsa?algorithm=MD5withRSA", "crypto:verify://rsa?
algorithm=MD5withRSA", "mock:result");
```

```
from("direct:provider").to("crypto:sign://provider?privateKey=#myPrivateKey&provider=SUN",
"crypto:verify://provider?publicKey=#myPublicKey&provider=SUN", "mock:result");
```

or

```
<route>
    <from uri="direct:algorithm"/>
    <to uri="crypto:sign://rsa?algorithm=MD5withRSA&rivateKey=#rsaPrivateKey" />
    <to uri="crypto:verify://rsa?algorithm=MD5withRSA&ublicKey=#rsaPublicKey" />
    <to uri="mock:result"/>
</route>
```

```
<route>
    <from uri="direct:provider"/>
    <to uri="crypto:sign://provider?privateKey=#myPrivateKey&rovider=SUN" />
    <to uri="crypto:verify://provider?publicKey=#myPublicKey&rovider=SUN" />
    <to uri="mock:result"/>
</route>
```

4) CHANGING THE SIGNATURE MESASGE HEADER

It may be desirable to change the message header used to store the signature. A different header name can be specified in the route definition as follows

```
from("direct:signature-header").to("crypto:sign://another?
privateKey=#myPrivateKey&signatureHeader=AnotherDigitalSignature",
                                   "crypto:verify://another?
```

```
publicKey=#myPublicKey&signatureHeader=AnotherDigitalSignature", "mock:result");
```

or

```
<route>
    <from uri="direct:signature-header"/>
    <to uri="crypto:sign://another?
privateKey=#myPrivateKey&ignatureHeader=AnotherDigitalSignature" />
    <to uri="crypto:verify://another?
publicKey=#myPublicKey&ignatureHeader=AnotherDigitalSignature" />
    <to uri="mock:result"/>
</route>
```

5) CHANGING THE BUFFERSIZE

In case you need to update the size of the buffer...

```
from("direct:buffersize").to("crypto:sign://buffer?privateKey=#myPrivateKey&buffersize=1024",
"crypto:verify://buffer?publicKey=#myPublicKey&buffersize=1024", "mock:result");
```

or

```
<route>
    <from uri="direct:buffersize" />
    <to uri="crypto:sign://buffer?privateKey=#myPrivateKey&uffersize=1024" />
    <to uri="crypto:verify://buffer?publicKey=#myPublicKey&uffersize=1024" />
    <to uri="mock:result"/>
</route>
```

6) SUPPLYING KEYS DYNAMICALLY.

When using a Recipient list or similar EIP the recipient of an exchange can vary dynamically. Using the same key across all recipients may neither be feasible or desirable. It would be useful to be able to specify the signature keys dynamically on a per exchange basis. The exchange could then be dynamically enriched with the key of its target recipient prior to signing. To facilitate this the signature mechanisms allow for keys to be supplied dynamically via the message headers below

- **Exchange.SIGNATURE_PRIVATE_KEY**, **"CamelSignaturePrivateKey"**
- **Exchange.SIGNATURE_PUBLIC_KEY_OR_CERT**, **"CamelSignaturePublicKeyOrCert"**

```
from("direct:headerkey-sign").to("crypto:sign://alias");
from("direct:headerkey-verify").to("crypto:verify://alias", "mock:result");
```

or

```
<route>
    <from uri="direct:headerkey-sign"/>
    <to uri="crypto:sign://headerkey" />
</route>
<route>
    <from uri="direct:headerkey-verify"/>
```

```
    <to uri="crypto:verify://headerkey" />
    <to uri="mock:result"/>
</route>
```

Better again would be to dynamically supply a keystore alias. Again the alias can be supplied in a message header

- **Exchange.KEYSTORE_ALIAS**, **"CamelSignatureKeyStoreAlias"**

```
from("direct:alias-sign").to("crypto:sign://alias?keystore=#keystore");
from("direct:alias-verify").to("crypto:verify://alias?keystore=#keystore", "mock:result");
```

or

```
<route>
    <from uri="direct:alias-sign"/>
    <to uri="crypto:sign://alias?keystore=#keystore" />
</route>
<route>
    <from uri="direct:alias-verify"/>
    <to uri="crypto:verify://alias?keystore=#keystore" />
    <to uri="mock:result"/>
</route>
```

The header would be set as follows

```
Exchange unsigned = getMandatoryEndpoint("direct:alias-sign").createExchange();
unsigned.getIn().setBody(payload);
unsigned.getIn().setHeader(DigitalSignatureConstants.KEYSTORE_ALIAS, "bob");
unsigned.getIn().setHeader(DigitalSignatureConstants.KEYSTORE_PASSWORD,
"letmein".toCharArray());
template.send("direct:alias-sign", unsigned);
Exchange signed = getMandatoryEndpoint("direct:alias-sign").createExchange();
signed.getIn().copyFrom(unsigned.getOut());
signed.getIn().setHeader(KEYSTORE_ALIAS, "bob");
template.send("direct:alias-verify", signed);
```

See also:

- Crypto is also available as a Data Format

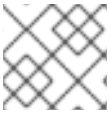
CHAPTER 26. CXF

CXF COMPONENT

The **cxf:** component provides integration with Apache CXF for connecting to JAX-WS services hosted in CXF.

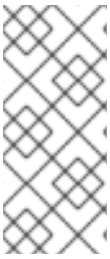
Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-cxf</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```



NOTE

If you want to learn about CXF dependencies, see the **WHICH-JARS** text file.



NOTE

When using CXF as a consumer, the CAMEL:CXF Bean Component allows you to factor out how message payloads are received from their processing as a RESTful or SOAP web service. This has the potential of using a multitude of transports to consume web services. The bean component's configuration is also simpler and provides the fastest method to implement web services using Camel and CXF.

NOTE

When using CXF in streaming modes (see DataFormat option), then also read about Stream caching.

URI FORMAT

```
cxf:bean:cxfEndpoint[?options]
```

Where **cxfEndpoint** represents a bean ID that references a bean in the Spring bean registry. With this URI format, most of the endpoint details are specified in the bean definition.

```
cxf://someAddress[?options]
```

Where **someAddress** specifies the CXF endpoint's address. With this URI format, most of the endpoint details are specified using options.

For either style above, you can append options to the URI as follows:

```
cxf:bean:cxfEndpoint?wsdlURL=wsdl/hello_world.wsdl&dataFormat=PAYLOAD
```

OPTIONS

Name	Required	Description
wsdlURL	No	The location of the WSDL. WSDL is obtained from endpoint address by default. For example: **file://local/wsdl/hello.wsdl** or **wsdl/hello.wsdl**
serviceClass	Yes	The name of the SEI (Service Endpoint Interface) class. This class can have, but does not require, JSR181 annotations. **Since 2.0,** this option is only required by POJO mode. If the wsdlURL option is provided, serviceClass is not required for PAYLOAD and MESSAGE mode. When wsdlURL option is used without serviceClass, the serviceName and portName (endpointName for Spring configuration) options **MUST** be provided. Since 2.0, it is possible to use **#** notation to reference a **serviceClass** object instance from the registry.. **Please be advised that the referenced object cannot be a Proxy (Spring AOP Proxy is OK)** as it relies on **Object.getClass().getName()** method for non Spring AOP Proxy. **Since 2.8,** it is possible to omit both wsdlURL and serviceClass options for PAYLOAD and MESSAGE mode. When they are omitted, arbitrary XML elements can be put in CxfPayload's body in PAYLOAD mode to facilitate CXF Dispatch Mode. For example: **org.apache.camel.Hello**
serviceName	Only if more than one **serviceName** present in WSDL	The service name this service is implementing, it maps to the **wsdl:service@name**. For example: **{http://org.apache.camel}ServiceName**

endpointName	Only if more than one **portName** under the **serviceName** is present, and it is required for camel-cxf consumer since camel 2.2	The port name this service is implementing, it maps to the **wsdl:port@name**. For example: **{http://org.apache.camel}PortName**
dataFormat	No	Which message data format the CXF endpoint supports. Possible values are: **POJO** *(default)*, **PAYLOAD**, **MESSAGE**.
relayHeaders	No	Please see the **Description ofrelayHeadersoption** section for this option. Should a CXF endpoint relay headers along the route. Currently only available when **dataFormat=POJO***Default*: **true***Example*: **true**, **false**
wrapped	No	Which kind of operation the CXF endpoint producer will invoke. Possible values are: **true**, **false** *(default)*.
wrappedStyle	No	**Since 2.5.0** The WSDL style that describes how parameters are represented in the SOAP body. If the value is **false**, CXF will chose the document-literal unwrapped style, If the value is **true**, CXF will chose the document-literal wrapped style
setDefaultBus	No	Specifies whether or not to use the default CXF bus for this endpoint. Possible values are: **true**, **false** *(default)*.
bus	No	Use **#** notation to reference a bus object from the registry—for example, **bus=#*busName***. The referenced object must be an instance of **org.apache.cxf.Bus**. By default, uses the default bus created by CXF Bus Factory.

cxfBinding	No	Use **#** notation to reference a CXF binding object from the registry—for example, **cxfBinding=#*bindingName***. The referenced object must be an instance of **org.apache.camel.component.cxf.CxfBinding**.
headerFilterStrategy	No	Use **#** notation to reference a header filter strategy object from the registry—for example, **headerFilterStrategy=#strategyName**. The referenced object must be an instance of **org.apache.camel.spi.HeaderFilterStrategy**.
loggingFeatureEnabled	No	New in 2.3, this option enables CXF Logging Feature which writes inbound and outbound SOAP messages to log. Possible values are: **true**, **false** *(default)*.
defaultOperationName	No	New in 2.4, this option will set the default **operationName** that will be used by the **CxfProducer** that invokes the remote service. For example: **defaultOperationName=greetMe**
defaultOperationNamespace	No	New in 2.4, this option will set the default operationNamespace that will be used by the CxfProducer which invokes the remote service. For example: **defaultOperationNamespace=http://apache.org/hello_world_soap_http**
synchronous	No	New in 2.5, this option will let CXF endpoint decide to use sync or async API to do the underlying work. The default value is **false**, which means **camel-cxf** endpoint will try to use async API by default.

publishedEndpointUrl	No	New in 2.5, this option overrides the endpoint URL that appears in the published WSDL that is accessed using the service address URL plus **?wsdl**. For example: **publshedEndpointUrl=http://example.com/service**
properties.*propName*	No	**Camel 2.8:** Allows you to set custom CXF properties in the endpoint URI. For example, setting **properties.mtom-enabled=true** to enable MTOM. To make sure that CXF does not switch the thread when starting the invocation, you can set **properties.org.apache.cxf.interceptor.OneWayProcessorInterceptor.USE_ORIGINAL_THREAD=true**.
allowStreaming	No	New in 2.8.2. This option controls whether the CXF component, when running in PAYLOAD mode (see below), will DOM parse the incoming messages into DOM Elements or keep the payload as a javax.xml.transform.Source object that would allow streaming in some cases.
skipFaultLogging	No	New in 2.11. This option controls whether the PhaseInterceptorChain skips logging the Fault that it catches.
cxfEndpointConfigurer	No	New in **Camel 2.11**. This option could apply the implementation of **org.apache.camel.component.cxf.CxfEndpointConfigurer which** supports to configure the CXF endpoint in programmatic way. Since **Camel 2.15.0,** user can configure the CXF server and client by implementing configure{Server|Client} method of **CxfEndpointConfigurer**.
username	No	New in **Camel 2.12.3** This option is used to set the basic authentication information of username for the CXF client.

password	No	New in **Camel 2.12.3** This option is used to set the basic authentication information of password for the CXF client.
continuationTimeout	No	New in **Camel 2.14.0** This option is used to set the CXF continuation timeout which could be used in CxfConsumer by default when the CXF server is using Jetty or Servlet transport. (Before **Camel 2.14.0**, CxfConsumer just set the continuation timeout to be 0, which means the continuation suspend operation never timeout.) Default: 30000 Example: continuation=80000

The **serviceName** and **portName** are QNames, so if you provide them be sure to prefix them with their **{namespace}** as shown in the examples above.

THE DESCRIPTIONS OF THE DATAFORMATS

DataFormat	Description
POJO	POJOs (plain old Java objects) are the Java parameters to the method being invoked on the target server. Both Protocol and Logical JAX-WS handlers are supported.
PAYLOAD	**PAYLOAD** is the message payload (the contents of the **soap:body**) after message configuration in the CXF endpoint is applied. Only Protocol JAX-WS handler is supported. Logical JAX-WS handler is not supported.
MESSAGE	**MESSAGE** is the raw message that is received from the transport layer. It is not suppose to touch or change Stream, some of the CXF interceptors will be removed if you are using this kind of DataFormat so you can't see any soap headers after the camel-cxf consumer and JAX-WS handler is not supported.
CXF_MESSAGE	New in **Camel 2.8.2**, **CXF_MESSAGE** allows for invoking the full capabilities of CXF interceptors by converting the message from the transport layer into a raw SOAP message

You can determine the data format mode of an exchange by retrieving the exchange property, **CamelCXFDataFormat**. The exchange key constant is defined in **org.apache.camel.component.cxf.CxfConstants.DATA_FORMAT_PROPERTY**.

CONFIGURING THE CXF ENDPOINTS WITH APACHE ARIES BLUEPRINT.

Since Camel 2.8, there is support for using Aries blueprint dependency injection for your CXF endpoints. The schema is very similar to the Spring schema, so the transition is fairly transparent.

For example:

```
 <blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:cm="http://aries.apache.org/blueprint/xmlns/blueprint-cm/v1.0.0"
          xmlns:camel-cxf="http://camel.apache.org/schema/blueprint/cxf"
    xmlns:cxfcore="http://cxf.apache.org/blueprint/core"
          xsi:schemaLocation="http://www.osgi.org/xmlns/blueprint/v1.0.0
http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd">

      <camel-cxf:cxfEndpoint id="routerEndpoint"
                address="http://localhost:9001/router"
                serviceClass="org.apache.servicemix.examples.cxf.HelloWorld">
        <camel-cxf:properties>
          <entry key="dataFormat" value="MESSAGE"/>
        </camel-cxf:properties>
      </camel-cxf:cxfEndpoint>

      <camel-cxf:cxfEndpoint id="serviceEndpoint"
   address="http://localhost:9000/SoapContext/SoapPort"
                serviceClass="org.apache.servicemix.examples.cxf.HelloWorld">
    </camel-cxf:cxfEndpoint>

    <camelContext xmlns="http://camel.apache.org/schema/blueprint">
       <route>
          <from uri="routerEndpoint"/>
          <to uri="log:request"/>
       </route>
    </camelContext>

</blueprint>
```

Currently the endpoint element is the first supported CXF namespacehandler.

You can also use the bean references just as in spring

```
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns:cm="http://aries.apache.org/blueprint/xmlns/blueprint-cm/v1.0.0"
          xmlns:jaxws="http://cxf.apache.org/blueprint/jaxws"
          xmlns:cxf="http://cxf.apache.org/blueprint/core"
          xmlns:camel="http://camel.apache.org/schema/blueprint"
          xmlns:camelcxf="http://camel.apache.org/schema/blueprint/cxf"
          xsi:schemaLocation="
            http://www.osgi.org/xmlns/blueprint/v1.0.0
http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd
          http://cxf.apache.org/blueprint/jaxws http://cxf.apache.org/schemas/blueprint/jaxws.xsd
```

```
        http://cxf.apache.org/blueprint/core http://cxf.apache.org/schemas/blueprint/core.xsd
        ">

    <camelcxf:cxfEndpoint id="reportIncident"
                address="/camel-example-cxf-blueprint/webservices/incident"
                wsdlURL="META-INF/wsdl/report_incident.wsdl"
                serviceClass="org.apache.camel.example.reportincident.ReportIncidentEndpoint">
    </camelcxf:cxfEndpoint>

    <bean id="reportIncidentRoutes"
class="org.apache.camel.example.reportincident.ReportIncidentRoutes" />

    <camelContext xmlns="http://camel.apache.org/schema/blueprint">
        <routeBuilder ref="reportIncidentRoutes"/>
    </camelContext>

</blueprint>
```

HOW TO ENABLE CXF'S LOGGINGOUTINTERCEPTOR IN MESSAGE MODE

CXF's **LoggingOutInterceptor** outputs outbound message that goes on the wire to logging system (**java.util.logging**). Since the **LoggingOutInterceptor** is in **PRE_STREAM** phase (but **PRE_STREAM** phase is removed in **MESSAGE** mode), you have to configure **LoggingOutInterceptor** to be run during the **WRITE** phase. The following is an example.

```
   <bean id="loggingOutInterceptor" class="org.apache.cxf.interceptor.LoggingOutInterceptor">
       <!--  it really should have been user-prestream but CXF does have such phase! -->
       <constructor-arg value="target/write"/>
   </bean>

<cxf:cxfEndpoint id="serviceEndpoint" address="http://localhost:9002/helloworld"
 serviceClass="org.apache.camel.component.cxf.HelloService">
 <cxf:outInterceptors>
     <ref bean="loggingOutInterceptor"/>
 </cxf:outInterceptors>
 <cxf:properties>
  <entry key="dataFormat" value="MESSAGE"/>
 </cxf:properties>
</cxf:cxfEndpoint>
```

DESCRIPTION OF RELAYHEADERS OPTION

There are *in-band* and *out-of-band* on-the-wire headers from the perspective of a JAXWS WSDL-first developer.

The *in-band* headers are headers that are explicitly defined as part of the WSDL binding contract for an endpoint such as SOAP headers.

The *out-of-band* headers are headers that are serialized over the wire, but are not explicitly part of the WSDL binding contract.

Headers relaying/filtering is bi-directional.

When a route has a CXF endpoint and the developer needs to have on-the-wire headers, such as SOAP headers, be relayed along the route to be consumed say by another JAXWS endpoint, then **relayHeaders** should be set to **true**, which is the default value.

AVAILABLE ONLY IN POJO MODE

The **relayHeaders=true** setting expresses an intent to relay the headers. The actual decision on whether a given header is relayed is delegated to a pluggable instance that implements the **MessageHeadersRelay** interface. A concrete implementation of **MessageHeadersRelay** will be consulted to decide if a header needs to be relayed or not. There is already an implementation of **SoapMessageHeadersRelay** which binds itself to well-known SOAP name spaces. Currently only out-of-band headers are filtered, and in-band headers will always be relayed when **relayHeaders=true**. If there is a header on the wire, whose name space is unknown to the runtime, then a fall back **DefaultMessageHeadersRelay** will be used, which simply allows all headers to be relayed.

The **relayHeaders=false** setting asserts that all headers, in-band and out-of-band, will be dropped.

You can plugin your own **MessageHeadersRelay** implementations overriding or adding additional ones to the list of relays. In order to override a preloaded relay instance just make sure that your **MessageHeadersRelay** implementation services the same name spaces as the one you looking to override. Also note, that the overriding relay has to service all of the name spaces as the one you looking to override, or else a runtime exception on route start up will be thrown as this would introduce an ambiguity in name spaces to relay instance mappings.

```
<cxf:cxfEndpoint ...>
  <cxf:properties>
    <entry key="org.apache.camel.cxf.message.headers.relays">
      <list>
        <ref bean="customHeadersRelay"/>
      </list>
    </entry>
  </cxf:properties>
 </cxf:cxfEndpoint>
 <bean id="customHeadersRelay"
class="org.apache.camel.component.cxf.soap.headers.CustomHeadersRelay"/>
```

Take a look at the tests that show how you'd be able to relay/drop headers here:

https://svn.apache.org/repos/asf/camel/branches/camel-1.x/components/camel-cxf/src/test/java/org/apache/camel/component/cxf/soap/headers/CxfMessageHeadersRelayTest.java

CHANGES SINCE RELEASE 2.0

- **POJO** and **PAYLOAD** modes are supported. In **POJO** mode, only out-of-band message headers are available for filtering as the in-band headers have been processed and removed from the header list by CXF. The in-band headers are incorporated into the **MessageContentList** in **POJO** mode. The **camel-cxf** component does make any attempt to remove the in-band headers from the **MessageContentList** If filtering of in-band headers is required, please use **PAYLOAD** mode or plug in a (pretty straightforward) CXF interceptor/JAXWS Handler to the CXF endpoint.

- The Message Header Relay mechanism has been merged into **CxfHeaderFilterStrategy**. The **relayHeaders** option, its semantics, and default value remain the same, but it is a property of **CxfHeaderFilterStrategy**. Here is an example of configuring it.

```
<bean id="dropAllMessageHeadersStrategy"
class="org.apache.camel.component.cxf.common.header.CxfHeaderFilterStrategy">

    <!--  Set relayHeaders to false to drop all SOAP headers -->
    <property name="relayHeaders" value="false"/>

</bean>
```

  Then, your endpoint can reference the **CxfHeaderFilterStrategy**.

```
<route>
    <from uri="cxf:bean:routerNoRelayEndpoint?
headerFilterStrategy=#dropAllMessageHeadersStrategy"/>
    <to uri="cxf:bean:serviceNoRelayEndpoint?
headerFilterStrategy=#dropAllMessageHeadersStrategy"/>
</route>
```

- The **MessageHeadersRelay** interface has changed slightly and has been renamed to **MessageHeaderFilter**. It is a property of **CxfHeaderFilterStrategy**. Here is an example of configuring user defined Message Header Filters:

```
<bean id="customMessageFilterStrategy"
class="org.apache.camel.component.cxf.common.header.CxfHeaderFilterStrategy">
    <property name="messageHeaderFilters">
        <list>
            <!--  SoapMessageHeaderFilter is the built in filter.  It can be removed by omitting it. -
->
            <bean
class="org.apache.camel.component.cxf.common.header.SoapMessageHeaderFilter"/>

            <!--  Add custom filter here -->
            <bean class="org.apache.camel.component.cxf.soap.headers.CustomHeaderFilter"/>
        </list>
    </property>
</bean>
```

- Other than **relayHeaders**, there are new properties that can be configured in **CxfHeaderFilterStrategy**.

Name	Description	type	Required?	Default value
relayHeaders	All message headers will be processed by Message Header Filters	**boolean**	No	**true** (1.6.1 behavior)

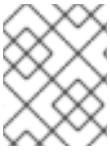
relayAllMessageHeaders	All message headers will be propagated (without processing by Message Header Filters)	**boolean**	No	**false** (1.6.1 behavior)
allowFilterNamespaceClash	If two filters overlap in activation namespace, the property control how it should be handled. If the value is **true**, last one wins. If the value is **false**, it will throw an exception	**boolean**	No	**false** (1.6.1 behavior)

CONFIGURE THE CXF ENDPOINTS WITH SPRING

You can configure the CXF endpoint with the Spring configuration file shown below, and you can also embed the endpoint into the **camelContext** tags. When you are invoking the service endpoint, you can set the **operationName** and **operationNamespace** headers to explicitly state which operation you are calling.

NOTE In Camel 2.x we change to use **http://camel.apache.org/schema/cxf** as the CXF endpoint's target namespace.

```
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xmlns:cxf="http://camel.apache.org/schema/cxf"
      xsi:schemaLocation="
      http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.0.xsd
      http://camel.apache.org/schema/cxf http://camel.apache.org/schema/cxf/camel-cxf.xsd
      http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd     ">
 ...
```



NOTE

In Apache Camel 2.x, the **http://activemq.apache.org/camel/schema/cxfEndpoint** namespace was changed to **http://camel.apache.org/schema/cxf**.

Be sure to include the JAX-WS **schemaLocation** attribute specified on the root beans element. This allows CXF to validate the file and is required. Also note the namespace declarations at the end of the **<cxf:cxfEndpoint/>** tag--these are required because the combined **{namespace}localName** syntax is presently not supported for this tag's attribute values.

The **cxf:cxfEndpoint** element supports many additional attributes:

Name	Value
PortName	The endpoint name this service is implementing, it maps to the **wsdl:port@name**. In the format of **ns:PORT_NAME** where **ns** is a namespace prefix valid at this scope.
serviceName	The service name this service is implementing, it maps to the **wsdl:service@name**. In the format of **ns:SERVICE_NAME** where **ns** is a namespace prefix valid at this scope.
wsdlURL	The location of the WSDL. Can be on the classpath, file system, or be hosted remotely.
bindingId	The **bindingId** for the service model to use.
address	The service publish address.
bus	The bus name that will be used in the JAX-WS endpoint.
serviceClass	The class name of the SEI (Service Endpoint Interface) class which could have JSR181 annotation or not.

It also supports many child elements:

Name	Value
cxf:inInterceptors	The incoming interceptors for this endpoint. A list of **<bean>** or **<ref>**.
cxf:inFaultInterceptors	The incoming fault interceptors for this endpoint. A list of **<bean>** or **<ref>**.
cxf:outInterceptors	The outgoing interceptors for this endpoint. A list of **<bean>** or **<ref>**.
cxf:outFaultInterceptors	The outgoing fault interceptors for this endpoint. A list of **<bean>** or **<ref>**.
cxf:properties	A properties map which should be supplied to the JAX-WS endpoint. See below.

cxf:handlers	A JAX-WS handler list which should be supplied to the JAX-WS endpoint. See below.
cxf:dataBinding	You can specify the which **DataBinding** will be use in the endpoint. This can be supplied using the Spring **<bean class="MyDataBinding"/>** syntax.
cxf:binding	You can specify the **BindingFactory** for this endpoint to use. This can be supplied using the Spring **<bean class="MyBindingFactory"/>** syntax.
cxf:features	The features that hold the interceptors for this endpoint. A list of **<bean>**s or **<ref>**s
cxf:schemaLocations	The schema locations for endpoint to use. A list of **<schemaLocation>**s
cxf:serviceFactory	The service factory for this endpoint to use. This can be supplied using the Spring **<bean class="MyServiceFactory"/>** syntax

You can find more advanced examples which show how to provide interceptors, properties and handlers here: http://cxf.apache.org/docs/jax-ws-configuration.html

NOTE

You can use CXF:properties to set the CXF endpoint's **dataFormat** and **setDefaultBus** properties from a Spring configuration file, as follows:

```
<cxf:cxfEndpoint id="testEndpoint" address="http://localhost:9000/router"
    serviceClass="org.apache.camel.component.cxf.HelloService"
    endpointName="s:PortName"
    serviceName="s:ServiceName"
    xmlns:s="http://www.example.com/test">
    <cxf:properties>
      <entry key="dataFormat" value="MESSAGE"/>
      <entry key="setDefaultBus" value="true"/>
    </cxf:properties>
  </cxf:cxfEndpoint>
```

HOW TO MAKE THE CAMEL-CXF COMPONENT USE LOG4J INSTEAD OF JAVA.UTIL.LOGGING

CXF's default logger is **java.util.logging**. If you want to change it to **log4j**, proceed as follows. Create a file, in the classpath, named **META-INF/cxf/org.apache.cxf.logger**. This file should contain the fully-qualified name of the class, **org.apache.cxf.common.logging.Log4jLogger**, with no comments, on a single line.

HOW TO LET CAMEL-CXF RESPONSE MESSAGE WITH XML START DOCUMENT

If you are using some SOAP client such as PHP, you will get this kind of error, because CXF doesn't add the XML start document **<?xml version="1.0" encoding="utf-8"?>**.

```
Error:sendSms: SoapFault exception: [Client] looks like we got no XML document in [...]
```

To resolved this issue, you just need to tell StaxOutInterceptor to write the XML start document for you.

```
public class WriteXmlDeclarationInterceptor extends AbstractPhaseInterceptor<SoapMessage> {
    public WriteXmlDeclarationInterceptor() {
        super(Phase.PRE_STREAM);
        addBefore(StaxOutInterceptor.class.getName());
    }

    public void handleMessage(SoapMessage message) throws Fault {
        message.put("org.apache.cxf.stax.force-start-document", Boolean.TRUE);
    }

}
```

You can add a customer interceptor like this and configure it into you **camel-cxf** endpont

```
<cxf:cxfEndpoint id="routerEndpoint"
address="http://localhost:${CXFTestSupport.port2}/CXFGreeterRouterTest/CamelContext/RouterPort"

  serviceClass="org.apache.hello_world_soap_http.GreeterImpl"
  skipFaultLogging="true">
    <cxf:outInterceptors>
        <!-- This interceptor will force the CXF server send the XML start document to client -->
        <bean class="org.apache.camel.component.cxf.WriteXmlDeclarationInterceptor"/>
    </cxf:outInterceptors>
    <cxf:properties>
        <!-- Set the publishedEndpointUrl which could override the service address from generated
WSDL as you want -->
        <entry key="publishedEndpointUrl" value="http://www.simple.com/services/test" />
    </cxf:properties>
 </cxf:cxfEndpoint>
```

Or adding a message header for it like this if you are using **Camel 2.4**.

```
// set up the response context which force start document
Map<String, Object> map = new HashMap<String, Object>();
map.put("org.apache.cxf.stax.force-start-document", Boolean.TRUE);
exchange.getOut().setHeader(Client.RESPONSE_CONTEXT, map);
```

HOW TO CONSUME A MESSAGE FROM A CAMEL-CXF ENDPOINT IN POJO DATA FORMAT

The **camel-cxf** endpoint consumer **POJO** data format is based on the cxf invoker, so the message header has a property with the name of **CxfConstants.OPERATION_NAME** and the message body is a list of the SEI method parameters.

```
public class PersonProcessor implements Processor {

    private static final transient Logger LOG = LoggerFactory.getLogger(PersonProcessor.class);

    @SuppressWarnings("unchecked")
    public void process(Exchange exchange) throws Exception {
        LOG.info("processing exchange in camel");

        BindingOperationInfo boi =
(BindingOperationInfo)exchange.getProperty(BindingOperationInfo.class.toString());
        if (boi != null) {
            LOG.info("boi.isUnwrapped" + boi.isUnwrapped());
        }
        // Get the parameters list which element is the holder.
        MessageContentsList msgList = (MessageContentsList)exchange.getIn().getBody();
        Holder<String> personId = (Holder<String>)msgList.get(0);
        Holder<String> ssn = (Holder<String>)msgList.get(1);
        Holder<String> name = (Holder<String>)msgList.get(2);

        if (personId.value == null || personId.value.length() == 0) {
            LOG.info("person id 123, so throwing exception");
            // Try to throw out the soap fault message
            org.apache.camel.wsdl_first.types.UnknownPersonFault personFault =
                new org.apache.camel.wsdl_first.types.UnknownPersonFault();
            personFault.setPersonId("");
            org.apache.camel.wsdl_first.UnknownPersonFault fault =
                new org.apache.camel.wsdl_first.UnknownPersonFault("Get the null value of person name",
personFault);
            // Since camel has its own exception handler framework, we can't throw the exception to
trigger it
            // We just set the fault message in the exchange for camel-cxf component handling and return
            exchange.getOut().setFault(true);
            exchange.getOut().setBody(fault);
            return;
        }

        name.value = "Bonjour";
        ssn.value = "123";
        LOG.info("setting Bonjour as the response");
        // Set the response message, first element is the return value of the operation,
        // the others are the holders of method parameters
        exchange.getOut().setBody(new Object[] {null, personId, ssn, name});
    }

}
```

HOW TO PREPARE THE MESSAGE FOR THE CAMEL-CXF ENDPOINT IN POJO DATA FORMAT

The **camel-cxf** endpoint producer is based on the cxf client API. First you need to specify the operation name in the message header, then add the method parameters to a list, and initialize the message with this parameter list. The response message's body is a **messageContentsList**, you can get the result from that list.

If you don't specify the operation name in the message header, **CxfProducer** will try to use the **defaultOperationName** from **CxfEndpoint**. If there is no **defaultOperationName** set on **CxfEndpoint**, it will pick up the first operation name from the operation list.

If you want to get the object array from the message body, you can get the body using **message.getbody(Object[].class)**, as follows:

```
Exchange senderExchange = new DefaultExchange(context, ExchangePattern.InOut);
final List<String> params = new ArrayList<String>();
// Prepare the request message for the camel-cxf procedure
params.add(TEST_MESSAGE);
senderExchange.getIn().setBody(params);
senderExchange.getIn().setHeader(CxfConstants.OPERATION_NAME, ECHO_OPERATION);

Exchange exchange = template.send("direct:EndpointA", senderExchange);

org.apache.camel.Message out = exchange.getOut();
// The response message's body is an MessageContentsList which first element is the return value of
the operation,
// If there are some holder parameters, the holder parameter will be filled in the reset of List.
// The result will be extract from the MessageContentsList with the String class type
MessageContentsList result = (MessageContentsList)out.getBody();
LOG.info("Received output text: " + result.get(0));
Map<String, Object> responseContext = CastUtils.cast((Map<?, ?
>)out.getHeader(Client.RESPONSE_CONTEXT));
assertNotNull(responseContext);
assertEquals("We should get the response context here", "UTF-8",
responseContext.get(org.apache.cxf.message.Message.ENCODING));
assertEquals("Reply body on Camel is wrong", "echo " + TEST_MESSAGE, result.get(0));
```

HOW TO DEAL WITH THE MESSAGE FOR A CAMEL-CXF ENDPOINT IN PAYLOAD DATA FORMAT

In Apache Camel 2.0: **CxfMessage.getBody()** will return an **org.apache.camel.component.cxf.CxfPayload** object, which has getters for SOAP message headers and Body elements. This change enables decoupling the native CXF message from the Apache Camel message.

```
protected RouteBuilder createRouteBuilder() {
    return new RouteBuilder() {
        public void configure() {
            from(SIMPLE_ENDPOINT_URI + "&dataFormat=PAYLOAD").to("log:info").process(new
Processor() {
                @SuppressWarnings("unchecked")
                public void process(final Exchange exchange) throws Exception {
                    CxfPayload<SoapHeader> requestPayload =
exchange.getIn().getBody(CxfPayload.class);
                    List<Source> inElements = requestPayload.getBodySources();
                    List<Source> outElements = new ArrayList<Source>();
                    // You can use a customer toStringConverter to turn a CxfPayLoad message into String
as you want
                    String request = exchange.getIn().getBody(String.class);
                    XmlConverter converter = new XmlConverter();
                    String documentString = ECHO_RESPONSE;
```

```
                Element in = new XmlConverter().toDOMElement(inElements.get(0));
                // Just check the element namespace
                if (!in.getNamespaceURI().equals(ELEMENT_NAMESPACE)) {
                    throw new IllegalArgumentException("Wrong element namespace");
                }
                if (in.getLocalName().equals("echoBoolean")) {
                    documentString = ECHO_BOOLEAN_RESPONSE;
                    checkRequest("ECHO_BOOLEAN_REQUEST", request);
                } else {
                    documentString = ECHO_RESPONSE;
                    checkRequest("ECHO_REQUEST", request);
                }
                Document outDocument = converter.toDOMDocument(documentString);
                outElements.add(new DOMSource(outDocument.getDocumentElement()));
                // set the payload header with null
                CxfPayload<SoapHeader> responsePayload = new CxfPayload<SoapHeader>(null,
outElements, null);
                exchange.getOut().setBody(responsePayload);
            }
        });
    }
};
}
```

HOW TO GET AND SET SOAP HEADERS IN POJO MODE

POJO means that the data format is a *list of Java objects* when the CXF endpoint produces or consumes Camel exchanges. Even though Apache Camel exposes the message body as POJOs in this mode, the CXF component still provides access to read and write SOAP headers. However, since CXF interceptors remove in-band SOAP headers from the header list after they have been processed, only out-of-band SOAP headers are available in POJO mode.

The following example illustrates how to get/set SOAP headers. Suppose we have a route that forwards from one CXF endpoint to another. That is, SOAP Client -> Apache Camel -> CXF service. We can attach two processors to obtain/insert SOAP headers at (1) before request goes out to the CXF service and (2) before response comes back to the SOAP Client. Processor (1) and (2) in this example are InsertRequestOutHeaderProcessor and InsertResponseOutHeaderProcessor. Our route looks like this:

```
<route>
    <from uri="cxf:bean:routerRelayEndpointWithInsertion"/>
    <process ref="InsertRequestOutHeaderProcessor" />
    <to uri="cxf:bean:serviceRelayEndpointWithInsertion"/>
    <process ref="InsertResponseOutHeaderProcessor" />
</route>
```

In 2.x SOAP headers are propagated to and from Apache Camel Message headers. The Apache Camel message header name is **org.apache.cxf.headers.Header.list**, which is a constant defined in CXF (**org.apache.cxf.headers.Header.HEADER_LIST**). The header value is a **List<>** of CXF **SoapHeader** objects (**org.apache.cxf.binding.soap.SoapHeader**). The following snippet is the **InsertResponseOutHeaderProcessor** (that inserts a new SOAP header in the response message). The way to access SOAP headers in both **InsertResponseOutHeaderProcessor** and **InsertRequestOutHeaderProcessor** are actually the same. The only difference between the two processors is setting the direction of the inserted SOAP header.

```
public static class InsertResponseOutHeaderProcessor implements Processor {

    @SuppressWarnings("unchecked")
    public void process(Exchange exchange) throws Exception {
        // You should be able to get the header if exchange is routed from camel-cxf endpoint
        List<SoapHeader> soapHeaders = CastUtils.cast((List<?
>)exchange.getIn().getHeader(Header.HEADER_LIST));
        if (soapHeaders == null) {
            // we just create a new soap headers in case the header is null
            soapHeaders = new ArrayList<SoapHeader>();
        }

        // Insert a new header
        String xml = "<?xml version=\"1.0\" encoding=\"utf-8\"?><outofbandHeader "
            + "xmlns=\"http://cxf.apache.org/outofband/Header\" hdrAttribute=\"testHdrAttribute\" "
            + "xmlns:soap=\"http://schemas.xmlsoap.org/soap/envelope/\" soap:mustUnderstand=\"1\">"
            + "<name>New_testOobHeader</name><value>New_testOobHeaderValue</value>
</outofbandHeader>";
        SoapHeader newHeader = new SoapHeader(soapHeaders.get(0).getName(),
                DOMUtils.readXml(new StringReader(xml)).getDocumentElement());
        // make sure direction is OUT since it is a response message.
        newHeader.setDirection(Direction.DIRECTION_OUT);
        //newHeader.setMustUnderstand(false);
        soapHeaders.add(newHeader);

    }

}
```

HOW TO GET AND SET SOAP HEADERS IN PAYLOAD MODE

We have already shown how to access SOAP message (**CxfPayload** object) in **PAYLOAD** mode (see the section called “How to deal with the message for a camel-cxf endpoint in PAYLOAD data format”).

Once you obtain a **CxfPayload** object, you can invoke the **CxfPayload.getHeaders()** method that returns a **List** of DOM Elements (SOAP headers).

```
from(getRouterEndpointURI()).process(new Processor() {
    @SuppressWarnings("unchecked")
    public void process(Exchange exchange) throws Exception {
        CxfPayload<SoapHeader> payload = exchange.getIn().getBody(CxfPayload.class);
        List<Source> elements = payload.getBodySources();
        assertNotNull("We should get the elements here", elements);
        assertEquals("Get the wrong elements size", 1, elements.size());

        Element el = new XmlConverter().toDOMElement(elements.get(0));
        elements.set(0, new DOMSource(el));
        assertEquals("Get the wrong namespace URI", "http://camel.apache.org/pizza/types",
                el.getNamespaceURI());

        List<SoapHeader> headers = payload.getHeaders();
        assertNotNull("We should get the headers here", headers);
        assertEquals("Get the wrong headers size", headers.size(), 1);
        assertEquals("Get the wrong namespace URI",
                ((Element)(headers.get(0).getObject())).getNamespaceURI(),
```

```
                "http://camel.apache.org/pizza/types");
    }

})
.to(getServiceEndpointURI());
```

SOAP HEADERS ARE NOT AVAILABLE IN MESSAGE MODE

SOAP headers are not available in **MESSAGE** mode as SOAP processing is skipped.

HOW TO THROW A SOAP FAULT FROM APACHE CAMEL

If you are using a CXF endpoint to consume the SOAP request, you may need to throw the SOAP **Fault** from the camel context. Basically, you can use the **throwFault** DSL to do that; it works for **POJO**, **PAYLOAD** and **MESSAGE** data format. You can define the soap fault like this:

```
SOAP_FAULT = new SoapFault(EXCEPTION_MESSAGE, SoapFault.FAULT_CODE_CLIENT);
Element detail = SOAP_FAULT.getOrCreateDetail();
Document doc = detail.getOwnerDocument();
Text tn = doc.createTextNode(DETAIL_TEXT);
detail.appendChild(tn);
```

Then throw it as you like:

```
from(routerEndpointURI).setFaultBody(constant(SOAP_FAULT));
```

If your CXF endpoint is working in the **MESSAGE** data format, you could set the the SOAP Fault message in the message body and set the response code in the message header.

```
from(routerEndpointURI).process(new Processor() {

    public void process(Exchange exchange) throws Exception {
        Message out = exchange.getOut();
        // Set the message body with the
        out.setBody(this.getClass().getResourceAsStream("SoapFaultMessage.xml"));
        // Set the response code here
        out.setHeader(org.apache.cxf.message.Message.RESPONSE_CODE, new Integer(500));
    }

});
```

The same is true for the POJO data format. You can set the SOAP Fault on the *Out* body and also indicate it's a fault by calling **Message.setFault(true)**, as follows:

```
from("direct:start").onException(SoapFault.class).maximumRedeliveries(0).handled(true)
    .process(new Processor() {
        public void process(Exchange exchange) throws Exception {
            SoapFault fault = exchange
                .getProperty(Exchange.EXCEPTION_CAUGHT, SoapFault.class);
            exchange.getOut().setFault(true);
            exchange.getOut().setBody(fault);
```

```
        }

    }).end().to(serviceURI);
```

HOW TO PROPAGATE A CXF ENDPOINT'S REQUEST AND RESPONSE CONTEXT

cxf client API provides a way to invoke the operation with request and response context. If you are using a CXF endpoint producer to invoke the external Web service, you can set the request context and get the response context with the following code:

```
        CxfExchange exchange = (CxfExchange)template.send(getJaxwsEndpointUri(), new
Processor() {
            public void process(final Exchange exchange) {
                final List<String> params = new ArrayList<String>();
                params.add(TEST_MESSAGE);
                // Set the request context to the inMessage
                Map<String, Object> requestContext = new HashMap<String, Object>();
                requestContext.put(BindingProvider.ENDPOINT_ADDRESS_PROPERTY,
JAXWS_SERVER_ADDRESS);
                exchange.getIn().setBody(params);
                exchange.getIn().setHeader(Client.REQUEST_CONTEXT , requestContext);
                exchange.getIn().setHeader(CxfConstants.OPERATION_NAME,
GREET_ME_OPERATION);
            }
        });
        org.apache.camel.Message out = exchange.getOut();
        // The output is an object array, the first element of the array is the return value
        Object\[\] output = out.getBody(Object\[\].class);
        LOG.info("Received output text: " + output\[0\]);
        // Get the response context form outMessage
        Map<String, Object> responseContext =
CastUtils.cast((Map)out.getHeader(Client.RESPONSE_CONTEXT));
        assertNotNull(responseContext);
        assertEquals("Get the wrong wsdl opertion name", "
{http://apache.org/hello_world_soap_http}greetMe",
                     responseContext.get("javax.xml.ws.wsdl.operation").toString());
```

ATTACHMENT SUPPORT

POJO Mode: Both SOAP with Attachment and MTOM are supported (see example in Payload Mode for enabling MTOM). However, SOAP with Attachment is not tested. Since attachments are marshalled and unmarshalled into POJOs, users typically do not need to deal with the attachment themself. Attachments are propagated to Camel message's attachments since 2.1. So, it is possible to retreive attachments by Camel Message API

```
DataHandler Message.getAttachment(String id)
```

.

Payload Mode: MTOM is supported since 2.1. Attachments can be retrieved by Camel Message APIs mentioned above. SOAP with Attachment is not supported as there is no SOAP processing in this mode.

To enable MTOM, set the CXF endpoint property "mtom_enabled" to *true*. (I believe you can only do it with Spring.)

```
<cxf:cxfEndpoint id="routerEndpoint"
address="http://localhost:${CXFTestSupport.port1}/CxfMtomRouterPayloadModeTest/jaxws-
mtom/hello"
        wsdlURL="mtom.wsdl"
        serviceName="ns:HelloService"
        endpointName="ns:HelloPort"
        xmlns:ns="http://apache.org/camel/cxf/mtom_feature">

    <cxf:properties>
        <!--  enable mtom by setting this property to true -->
        <entry key="mtom-enabled" value="true"/>

        <!--  set the camel-cxf endpoint data fromat to PAYLOAD mode -->
        <entry key="dataFormat" value="PAYLOAD"/>
    </cxf:properties>
```

You can produce a Camel message with attachment to send to a CXF endpoint in Payload mode.

```
Exchange exchange = context.createProducerTemplate().send("direct:testEndpoint", new
Processor() {

    public void process(Exchange exchange) throws Exception {
        exchange.setPattern(ExchangePattern.InOut);
        List&lt;Source> elements = new ArrayList&lt;Source>();
        elements.add(new DOMSource(DOMUtils.readXml(new
StringReader(MtomTestHelper.REQ_MESSAGE)).getDocumentElement()));
        CxfPayload<SoapHeader> body = new CxfPayload<SoapHeader>(new ArrayList<SoapHeader>
(),
            elements, null);
        exchange.getIn().setBody(body);
        exchange.getIn().addAttachment(MtomTestHelper.REQ_PHOTO_CID,
            new DataHandler(new ByteArrayDataSource(MtomTestHelper.REQ_PHOTO_DATA,
"application/octet-stream")));

        exchange.getIn().addAttachment(MtomTestHelper.REQ_IMAGE_CID,
            new DataHandler(new ByteArrayDataSource(MtomTestHelper.requestJpeg, "image/jpeg")));

    }

});

// process response

CxfPayload<SoapHeader> out = exchange.getOut().getBody(CxfPayload.class);
Assert.assertEquals(1, out.getBody().size());

Map<String, String> ns = new HashMap<String, String>();
ns.put("ns", MtomTestHelper.SERVICE_TYPES_NS);
ns.put("xop", MtomTestHelper.XOP_NS);

XPathUtils xu = new XPathUtils(ns);
Element oute = new XmlConverter().toDOMElement(out.getBody().get(0));
```

```
Element ele = (Element)xu.getValue("//ns:DetailResponse/ns:photo/xop:Include", oute,
                        XPathConstants.NODE);
String photoId = ele.getAttribute("href").substring(4); // skip "cid:"

ele = (Element)xu.getValue("//ns:DetailResponse/ns:image/xop:Include", oute,
                        XPathConstants.NODE);
String imageId = ele.getAttribute("href").substring(4); // skip "cid:"

DataHandler dr = exchange.getOut().getAttachment(photoId);
Assert.assertEquals("application/octet-stream", dr.getContentType());
MtomTestHelper.assertEquals(MtomTestHelper.RESP_PHOTO_DATA,
IOUtils.readBytesFromStream(dr.getInputStream()));

dr = exchange.getOut().getAttachment(imageId);
Assert.assertEquals("image/jpeg", dr.getContentType());

BufferedImage image = ImageIO.read(dr.getInputStream());
Assert.assertEquals(560, image.getWidth());
Assert.assertEquals(300, image.getHeight());
```

You can also consume a Camel message received from a CXF endpoint in Payload mode.

```
public static class MyProcessor implements Processor {

    @SuppressWarnings("unchecked")
    public void process(Exchange exchange) throws Exception {
        CxfPayload<SoapHeader> in = exchange.getIn().getBody(CxfPayload.class);

        // verify request
        assertEquals(1, in.getBody().size());

        Map<String, String> ns = new HashMap<String, String>();
        ns.put("ns", MtomTestHelper.SERVICE_TYPES_NS);
        ns.put("xop", MtomTestHelper.XOP_NS);

        XPathUtils xu = new XPathUtils(ns);
        Element body = new XmlConverter().toDOMElement(in.getBody().get(0));
        Element ele = (Element)xu.getValue("//ns:Detail/ns:photo/xop:Include", body,
                                XPathConstants.NODE);
        String photoId = ele.getAttribute("href").substring(4); // skip "cid:"
        assertEquals(MtomTestHelper.REQ_PHOTO_CID, photoId);

        ele = (Element)xu.getValue("//ns:Detail/ns:image/xop:Include", body,
                                XPathConstants.NODE);
        String imageId = ele.getAttribute("href").substring(4); // skip "cid:"
        assertEquals(MtomTestHelper.REQ_IMAGE_CID, imageId);

        DataHandler dr = exchange.getIn().getAttachment(photoId);
        assertEquals("application/octet-stream", dr.getContentType());
        MtomTestHelper.assertEquals(MtomTestHelper.REQ_PHOTO_DATA,
IOUtils.readBytesFromStream(dr.getInputStream()));

        dr = exchange.getIn().getAttachment(imageId);
        assertEquals("image/jpeg", dr.getContentType());
        MtomTestHelper.assertEquals(MtomTestHelper.requestJpeg,
IOUtils.readBytesFromStream(dr.getInputStream()));
```

```
        // create response
        List&lt;Source> elements = new ArrayList&lt;Source>();
        elements.add(new DOMSource(DOMUtils.readXml(new
StringReader(MtomTestHelper.RESP_MESSAGE)).getDocumentElement()));
        CxfPayload&lt;SoapHeader> sbody = new CxfPayload&lt;SoapHeader>(new
ArrayList&lt;SoapHeader>(),
            elements, null);
        exchange.getOut().setBody(sbody);
        exchange.getOut().addAttachment(MtomTestHelper.RESP_PHOTO_CID,
            new DataHandler(new ByteArrayDataSource(MtomTestHelper.RESP_PHOTO_DATA,
"application/octet-stream")));

        exchange.getOut().addAttachment(MtomTestHelper.RESP_IMAGE_CID,
            new DataHandler(new ByteArrayDataSource(MtomTestHelper.responseJpeg, "image/jpeg")));

    }
}
```

Message Mode: Attachments are not supported as it does not process the message at all.

CXF_MESSAGE Mode: MTOM is supported, and Attachments can be retrieved by Camel Message APIs mentioned above. Note that when receiving a multipart (that is, MTOM) message the default **SOAPMessage** to **String** converter will provide the complete multi-part payload on the body. If you require just the SOAP XML as a **String**, you can set the message body with **message.getSOAPPart()**, and Camel convert can do the rest of work for you.

HOW TO PROPAGATE STACK TRACE INFORMATION

It is possible to configure a CXF endpoint so that, when a Java exception is thrown on the server side, the stack trace for the exception is marshalled into a fault message and returned to the client. To enable this feaure, set the **dataFormat** to **PAYLOAD** and set the **faultStackTraceEnabled** property to **true** in the **cxfEndpoint** element, as follows:

```
<cxf:cxfEndpoint id="router" address="http://localhost:9002/TestMessage"
    wsdlURL="ship.wsdl"
    endpointName="s:TestSoapEndpoint"
    serviceName="s:TestService"
    xmlns:s="http://test">
  <cxf:properties>
    <!-- enable sending the stack trace back to client; the default value is false-->
    <entry key="faultStackTraceEnabled" value="true" />
    <entry key="dataFormat" value="PAYLOAD" />
  </cxf:properties>
</cxf:cxfEndpoint>
```

For security reasons, the stack trace does not include the causing exception (that is, the part of a stack trace that follows **Caused by**). If you want to include the causing exception in the stack trace, set the **exceptionMessageCauseEnabled** property to **true** in the **cxfEndpoint** element, as follows:

```
<cxf:cxfEndpoint id="router" address="http://localhost:9002/TestMessage"
    wsdlURL="ship.wsdl"
    endpointName="s:TestSoapEndpoint"
    serviceName="s:TestService"
    xmlns:s="http://test">
```

```
 <cxf:properties>
   <!-- enable to show the cause exception message and the default value is false -->
 <entry key="exceptionMessageCauseEnabled" value="true" />
   <!-- enable to send the stack trace back to client,  the default value is false-->
   <entry key="faultStackTraceEnabled" value="true" />
   <entry key="dataFormat" value="PAYLOAD" />
 </cxf:properties>
</cxf:cxfEndpoint>
```

WARNING

You should only enable the **exceptionMessageCauseEnabled** flag for testing and diagnostic purposes. It is normal practice for servers to conceal the original cause of an exception to make it harder for hostile users to probe the server.

STREAMING SUPPORT IN PAYLOAD MODE

In 2.8.2, the camel-cxf component now supports streaming of incoming messages when using PAYLOAD mode. Previously, the incoming messages would have been completely DOM parsed. For large messages, this is time consuming and uses a significant amount of memory. Starting in 2.8.2, the incoming messages can remain as a javax.xml.transform.Source while being routed and, if nothing modifies the payload, can then be directly streamed out to the target destination. For common "simple proxy" use cases (example: from("cxf:...").to("cxf:...")), this can provide very significant performance increases as well as significantly lowered memory requirements.

However, there are cases where streaming may not be appropriate or desired. Due to the streaming nature, invalid incoming XML may not be caught until later in the processing chain. Also, certain actions may require the message to be DOM parsed anyway (like WS-Security or message tracing and such) in which case the advantages of the streaming is limited. At this point, there are two ways to control the streaming:

- Endpoint property: you can add "allowStreaming=false" as an endpoint property to turn the streaming on/off.
- Component property: the CxfComponent object also has an allowStreaming property that can set the default for endpoints created from that component.
- Global system property: you can add a system property of "org.apache.camel.component.cxf.streaming" to "false" to turn if off. That sets the global default, but setting the endpoint property above will override this value for that endpoint.

USING THE GENERIC CXF DISPATCH MODE

From 2.8.0, the camel-cxf component supports the generic CXF dispatch mode that can transport messages of arbitrary structures (i.e., not bound to a specific XML schema). To use this mode, you simply omit specifying the wsdlURL and serviceClass attributes of the CXF endpoint.

```
<cxf:cxfEndpoint id="testEndpoint" address="http://localhost:9000/SoapContext/SoapAnyPort">
    <cxf:properties>
      <entry key="dataFormat" value="PAYLOAD"/>
```

```
    </cxf:properties>
  </cxf:cxfEndpoint>
```

It is noted that the default CXF dispatch client does not send a specific SOAPAction header. Therefore, when the target service requires a specific SOAPAction value, it is supplied in the Camel header using the key SOAPAction (case-insensitive).

CHAPTER 27. CXF BEAN COMPONENT

CXF BEAN COMPONENT (2.0 OR LATER)

The **cxfbean:** component allows other Camel endpoints to send exchange and invoke Web service bean objects. **Currently, it only supports JAXRS and JAXWS (new to Camel 2.1) annotated service beans.**

IMPORTANT

CxfBeanEndpoint is a **ProcessorEndpoint** so it has no consumers. It works similarly to a Bean component.

URI FORMAT

```
cxfbean:serviceBeanRef
```

Where **serviceBeanRef** is a registry key to look up the service bean object. If **serviceBeanRef** references a **List** object, elements of the **List** are the service bean objects accepted by the endpoint.

OPTIONS

Name	Description	Example	Required?	Default Value
bus	CXF bus reference specified by the **#** notation. The referenced object must be an instance of **org.apache.cxf.Bus**.	**bus=#busName**	No	Default bus created by CXF Bus Factory
cxfBeanBinding	CXF bean binding specified by the **#** notation. The referenced object must be an instance of **org.apache.camel.component.cxf.cxfbean.CxfBeanBinding**.	**cxfBinding=#bindingName**	No	**DefaultCxfBeanBinding**

headerFilterStrategy	Header filter strategy specified by the **#** notation. The referenced object must be an instance of **org.apache.camel.spi.HeaderFilterStrategy**.	**headerFilterStrategy=#strategyName**	No	**CxfHeaderFilterStrategy**
populateFromClass	Since 2.3, the wsdlLocation annotated in the POJO is ignored (by default) unless this option is set to **false.** Prior to 2.3, the wsdlLocation annotated in the POJO is always honored and it is not possible to ignore.	**true**, **false**	No	**true**
providers	Since 2.5, setting the providers for the CXFRS endpoint.	**providers=#providerRef1,#providerRef2**	No	**null**
setDefaultBus	Will set the default bus when CXF endpoint create a bus by itself.	**true**, **false**	No	**false**

HEADERS

Name	Description	Type	Required?	Default Value	In/Out	Examples
CamelHttpCharacterEncoding (before 2.0-m2: **CamelCxfBeanCharacterEncoding**)	Character encoding	**String**	No	None	In	ISO-8859-1

CamelContentType (before 2.0-m2: **CamelCxfBeanContentType**)	Content type	**String**	No	**/**	In	**text/xml**
CamelHttpBaseUri (2.0-m3 and before: **CamelCxfBeanRequestBasePath**)	The value of this header will be set in the CXF message as the **Message.BASE_PATH** property. It is needed by CXF JAX-RS processing. Basically, it is the scheme, host and port portion of the request URI.	**String**	Yes	The Endpoint URI of the source endpoint in the Camel exchange	In	http://localhost:9000
CamelHttpPath (before 2.0-m2: **CamelCxfBeanRequestPat{}**h)	Request URI's path	**String**	Yes	None	In	**consumer/123**
CamelHttpMethod (before 2.0-m2: **CamelCxfBeanVerb**)	RESTful request verb	**String**	Yes	None	In	**GET**, **PUT**, **POST**, **DELETE**
CamelHttpResponseCode	HTTP response code	**Integer**	No	None	Out	200

NOTE

Currently, CXF Bean component has (only) been tested with Jetty HTTP component it can understand headers from Jetty HTTP component without requiring conversion.

A WORKING SAMPLE

This sample shows how to create a route that starts a Jetty HTTP server. The route sends requests to a CXF Bean and invokes a JAXRS annotated service.

First, create a route as follows. The **from** endpoint is a Jetty HTTP endpoint that is listening on port 9000. Notice that the **matchOnUriPrefix** option must be set to **true** because RESTful request URI will not match the endpoint's URI http://localhost:9000 exactly.

```
<route>
 <from uri="jetty:http://localhost:9000?matchOnUriPrefix=true" />
 <to uri="cxfbean:customerServiceBean" />
 <to uri="mock:endpointA" />
</route>
```

The **to** endpoint is a CXF Bean with bean name **customerServiceBean**. The name will be looked up from the registry. Next, we make sure our service bean is available in Spring registry. We create a bean definition in the Spring configuration. In this example, we create a List of service beans (of one element). We could have created just a single bean without a List.

```
<util:list id="customerServiceBean">
 <bean class="org.apache.camel.component.cxf.jaxrs.testbean.CustomerService" />
</util:list>

<bean class="org.apache.camel.wsdl_first.PersonImpl" id="jaxwsBean" />
```

That's it. Once the route is started, the web service is ready for business. A HTTP client can make a request and receive response.

```
url = new URL("http://localhost:9000/customerservice/orders/223/products/323");
in = url.openStream();
assertEquals("{\"Product\":{\"description\":\"product 323\",\"id\":323}}",
CxfUtils.getStringFromInputStream(in));
```

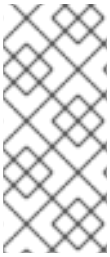
CHAPTER 28. CXFRS

CXFRS COMPONENT

The **cxfrs:** component provides integration with Apache CXF for connecting to JAX-RS services hosted in CXF.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-cxf</artifactId>
  <version>x.x.x</version>  <!-- use the same version as your Camel core version -->
</dependency>
```



NOTE

When using CXF as a consumer, the CAMEL:CXF Bean Component allows you to factor out how message payloads are received from their processing as a RESTful or SOAP web service. This has the potential of using a multitude of transports to consume web services. The bean component's configuration is also simpler and provides the fastest method to implement web services using Camel and CXF.

URI FORMAT

```
cxfrs://address?options
```

Where **address** represents the CXF endpoint's address

```
cxfrs:bean:rsEndpoint
```

Where **rsEndpoint** represents the Spring bean's name which represents the CXFRS client or server

For either style above, you can append options to the URI as follows:

```
cxfrs:bean:cxfEndpoint?resourceClasses=org.apache.camel.rs.Example
```

OPTIONS

Name	Description	Example	Required?	default value
resourceClasses	The resource classes which you want to export as REST service. Multiple classes can be separated by a comma.	**resourceClasses=org.apache.camel.rs.Example1,org.apache.camel.rs.Exchange2**	No	*None*

httpClientAPI	**New to Apache Camel 2.1** If true, the CxfRsProducer will use the HttpClientAPI to invoke the service	**httpClientAPI=true**	No	**true**
synchronous	New in 2.5, this option will let CxfRsConsumer decide to use sync or async API to do the underlying work. The default value is false which means it will try to use async API by default.	**synchronous=true**	No	**false**
throwExceptionOnFailure	New in 2.6, this option tells the CxfRsProducer to inspect return codes and will generate an Exception if the return code is larger than 207.	**throwExceptionOnFailure=true**	No	**true**
maxClientCacheSize	New in 2.6, you can set the *In* message header, **CamelDestinationOverrideUrl**, to dynamically override the target destination Web Service or REST Service defined in your routes. The implementation caches CXF clients or **ClientFactoryBean** in **CxfProvider** and **CxfRsProvider**. This option allows you to configure the maximum size of the cache.	**maxClientCacheSize=5**	No	10

setDefaultBus	New in 2.9.0. Will set the default bus when CXF endpoint create a bus by itself	**setDefaultBus=true**	No	**false**
bus	New in 2.9.0. A default bus created by CXF Bus Factory. Use **\#** notation to reference a bus object from the registry. The referenced object must be an instance of **org.apache.cxf.Bus**.	**bus=#busName**	No	*None*

bindingStyle	**As of 2.11**. Sets how requests and responses will be mapped to/from Camel. Two values are possible: • **SimpleConsumer** => see the Consuming a REST Request with the Simple Binding Style below. • **Default** => the default style. For consumers this passes on a **MessageContentsList** to the route, requiring low-level processing in the route. • Custom => allows you to specify a custom binding through the **binding** option.	**bindingStyle=SimpleConsumer**	No	*Default*

binding	Allows you to specify a custom **CxfRsBinding** implementation to perform low-level processing of the raw CXF request and response objects. The implementation must be bound in the Camel registry, and you must use the hash (#) notation to refer to it.	**binding=#myBinding**	No	**DefaultCxfRsBinding**
providers	**Since Camel 2.12.2** set custom JAX-RS providers list to the CxfRs endpoint.	**providers=#MyProviders**	No	None
schemaLocations	**Since Camel 2.12.2** Sets the locations of the schemas which can be used to validate the incoming XML or JAXB-driven JSON.	**schemaLocations=#MySchemaLocations**	No	None
features	**Since Camel 2.12.3** Set the feature list to the CxfRs endpoint.	**features=#MyFeatures**	No	None
properties	**Since Camel 2.12.4** Set the properties to the CxfRs endpoint.	**properties=#MyProperties**	No	None
inInterceptors	**Since Camel 2.12.4** Set the inInterceptors to the CxfRs endpoint.	**inInterceptors=#MyInterceptors**	No	None
outInterceptors	**Since Camel 2.12.4** Set the outInterceptor to the CxfRs endpoint.	**outInterceptors=#MyInterceptors**	No	None

inFaultInterceptors	**Since Camel 2.12.4** Set the inFaultInterceptors to the CxfRs endpoint.	**inFaultInterceptors=#MyInterceptors**	No	None
outFaultIntercetpros	**Since Camel 2.12.4** Set the outFaultInterceptors to the CxfRs endpoint.	**outFaultInterceptors=#MyInterceptors**	No	None
continuationTimeout	**Since Camel 2.14.0** This option is used to set the CXF continuation timeout which could be used in CxfConsumer by default when the CXF server is using Jetty or Servlet transport. (Before **Camel 2.14.0**, CxfConsumer just set the continuation timeout to be 0, which means the continuation suspend operation never timeout.)	**continuationTimeout=800000**	No	30000
ignoreDeleteMethodMessageBody	**Since Camel 2.14.1** This option is used to tell **CxfRsProducer** to ignore the message body of the **DELETE** method when using HTTP API.	**ignoreDeleteMethodMessageBody=true**	No	false

modelRef	**Since Camel 2.14.2** This option is used to specify the model file which is useful for the resource class without annotation. **Since Camel 2.15** This option can point to a model file without specifying a service class for emulating document-only endpoints.	**modelRef=classpath:/CustomerServiceModel.xml**	No	None
performInvocation	**Since Camel 2.15** When the option is true, camel will perform the invocation of the resource class instance and put the response object into the exchange for further processing.	**performInvocation=true**	No	false
propagateContexts	**Since Camel 2.15** When **true**, JAXRS UriInfo, HttpHeaders, Request and SecurityContext contexts will be available to custom CXFRS processors as typed Camel exchange properties. These contexts can be used to analyze the current requests using JAX-RS API.			

You can also configure the CXF REST endpoint through the Spring configuration. Since there are lots of differences between the CXF REST client and CXF REST Server, we provide different configurations for them. Please check out the schema file and the CXF JAX-RS documentation for more information.

HOW TO CONFIGURE THE REST ENDPOINT IN APACHE CAMEL

In camel-cxf schema file, there are two elements for the REST endpoint definition. **cxf:rsServer** for REST consumer, **cxf:rsClient** for REST producer. You can find a Apache Camel REST service route configuration example here.

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:cxf="http://camel.apache.org/schema/cxf"
       xmlns:jaxrs="http://cxf.apache.org/jaxrs"
       xsi:schemaLocation="
       http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
       http://camel.apache.org/schema/cxf http://camel.apache.org/schema/cxf/camel-cxf.xsd
       http://cxf.apache.org/jaxrs http://cxf.apache.org/schemas/jaxrs.xsd
       http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-spring.xsd
    ">
  <!-- Defined the real JAXRS back end service  -->
  <jaxrs:server id="restService"
          address="http://localhost:9002/rest"
          staticSubresourceResolution="true">
    <jaxrs:serviceBeans>
      <ref bean="customerService"/>
    </jaxrs:serviceBeans>
  </jaxrs:server>

  <!--bean id="jsonProvider" class="org.apache.cxf.jaxrs.provider.JSONProvider"/-->

  <bean id="customerService"
class="org.apache.camel.component.cxf.jaxrs.testbean.CustomerService" />

  <!-- Defined the server endpoint to create the cxf-rs consumer -->
  <cxf:rsServer id="rsServer" address="http://localhost:9000/route"
    serviceClass="org.apache.camel.component.cxf.jaxrs.testbean.CustomerService"
      loggingFeatureEnabled="true" loggingSizeLimit="20" skipFaultLogging="true"/>

  <!-- Defined the client endpoint to create the cxf-rs consumer -->
  <cxf:rsClient id="rsClient" address="http://localhost:9002/rest"
    serviceClass="org.apache.camel.component.cxf.jaxrs.testbean.CustomerService"
      loggingFeatureEnabled="true" skipFaultLogging="true"/>

  <!-- The camel route context -->
  <camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
    <route>
      <from uri="cxfrs://bean://rsServer"/>
      <!-- We can remove this configure as the CXFRS producer is using the HttpAPI by default -->
      <setHeader headerName="CamelCxfRsUsingHttpAPI">
        <constant>True</constant>
      </setHeader>
      <to uri="cxfrs://bean://rsClient"/>
    </route>
  </camelContext>

</beans>
```

HOW TO OVERRIDE THE CXF PRODUCER ADDRESS FROM MESSAGE HEADER

The camel-cxfrs producer supports to override the services address by setting the message with the key of "CamelDestinationOverrideUrl".

-

```
// set up the service address from the message header to override the setting of CXF endpoint
exchange.getIn().setHeader(Exchange.DESTINATION_OVERRIDE_URL,
constant(getServiceAddress()));
```

CONSUMING A REST REQUEST - SIMPLE BINDING STYLE

Available as of Camel 2.11

The **Default** binding style is rather low-level, requiring the user to manually process the **MessageContentsList** object coming into the route. Thus, it tightly couples the route logic with the method signature and parameter indices of the JAX-RS operation. Somewhat inelegant, difficult and error-prone.

In contrast, the **SimpleConsumer** binding style performs the following mappings, in order to **make the request data more accessible** to you within the Camel Message:

- JAX-RS Parameters (@HeaderParam, @QueryParam, etc.) are injected as IN message headers. The header name matches the value of the annotation.
- The request entity (POJO or other type) becomes the IN message body. If a single entity cannot be identified in the JAX-RS method signature, it falls back to the original **MessageContentsList**.
- Binary **@Multipart** body parts become IN message attachments, supporting **DataHandler**, **InputStream**, **DataSource** and CXF's **Attachment** class.
- Non-binary **@Multipart** body parts are mapped as IN message headers. The header name matches the Body Part name.

Additionally, the following rules apply to the **Response mapping**:

- If the message body type is different to **javax.ws.rs.core.Response** (user-built response), a new **Response** is created and the message body is set as the entity (so long it's not null). The response status code is taken from the **Exchange.HTTP_RESPONSE_CODE** header, or defaults to 200 OK if not present.
- If the message body type is equal to **javax.ws.rs.core.Response**, it means that the user has built a custom response, and therefore it is respected and it becomes the final response.
- In all cases, Camel headers permitted by custom or default **HeaderFilterStrategy** are added to the HTTP response.

ENABLING THE SIMPLE BINDING STYLE

This binding style can be activated by setting the **bindingStyle** parameter in the consumer endpoint to value **SimpleConsumer**:

```
from("cxfrs:bean:rsServer?bindingStyle=SimpleConsumer")
  .to("log:TEST?showAll=true");
```

EXAMPLES OF REQUEST BINDING WITH DIFFERENT METHOD SIGNATURES

Below is a list of method signatures along with the expected result from the Simple binding.

public Response doAction(BusinessObject request); Request payload is placed in IN message body, replacing the original MessageContentsList.

public Response doAction(BusinessObject request, @HeaderParam("abcd") String abcd, @QueryParam("defg") String defg); Request payload placed in IN message body, replacing the original MessageContentsList. Both request params mapped as IN message headers with names abcd and defg.

public Response doAction(@HeaderParam("abcd") String abcd, @QueryParam("defg") String defg); Both request params mapped as IN message headers with names abcd and defg. The original MessageContentsList is preserved, even though it only contains the 2 parameters.

public Response doAction(@Multipart(value="body1") BusinessObject request, @Multipart(value="body2") BusinessObject request2); The first parameter is transferred as a header with name body1, and the second one is mapped as header body2. The original MessageContentsList is preserved as the IN message body.

public Response doAction(InputStream abcd); The InputStream is unwrapped from the MessageContentsList and preserved as the IN message body.

public Response doAction(DataHandler abcd); The DataHandler is unwrapped from the MessageContentsList and preserved as the IN message body.

MORE EXAMPLES OF THE SIMPLE BINDING STYLE

Given a JAX-RS resource class with this method:

```
    @POST @Path("/customers/{type}")
    public Response newCustomer(Customer customer, @PathParam("type") String type,
@QueryParam("active") @DefaultValue("true") boolean active) {
        return null;
    }
```

Serviced by the following route:

```
    from("cxfrs:bean:rsServer?bindingStyle=SimpleConsumer")
        .recipientList(simple("direct:${header.operationName}"));

    from("direct:newCustomer")
        .log("Request: type=${header.type}, active=${header.active}, customerData=${body}");
```

The following HTTP request with XML payload (given that the Customer DTO is JAXB-annotated):

```
POST /customers/gold?active=true

Payload:
<Customer>
  <fullName>Raul Kripalani</fullName>
  <country>Spain</country>
  <project>Apache Camel</project>
</Customer>
```

Will print the message:

```
Request: type=gold, active=true, customerData=<Customer.toString() representation>
```

For more examples on how to process requests and write responses can be found here.

CONSUMING A REST REQUEST - DEFAULT BINDING STYLE

The CXF JAX-RS front end implements the JAX-RS (JSR-311) API, so we can export the resources classes as a REST service. And we leverage the CXF Invoker API to turn a REST request into a normal Java object method invocation. Unlike the **camel-restlet** component, you don't need to specify the URI template within your endpoint, CXF takes care of the REST request URI to resource class method mapping according to the JSR-311 specification. All you need to do in Apache Camel is delegate this method request to a right processor or endpoint.

Here is an example of a CXFRS route:

```
private static final String CXF_RS_ENDPOINT_URI = "cxfrs://http://localhost:" + CXT + "/rest?
resourceClasses=org.apache.camel.component.cxf.jaxrs.testbean.CustomerServiceResource";

 protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
       public void configure() {
          errorHandler(new NoErrorHandlerBuilder());
          from(CXF_RS_ENDPOINT_URI).process(new Processor() {

              public void process(Exchange exchange) throws Exception {
                 Message inMessage = exchange.getIn();
                 // Get the operation name from in message
                 String operationName = inMessage.getHeader(CxfConstants.OPERATION_NAME,
String.class);
                 if ("getCustomer".equals(operationName)) {
                    String httpMethod = inMessage.getHeader(Exchange.HTTP_METHOD, String.class);
                    assertEquals("Get a wrong http method", "GET", httpMethod);
                    String path = inMessage.getHeader(Exchange.HTTP_PATH, String.class);
                    // The parameter of the invocation is stored in the body of in message
                    String id = inMessage.getBody(String.class);
                    if ("/customerservice/customers/126".equals(path)) {
                       Customer customer = new Customer();
                       customer.setId(Long.parseLong(id));
                       customer.setName("Willem");
                       // We just put the response Object into the out message body
                       exchange.getOut().setBody(customer);
                    } else {
                       if ("/customerservice/customers/400".equals(path)) {
                          // We return the remote client IP address this time
                          org.apache.cxf.message.Message cxfMessage =
inMessage.getHeader(CxfConstants.CAMEL_CXF_MESSAGE,
org.apache.cxf.message.Message.class);
                          ServletRequest request = (ServletRequest) cxfMessage.get("HTTP.REQUEST");
                          String remoteAddress = request.getRemoteAddr();
                          Response r = Response.status(200).entity("The remoteAddress is " +
remoteAddress).build();
                          exchange.getOut().setBody(r);
                          return;
                       }
                       if ("/customerservice/customers/123".equals(path)) {
```

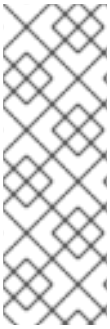
```
                        // send a customer response back
                        Response r = Response.status(200).entity("customer response back!").build();
                        exchange.getOut().setBody(r);
                        return;
                    }
                    if ("/customerservice/customers/456".equals(path)) {
                        Response r = Response.status(404).entity("Can't found the customer with uri " +
path).build();
                        throw new WebApplicationException(r);
                    } else {
                        throw new RuntimeCamelException("Can't found the customer with uri " + path);
                    }
                }
            }
            if ("updateCustomer".equals(operationName)) {
                assertEquals("Get a wrong customer message header", "header1;header2",
inMessage.getHeader("test"));
                String httpMethod = inMessage.getHeader(Exchange.HTTP_METHOD, String.class);
                assertEquals("Get a wrong http method", "PUT", httpMethod);
                Customer customer = inMessage.getBody(Customer.class);
                assertNotNull("The customer should not be null.", customer);
                // Now you can do what you want on the customer object
                assertEquals("Get a wrong customer name.", "Mary", customer.getName());
                // set the response back
                exchange.getOut().setBody(Response.ok().build());
            }
            }

        });
    }
};
}
```

The corresponding resource class used to configure the endpoint is defined as an interface:

```
@Path("/customerservice/")
public interface CustomerServiceResource {

    @GET
    @Path("/customers/{id}/")
    Customer getCustomer(@PathParam("id") String id);

    @PUT
    @Path("/customers/")
    Response updateCustomer(Customer customer);
 }
```

IMPORTANT

By default, JAX-RS resource classes are used to configure the JAX-RS properties *only*. The methods will *not* be executed during the routing of messages to the endpoint, the route itself is responsible for all processing instead.



NOTE

Note that starting from Camel 2.15, it is also sufficient to provide an interface only, as opposed to a no-op service implementation class for the default mode. Starting from Camel 2.15, if the **performInvocation** option is enabled, the service implementation will be invoked first, the response will be set on the Camel exchange and the route execution will continue as usual. This can be useful for integrating the existing JAX-RS implementations into Camel routes and for post-processing JAX-RS Responses in custom processors.

HOW TO INVOKE THE REST SERVICE THROUGH CAMEL-CXFRS PRODUCER ?

The CXF JAXRS front end implements a proxy-based client API, with this API you can invoke the remote REST service through a proxy. The **camel-cxfrs** producer is based on this proxy API. You just need to specify the operation name in the message header and prepare the parameter in the message body, the **camel-cxfrs** producer will generate the right REST request for you.

Here is an example:

```
Exchange exchange = template.send("direct://proxy", new Processor() {

    public void process(Exchange exchange) throws Exception {
        exchange.setPattern(ExchangePattern.InOut);
        Message inMessage = exchange.getIn();
        setupDestinationURL(inMessage);
        // set the operation name
        inMessage.setHeader(CxfConstants.OPERATION_NAME, "getCustomer");
        // using the proxy client API
        inMessage.setHeader(CxfConstants.CAMEL_CXF_RS_USING_HTTP_API, Boolean.FALSE);
        // set a customer header
        inMessage.setHeader("key", "value");
        // set the parameters , if you just have one parameter
        // camel will put this object into an Object[] itself
        inMessage.setBody("123");
    }

});

// get the response message
Customer response = (Customer) exchange.getOut().getBody();

assertNotNull("The response should not be null ", response);
assertEquals("Get a wrong customer id ", String.valueOf(response.getId()), "123");
assertEquals("Get a wrong customer name", response.getName(), "John");
assertEquals("Get a wrong response code", 200,
exchange.getOut().getHeader(Exchange.HTTP_RESPONSE_CODE));
assertEquals("Get a wrong header value", "value", exchange.getOut().getHeader("key"));
```

CXF JAXRS front end also provides a http centric client API, You can also invoke this API from **camel-cxfrs** producer. You need to specify the HTTP_PATH and Http method and let the the producer know to use the HTTP centric client by using the URI option **httpClientAPI** or set the message header with **CxfConstants.CAMEL_CXF_RS_USING_HTTP_API**. You can turn the response object to the type class that you specify with **CxfConstants.CAMEL_CXF_RS_RESPONSE_CLASS**.

```
Exchange exchange = template.send("direct://http", new Processor() {

    public void process(Exchange exchange) throws Exception {
        exchange.setPattern(ExchangePattern.InOut);
        Message inMessage = exchange.getIn();
        setupDestinationURL(inMessage);
        // using the http central client API
        inMessage.setHeader(CxfConstants.CAMEL_CXF_RS_USING_HTTP_API, Boolean.TRUE);
        // set the Http method
        inMessage.setHeader(Exchange.HTTP_METHOD, "GET");
        // set the relative path
        inMessage.setHeader(Exchange.HTTP_PATH, "/customerservice/customers/123");
        // Specify the response class , cxfrs will use InputStream as the response object type
        inMessage.setHeader(CxfConstants.CAMEL_CXF_RS_RESPONSE_CLASS, Customer.class);
        // set a customer header
        inMessage.setHeader("key", "value");
        // since we use the Get method, so we don't need to set the message body
        inMessage.setBody(null);
    }

});

// get the response message
Customer response = (Customer) exchange.getOut().getBody();

assertNotNull("The response should not be null ", response);
assertEquals("Get a wrong customer id ", String.valueOf(response.getId()), "123");
assertEquals("Get a wrong customer name", response.getName(), "John");
assertEquals("Get a wrong response code", 200,
exchange.getOut().getHeader(Exchange.HTTP_RESPONSE_CODE));
assertEquals("Get a wrong header value", "value", exchange.getOut().getHeader("key"));
```

From Apache Camel 2.1, we also support to specify the query parameters from CXFRS URI for the CXFRS HTTP centric client.

```
Exchange exchange = template.send("cxfrs://http://localhost:" + getPort2() + "/" +
getClass().getSimpleName() + "/testQuery?httpClientAPI=true&q1=12&q2=13"
```

To support the Dynamical routing, you can override the URI's query parameters by using the **CxfConstants.CAMEL_CXF_RS_QUERY_MAP** header to set the parameter map for it.

```
Map<String, String> queryMap = new LinkedHashMap<String, String>();
queryMap.put("q1", "new");
queryMap.put("q2", "world");
inMessage.setHeader(CxfConstants.CAMEL_CXF_RS_QUERY_MAP, queryMap);
```

CHAPTER 29. DATAFORMAT COMPONENT

DATA FORMAT COMPONENT

Available as of Camel 2.12

The **dataformat:** component allows to use Data Format as a Camel Component.

URI FORMAT

```
dataformat:name:(marshal|unmarshal)[?options]
```

Where **name** is the name of the Data Format. And then followed by the operation which must either be **marshal** or **unmarshal**. The options is used for configuring the Data Format in use. See the Data Format documentation for which options it support.

SAMPLES

For example to use the JAXB Data Format we can do as follows:

```
from("activemq:My.Queue").
  to("dataformat:jaxb:unmarshal?contextPath=com.acme.model").
  to("mqseries:Another.Queue");
```

And in XML DSL you do:

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="activemq:My.Queue"/>
    <to uri="dataformat:jaxb:unmarshal?contextPath=com.acme.model"/>
    <to uri="mqseries:Another.Queue"/>
  </route>
</camelContext>
```

- Data Format

CHAPTER 30. DATASET

DATASET COMPONENT

The DataSet component (available since 1.3.0) provides a mechanism to easily perform load & soak testing of your system. It works by allowing you to create DataSet instances both as a source of messages and as a way to assert that the data set is received.

Apache Camel will use the throughput logger when sending dataset's.

URI FORMAT

```
dataset:name[?options]
```

Where **name** is used to find the DataSet instance in the Registry

Apache Camel ships with a support implementation of **org.apache.camel.component.dataset.DataSet**, the **org.apache.camel.component.dataset.DataSetSupport** class, that can be used as a base for implementing your own DataSet. Apache Camel also ships with a default implementation, the **org.apache.camel.component.dataset.SimpleDataSet** that can be used for testing.

OPTIONS

Option	Default	Description
produceDelay	3	Allows a delay in ms to be specified, which causes producers to pause in order to simulate slow producers. Uses a minimum of 3 ms delay unless you set this option to -1 to force no delay at all.
consumeDelay	0	Allows a delay in ms to be specified, which causes consumers to pause in order to simulate slow consumers.
preloadSize	0	Sets how many messages should be preloaded (sent) before the route completes its initialization.
initialDelay	1000	**Camel 2.1:** Time period in millis to wait before starting sending messages.
minRate	0	Wait until the DataSet contains at least this number of messages

You can append query options to the URI in the following format, **?option=value&option=value&...**

CONFIGURING DATASET

Apache Camel will lookup in the Registry for a bean implementing the DataSet interface. So you can register your own DataSet as:

```
<bean id="myDataSet" class="com.mycompany.MyDataSet">
  <property name="size" value="100"/>
</bean>
```

EXAMPLE

For example, to test that a set of messages are sent to a queue and then consumed from the queue without losing any messages:

```
// send the dataset to a queue
from("dataset:foo").to("activemq:SomeQueue");

// now lets test that the messages are consumed correctly
from("activemq:SomeQueue").to("dataset:foo");
```

The above would look in the Registry to find the **foo** DataSet instance which is used to create the messages.

Then you create a DataSet implementation, such as using the **SimpleDataSet** as described below, configuring things like how big the data set is and what the messages look like etc.

PROPERTIES ON SIMPLEDATASET

Property	Type	Default	Description
defaultBody	**Object**	**<hello>world!</hello>**	Specifies the default message body. For **SimpleDataSet** it is a constant payload; though if you want to create custom payloads per message, create your own derivation of **DataSetSupport**.
reportCount	**long**	**-1**	Specifies the number of messages to be received before reporting progress. Useful for showing progress of a large load test. If < 0, then **size** / 5, if is 0 then **size**, else set to **reportCount** value.

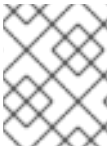
size	**long**	**10**	Specifies how many messages to send/consume.

- Spring Testing

CHAPTER 31. DIRECT

DIRECT COMPONENT

The **direct:** component provides direct, synchronous invocation of any consumers when a producer sends a message exchange. This endpoint can be used to connect existing routes in the **same** camel context.



NOTE

The SEDA component provides asynchronous invocation of any consumers when a producer sends a message exchange.

NOTE

The VM component provides connections between Camel contexts as long they run in the same **JVM**.

URI FORMAT

```
direct:someName[?options]
```

Where **someName** can be any string to uniquely identify the endpoint

OPTIONS

Name	Default Value	Description
block	**false**	**Camel 2.11.1:** If sending a message to a direct endpoint which has no active consumer, then we can tell the producer to block and wait for the consumer to become active.
timeout	**30000**	**Camel 2.11.1:** The timeout value to use if block is enabled.

You can append query options to the URI in the following format, **?option=value&option=value&...**

SAMPLES

In the route below we use the direct component to link the two routes together:

```
from("activemq:queue:order.in")
    .to("bean:orderServer?method=validate")
    .to("direct:processOrder");
```

```
from("direct:processOrder")
    .to("bean:orderService?method=process")
    .to("activemq:queue:order.out");
```

And the sample using spring DSL:

```
 <route>
   <from uri="activemq:queue:order.in"/>
   <to uri="bean:orderService?method=validate"/>
   <to uri="direct:processOrder"/>
 </route>

 <route>
   <from uri="direct:processOrder"/>
   <to uri="bean:orderService?method=process"/>
   <to uri="activemq:queue:order.out"/>
 </route>
```

See also samples from the SEDA component, how they can be used together.

- SEDA
- VM

CHAPTER 32. DIRECT-VM

DIRECT VM COMPONENT

Available as of Camel 2.10

The **direct-vm:** component provides direct, synchronous invocation of any consumers in the JVM when a producer sends a message exchange. This endpoint can be used to connect existing routes in the same camel context, as well from other camel contexts in the **same** JVM.

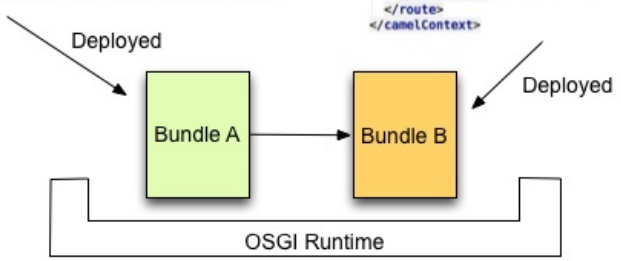
This component differs from the Direct component in that Direct-VM supports communication across CamelContext instances - so you can use this mechanism to communicate across web applications (provided that camel-core.jar is on the system/boot classpath).

At runtime you can swap in new consumers, by stopping the existing consumer(s) and start new consumers. But at any given time there can be at most only one active consumer for a given endpoint.

This component allows also to connect routes deployed in different OSGI Bundles as you can see here after. Even if they are running in different bundles, the camel routes will use the same thread. That autorises to develop applications using Transactions - Tx.

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="timer:foo?period=5000"/>
    <log message=">> Here is a message from direct-vm (bundle1)"/>
    <log message=">> Using ${threadName} of bundle 1"/>
    <to uri="direct-vm:hello"/>
    <log message=">> Response received from bundle 2 : ${body}"/>
  </route>
</camelContext>
```

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct-vm:hello"/>
    <log message=">> Prepare response from bundle 2"/>
    <log message=">> Using ${threadName} of bundle 2"/>
    <transform>
       <method ref="helloBean" method="hello"/>
    </transform>
  </route>
</camelContext>
```




```
INFO  | 14 - timer://foo | route7  >> Here is a message from direct-vm (bundle1)
INFO  | 14 - timer://foo | route7  >> Using Camel (89-camel-23) thread #14 - timer://foo of bundle 1
INFO  | 14 - timer://foo | route8  >> Prepare response from bundle 2
INFO  | 14 - timer://foo | route8  >> Using Camel (89-camel-23) thread #14 - timer://foo of bundle 2
INFO  | 14 - timer://foo | route7  >> Response received from bundle 2 : Hi from Camel direct-vm at 2012-06-21 15:21:22
```

URI FORMAT

```
direct-vm:someName
```

Where **someName** can be any string to uniquely identify the endpoint

OPTIONS

Name	Default Value	Description

block	**false**	**Camel 2.11.1:** If sending a message to a direct endpoint which has no active consumer, then we can tell the producer to block and wait for the consumer to become active.
timeout	**30000**	**Camel 2.11.1:** The timeout value to use if block is enabled.

SAMPLES

In the route below we use the direct component to link the two routes together:

```
from("activemq:queue:order.in")
    .to("bean:orderServer?method=validate")
    .to("direct-vm:processOrder");
```

And now in another CamelContext, such as another OSGi bundle

```
from("direct-vm:processOrder")
    .to("bean:orderService?method=process")
    .to("activemq:queue:order.out");
```

And the sample using spring DSL:

```
 <route>
   <from uri="activemq:queue:order.in"/>
   <to uri="bean:orderService?method=validate"/>
   <to uri="direct-vm:processOrder"/>
</route>

<route>
   <from uri="direct-vm:processOrder"/>
   <to uri="bean:orderService?method=process"/>
   <to uri="activemq:queue:order.out"/>
</route>
```

- Direct
- SEDA
- VM

CHAPTER 33. DISRUPTOR

DISRUPTOR COMPONENT

Available as of Camel 2.12

The **disruptor:** component provides asynchronous SEDA behavior much as the standard SEDA Component, but utilizes a Disruptor instead of a BlockingQueue utilized by the standard SEDA. Alternatively, a

disruptor-vm: endpoint is supported by this component, providing an alternative to the standard VM. As with the SEDA component, buffers of the **disruptor:** endpoints are only visible within a **single** CamelContext and no support is provided for persistence or recovery. The buffers of the ***disruptor-vm:*** endpoints also provides support for communication across CamelContexts instances so you can use this mechanism to communicate across web applications (provided that **camel-disruptor.jar** is on the **system/boot** classpath).

The main advantage of choosing to use the Disruptor Component over the SEDA or the VM Component is performance in use cases where there is high contention between producer(s) and/or multicasted or concurrent Consumers. In those cases, significant increases of throughput and reduction of latency has been observed. Performance in scenarios without contention is comparable to the SEDA and VM Components.

The Disruptor is implemented with the intention of mimicing the behaviour and options of the SEDA and VM Components as much as possible. The main differences with the them are the following:

- The buffer used is always bounded in size (default 1024 exchanges).
- As a the buffer is always bouded, the default behaviour for the Disruptor is to block while the buffer is full instead of throwing an exception. This default behaviour may be configured on the component (see options).
- The Disruptor enpoints don't implement the BrowsableEndpoint interface. As such, the exchanges currently in the Disruptor can't be retrieved, only the amount of exchanges.
- The Disruptor requires its consumers (multicasted or otherwise) to be statically configured. Adding or removing consumers on the fly requires complete flushing of all pending exchanges in the Disruptor.
- As a result of the reconfiguration: Data sent over a Disruptor is directly processed and 'gone' if there is at least one consumer, late joiners only get new exchanges published after they've joined.
- The **pollTimeout** option is not supported by the Disruptor Component.
- When a producer blocks on a full Disruptor, it does not respond to thread interrupts.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-disruptor</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
disruptor:someName[?options]
```

or

```
disruptor-vm:someName[?options]
```

Where ***someName**** can be any string that uniquely identifies the endpoint within the current CamelContext (or across contexts in case of ***disruptor-vm:***). You can append query options to the URI in the following format:

```
?option=value&option=value&...
```

OPTIONS

All the following options are valid for both the ***disruptor:*** and ***disruptor-vm:*** components.

Name	Default	Description
size	1024	The maximum capacity of the Disruptors ringbuffer. Will be effectively increased to the nearest power of two. **Notice:** Mind if you use this option, then its the first endpoint being created with the queue name, that determines the size. To make sure all endpoints use same size, then configure the size option on all of them, or the first endpoint being created.
bufferSize		**Component only:** The maximum default size (capacity of the number of messages it can hold) of the Disruptors ringbuffer. This option is used if size is not in use.
queueSize		**Component only:** Additional option to specify the bufferSize to maintain maximum compatibility with the SEDA Component.
concurrentConsumers	1	Number of concurrent threads processing exchanges.

waitForTaskToComplete	IfReplyExpected	Option to specify whether the caller should wait for the async task to complete or not before continuing. The following three options are supported: *Always*, *Never* or *IfReplyExpected*. The first two values are self-explanatory. The last value, *IfReplyExpected*, will only wait if the message is Request Reply based. See more information about Async messaging.
timeout	30000	Timeout (in milliseconds) before a producer will stop waiting for an asynchronous task to complete. See *waitForTaskToComplete* and Async for more details. You can disable timeout by using 0 or a negative value.
defaultMultipleConsumers		**Component only:** Allows to set the default allowance of multiple consumers for endpoints created by this comonent used when *multipleConsumers* is not provided.
multipleConsumers	false	Specifies whether multiple consumers are allowed. If enabled, you can use Disruptor for Publish-Subscribe messaging. That is, you can send a message to the SEDA queue and have each consumer receive a copy of the message. When enabled, this option should be specified on every consumer endpoint.
limitConcurrentConsumers	true	Whether to limit the number of concurrentConsumers to the maximum of 500. By default, an exception will be thrown if a Disruptor endpoint is configured with a greater number. You can disable that check by turning this option off.

blockWhenFull	true	Whether a thread that sends messages to a full Disruptor will block until the ringbuffer's capacity is no longer exhausted. By default, the calling thread will block and wait until the message can be accepted. By disabling this option, an exception will be thrown stating that the queue is full.
defaultBlockWhenFull		**Component only:** Allows to set the default producer behaviour when the ringbuffer is full for endpoints created by this comonent used when *blockWhenFull* is not provided.
waitStrategy	Blocking	Defines the strategy used by consumer threads to wait on new exchanges to be published. The options allowed are:*Blocking*, *Sleeping*, *BusySpin* and *Yielding*. Refer to the section below for more information on this subject
defaultWaitStrategy		**Component only:** Allows to set the default wait strategy for endpoints created by this comonent used when *waitStrategy* is not provided.
producerType	Multi	Defines the producers allowed on the Disruptor. The options allowed are: *Multi* to allow multiple producers and *Single* to enable certain optimizations only allowed when one concurrent producer (on one thread or otherwise synchronized) is active.

WAIT STRATEGIES

The wait strategy effects the type of waiting performed by the consumer threads that are currently waiting for the next exchange to be published. The following strategies can be chosen:

Name	Description	Advice
Blocking	Blocking strategy that uses a lock and condition variable for Consumers waiting on a barrier.	This strategy can be used when throughput and low-latency are not as important as CPU resource.

Sleeping	Sleeping strategy that initially spins, then uses a Thread.yield(), and eventually for the minimum number of nanos the OS and JVM will allow while the Consumers are waiting on a barrier.	This strategy is a good compromise between performance and CPU resource. Latency spikes can occur after quiet periods.
BusySpin	Busy Spin strategy that uses a busy spin loop for Consumers waiting on a barrier.	This strategy will use CPU resource to avoid syscalls which can introduce latency jitter. It is best used when threads can be bound to specific CPU cores.
Yielding	Yielding strategy that uses a Thread.yield() for Consumers waiting on a barrier after an initially spinning.	This strategy is a good compromise between performance and CPU resource without incurring significant latency spikes.

USE OF REQUEST REPLY

The Disruptor component supports using Request Reply, where the caller will wait for the Async route to complete. For instance:

```
from("mina:tcp://0.0.0.0:9876?textline=true&sync=true").to("disruptor:input");
from("disruptor:input").to("bean:processInput").to("bean:createResponse");
```

In the route above, we have a TCP listener on port 9876 that accepts incoming requests. The request is routed to the *disruptor:input* buffer. As it is a Request Reply message, we wait for the response. When the consumer on the *disruptor:input* buffer is complete, it copies the response to the original message response.

CONCURRENT CONSUMERS

By default, the Disruptor endpoint uses a single consumer thread, but you can configure it to use concurrent consumer threads. So instead of thread pools you can use:

```
from("disruptor:stageName?concurrentConsumers=5").process(...)
```

As for the difference between the two, note a thread pool can increase/shrink dynamically at runtime depending on load, whereas the number of concurrent consumers is always fixed and supported by the Disruptor internally so performance will be higher.

THREAD POOLS

Be aware that adding a thread pool to a Disruptor endpoint by doing something like:

```
from("disruptor:stageName").thread(5).process(...)
```

Can wind up with adding a normal BlockingQueue to be used in conjunction with the Disruptor, effectively negating part of the performance gains achieved by using the Disruptor. Instead, it is advices to directly configure number of threads that process messages on a Disruptor endpoint using the

concurrentConsumers option.

SAMPLE

In the route below we use the Disruptor to send the request to this async queue to be able to send a fire-and-forget message for further processing in another thread, and return a constant reply in this thread to the original caller.

```
public void configure() throws Exception {
    from("direct:start")
        // send it to the disruptor that is async
        .to("disruptor:next")
        // return a constant response
        .transform(constant("OK"));

    from("disruptor:next").to("mock:result");
}
```

Here we send a Hello World message and expects the reply to be OK.

```
Object out = template.requestBody("direct:start", "Hello World");
assertEquals("OK", out);
```

The "Hello World" message will be consumed from the Disruptor from another thread for further processing. Since this is from a unit test, it will be sent to a mock endpoint where we can do assertions in the unit test.

USING MULTIPLECONSUMERS

In this example we have defined two consumers and registered them as spring beans.

```
<!-- define the consumers as spring beans -->
<bean id="consumer1" class="org.apache.camel.spring.example.FooEventConsumer"/>

<bean id="consumer2" class="org.apache.camel.spring.example.AnotherFooEventConsumer"/>

<camelContext xmlns="http://camel.apache.org/schema/spring">
    <!-- define a shared endpoint which the consumers can refer to instead of using url -->
    <endpoint id="foo" uri="disruptor:foo?multipleConsumers=true"/>
</camelContext>
```

Since we have specified multipleConsumers=true on the Disruptor foo endpoint we can have those two or more consumers receive their own copy of the message as a kind of pub-sub style messaging. As the beans are part of an unit test they simply send the message to a mock endpoint, but notice how we can use @Consume to consume from the Disruptor.

```
public class FooEventConsumer {

    @EndpointInject(uri = "mock:result")
    private ProducerTemplate destination;

    @Consume(ref = "foo")
    public void doSomething(String body) {
```

```
        destination.sendBody("foo" + body);
    }

}
```

EXTRACTING DISRUPTOR INFORMATION

If needed, information such as buffer size, etc. can be obtained without using JMX in this fashion:

```
DisruptorEndpoint disruptor = context.getEndpoint("disruptor:xxxx");
int size = disruptor.getBufferSize();
```

CHAPTER 34. DNS

DNS

Available as of Camel 2.7

This is an additional component for Camel to run DNS queries, using DNSJava. The component is a thin layer on top of DNSJava. The component offers the following operations:

ip

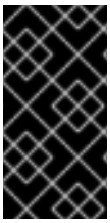
To resolve a domain by its IP address.

lookup

To look up information about the domain.

dig

To run DNS queries.



REQUIRES SUN JVM

The DNSJava library requires running on the SUN JVM. If you use Apache ServiceMix or Apache Karaf, you'll need to adjust the **etc/jre.properties** file, to add **sun.net.spi.nameservice** to the list of Java platform packages exported. The server will need restarting before this change takes effect.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-dns</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a DNS component is as follows

```
dns://operation
```

This component only supports producers.

OPTIONS

None.

HEADERS

Header	Type	Operations	Description
dns.domain	**String**	**ip**	The domain name. Mandatory.
dns.name	**String**	**lookup**	The name to lookup. Mandatory.
dns.type	-	**lookup**, **dig**	The type of the lookup. Should match the values of **org.xbill.dns.Type**. Optional.
dns.class	-	**lookup**, **dig**	he DNS class of the lookup. Should match the values of **org.xbill.dns.DClass**. Optional.
dns.query	**String**	**dig**	The query itself. Mandatory.
dns.server	**String**	**dig**	The server in particular for the query. If none is given, the default one specified by the OS will be used. Optional.

EXAMPLES

IP LOOKUP

```
<route id="IPCheck">
    <from uri="direct:start"/>
    <to uri="dns:ip"/>
</route>
```

This looks up a domain's IP. For example, www.example.com resolves to 192.0.32.10. The IP address to lookup must be provided in the header with key **"dns.domain"**.

DNS LOOKUP

```
<route id="IPCheck">
    <from uri="direct:start"/>
    <to uri="dns:lookup"/>
</route>
```

This returns a set of DNS records associated with a domain. The name to lookup must be provided in the header with key **"dns.name"**.

DNS DIG

Dig is a Unix command-line utility to run DNS queries.

```
<route id="IPCheck">
    <from uri="direct:start"/>
    <to uri="dns:dig"/>
</route>
```

The query must be provided in the header with key **"dns.query"**.

CHAPTER 35. DOCKER

DOCKER COMPONENT

Available as of Camel 2.15

Camel component for communicating with Docker.

The Docker Camel component leverages the docker-java via the Docker Remote API.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-docker</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
docker://[operation]?[options]
```

Where **operation** is the specific action to perform on Docker.

HEADER STRATEGY

All URI option can be passed as Header properties. Values found in a message header take precedence over URI parameters. A header property takes the form of a URI option prefixed with *CamelDocker* as shown below

URI Option	Header Property
containerId	CamelDockerContainerId

GENERAL OPTIONS

The following parameters can be used with any invocation of the component

Option	Header	Description	Default Value
host	CamelDockerHost	**Mandatory:** Docker host	localhost
port	CamelDockerPort	**Mandatory:**Docker port	2375
username	CamelDockerUserName	User name to authenticate with	

password	CamelDockerPassword	Password to authenticate with	
email	CamelDockerEmail	Email address associated with the user	
secure	CamelDockerSecure	Use HTTPS communication	false
requestTimeout	CamelDockerRequestTimeout	Request timeout for response (in seconds)	30
certPath	CamelDockerCertPath	Location containing the SSL certificate chain	

CONSUMER OPERATIONS

The consumer supports the following operations.

Operation	Options	Description	Produces
events	initialRange	Monitor Docker events (Streaming)	Event

PRODUCER OPERATIONS

The following producer operations are available.

Misc Operation	Options	Description	Returns
auth		Check auth configuration	
info		System wide information	Info
ping		Ping the Docker server	
version		Show the docker version information	Version

Image Operation	Options	Description	Body Content	Returns
image/list	filter, showAll	List images		List<Image>
image/create	**repository**	Create an image	InputStream	CreateImageResponse

image/build	noCache, quiet, remove, tag	Build an image from Dockerfile via stdin	InputStream or File	InputStream
image/pull	**repository**, registry, tag	Pull an image from the registry		InputStream
image/push	**name**	Push an image on the registry		InputStream
image/search	**term**	Search for images		List<SearchItem>
image/remove	**imageId**	Remove an image		
image/tag	**imageId, repository, tag, force**	Tag an image into a repository		
image/inspect	**imageId**	Inspect an image		InspectImageResponse

Container Operation	**Options**	**Description**	**Body Content**	**Returns**
container/list	showSize, showAll, before, since, limit, List containers	initialRange		List<Container>
container/create	**imageId**, name, exposedPorts, workingDir, disableNetwork, hostname, user, tty, stdInOpen, stdInOnce, memoryLimit, memorySwap, cpuShares, attachStdIn, attachStdOut, attachStdErr, env, cmd, dns, image, volumes, volumesFrom	Create a container		CreateContainerResponse

container/start	**containerId**, binds, links, lxcConf, portBindings, privileged, publishAllPorts, dns, dnsSearch, volumesFrom, networkMode, devices, restartPolicy, capAdd, capDrop	Start a container		
container/inspect	**containerId**	Inspect a container		InspectContainerResponse
container/wait	**containerId**	Wait a container	Integer	
container/log	**containerId**, stdOut, stdErr, timestamps, followStream, tailAll, tail	Get container logs		InputStream
container/attach	**containerId**, stdOut, stdErr, timestamps, logs, followStream	Attach to a container		InputStream
container/stop	**containerId**, timeout	Stop a container		
container/restart	**containerId**, timeout	Restart a container		
container/diff	**containerId**	Inspect changes on a container		ChangeLog
container/kill	**containerId**, signal	Kill a container		
container/top	**containerId**, psArgs	List processes running in a container		TopContainerResponse
container/pause	**containerId**	Pause a container		
container/unpause	**containerId**	Unpause a container		

container/commit	**containerId**, repository, message, tag, attachStdIn, attachStdOut, attachStdErr, cmd, disableNetwork, pause, env, exposedPorts, hostname, memory, memorySwap, openStdIn, portSpecs, stdInOnce, tty, user, volumes, hostname	Create a new image from a container's changes	String	
container/copyfile	**containerId**, **resource**, hostPath	Copy files or folders from a container	InputStream	
container/remove	**containerId**, force, removeVolumes	Remove a container		

EXAMPLES

The following example consumes events from Docker:

```
from("docker://events?host=192.168.59.103&port=2375").to("log:event");
```

The following example queries Docker for system wide information

```
from("docker://info?host=192.168.59.103&port=2375").to("log:info");
```

CHAPTER 36. DOZER

DOZER COMPONENT

The **dozer:** component provides the ability to map between Java beans using the Dozer mapping framework. Camel also supports the ability to trigger Dozer mappings as a type converter. The primary differences between using a Dozer endpoint and a Dozer converter are:

- The ability to manage Dozer mapping configuration on a per-endpoint basis vs. global configuration via the converter registry.
- A Dozer endpoint can be configured to marshal/unmarshal input and output data using Camel data formats to support a single, any-to-any transformation endpoint
- The Dozer component allows for fine-grained integration and extension of Dozer to support additional functionality (e.g. mapping literal values, using expressions for mappings, etc.).

In order to use the Dozer component, Maven users will need to add the following dependency to their **pom.xml**:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-dozer</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The Dozer component only supports producer endpoints.

```
dozer:endpointId[?options]
```

Where **endpointId** is a name used to uniquely identify the Dozer endpoint configuration.

An example Dozer endpoint URI:

```
from("direct:orderInput").
  to("dozer:transformOrder?mappingFile=orderMapping.xml&targetModel=example.XYZOrder").
  to("direct:orderOutput");
```

OPTIONS

Name	Default	Description

mappingFile	dozerBeanMapping.xml	The location of a Dozer configuration file. The file is loaded from the classpath by default, but you can use **file:**, **classpath:**, or **http:** to load the configuration from a specific location.
unmarshalId	none	The id of a dataFormat defined within the Camel Context to use for unmarshalling the mapping input from a non-Java type.
marshalId	none	The id of a dataFormat defined within the Camel Context to use for marshalling the mapping output to a non-Java type.
sourceModel	none	Fully-qualified class name for the source type used in the mapping. If specified, the input to the mapping is converted to the specified type before being mapped with Dozer.
targetModel	none	Fully-qualified class name for the target type used in the mapping. This option is required.
mappingConfiguration	none	The name of a DozerBeanMapperConfiguration bean in the Camel registry which should be used for configuring the Dozer mapping. This is an alternative to the mappingFile option that can be used for fine-grained control over how Dozer is configured. Remember to use a "#" prefix in the value to indicate that the bean is in the Camel registry (e.g. "#myDozerConfig").

USING DATA FORMATS WITH DOZER

Dozer does not support non-Java sources and targets for mappings, so it cannot, for example, map an XML document to a Java object on its own. Luckily, Camel has extensive support for marshalling between Java and a wide variety of formats using data formats. The Dozer component takes advantage of this support by allowing you to specify that input and output data should be passed through a data format prior to processing via Dozer. You can always do this on your own outside the call to Dozer, but supporting it directly in the Dozer component allows you to use a single endpoints to configure any-to-any transformation within Camel.

As an example, let's say you wanted to map between an XML data structure and a JSON data structure using the Dozer component. If you had the following data formats defined in a Camel Context:

```
<dataFormats>
  <json library="Jackson" id="myjson"/>
  <jaxb contextPath="org.example" id="myjaxb"/>
</dataFormats>
```

You could then configure a Dozer endpoint to unmarshal the input XML using a JAXB data format and marshal the mapping output using Jackson.

```
<endpoint uri="dozer:xml2json?
marshalId=myjson&amp;amp;unmarshalId=myjaxb&amp;amp;targetModel=org.example.Order"/>
```

CONFIGURING DOZER

All Dozer endpoints require a Dozer mapping configuration file which defines mappings between source and target objects. The component will default to a location of META-INF/dozerBeanMapping.xml if the mappingFile or mappingConfiguration options are not specified on an endpoint. If you need to supply multiple mapping configuration files for a single endpoint or specify additional configuration options (e.g. event listeners, custom converters, etc.), then you can use an instance of **org.apache.camel.converter.dozer.DozerBeanMapperConfiguration**.

```
<bean id="mapper" class="org.apache.camel.converter.dozer.DozerBeanMapperConfiguration">
  <property name="mappingFiles">
    <list>
      <value>mapping1.xml</value>
      <value>mapping2.xml</value>
    </list>
  </property>
</bean>
```

MAPPING EXTENSIONS

The Dozer component implements a number of extensions to the Dozer mapping framework as custom converters. These converters implement mapping functions that are not supported directly by Dozer itself.

VARIABLE MAPPINGS

Variable mappings allow you to map the value of a variable definition within a Dozer configuration into a target field instead of using the value of a source field. This is equivalent to constant mapping in other mapping frameworks, where can you assign a literal value to a target field. To use a variable mapping, simply define a variable within your mapping configuration and then map from the VariableMapper class into your target field of choice:

```
<mappings xmlns="http://dozer.sourceforge.net"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://dozer.sourceforge.net
http://dozer.sourceforge.net/schema/beanmapping.xsd">
  <configuration>
    <variables>
```

```
      <variable name="CUST_ID">ACME-SALES</variable>
    </variables>
  </configuration>
  <mapping>
    <class-a>org.apache.camel.component.dozer.VariableMapper</class-a>
    <class-b>org.example.Order</class-b>
    <field custom-converter-id="_variableMapping" custom-converter-param="${CUST_ID}">
      <a>literal</a>
      <b>custId</b>
    </field>
  </mapping>
</mappings>
```

CUSTOM MAPPINGS

Custom mappings allow you to define your own logic for how a source field is mapped to a target field. They are similar in function to Dozer customer converters, with two notable differences:

- You can have multiple converter methods in a single class with custom mappings.
- There is no requirement to implement a Dozer-specific interface with custom mappings.

A custom mapping is declared by using the built-in '_customMapping' converter in your mapping configuration. The parameter to this converter has the following syntax:

```
[class-name][,method-name]
```

Method name is optional - the Dozer component will search for a method that matches the input and output types required for a mapping. An example custom mapping and configuration are provided below.

```
public class CustomMapper {
    // All customer ids must be wrapped in "[ ]"
    public Object mapCustomer(String customerId) {
        return "[" + customerId + "]";
    }
}
```

```
<mappings xmlns="http://dozer.sourceforge.net"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://dozer.sourceforge.net
http://dozer.sourceforge.net/schema/beanmapping.xsd">
  <mapping>
    <class-a>org.example.A</class-a>
    <class-b>org.example.B</class-b>
    <field custom-converter-id="_customMapping"
     custom-converter-param="org.example.CustomMapper,mapCustomer">
      <a>header.customerNum</a>
      <b>custId</b>
    </field>
  </mapping>
</mappings>
```

EXPRESSION MAPPINGS

Expression mappings allow you to use the powerful language capabilities of Camel to evaluate an expression and assign the result to a target field in a mapping. Any language that Camel supports can be used in an expression mapping. Basic examples of expressions include the ability to map a Camel message header or exchange property to a target field or to concatenate multiple source fields into a target field. The syntax of a mapping expression is:

```
[language]:[expression]
```

An example of mapping a message header into a target field:

```
<mappings xmlns="http://dozer.sourceforge.net"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://dozer.sourceforge.net
http://dozer.sourceforge.net/schema/beanmapping.xsd">
  <mapping>
    <class-a>org.apache.camel.component.dozer.ExpressionMapper</class-a>
    <class-b>org.example.B</class-b>
    <field custom-converter-id="_expressionMapping" custom-converter-
param="simple:\${header.customerNumber}">
      <a>expression</a>
      <b>custId</b>
    </field>
  </mapping>
</mappings>
```

Note that any properties within your expression must be escaped with "\" to prevent an error when Dozer attempts to resolve variable values defined using the EL.

CHAPTER 37. DROPBOX

CAMEL DROPBOX COMPONENT

Available as of Camel 2.14

The **dropbox:** component allows you to treat Dropbox remote folders as a producer or consumer of messages. Using the Dropbox Java Core API (reference version for this component is 1.7.x), this camel component has the following features:

- As a consumer, download files and search files by queries
- As a producer, download files, move files between remote directories, delete files/dir, upload files and search files by queries

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-dropbox</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
dropbox://[operation]?[options]
```

Where **operation** is the specific action (typically is a CRUD action) to perform on Dropbox remote folder.

OPERATION

Operation	Description
del	deletes files or directories on Dropbox
get	download files from Dropbox
move	move files from folders on Dropbox
put	upload files on Dropbox
search	search files on Dropbox based on string queries

Operations require additional options to work, some are mandatory for the specific operation.

OPTIONS

In order to work with Dropbox API you need to obtain an **accessToken** and a **clientIdentifier.** You can refer to the Dropbox documentation that expalins how to get them.

Below are listed the mandatory options for all operations:

Property	Mandatory	Description
accessToken	**true**	The access token to make API requests for a specific Dropbox user
clientIdentifier	**true**	Name of the app registered to make API requests

DEL OPERATION

Delete files on Dropbox.

Works only as Camel producer.

Below are listed the options for this operation:

Property	Mandatory	Description
remotePath	**true**	Folder or file to delete on Dropbox

SAMPLES

from("direct:start").to("dropbox://del?
accessToken=XXX&clientIdentifier=XXX&remotePath=/root/folder1").to("mock:result");

from("direct:start").to("dropbox://del?
accessToken=XXX&clientIdentifier=XXX&remotePath=/root/folder1/file1.tar.gz").to("mock:result");

RESULT MESSAGE HEADERS

The following headers are set on message result:

Property	Value
DELETED_PATH	name of the path deleted on dropbox

RESULT MESSAGE BODY

The following objects are set on message body result:

Object type	Description
String	name of the path deleted on dropbox

GET (DOWNLOAD) OPERATION

Download files from Dropbox.

Works as Camel producer or Camel consumer.

Below are listed the options for this operation:

Property	Mandatory	Description
remotePath	**true**	Folder or file to download from Dropbox

SAMPLES

```
from("direct:start").to("dropbox://get?
accessToken=XXX&clientIdentifier=XXX&remotePath=/root/folder1/file1.tar.gz").to("file:///home/kermit/?
fileName=file1.tar.gz");
```

```
from("direct:start").to("dropbox://get?
accessToken=XXX&clientIdentifier=XXX&remotePath=/root/folder1").to("mock:result");
```

```
from("dropbox://get?
accessToken=XXX&clientIdentifier=XXX&remotePath=/root/folder1").to("file:///home/kermit/");
```

RESULT MESSAGE HEADERS

The following headers are set on message result:

Property	Value
DOWNLOADED_FILE	in case of single file download, path of the remote file downloaded
DOWNLOADED_FILES	in case of multiple files download, path of the remote files downloaded

RESULT MESSAGE BODY

The following objects are set on message body result:

Object type	Description

ByteArrayOutputStream	in case of single file download, stream representing the file downloaded
Map<String, ByteArrayOutputStream>	in case of multiple files download, a map with as key the path of the remote file downloaded and as value the stream representing the file downloaded

MOVE OPERATION

Move files on Dropbox between one folder to another.

Works only as Camel producer.

Below are listed the options for this operation:

Property	Mandatory	Description
remotePath	**true**	Original file or folder to move
newRemotePath	**true**	Destination file or folder

SAMPLES

from("direct:start").to("dropbox://move?
accessToken=XXX&clientIdentifier=XXX&remotePath=/root/folder1&newRemotePath=/root/folder2").to("mo

RESULT MESSAGE HEADERS

The following headers are set on message result:

Property	Value
MOVED_PATH	name of the path moved on dropbox

RESULT MESSAGE BODY

The following objects are set on message body result:

Object type	Description
String	name of the path moved on dropbox

PUT (UPLOAD) OPERATION

Upload files on Dropbox.

Works as Camel producer.

Below are listed the options for this operation:

Property	Mandatory	Description
uploadMode	**true**	add or force this option specifies how a file should be saved on dropbox: in case of "add" the new file will be renamed if a file with the same name already exists on dropbox. in case of "force" if a file with the same name already exists on dropbox, this will be overwritten.
localPath	**true**	Folder or file to upload on Dropbox from the local filesystem .
remotePath	**false**	Folder destination on Dropbox. If the property is not set, the component will upload the file on a remote path equal to the local path.

SAMPLES

from("direct:start").to("dropbox://put?
accessToken=XXX&clientIdentifier=XXX&uploadMode=add&localPath=/root/folder1").to("mock:result");

from("direct:start").to("dropbox://put?
accessToken=XXX&clientIdentifier=XXX&uploadMode=add&localPath=/root/folder1&remotePath=/root/fold

RESULT MESSAGE HEADERS

The following headers are set on message result:

Property	Value
UPLOADED_FILE	in case of single file upload, path of the remote path uploaded
UPLOADED_FILES	in case of multiple files upload, string with the remote paths uploaded

RESULT MESSAGE BODY

The following objects are set on message body result:

Object type	Description
String	in case of single file upload, result of the upload operation, OK or KO
Map<String, DropboxResultCode>	in case of multiple files upload, a map with as key the path of the remote file uploaded and as value the result of the upload operation, OK or KO

SEARCH OPERATION

Search inside a remote Dropbox folder including its sub directories.

Works as Camel producer and as Camel consumer.

Below are listed the options for this operation:

Property	Mandatory	Description
remotePath	**true**	Folder on Dropbox where to search in.
query	**false**	A space-separated list of substrings to search for. A file matches only if it contains all the substrings. If this option is not set, all files will be matched.

SAMPLES

from("dropbox://search?
accessToken=XXX&clientIdentifier=XXX&remotePath=/XXX&query=XXX").to("mock:result");

from("direct:start").to("dropbox://search?
accessToken=XXX&clientIdentifier=XXX&remotePath=/XXX").to("mock:result");

RESULT MESSAGE HEADERS

The following headers are set on message result:

Property	Value
FOUNDED_FILES	list of file path founded

RESULT MESSAGE BODY

The following objects are set on message body result:

Object type	Description
List<DbxEntry>	list of file path founded. For more information on this object refer to Dropbox documentation, http://dropbox.github.io/dropbox-sdk-java/api-docs/v1.7.x/com/dropbox/core/DbxEntry.html

CHAPTER 38. ELASTICSEARCH

ELASTICSEARCH COMPONENT

Available as of Camel 2.11

The ElasticSearch component allows you to interface with an ElasticSearch server.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-elasticsearch</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
elasticsearch://clusterName?[options]
```

TIP

if you want to run against a local (in JVM/classloader) ElasticSearch server, just set the clusterName value in the URI to **local**. See the client guide for more details.

ENDPOINT OPTIONS

The following options may be configured on the ElasticSearch endpoint. All are required to be set as either an endpoint URI parameter or as a header (headers override endpoint properties)

name	description
operation	required, indicates the operation to perform
indexName	the name of the index to act against
ip	the TransportClient remote host ip to use **Camel 2.12**

MESSAGE OPERATIONS

The following ElasticSearch operations are currently supported. Simply set an endpoint URI option or exchange header with a key of **operation** and a value set to one of the following. Some operations also require other parameters or the message body to be set.

operation	message body	description

INDEX	**Map**, **String**, **byte[]** or **XContentBuilder** content to index	Adds content to an index and returns the content's **indexId** in the body.
GET_BY_ID	Index ID of content to retrieve	Retrieves the specified index and returns a **GetResult** object in the body.
DELETE	Index ID of content to delete	Deletes the specified indexId and returns a **DeleteResult** object in the body.
BULK_INDEX	A **List** or **Collection** of any type that is already accepted (**XContentBuilder**, **Map**, **byte[]**, or **String**)	**Camel 2.14,** Adds content to an index and return a List of the id of the successfully indexed documents in the body.
BULK	A **List** or **Collection** of any type that is already accepted (**XContentBuilder**, **Map**, **byte[]**, or **String**)	**Camel 2.15,** Adds content to an index and returns the BulkResponse object in the body.

INDEX EXAMPLE

Below is a simple INDEX example

```
from("direct:index")
    .to("elasticsearch://local?operation=INDEX&indexName=twitter&indexType=tweet");
```

```
<route>
    <from uri="direct:index" />
    <to uri="elasticsearch://local?operation=INDEX&indexName=twitter&indexType=tweet"/>
</route>
```

A client would simply need to pass a body message containing a Map to the route. The result body contains the indexId created.

```
Map<String, String> map = new HashMap<String, String>();
map.put("content", "test");
String indexId = template.requestBody("direct:index", map, String.class);
```

FOR MORE INFORMATION, SEE THESE RESOURCES

ElasticSearch Main Site

ElasticSearch Java API

CHAPTER 39. EVENTADMIN

EVENTADMIN COMPONENT

Available in Camel 2.6

The **eventadmin** component can be used in an OSGi environment to receive OSGi EventAdmin events and process them.

DEPENDENCIES

Maven users need to add the following dependency to their **pom.xml**

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-eventadmin</artifactId>
  <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.6.0 or higher).

URI FORMAT

```
eventadmin:topic[?options]
```

where **topic** is the name of the topic to listen too.

URI OPTIONS

Name	Default value	Description
send	**false**	Whether to use 'send' or 'synchronous' deliver. Default false (async delivery)

MESSAGE HEADERS

Name	Type	Message	Description

MESSAGE BODY

The **in** message body will be set to the received Event.

EXAMPLE USAGE

```
<route>
   <from uri="eventadmin:*"/>
```

```
    <to uri="stream:out"/>
</route>
```

CHAPTER 40. EXEC

EXEC COMPONENT

Available in Apache Camel 2.3

The **exec** component can be used to execute system commands.

DEPENDENCIES

Maven users need to add the following dependency to their **pom.xml**

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-exec</artifactId>
  <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Apache Camel (2.3.0 or higher).

URI FORMAT

```
exec://executable[?options]
```

where **executable** is the name, or file path, of the system command that will be executed. If executable name is used (e.g. **exec:java**), the executable must in the system path.

URI OPTIONS

Name	Default value	Description
args	**null**	The arguments of the executable. The arguments may be one or many whitespace-separated tokens, that can be quoted with **''**, e.g. **args="arg 1" arg2** will use two arguments **arg 1** and **arg2**. To include the quotes use **""**, e.g. **args=""arg 1"" arg2** will use the arguments **"arg 1"** and **arg2**.
workingDir	**null**	The directory in which the command should be executed. If **null**, the working directory of the current process will be used.

timeout	**Long.MAX_VALUE**	The timeout, in milliseconds, after which the executable should be terminated. If execution has has not finished within the timeout, the component will send a termination request.
outFile	**null**	The name of a file, created by the executable, that should be considered as its output. If no **outFile** is set, the standard output (stdout) of the executable will be considered as output.
binding	a **DefaultExecBinding** instance	A reference to a **org.apache.commons.exec.ExecBinding** in the Registry.
commandExecutor	a **DefaultCommandExecutor** instance	A reference to a **org.apache.commons.exec.ExecCommandExecutor** in the Registry, that customizes the command execution. The default command executor utilizes the commons-exec library. It adds a shutdown hook for every executed command.
useStderrOnEmptyStdout	**false**	A boolean indicating that when **stdout** is empty, this component will populate the Camel Message Body with **stderr**. This behavior is disabled (**false**) by default.

MESSAGE HEADERS

The supported headers are defined in **org.apache.camel.component.exec.ExecBinding**.

Name	Type	Message	Description
ExecBinding.EXEC_COMMAND_EXECUTABLE	**String**	**in**	The name of the system command that will be executed. Overrides the **executable** in the URI.

ExecBinding.EXEC_COMMAND_ARGS	**java.util.List<String>**	**in**	The arguments of the executable. The arguments are used literally, no quoting is applied. Overrides existing **args** in the URI.
ExecBinding.EXEC_COMMAND_ARGS	**String**	**in**	**Camel 2.5:** The arguments of the executable as a Single string where each argument is whitespace separated (see **args** in URI option). The arguments are used literally, no quoting is applied. Overrides existing **args** in the URI.
ExecBinding.EXEC_COMMAND_OUT_FILE	**String**	**in**	The name of a file, created by the executable, that should be considered as output of the executable. Overrides existing **outFile** in the URI.
ExecBinding.EXEC_COMMAND_TIMEOUT	**long**	**in**	The timeout, in milliseconds, after which the executable should be terminated. Overrides any existing **timeout** in the URI.
ExecBinding.EXEC_COMMAND_WORKING_DIR	**String**	**in**	The directory in which the command should be executed. Overrides any existing **workingDir** in the URI.
ExecBinding.EXEC_EXIT_VALUE	**int**	**out**	The value of this header is the *exit value* of the executable. Non-zero exit values typically indicate abnormal termination. Note that the exit value is OS-dependent.

ExecBinding.EXEC_STDERR	**java.io.InputStream**	**out**	The value of this header points to the standard error stream (stderr) of the executable. If no stderr is written, the value is **null**.
ExecBinding.EXEC_USE_STDERR_ON_EMPTY_STDOUT	**boolean**	**in**	Indicates that when **stdout** is empty, this component will populate the Camel Message Body with **stderr**. This behavior is disabled (**false**) by default.

MESSAGE BODY

If the **Exec** component receives an **in** message body that is convertible to **java.io.InputStream**, it is used to feed input to the executable via its stdin. After execution, the message body is the result of the execution, that is, an **org.apache.camel.components.exec.ExecResult** instance containing the stdout, stderr, exit value, and out file. This component supports the following **ExecResult** type converters for convenience:

From	To
ExecResult	**java.io.InputStream**
ExecResult	**String**
ExecResult	**byte []**
ExecResult	**org.w3c.dom.Document**

EXECUTING WORD COUNT (LINUX)

The example below executes **wc** (word count, Linux) to count the words in file **/usr/share/dict/words**. The word count (output) is written in the standart output stream of **wc**.

```
from("direct:exec")
.to("exec:wc?args=--words /usr/share/dict/words")
.process(new Processor() {
    public void process(Exchange exchange) throws Exception {
      // By default, the body is ExecResult instance
      assertIsInstanceOf(ExecResult.class, exchange.getIn().getBody());
      // Use the Camel Exec String type converter to convert the ExecResult to String
      // In this case, the stdout is considered as output
      String wordCountOutput = exchange.getIn().getBody(String.class);
      // do something with the word count
    }
});
```

EXECUTING JAVA

The example below executes **java** with 2 arguments: **-server** and **-version**, provided that **java** is in the system path.

```
from("direct:exec")
.to("exec:java?args=-server -version")
```

The example below executes **java** in **c:/temp** with 3 arguments: **-server**, **-version** and the sytem property **user.name**.

```
from("direct:exec")
.to("exec:c:/program files/jdk/bin/java?args=-server -version -
Duser.name=Camel&workingDir=c:/temp")
```

EXECUTING ANT SCRIPTS

The following example executes Apache Ant (Windows only) with the build file **CamelExecBuildFile.xml**, provided that **ant.bat** is in the system path, and that **CamelExecBuildFile.xml** is in the current directory.

```
from("direct:exec")
.to("exec:ant.bat?args=-f CamelExecBuildFile.xml")
```

In the next example, the **ant.bat** command redirects its output to **CamelExecOutFile.txt** with **-l**. The file **CamelExecOutFile.txt** is used as the out file with **outFile=CamelExecOutFile.txt**. The example assumes that **ant.bat** is in the system path, and that **CamelExecBuildFile.xml** is in the current directory.

```
from("direct:exec")
.to("exec:ant.bat?args=-f CamelExecBuildFile.xml -l
CamelExecOutFile.txt&outFile=CamelExecOutFile.txt")
.process(new Processor() {
    public void process(Exchange exchange) throws Exception {
      InputStream outFile = exchange.getIn().getBody(InputStream.class);
      assertIsInstanceOf(InputStream.class, outFile);
      // do something with the out file here
    }
 });
```

EXECUTING ECHO (WINDOWS)

Commands such as **echo** and **dir** can be executed only with the command interpreter of the operating system. This example shows how to execute such a command - **echo** - in Windows.

```
from("direct:exec").to("exec:cmd?args=/C echo echoString")
```

CHAPTER 41. FABRIC COMPONENT

Abstract

The Fabric component implements a location discovery mechanism for Apache Camel endpoints. This mechanism can also be used to provide load-balancing over a cluster of endpoints. On the client side (producer endpoints), endpoints are represented by an abstract ID and at run time, the ID is resolved to a specific endpoint URI. Because the URI is stored in a distributed registry (provided by Fuse Fabric), this enables you to create flexible applications whose topology can be specified at deploy time and updated dynamically.

DEPENDENCIES

The Fabric component can only be used in the context of a fabric-enabled Red Hat JBoss Fuse container. You must ensure that the **fabric-camel** feature is installed. If necessary, you can install it using the following console command:

```
karaf@root> features:install fabric-camel
```

Alternatively, if you decide to use a custom feature to deploy your application, you can ensure that the **fabric-camel** feature is installed by including it in your feature definition. For example:

```
<?xml version="1.0" encoding="UTF-8"?>
<features>
   <feature name="fabric-component-example">
      <feature>fabric-camel</feature>
      <bundle>URIforMyBundle</bundle>
      <!-- Specify any other required bundles or features -->
      ...
   </feature>
</features>
```

For more details about features, see Deploying Features.

URI FORMAT

A fabric endpoint has the following URI format:

```
fabric:ClusterID[:PublishedURI[?Options]]
```

The format of the URI depends on whether it is used to specify a consumer endpoint or a producer endpoint.

For a Fabric *producer endpoint*, the URI format is:

```
fabric:ClusterID:PublishedURI[?Options]
```

Where the specified URI, ***PublishedURI***, is published in the fabric registry and associated with the ***ClusterId*** cluster. The options, ***Options***, are used when creating the producer endpoint instance, but the options are *not* published with the ***PublishedURI*** in the fabric registry.

For a Fabric *consumer endpoint*, the URI format is:

fabric:*ClusterID*

Where the client looks up the ID, ***ClusterId***, in the fabric registry to discover the URI to connect to.

URI OPTIONS

The Fabric component itself does *not* support any URI options. It is possible, however, to specify options for the published URI. These options are stored in the fabric registry as part of the URI and are used as follows:

- *Server-only options*—options that are applicable only to the server are applied to the server endpoint (consumer endpoint) at run time.
- *Client-only options*—options that are applicable only to the client are applied to the client endpoint (producer endpoint) at run time.
- *Common options*—options common to the client and the server are applied to both.

USE CASES FOR FABRIC ENDPOINTS

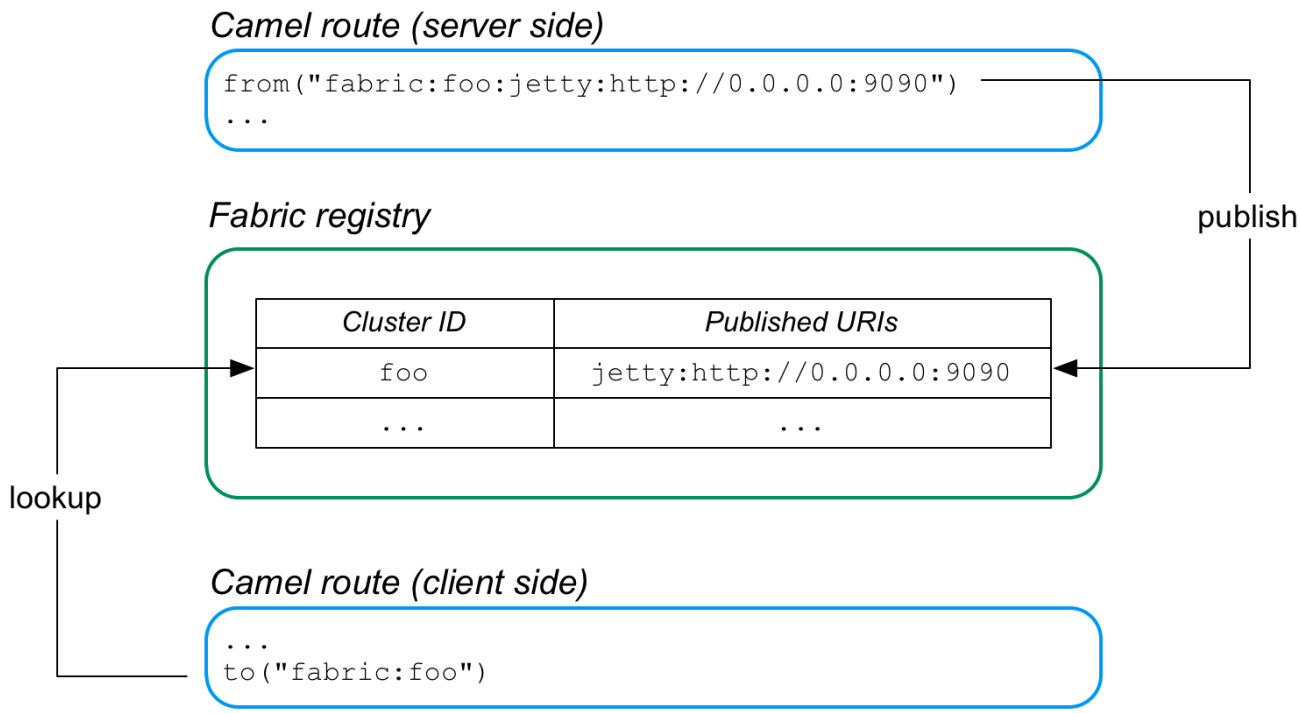
Fabric endpoints essentially provide a discovery mechanism for Apache Camel endpoints. For example, they support the following basic use cases:

- the section called “Location discovery”.
- the section called “Load-balancing cluster”.

LOCATION DISCOVERY

Figure 41.1, “Location Discovery through Fabric” gives an overview of how Fabric endpoints enable location discovery at run time.

Figure 41.1. Location Discovery through Fabric



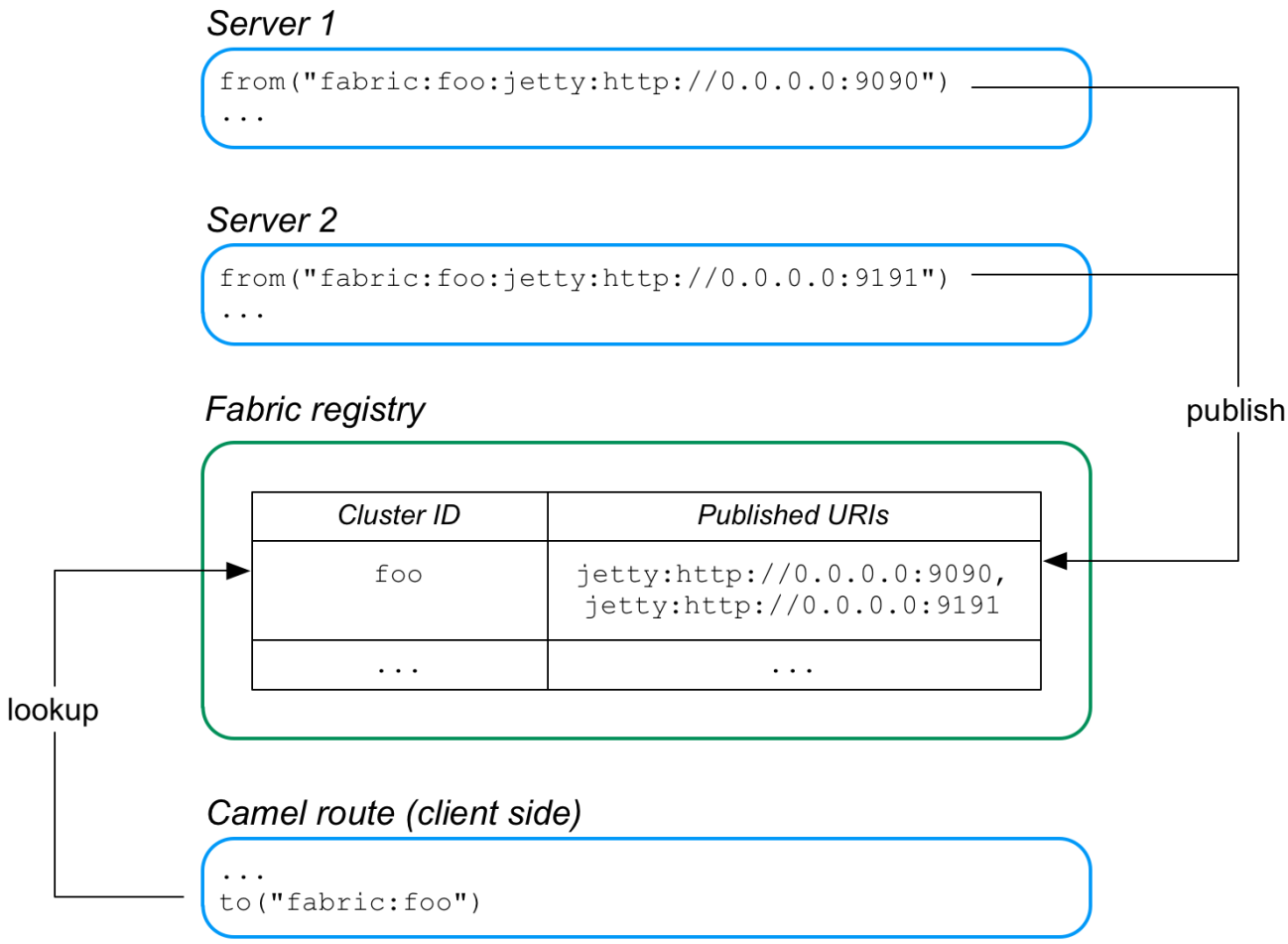
The server side of this application is defined by a route that starts with a Fabric endpoint, where the Fabric endpoint publishes the URI, **jetty:http://0.0.0.0:9090**. When this route is started, it automatically registers the Jetty URI in the fabric registry, under the cluster ID, **foo**.

The client side of the application is defined by a route that ends with the Fabric endpoint, **fabric:foo**. Now, when the client route starts, it automatically looks up the ID, **foo**, in the fabric registry and retrieves the associated Jetty endpoint URI. The client then creates a producer endpoint using the discovered Jetty URI and connects to the corresponding server port.

LOAD-BALANCING CLUSTER

Figure 41.2, “Load Balancing through Fabric” gives an overview of how Fabric endpoints enable you to create a load-balancing cluster.

Figure 41.2. Load Balancing through Fabric



In this case, two Jetty servers are created, with the URIs, **jetty:http://0.0.0.0:9090** and **jetty:http://0.0.0.0:9191**. Because these published URIs are both prefixed by **fabric:foo:**, both of the Jetty URIs are registered under the *same* cluster ID, **foo**, in the fabric registry.

Now, when the client routes starts, it automatically looks up the ID, **foo**, in the fabric registry. Because the **foo** ID is associated with multiple endpoint URIs, fabric implements a random load balancing algorithm to choose one of the available URIs. The client then creates a producer endpoint, using the chosen URI.

AUTO-RECONNECT FEATURE

Fabric endpoints support auto-reconnection. So, if a client endpoint (producer endpoint) loses its connection to a server endpoint, it will automatically go back to the fabric registry, ask for another URI, and then connect to the new URI.

PUBLISHING AN ENDPOINT URI

To publish an endpoint URI, ***PublishedURI***, in the fabric registry, define a fabric endpoint with the publisher syntax, ***FabricScheme*:*ClusterID*:*PublishedURI***. Note that this syntax can only be used in a consumer endpoint (that is, an endpoint that appears in a **from** DSL command).

Example 41.1, “Publishing a URI ” shows a route that implements a Jetty HTTP server, where the Jetty URI is published to the fabric registry under the ID, **cluster**. The route is a simply HTTP server that returns the constant message, **Response from Zookeeper agent**, in the body of the HTTP response.

Example 41.1. Publishing a URI

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
           xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
           xsi:schemaLocation="
           http://www.osgi.org/xmlns/blueprint/v1.0.0
           http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd">

 <bean id="fabric-camel" class="io.fabric8.camel.FabricComponent"/>

   <camelContext id="camel" trace="false" xmlns="http://camel.apache.org/schema/blueprint">
      <route id="fabric-server">
         <from uri="fabric-camel:cluster:jetty:http://0.0.0.0:9090/fabric"/>
         <log message="Request received : ${body}"/>
         <setHeader headerName="karaf.name">
            <simple>${sys.karaf.name}</simple>
         </setHeader>
         <transform>
            <simple>Response from Zookeeper agent</simple>
         </transform>
      </route>
   </camelContext>

</blueprint>
```

Note the following points about the preceding sample:

- The Fabric component uses the **CuratorFramework** object to connect to the ZooKeeper server (Fabric registry), where the reference to the **CuratorFramework** object is provided automatically.
- The **from** DSL command defines the fabric URI, **fabric-camel:cluster:jetty:http://0.0.0.0:9090/fabric**. At run time, this causes two things to happen:
  - The specified **jetty** URI is published to the fabric registry under the cluster ID, **cluster**.
  - The Jetty endpoint is activated and used as the consumer endpoint of the route (just as if it had been specified without the **fabric-camel:cluster:** prefix).

Because the route is implemented in blueprint XML, you would normally add the file containing this code to the **src/main/resources/OSGI-INF/blueprint** directory of a Maven project.

LOOKING UP AN ENDPOINT URI

To look up a URI in the fabric registry, simply specify the fabric endpoint URI with an ID, in the format, ***FabricScheme*:*ClusterID***. This syntax is used in a producer endpoint (for example, an endpoint that appears in a **to** DSL command).

Example 41.2, “Looking up a URI” shows a route that implements a HTTP client, where the HTTP endpoint is discovered dynamically at run time, by looking up the specified ID, **cluster**, in the fabric registry.

Example 41.2. Looking up a URI

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
           xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
           xsi:schemaLocation="
           http://www.osgi.org/xmlns/blueprint/v1.0.0
           http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd">

 <bean id="fabric-camel" class="io.fabric8.camel.FabricComponent"/>

 <camelContext id="camel" trace="false" xmlns="http://camel.apache.org/schema/blueprint">

   <route id="fabric-client">
     <from uri="timer://foo?fixedRate=true&amp;period=10000"/>
     <setBody>
        <simple>Hello from Zookeeper server</simple>
     </setBody>
     <to uri="fabric-camel:cluster"/>
     <log message=">>> ${body} : ${header.karaf.name}"/>
   </route>

 </camelContext>

 <reference interface="org.apache.camel.spi.ComponentResolver"
            filter="(component=jetty)"/>

</blueprint>
```

Because the route is implemented in blueprint XML, you would normally add the file containing this code to the **src/main/resources/OSGI-INF/blueprint** directory of a Maven project.

LOAD-BALANCING EXAMPLE

In principle, implementing load balancing is easy using fabric endpoints. All that you have to do is to publish more than one endpoint URI under the *same* cluster ID. Now, when a client looks up that cluster ID, it gets a random selection out of the list of available endpoint URIs.

The servers in the load-balancing cluster have almost the same configuration. Essentially, the only difference between them is that they publish an endpoint URI with a different hostname and/or IP port.

Instead of creating a separate OSGi bundle for every single server in the load-balancing cluster, however, it is better to define a template that enables you to specify the host or port using a configuration variable.

Example 41.3, “Server Template for a Load-Balancing Cluster” illustrates the template approach to defining servers in a load-balancing cluster.

Example 41.3. Server Template for a Load-Balancing Cluster

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xmlns:cm="http://aries.apache.org/blueprint/xmlns/blueprint-cm/v1.0.0"
        xsi:schemaLocation="
        http://www.osgi.org/xmlns/blueprint/v1.0.0
        http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd">

   <!-- osgi blueprint property placeholder -->
   <cm:property-placeholder
      id="myConfig"
      persistent-id="io.fabric8.examples.camel.loadbalancing.server"/>

   <bean id="fabric-camel" class="io.fabric8.camel.FabricComponent"/>

   <camelContext id="camel" trace="false" xmlns="http://camel.apache.org/schema/blueprint">
      <!-- using Camel properties component and refer
           to the blueprint property placeholder by its id -->
      <propertyPlaceholder id="properties"
                           location="blueprint:myConfig"
                           prefixToken="[[" suffixToken="]]"/>

      <route id="fabric-server">
         <from uri="fabric-camel:cluster:jetty:http://0.0.0.0:[[portNumber]]/fabric"/>
         <log message="Request received : ${body}"/>
         <setHeader headerName="karaf.name">
            <simple>${sys.karaf.name}</simple>
         </setHeader>
         <transform>
            <simple>Response from Zookeeper agent</simple>
         </transform>
      </route>
   </camelContext>

</blueprint>
```

First of all, you need to initialize the OSGi blueprint property placeholder. The property placeholder mechanism enables you to read property settings from the OSGi Config Admin service and substitute the properties in the blueprint configuration file. In this example, the property placeholder accesses properties from the **io.fabric8.examples.camel.loadbalancing.server** persistent ID. A persistent ID in the OSGi Config Admin service identifies a collection of related property settings. After initializing the property placeholder, you can access any property values from the persistent ID using the syntax, **[[*PropName*]]**.

The Fabric endpont URI exploits the property placeholder mechanism to substitute the value of the Jetty

port, **[[portNumber]]**, at run time. At deploy time, you can specify the value of the **portName** property. For example, if using a custom feature, you could specify the property in the feature definition (see Add OSGi configurations to the feature). Alternatively, you can specify configuration properties when defining deployment profiles in the *Fuse Management Console*.

OSGI BUNDLE PLUG-IN CONFIGURATION

When defining an OSGi bundle that uses Fabric endpoints, the **Import-Package** bundle header must be configured to import the following Java packages:

```
io.fabric8.zookeeper
```

For example, assuming that you use Maven to build your application, Example 41.4, “Maven Bundle Plug-In Configuration” shows how you can configure the Maven bundle plug-in to import the required packages.

Example 41.4. Maven Bundle Plug-In Configuration

```
<project ... >
  ...
  <build>
    <defaultGoal>install</defaultGoal>
    <plugins>
      ...
      <plugin>
        <groupId>org.apache.felix</groupId>
        <artifactId>maven-bundle-plugin</artifactId>
        <extensions>true</extensions>
        <configuration>
          <instructions>
            <Bundle-SymbolicName>${project.groupId}.${project.artifactId}</Bundle-SymbolicName>
            <Import-Package>
              io.fabric8.zookeeper,
              *
            </Import-Package>
          </instructions>
        </configuration>
      </plugin>
    </plugins>
  </build>
  ...
</project>
```

CHAPTER 42. FACEBOOK

FACEBOOK COMPONENT

Available as of Camel 2.12

The Facebook component provides access to all of the Facebook APIs accessible using Facebook4J. It allows producing messages to retrieve, add, and delete posts, likes, comments, photos, albums, videos, photos, checkins, locations, links, etc. It also supports APIs that allow polling for posts, users, checkins, groups, locations, etc.

Facebook requires the use of OAuth for all client application authentication. In order to use camel-facebook with your account, you'll need to create a new application within Facebook at https://developers.facebook.com/apps and grant the application access to your account. The Facebook application's id and secret will allow access to Facebook APIs which do not require a current user. A user access token is required for APIs that require a logged in user. More information on obtaining a user access token can be found at https://developers.facebook.com/docs/facebook-login/access-tokens/.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-facebook</artifactId>
    <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
facebook://[endpoint]?[options]
```

FACEBOOKCOMPONENT

The facebook component can be configured with the Facebook account settings below, which are mandatory. The values can be provided to the component using the bean property **configuration** of type **org.apache.camel.component.facebook.config.FacebookConfiguration**. The **oAuthAccessToken** option may be ommited but that will only allow access to application APIs.

You can also configure these options directly in an endpoint URI.

Option	Description
oAuthAppId	The application Id
oAuthAppSecret	The application Secret
oAuthAccessToken	The user access token

In addition to the above settings, non-mandatory options below can be used to configure the underlying Facebook4J runtime through either the component's **configuration** property or in an endpoint URI.

Option	Description	Default Value
oAuthAuthorizationURL	OAuth authorization URL	https://www.facebook.com/dialog/oauth
oAuthPermissions	Default OAuth permissions. Comma separeted permission names. See https://developers.facebook.com/docs/reference/login/#permissions for the detail	null
oAuthAccessTokenURL	OAuth access token URL	https://graph.facebook.com/oauth/access_token
debugEnabled	Enables deubg output. Effective only with the embedded logger	false
gzipEnabled	Use Facebook GZIP encoding	true
httpConnectionTimeout	Http connection timeout in milliseconds	20000
httpDefaultMaxPerRoute	HTTP maximum connections per route	2
httpMaxTotalConnections	HTTP maximum total connections	20
httpProxyHost	HTTP proxy server host name	null
httpProxyPassword	HTTP proxy server password	null
httpProxyPort	HTTP proxy server port	null
httpProxyUser	HTTP proxy server user name	null
httpReadTimeout	Http read timeout in milliseconds	120000
httpRetryCount	Number of HTTP retries	0
httpRetryIntervalSeconds	HTTP retry interval in seconds	5
httpStreamingReadTimeout	HTTP streaming read timeout in milliseconds	40000
jsonStoreEnabled	If set to true, raw JSON forms will be stored in DataObjectFactory	false

mbeanEnabled	If set to true, Facebook4J mbean will be registerd	false
prettyDebugEnabled	prettify JSON debug output if set to true	false
restBaseURL	API base URL	https://graph.facebook.com/
useSSL	Use SSL	true
videoBaseURL	Video API base URL	https://graph-video.facebook.com/
clientURL	Facebook4J API client URL	http://facebook4j.org/en/facebook4j-<ersion>xml
clientVersion	Facebook4J client API version	1.1.12

PRODUCER ENDPOINTS:

Producer endpoints can use endpoint names and options from the table below. Endpoints can also use the short name without the **get** or **search** prefix, except **checkin** due to ambiguity between **getCheckin** and **searchCheckin**. Endpoint options that are not mandatory are denoted by [].

Producer endpoints can also use a special option ***inBody*** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message. For example, the facebook endpoint in the following route retrieves activities for the user id value in the incoming message body.

```
from("direct:test").to("facebook://activities?inBody=userId")...
```

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelFacebook.option**. For example, the **userId** option value in the previous route could alternately be provided in the message header **CamelFacebook.userId**. Note that the inBody option overrides message header, e.g. the endpoint option **inBody=user** would override a **CamelFacebook.userId** header.

Endpoints that return a String return an Id for the created or modified entity, e.g. **addAlbumPhoto** returns the new album Id. Endpoints that return a boolean, return true for success and false otherwise. In case of Facebook API errors the endpoint will throw a RuntimeCamelException with a facebook4j.FacebookException cause.

Endpoint	Short Name	Options	Body Type
Accounts			
getAccounts	accounts	[reading],[userId]	facebook4j.ResponseList<acebook4j.Account>
Activities			

getActivities	activities	[reading],[userId]	facebook4j.ResponseList<acebook4j.Activity>
Albums			
addAlbumPhoto	addAlbumPhoto	albumId,source,[message]	String
commentAlbum	commentAlbum	albumId,message	String
createAlbum	createAlbum	albumCreate,[userId]	String
getAlbum	album	albumId,[reading]	facebook.Album
getAlbumComments	albumComments	albumId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getAlbumCoverPhoto	albumCoverPhoto	albumId	java.net.URL
getAlbumLikes	albumLikes	albumId,[reading]	facebook4j.ResponseList<acebook4j.Like>
getAlbumPhotos	albumPhotos	albumId,[reading]	facebook4j.ResponseList<acebook4j.Photos>
getAlbums	albums	[reading],[userId]	facebook4j.ResponseList<acebook4j.Album>
likeAlbum	likeAlbum	albumId	boolean
unlikeAlbum	unlikeAlbum	albumId	boolean
Checkins			
checkin	checkin	checkinCreate,[userId]	String
commentCheckin	commentCheckin	checkinId,message	String
getCheckin	checkin	checkinId,[reading]	facebook4j.Checkin
getCheckinComments	checkinComments	checkinId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getCheckinLikes	checkinLikes	checkinId,[reading]	facebook4j.ResponseList<acebook4j.Like>
getCheckins	checkins	[reading],[userId]	facebook4j.ResponseList<acebook4j.Checkin>

likeCheckin	likeCheckin	checkinId	boolean
unlikeCheckin	unlikeCheckin	checkinId	boolean
Comments			
deleteComment	deleteComment	commentId	boolean
getComment	comment	commentId	facebook4j.Comment
getCommentLikes	commentLikes	commentId,[reading]	facebook4j.ResponseList<acebook4j.Like>
likeComment	likeComment	commentId	boolean
unlikeComment	unlikeComment	commentId	boolean
Domains			
getDomain	domain	domainId	facebook4j.Domain
getDomainByName	domainByName	domainName	facebook4j.Domain
getDomainsByName	domainsByName	domainNames	java.util.List<acebook4j.Domain>
Events			
createEvent	createEvent	eventUpdate,[userId]	String
deleteEvent	deleteEvent	eventId	boolean
deleteEventPicture	deleteEventPicture	eventId	boolean
editEvent	editEvent	eventId,eventUpdate	boolean
getEvent	event	eventId,[reading]	facebook4j.Event
getEventFeed	eventFeed	eventId,[reading]	facebook4j.ResponseList<acebook4j.Post>
getEventPhotos	eventPhotos	eventId,[reading]	facebook4j.ResponseList<acebook4j.Photo>
getEventPictureURL	eventPictureURL	eventId,[size]	java.net.URL

getEvents	events	[reading],[userId]	facebook4j.ResponseList<acebook4j.Event>
getEventVideos	eventVideos	eventId,[reading]	facebook4j.ResponseList<acebook4j.Video>
getRSVPStatusAsInvited	rSVPStatusAsInvited	eventId,[userId]	facebook4j.ResponseList<acebook4j.RSVPStatus>
getRSVPStatusAsNoreply	rSVPStatusAsNoreply	eventId,[userId]	facebook4j.ResponseList<acebook4j.RSVPStatus>
getRSVPStatusInAttending	rSVPStatusInAttending	eventId,[userId]	facebook4j.ResponseList<acebook4j.RSVPStatus>
getRSVPStatusInDeclined	rSVPStatusInDeclined	eventId,[userId]	facebook4j.ResponseList<acebook4j.RSVPStatus>
getRSVPStatusInMaybe	rSVPStatusInMaybe	eventId,[userId]	facebook4j.ResponseList<acebook4j.RSVPStatus>
inviteToEvent	inviteToEvent	eventId,[userId],[userIds]	boolean
postEventFeed	postEventFeed	eventId,postUpdate	String
postEventLink	postEventLink	eventId,link,[message]	String
postEventPhoto	postEventPhoto	eventId,source, [message]	String
postEventStatusMessage	postEventStatusMessage	eventId,message	String
postEventVideo	postEventVideo	eventId,source, [title,description]	String
rsvpEventAsAttending	rsvpEventAsAttending	eventId	boolean
rsvpEventAsDeclined	rsvpEventAsDeclined	eventId	boolean
rsvpEventAsMaybe	rsvpEventAsMaybe	eventId	boolean
uninviteFromEvent	uninviteFromEvent	eventId,userId	boolean

updateEventPicture	updateEventPicture	eventId,source	boolean
Family			
getFamily	family	[reading],[userId]	facebook4j.ResponseList<acebook4j.Family>
Favorites			
getBooks	books	[reading],[userId]	facebook4j.ResponseList<acebook4j.Book>
getGames	games	[reading],[userId]	facebook4j.ResponseList<acebook4j.Game>
getInterests	interests	[reading],[userId]	facebook4j.ResponseList<acebook4j.Interest>
getMovies	movies	[reading],[userId]	facebook4j.ResponseList<acebook4j.Movie>
getMusic	music	[reading],[userId]	facebook4j.ResponseList<acebook4j.Music>
getTelevision	television	[reading],[userId]	facebook4j.ResponseList<acebook4j.Television>
Facebook Query Language (FQL)			
executeFQL	executeFQL	query,[locale]	facebook4j.internal.org.json.JSONArray
executeMultiFQL	executeMultiFQL	queries,[locale]	java.util.Map<tring,facebook4j.internal.org.json.JSONArray>
Friends			
addFriendlistMember	addFriendlistMember	friendlistId,userId	boolean
createFriendlist	createFriendlist	friendlistName,[userId]	String
deleteFriendlist	deleteFriendlist	friendlistId	boolean
getBelongsFriend	belongsFriend	friendId,[reading],[userId]	facebook4j.ResponseList<acebook4j.Friend>

getFriendlist	friendlist	friendlistId,[reading]	facebook4j.FriendList
getFriendlistMembers	friendlistMembers	friendlistId	facebook4j.ResponseList<acebook4j.Friend>
getFriendlists	friendlists	[reading],[userId]	facebook4j.ResponseList<acebook4j.FriendList>
getFriendRequests	friendRequests	[reading],[userId]	facebook4j.ResponseList<acebook4j.FriendRequest>
getFriends	friends	[reading],[userId]	facebook4j.ResponseList<acebook4j.Friend>
getMutualFriends	mutualFriends	[friendUserId],[reading], [userId1,userId2]	facebook4j.ResponseList<acebook4j.Friend>
removeFriendlistMember	removeFriendlistMember	friendlistId,userId	boolean
Games			
deleteAchievement	deleteAchievement	achievementURL, [userId]	boolean
deleteScore	deleteScore	[userId]	boolean
getAchievements	achievements	[reading],[userId]	facebook4j.ResponseList<acebook4j.Achievement>
getScores	scores	[reading],[userId]	facebook4j.ResponseList<acebook4j.Score>
postAchievement	postAchievement	achievementURL, [userId]	String
postScore	postScore	scoreValue,[userId]	String
Groups			
getGroup	group	groupId,[reading]	facebook4j.Group
getGroupDocs	groupDocs	groupId,[reading]	facebook4j.ResponseList<acebook4j.GroupDoc>
getGroupFeed	groupFeed	groupId,[reading]	facebook4j.ResponseList<acebook4j.Post>

getGroupMembers	groupMembers	groupId,[reading]	facebook4j.ResponseList<acebook4j.GroupMember>
getGroupPictureURL	groupPictureURL	groupId	java.net.URL
getGroups	groups	[reading],[userId]	facebook4j.ResponseList<acebook4j.Group>
postGroupFeed	postGroupFeed	groupId,postUpdate	String
postGroupLink	postGroupLink	groupId,link,[message]	String
postGroupStatusMessage	postGroupStatusMessage	groupId,message	String
Insights			
getInsights	insights	objectId,metric,[reading]	facebook4j.ResponseList<acebook4j.Insight>
Likes			
getUserLikes	userLikes	[reading],[userId]	facebook4j.ResponseList<acebook4j.Like>
Links			
commentLink	commentLink	linkId,message	String
getLink	link	linkId,[reading]	facebook4j.Link
getLinkComments	linkComments	linkId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getLinkLikes	linkLikes	linkId,[reading]	facebook4j.ResponseList<acebook4j.Like>
likeLink	likeLink	linkId	boolean
unlikeLink	unlikeLink	linkId	boolean
Locations			
getLocations	locations	[reading],[userId]	facebook4j.ResponseList<acebook4j.Location>
Messages			

getInbox	inbox	[reading],[userId]	facebook4j.InboxResponseList<acebook4j.Inbox>
getMessage	message	messageId,[reading]	facebook4j.Message
getOutbox	outbox	[reading],[userId]	facebook4j.ResponseList<acebook4j.Message>
getUpdates	updates	[reading],[userId]	facebook4j.ResponseList<acebook4j.Message>
Notes			
commentNote	commentNote	noteId,message	String
createNote	createNote	subject,message, [userId]	String
getNote	note	noteId,[reading]	facebook4j.Note
getNoteComments	noteComments	noteId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getNoteLikes	noteLikes	noteId,[reading]	facebook4j.ResponseList<acebook4j.Like>
getNotes	notes	[reading],[userId]	facebook4j.ResponseList<acebook4j.Note>
likeNote	likeNote	noteId	boolean
unlikeNote	unlikeNote	noteId	boolean
Notifications			
getNotifications	notifications	[includeRead],[reading], [userId]	facebook4j.ResponseList<acebook4j.Notification>
markNotificationAsRead	markNotificationAsRead	notificationId	boolean
Permissions			
getPermissions	permissions	[userId]	java.util.List<acebook4j.Permission>
revokePermission	revokePermission	permissionName, [userId]	boolean

Photos			
addTagToPhoto	addTagToPhoto	photoId,[toUserId], [toUserIds],[tagUpdate]	boolean
commentPhoto	commentPhoto	photoId,message	String
deletePhoto	deletePhoto	photoId	boolean
getPhoto	photo	photoId,[reading]	facebook4j.Photo
getPhotoComments	photoComments	photoId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getPhotoLikes	photoLikes	photoId,[reading]	facebook4j.ResponseList<acebook4j.Like>
getPhotos	photos	[reading],[userId]	facebook4j.ResponseList<acebook4j.Photo>
getPhotoURL	photoURL	photoId	java.net.URL
getTagsOnPhoto	tagsOnPhoto	photoId,[reading]	facebook4j.ResponseList<acebook4j.Tag>
likePhoto	likePhoto	photoId	boolean
postPhoto	postPhoto	source,[message], [place],[noStory],[userId]	String
unlikePhoto	unlikePhoto	photoId	boolean
updateTagOnPhoto	updateTagOnPhoto	photoId,[toUserId], [tagUpdate]	boolean
Pokes			
getPokes	pokes	[reading],[userId]	facebook4j.ResponseList<acebook4j.Poke>
Posts			
commentPost	commentPost	postId,message	String
deletePost	deletePost	postId	boolean
getFeed	feed	[reading],[userId]	facebook4j.ResponseList<acebook4j.Post>

getHome	home	[reading]	facebook4j.ResponseList<acebook4j.Post>
getLinks	links	[reading],[userId]	facebook4j.ResponseList<acebook4j.Link>
getPost	post	postId,[reading]	facebook4j.Post
getPostComments	postComments	postId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getPostLikes	postLikes	postId,[reading]	facebook4j.ResponseList<acebook4j.Like>
getPosts	posts	[reading],[userId]	facebook4j.ResponseList<acebook4j.Post>
getStatuses	statuses	[reading],[userId]	facebook4j.ResponseList<acebook4j.Post>
getTagged	tagged	[reading],[userId]	facebook4j.ResponseList<acebook4j.Post>
likePost	likePost	postId	boolean
postFeed	postFeed	postUpdate,[userId]	String
postLink	postLink	link,[message],[userId]	String
postStatusMessage	postStatusMessage	message,[userId]	String
unlikePost	unlikePost	postId	boolean
Questions			
addQuestionOption	addQuestionOption	questionId,optionDescription	String
createQuestion	createQuestion	question,[options],[allowNewOptions],[userId]	String
deleteQuestion	deleteQuestion	questionId	boolean
getQuestion	question	questionId,[reading]	facebook4j.Question

getQuestionOptions	questionOptions	questionId,[reading]	facebook4j.ResponseList<acebook4j.Question.Option>
getQuestionOptionVotes	questionOptionVotes	questionId	facebook4j.ResponseList<acebook4j.QuestionVotes>
getQuestions	questions	[reading],[userId]	facebook4j.ResponseList<acebook4j.Question>
getSubscribedto	subscribedto	[reading],[userId]	facebook4j.ResponseList<acebook4j.Subscribedto>
getSubscribers	subscribers	[reading],[userId]	facebook4j.ResponseList<acebook4j.Subscriber>
Test Users			
createTestUser	createTestUser	appId,[name],[userLocale],[permissions]	facebook4j.TestUser
deleteTestUser	deleteTestUser	testUserId	boolean
getTestUsers	testUsers	appId	java.util.List<acebook4j.TestUser>
makeFriendTestUser	makeFriendTestUser	testUser1,testUser2	boolean
Users			
getMe	me	[reading]	facebook4j.User
getPictureURL	pictureURL	[size],[userId]	java.net.URL
getUser	user	userId,[reading]	facebook4j.User
getUsers	users	ids	java.util.List<acebook4j.User>
Videos			
commentVideo	commentVideo	videoId,message	String
getVideo	video	videoId,[reading]	facebook4j.Video

getVideoComments	videoComments	videoId,[reading]	facebook4j.ResponseList<acebook4j.Comment>
getVideoCover	videoCover	videoId	java.net.URL
getVideoLikes	videoLikes	videoId,[reading]	facebook4j.ResponseList<acebook4j.Like>
getVideos	videos	[reading],[userId]	facebook4j.ResponseList<acebook4j.Video>
likeVideo	likeVideo	videoId	boolean
postVideo	postVideo	source,[title,description],[userId]	String
unlikeVideo	unlikeVideo	videoId	boolean
Search			
search	search	query,[reading]	facebook4j.ResponseList<acebook4j.internal.org.json.JSONObject>
searchCheckins	checkins	[reading]	facebook4j.ResponseList<acebook4j.Checkin>
searchEvents	events	query,[reading]	facebook4j.ResponseList<acebook4j.Event>
searchGroups	groups	query,[reading]	facebook4j.ResponseList<acebook4j.Group>
searchLocations	locations	[center,distance],[reading],[placeId]	facebook4j.ResponseList<acebook4j.Location>
searchPlaces	places	query,[reading],[center,distance]	facebook4j.ResponseList<acebook4j.Place>
searchPosts	posts	query,[reading]	facebook4j.ResponseList<acebook4j.Post>
searchUsers	users	query,[reading]	facebook4j.ResponseList<acebook4j.User>

CONSUMER ENDPOINTS:

Any of the producer endpoints that take a reading#reading parameter can be used as a consumer endpoint. The polling consumer uses the **since** and **until** fields to get responses within the polling

interval. In addition to other reading fields, an initial **since** value can be provided in the endpoint for the first poll.

Rather than the endpoints returning a List (or **facebook4j.ResponseList**) through a single route exchange, camel-facebook creates one route exchange per returned object. As an example, if **"facebook://home"** results in five posts, the route will be executed five times (once for each Post).

1. URI Options

Name	Type	Description
achievementURL	java.net.URL	The unique URL of the achievement
albumCreate	facebook4j.AlbumCreate	The facebook Album to be created
albumId	String	The album ID
allowNewOptions	boolean	True if allows other users to add new options
appId	String	The ID of the Facebook Application
center	facebook4j.GeoLocation	Location latitude and longitude
checkinCreate	facebook4j.CheckinCreate	The checkin to be created. **Deprecated**, instead create a Post with an attached location
checkinId	String	The checkin ID
commentId	String	The comment ID
description	String	The description text
distance	int	Distance in meters
domainId	String	The domain ID
domainName	String	The domain name
domainNames	String[]	The domain names
eventId	String	The event ID
eventUpdate	facebook4j.EventUpdate	The event to be created or updated

friendId	String	The friend ID
friendUserId	String	The friend user ID
friendlistId	String	The friend list ID
friendlistName	String	The friend list Name
groupId	String	The group ID
ids	String[]	The ids of users
includeRead	boolean	Enables notifications that the user has already read in addition to unread ones
link	java.net.URL	Link URL
linkId	String	The link ID
locale	java.util.Locale	Desired FQL locale
message	String	The message text
messageId	String	The message ID
metric	String	The metric name
name	String	Test user name, must be of the form 'first last'
noStory	boolean	If set to true, optionally suppresses the feed story that is automatically generated on a user's profile when they upload a photo using your application.
noteId	String	The note ID
notificationId	String	The notification ID
objectId	String	The insight object ID
optionDescription	String	The question's answer option description
options	java.util.List<tring>	The question's answer options

permissionName	String	The permission name
permissions	String	Test user permissions in the format perm1,perm2,...
photoId	String	The photo ID
place	String	The Facebook ID of the place associated with the Photo
placeId	String	The place ID
postId	String	The post ID
postUpdate	facebook4j.PostUpdate	The post to create or update
queries	java.util.Map<tring>	FQL queries
query	String	FQL query or search terms for search* endpoints
question	String	The question text
questionId	String	The question id
reading	facebook4j.Reading	Optional reading parameters. See Reading Options(#reading)
scoreValue	int	The numeric score with value
size	facebook4j.PictureSize	The picture size, one of large, normal, small or square
source	facebook4j.Media	The media content from either a java.io.File or java.io.Inputstream
subject	String	The note of the subject
tagUpdate	facebook4j.TagUpdate	Photo tag information
testUser1	facebook4j.TestUser	Test user
testUser2	facebook4j.TestUser	Test user
testUserId	String	The ID of the test user
title	String	The title text

toUserId	String	The ID of the user to tag
toUserIds	java.util.List<tring>	The IDs of the users to tag
userId	String	The Facebook user ID
userId1	String	The ID of a user
userId2	String	The ID of a user
userIds	String[]	The IDs of users to invite to event
userLocale	String	The test user locale
videoId	String	The video ID

READING OPTIONS

The **reading** option of type **facebook4j.Reading** adds support for reading parameters, which allow selecting specific fields, limits the number of results, etc. For more information see Graph API at Facebook Developers.

It is also used by consumer endpoints to poll Facebook data to avoid sending duplicate messages across polls.

The reading option can be a reference or value of type **facebook4j.Reading**, or can be specified using the following reading options in either the endpoint URI or exchange header with **CamelFacebook.** prefix.

Option	Description
reading.fields	Field names to retrieve, in the format field1,field2,...
reading.limit	Limit for number of items to return for list results, e.g. a limit of 10 returns items 1 through 10
reading.offset	Starting offset for list results, e.g. a limit of 10, and offset of 10 returns items 11 through 20
reading.until	A Unix timestamp or strtotime data value that points to the end of the range of time-based data
reading.since	A Unix timestamp or strtotime data value that points to the start of the range of time-based data
reading.locale	Retrieve localized content in a particular locale, specified as a String with the format language[,country][,variant]

reading.with	Retrieve information about objects that have location information attached, set it to true
reading.metadata	Use Facebook Graph API Introspection to retrieve object metadata, set it to true
reading.filter	User's stream filter key. See Facebook stream_filter

MESSAGE HEADER

Any of the URI options can be provided in a message header for producer endpoints with **CamelFacebook.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the Facebook4J API. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint parameter.

For endpoints that return an array, or **facebook4j.ResponseList**, or **java.util.List**, a consumer endpoint will map every elements in the list to distinct messages.

USE CASES

To create a post within your Facebook profile, send this producer a facebook4j.PostUpdate body.

```
from("direct:foo")
 .to("facebook://postFeed/inBody=postUpdate);
```

To poll all statuses on your home feed every 5 seconds:

```
from("facebook://home?consumer.delay=5000")
 .to("bean:blah");
```

Searching using a producer with dynamic options from header.

In the bar header we have the Facebook search string we want to execute in public posts, so we need to assign this value to the CamelFacebook.query header.

```
from("direct:foo")
 .setHeader("CamelFacebook.query", header("bar"))
 .to("facebook://posts");
```

CHAPTER 43. FILE2

FILE COMPONENT - APACHE CAMEL 2.0 ONWARDS

The File component provides access to file systems, allowing files to be processed by any other Apache Camel Components or messages from other components to be saved to disk.

URI FORMAT

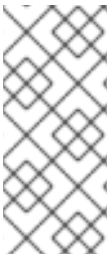
```
file:directoryName[?options]
```

or

```
file://directoryName[?options]
```

Where **directoryName** represents the underlying file directory.

You can append query options to the URI in the following format, **?option=value&option=value&...**



NOTE

Apache Camel only supports endpoints configured with a starting directory. So the **directoryName** must be a directory. If you want to consume a single file only, you can use the **fileName** option, e.g. by setting **fileName=thefilename**. Also, the starting directory must not contain dynamic expressions with ${ } placeholders. Again use the **fileName** option to specify the dynamic part of the filename.

AVOID READING FILES CURRENTLY BEING WRITTEN BY ANOTHER APPLICATION

Beware the JDK File IO API is a bit limited in detecting whether another application is currently writing/copying a file. And the implementation can be different depending on OS platform as well. This could lead to that Apache Camel thinks the file is not locked by another process and start consuming it. Therefore you have to do you own investigation as to what suits your environment. To help with this, Apache Camel provides different **readLock** options and the **doneFileOption** option that you can use. See also the section the section called “Consuming files from folders where others drop files directly”.

URI OPTIONS

Name	Default Value	Description

autoCreate	**true**	Automatically create missing directories in the file's pathname. For the file consumer, that means creating the starting directory. For the file producer, it means the directory where the files should be written.
bufferSize	128kb	Write buffer sized in bytes.
fileName	**null**	Use Expression such as File Language to dynamically set the filename. For consumers, it's used as a filename filter. For producers, it's used to evaluate the filename to write. If an expression is set, it take precedence over the **CamelFileName** header. (**Note:** The header itself can also be an Expression). The expression options support both **String** and **Expression** types. If the expression is a **String** type, it is **always** evaluated using the File Language. If the expression is an **Expression** type, the specified **Expression** type is used - this allows you, for instance, to use OGNL expressions. For the consumer, you can use it to filter filenames, so you can for instance consume today's file using the File Language syntax: **mydata-${date:now:yyyyMMdd}.txt**. From **Camel 2.11** onwards the producers support the **CamelOverruleFileName** header which takes precedence over any existing **CamelFileName** header; the **CamelOverruleFileName** is a header that is used only once, and makes it easier as this avoids to temporary store **CamelFileName** and have to restore it afterwards.

flatten	**false**	Flatten is used to flatten the file name path to strip any leading paths, so it's just the file name. This allows you to consume recursively into sub-directories, but when you eg write the files to another directory they will be written in a single directory. Setting this to **true** on the producer enforces that any file name recived in **CamelFileName** header will be stripped for any leading paths.
charset	**null**	**Camel 2.5:** this option is used to specify the encoding of the file, and camel will set the Exchange property with Exchange.CHARSET_NAME with the value of this option.
copyAndDeleteOnRenameFail	**true**	**Camel 2.9**: whether to fallback and do a copy and delete file, in case the file could not be renamed directly. This option is not available for the FTP component.
renameUsingCopy	**false**	**Camel 2.13.1:** Perform rename operations using a copy and delete strategy. This is primarily used in environments where the regular rename operation is unreliable (e.g. across different file systems or networks). This option takes precedence over the **copyAndDeleteOnRenameFail** parameter that will automatically fall back to the copy and delete strategy, but only after additional delays.

CONSUMER ONLY

Name	Default Value	Description
initialDelay	**1000**	Milliseconds before polling the file/directory starts.
delay	**500**	Milliseconds before the next poll of the file/directory.

useFixedDelay	**true**	Set to **true** to use fixed delay between pools, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.
runLoggingLevel	**TRACE**	**Camel 2.8:** The consumer logs a start/complete log line when it polls. This option allows you to configure the logging level for that.
recursive	**false**	If a directory, will look for files in all the sub-directories as well.
delete	**false**	If **true**, the file will be deleted after it is processed successfully.
noop	**false**	If **true**, the file is not moved or deleted in any way. This option is good for readonly data, or for ETL type requirements. If **noop=true**, Apache Camel will set **idempotent=true** as well, to avoid consuming the same files over and over again.
preMove	**null**	Use Expression such as File Language to dynamically set the filename when moving it **before** processing. For example to move in-progress files into the **order** directory set this value to **order**.
move	**.camel**	Use Expression such as File Language to dynamically set the filename when moving it **after** processing. To move files into a **.done** subdirectory just enter **.done**.
moveFailed	**null**	Use Expression such as File Language to dynamically set the filename when moving **failed files after** processing. To move files into a **error** subdirectory just enter **error**. **Note:** When moving the files to another location it can/will **handle** the error when you move it to another location so Apache Camel cannot pick up the file again.

include	**null**	Is used to include files, if filename matches the regex pattern.
exclude	**null**	Is used to exclude files, if filename matches the regex pattern.
antInclude	**null**	**Camel 2.10:** Ant style filter inclusion, for example **antInclude=*{}*/*{}.txt**. Multiple inclusions may be specified in comma-delimited format. See below for more details about ant path filters.
antExclude	**null**	**Camel 2.10:** Ant style filter exclusion. If both **antInclude** and **antExclude** are used, **antExclude** takes precedence over **antInclude**. Multiple exclusions may be specified in comma-delimited format. See below for more details about ant path filters.
antFilterCaseSensitive	**true**	**Camel 2.11:** Ant style filter which is case sensitive or not.
idempotent	**false**	Option to use the Idempotent Consumer EIP pattern to let Apache Camel skip already processed files. Will by default use a memory based LRUCache that holds 1000 entries. If **noop=true** then idempotent will be enabled as well to avoid consuming the same files over and over again.
idempotentKey	**Expression**	**Camel 2.11:** To use a custom idempotent key. By default the absolute path of the file is used. You can use the File Language, for example to use the file name and file size, you can do: idempotentKey=$-$.
idempotentRepository	**null**	Pluggable repository as a org.apache.camel.processor.idempotent.MessageIdRepository class. Will by default use **MemoryMessageIdRepository** if none is specified and **idempotent** is **true**.

inProgressRepository	**memory**	Pluggable in-progress repository as a org.apache.camel.processor.idempotent.MessageIdRepository class. The in-progress repository is used to account the current in progress files being consumed. By default a memory based repository is used.
filter	**null**	Pluggable filter as a **org.apache.camel.component.file.GenericFileFilter** class. Will skip files if filter returns **false** in its **accept()** method. Apache Camel also ships with an **ANT path matcher** filter in the **camel-spring** component. More details in section below.
sorter	**null**	Pluggable sorter as a java.util.Comparator<org.apache.camel.component.file.GenericFile> class.
sortBy	**null**	Built-in sort using the File Language. Supports nested sorts, so you can have a sort by file name and as a 2nd group sort by modified date. See sorting section below for details.

readLock	**markerFile**	Used by consumer, to only poll the files if it has exclusive read-lock on the file (i.e. the file is not in-progress or being written). Apache Camel will wait until the file lock is granted. The **readLock** option supports the following built-in strategies: • **changed** uses a length/modification timestamp to detect whether the file is currently being copied or not. Will wait at least 1 second to determine this, so this option cannot consume files as fast as the others, but can be more reliable as the JDK IO API cannot always determine whether a file is currently being used by another process. • **fileLock** is for using **java.nio.channels.FileLock**. This approach should be avoided when accessing a remote file system via a mount/share unless that file system supports distributed file locks. • **rename** attempts to rename the file, in order to test whether we can get an exclusive read-lock. • **none** is for no read locks at all.
readLockTimeout	**0** (for FTP, **2000**)	Optional timeout in milliseconds for the read-lock, if supported by the read-lock. If the read-lock could not be granted and the timeout triggered, then Apache Camel will skip the file. At next poll Apache Camel, will try the file again, and this time maybe the read-lock could be granted. Currently **fileLock**, **changed** and **rename** support the timeout.

readLockCheckInterval	**1000** (for FTP, **5000**)	**Camel 2.6:** Interval in millis for the read-lock, if supported by the read lock. This interval is used for sleeping between attempts to acquire the read lock. For example when using the **changed** read lock, you can set a higher interval period to cater for *slow writes*. The default of 1 sec. may be *too fast* if the producer is very slow writing the file.
readLockMinLength	**1**	**Camel 2.10.1:** This option applied only for **readLock=changed**. This option allows you to configure a minimum file length. By default Camel expects the file to contain data, and thus the default value is 1. You can set this option to zero, to allow consuming zero-length files.
readLockLoggingLevel	**WARN**	**Camel 2.12:** Logging level used when a read lock could not be acquired. By default a WARN is logged. You can change this level, for example to OFF to not have any logging. This option is only applicable for **readLock** of types: **changed**, **fileLock**, **rename**.
readLockMarkerFile	**true**	**Camel 2.14:** Whether to use marker file with the changed, rename, or exclusive read lock types. By default a marker file is used as well to guard against other processes picking up the same files. This behavior can be turned off by setting this option to false. For example if you do not want to write marker files to the file systems by the Camel application.
directoryMustExist		**Camel 2.5:** Similar to **startingDirectoryMustExist** but this applies during polling recursive sub directories.

doneFileName	**null**	**Camel 2.6:** If provided, Camel will only consume files if a *done* file exists. This option configures what file name to use. Either you can specify a fixed name. Or you can use dynamic placeholders. The *done* file is **always** expected in the same folder as the original file. See *using done file* and *writing done file* sections for examples.
exclusiveReadLockStrategy	**null**	Pluggable read-lock as a **org.apache.camel.component.file.GenericFileExclusiveReadLockStrategy** implementation.
maxMessagesPerPoll	**0**	An integer that defines the maximum number of messages to gather per poll. By default, no maximum is set. Can be used to set a limit of e.g. 1000 to avoid having the server read thousands of files as it starts up. Set a value of 0 or negative to disabled it.
eagerMaxMessagesPerPoll	**true**	**Camel 2.9.3:** Allows for controlling whether the limit from **maxMessagesPerPoll** is eager or not. If eager then the limit is during the scanning of files. Where as false would scan all files, and then perform sorting. Setting this option to false allows for sorting all files first, and then limit the poll. Mind that this requires a higher memory usage as all file details are in memory to perform the sorting.
minDepth	0	**Camel 2.8**: The minimum depth to start processing when recursively processing a directory. Using **minDepth=1** means the base directory. Using **minDepth=2** means the first sub directory. This option is **not** supported by FTP consumer.

maxDepth	**Integer.MAX_VALUE**	**Camel 2.8:** The maximum depth to traverse when recursively processing a directory. This option is **not** supported by FTP consumer.
processStrategy	**null**	A pluggable **org.apache.camel.component.file.GenericFileProcessStrategy** allowing you to implement your own **readLock** option or similar. Can also be used when special conditions must be met before a file can be consumed, such as a special *ready* file exists. If this option is set then the **readLock** option does not apply.
startingDirectoryMustExist	**false**	Whether the starting directory must exist. Mind that the **autoCreate** option is default enabled, which means the starting directory is normally auto-created if it doesn't exist. You can disable **autoCreate** and enable this to ensure the starting directory must exist. Will throw an exception, if the directory doesn't exist.
pollStrategy	**null**	A pluggable **org.apache.camel.spi.PollingConsumerPollStrategy** allowing you to provide your custom implementation to control error handling usually occurred during the poll operation before an **Exchange** have been created and being routed in Camel. In other words, the error occurred while the polling was gathering information, for instance access to a file network failed so Camel cannot access it to scan for files. The default implementation will log the caused exception at **WARN** level and ignore it.
sendEmptyMessageWhenIdle	**false**	**Camel 2.9:** If the polling consumer did not poll any files, you can enable this option to send an empty message (no body) instead.

consumer.bridgeErrorHandler	**false**	**Camel 2.10:** Allows for bridging the consumer to the Camel routing Error Handler, which mean any exceptions occurred while trying to pick up files, or the like, will now be processed as a message and handled by the routing Error Handler. By default the consumer will use the **org.apache.camel.spi.ExceptionHandler** to deal with exceptions, that by default will be logged at **WARN**/**ERROR** level and ignored. See further below on this page fore more details, at section How to use the Camel error handler to deal with exceptions triggered outside the routing engine.
scheduledExecutorService	**null**	**Camel 2.10:** Allows for configuring a custom/shared thread pool to use for the consumer. By default each consumer has its own single threaded thread pool. This option allows you to share a thread pool among multiple file consumers.
scheduler	**null**	**Camel 2.12:** To use a custom scheduler to trigger the consumer to run. See more details at Polling Consumer, for example there is a Quartz2, and Spring based scheduler that supports CRON expressions.
backoffMultiplier	**0**	**Camel 2.12:** To let the scheduled polling consumer backoff if there has been a number of subsequent idles/errors in a row. The multiplier is then the number of polls that will be skipped before the next actual attempt is happening again. When this option is in use then **backoffIdleThreshold** and/or **backoffErrorThreshold** must also be configured. See more details at Polling Consumer.
backoffIdleThreshold	**0**	**Camel 2.12:** The number of subsequent idle polls that should happen before the **backoffMultipler** should kick-in.

backoffErrorThreshold	**0**	**Camel 2.12:** The number of subsequent error polls (failed due some error) that should happen before the **backoffMultipler** should kick-in.

DEFAULT BEHAVIOR FOR FILE CONSUMER

- By default the file is locked for the duration of the processing.
- After the route has completed, files are moved into the **.camel** subdirectory, so that they appear to be deleted.
- The File Consumer will always skip any file whose name starts with a dot, such as **.**, **.camel**, **.m2** or **.groovy**.
- Only files (not directories) are matched for valid filename, if options such as: **includeNamePrefix**, **includeNamePostfix**, **excludeNamePrefix**, **excludeNamePostfix**, **regexPattern** are used.

PRODUCER ONLY

Name	Default Value	Description

fileExist	**Override**	What to do if a file already exists with the same name. The following values can be specified: **Override**, **Append**, **Fail**, **Ignore**, **Move**, and **TryRename** (Camel 2.11.1). **Override**, which is the default, replaces the existing file. **Append** adds content to the existing file. **Fail** throws a **GenericFileOperationException**, indicating that there is already an existing file. **Ignore** silently ignores the problem and **does not** override the existing file, but assumes everything is okay. The **Move** option requires **Camel 2.10.1** onwards, and the corresponding **moveExisting** option to be configured as well. The option **eagerDeleteTargetFile** can be used to control what to do if an moving the file, and there exists already an existing file, otherwise causing the move operation to fail. The **Move** option will move any existing files, before writing the target file. **TryRenameCamel 2.11.1** is only applicable if **tempFileName** option is in use. This allows to try renaming the file from the temporary name to the actual name, without doing any exists check. This check may be faster on some file systems and especially FTP servers.
tempPrefix	**null**	This option is used to write the file using a temporary name and then, after the write is complete, rename it to the real name. Can be used to identify files being written and also avoid consumers (not using exclusive read locks) reading in progress files. Is often used by FTP when uploading big files.
tempFileName	**null**	**Camel 2.1:** The **same** as **tempPrefix** option but offering a more fine grained control on the naming of the temporary filename as it uses the File Language.

keepLastModified	**false**	**Camel 2.2:** Will keep the last modified timestamp from the source file (if any). Will use the **Exchange.FILE_LAST_MODIFIED** header to located the timestamp. This header can contain either a **java.util.Date** or **long** with the timestamp. If the timestamp exists and the option is enabled it will set this timestamp on the written file. **Note:** This option only applies to the **file** producer. You *cannot* use this option with any of the ftp producers.
eagerDeleteTargetFile	**true**	**Camel 2.3:** Whether or not to eagerly delete any existing target file. This option only applies when you use **fileExists=Override** and the **tempFileName** option as well. You can use this to disable (set it to false) deleting the target file before the temp file is written. For example you may write big files and want the target file to exists during the temp file is being written. This ensure the target file is only deleted until the very last moment, just before the temp file is being renamed to the target filename. From **Camel 2.10.1** on this option is also used to control whether to delete any existing files when **fileExist=Move** is enabled, and an existing file exists. If the option **copyAndDeleteOnRenameFail** is **false**, an exception will be thrown if an existing file existed; if it's **true**, the existing file is deleted before the move operation.

doneFileName	**null**	**Camel 2.6:** If provided, then Camel will write a 2nd *done* file when the original file has been written. The *done* file will be empty. This option configures what file name to use. Either you can specify a fixed name. Or you can use dynamic placeholders. The *done* file will **always** be written in the same folder as the original file. See *writing done file* section for examples.
allowNullBody	**false**	**Camel 2.10.1:** Used to specify if a null body is allowed during file writing. If set to true then an empty file will be created, when set to false, and attempting to send a null body to the file component, a GenericFileWriteException of 'Cannot write null body to file.' will be thrown. If the `fileExist` option is set to 'Override', then the file will be truncated, and if set to `append` the file will remain unchanged.
forceWrites	**true**	**Camel 2.10.5/2.11:** Whether to force syncing writes to the file system. You can turn this off if you do not want this level of guarantee, for example if writing to logs / audit logs etc; this would yield better performance.

DEFAULT BEHAVIOR FOR FILE PRODUCER

- By default it will override any existing file, if one exist with the same name. In Apache Camel 1.x the **Append** is the default for the file producer. We have changed this to **Override** in Apache Camel 2.0 as this is also the default file operation using **java.io.File**. And also the default for the FTP library we use in the camel-ftp component.

MOVE AND DELETE OPERATIONS

Any move or delete operations is executed after (post command) the routing has completed; so during processing of the **Exchange** the file is still located in the inbox folder.

Lets illustrate this with an example:

```
from("file://inbox?move=.done").to("bean:handleOrder");
```

When a file is dropped in the **inbox** folder, the file consumer notices this and creates a new **FileExchange** that is routed to the **handleOrder** bean. The bean then processes the **File** object. At this

point in time the file is still located in the **inbox** folder. After the bean completes, and thus the route is completed, the file consumer will perform the move operation and move the file to the **.done** sub-folder.

The **move** and **preMove** options is considered as a directory name (though if you use an expression such as File Language, or Simple then the result of the expression evaluation is the file name to be used - eg if you set

```
move=../backup/copy-of-${file:name}
```

then that's using the File Language which we use return the file name to be used), which can be either relative or absolute. If relative, the directory is created as a sub-folder from within the folder where the file was consumed.

By default, Apache Camel will move consumed files to the **.camel** sub-folder relative to the directory where the file was consumed.

If you want to delete the file after processing, the route should be:

```
    from("file://inobox?delete=true").to("bean:handleOrder");
```

We have introduced a **pre** move operation to move files **before** they are processed. This allows you to mark which files have been scanned as they are moved to this sub folder before being processed.

```
    from("file://inbox?preMove=inprogress").to("bean:handleOrder");
```

You can combine the **pre** move and the regular move:

```
    from("file://inbox?preMove=inprogress&move=.done").to("bean:handleOrder");
```

So in this situation, the file is in the **inprogress** folder when being processed and after it's processed, it's moved to the **.done** folder.

FINE GRAINED CONTROL OVER MOVE AND PREMOVE OPTION

The **move** and **preMove** option is Expression-based, so we have the full power of the File Language to do advanced configuration of the directory and name pattern. Apache Camel will, in fact, internally convert the directory name you enter into a File Language expression. So when we enter **move=.done** Apache Camel will convert this into: **${file:parent}/.done/${file:onlyname}**. This is only done if Apache Camel detects that you have not provided a **${ }** in the option value yourself. So when you enter an expression containing **${ }**, the expression is interpreted as a File Language expression.

So if we want to move the file into a backup folder with today's date as the pattern, we can do:

```
move=backup/${date:now:yyyyMMdd}/${file:name}
```

ABOUT MOVEFAILED

The **moveFailed** option allows you to move files that **could not** be processed succesfully to another location such as a error folder of your choice. For example to move the files in an error folder with a timestamp you can use **moveFailed=/error/${file:name.noext}-${date:now:yyyyMMddHHmmssSSS}.${file:name.ext}**.

See more examples at File Language.

MESSAGE HEADERS

The following headers are supported by this component:

FILE PRODUCER ONLY

Header	Description
CamelFileName	Specifies the name of the file to write (relative to the endpoint directory). The name can be a **String**; a **String** with a File Language or Simple expression; or an Expression object. If it's **null** then Apache Camel will auto-generate a filename based on the message unique ID.
CamelFileNameProduced	The actual absolute filepath (path + name) for the output file that was written. This header is set by Camel and its purpose is providing end-users with the name of the file that was written.
CamelOverruleFileName	**Camel 2.11:** Is used for overruling **CamelFileName** header and use the value instead (but only once, as the producer will remove this header after writing the file). The value can be only be a String. Notice that if the option **fileName** has been configured, then this is still being evaluated.

FILE CONSUMER ONLY

Header	Description
CamelFileName	Name of the consumed file as a relative file path with offset from the starting directory configured on the endpoint.
CamelFileNameOnly	Only the file name (the name with no leading paths).
CamelFileAbsolute	A **boolean** option specifying whether the consumed file denotes an absolute path or not. Should normally be **false** for relative paths. Absolute paths should normally not be used but we added to the move option to allow moving files to absolute paths. But can be used elsewhere as well.
CamelFileAbsolutePath	The absolute path to the file. For relative files this path holds the relative path instead.

CamelFilePath	The file path. For relative files this is the starting directory + the relative filename. For absolute files this is the absolute path.
CamelFileRelativePath	The relative path.
CamelFileParent	The parent path.
CamelFileLength	A **long** value containing the file size.
CamelFileLastModified	A **long** value containing the last modified timestamp of the file.

BATCH CONSUMER

This component implements the Batch Consumer.

EXCHANGE PROPERTIES, FILE CONSUMER ONLY

As the file consumer is **BatchConsumer** it supports batching the files it polls. By batching it means that Apache Camel will add some properties to the Exchange so you know the number of files polled the current index in that order.

Property	Description
CamelBatchSize	The total number of files that was polled in this batch.
CamelBatchIndex	The current index of the batch. Starts from 0.
CamelBatchComplete	A **boolean** value indicating the last Exchange in the batch. Is only **true** for the last entry.

This allows you for instance to know how many files exists in this batch and for instance let the Aggregator aggregate this number of files.

COMMON GOTCHAS WITH FOLDER AND FILENAMES

When Apache Camel is producing files (writing files) there are a few gotchas affecting how to set a filename of your choice. By default, Apache Camel will use the message ID as the filename, and since the message ID is normally a unique generated ID, you will end up with filenames such as: **ID-MACHINENAME-2443-1211718892437-1-0**. If such a filename is not desired, then you must provide a filename in the **CamelFileName** message header. The constant, **Exchange.FILE_NAME**, can also be used.

The sample code below produces files using the message ID as the filename:

```
from("direct:report").to("file:target/reports");
```

To use **report.txt** as the filename you have to do:

```
from("direct:report").setHeader(Exchange.FILE_NAME, constant("report.txt")).to( "file:target/reports");
```

Or the same as above, but with **CamelFileName**:

```
from("direct:report").setHeader("CamelFileName", constant("report.txt")).to( "file:target/reports");
```

And a syntax where we set the filename on the endpoint with the **fileName** URI option.

```
from("direct:report").to("file:target/reports/?fileName=report.txt");
```

FILENAME EXPRESSION

Filename can be set either using the **expression** option or as a string-based File Language expression in the **CamelFileName** header. See the File Language for syntax and samples.

CONSUMING FILES FROM FOLDERS WHERE OTHERS DROP FILES DIRECTLY

Beware if you consume files from a folder where other applications write files directly. Take a look at the different **readLock** options to see what suits your use cases. The best approach is however to write to another folder and after the write move the file in the drop folder. However if you write files directly to the drop folder then the option **changed** could better detect whether a file is currently being written/copied as it uses a file changed algorithm to see whether the file size / modification changes over a period of time. The other read lock options rely on Java File API that sadly is not always very good at detecting this. You may also want to look at the **doneFileName** option, which uses a marker file (done) to signal when a file is done and ready to be consumed.

USING DONE FILES

Available as of Camel 2.6

See also section *writing done files* below.

If you want only to consume files when a done file exists, then you can use the **doneFileName** option on the endpoint.

```
from("file:bar?doneFileName=done");
```

Will only consume files from the bar folder, if a file name done exists in the same directory as the target files. Camel will automatically delete the done file when it's done consuming the files.

However its more common to have one done file per target file. This means there is a 1:1 correlation. To do this you must use dynamic placeholders in the **doneFileName** option. Currently Camel supports the following two dynamic tokens: **file:name** and **file:name.noext** which must be enclosed in ${ }. The consumer only supports the static part of the done file name as either prefix or suffix (not both).

```
from("file:bar?doneFileName=${file:name}.done");
```

In this example only files will be polled if there exists a done file with the name *file name*.done. For example

- **hello.txt** - is the file to be consumed
- **hello.txt.done** - is the associated done file

You can also use a prefix for the done file, such as:

```
from("file:bar?doneFileName=ready-${file:name}");
```

- **hello.txt** - is the file to be consumed
- **ready-hello.txt** - is the associated done file

WRITING DONE FILES

Available as of Camel 2.6

After you have written af file you may want to write an additional *done* file as a kinda of marker, to indicate to others that the file is finished and has been written. To do that you can use the **doneFileName** option on the file producer endpoint.

```
.to("file:bar?doneFileName=done");
```

Will simply create a file named **done** in the same directory as the target file.

However its more common to have one done file per target file. This means there is a 1:1 correlation. To do this you must use dynamic placeholders in the **doneFileName** option. Currently Camel supports the following two dynamic tokens: **file:name** and **file:name.noext** which must be enclosed in **${ }**.

```
.to("file:bar?doneFileName=done-${file:name}");
```

Will for example create a file named **done-foo.txt** if the target file was **foo.txt** in the same directory as the target file.

```
.to("file:bar?doneFileName=${file:name}.done");
```

Will for example create a file named **foo.txt.done** if the target file was **foo.txt** in the same directory as the target file.

```
.to("file:bar?doneFileName=${file:name.noext}.done");
```

Will for example create a file named **foo.done** if the target file was **foo.txt** in the same directory as the target file.

READ FROM A DIRECTORY AND WRITE TO ANOTHER DIRECTORY

```
from("file://inputdir/?delete=true").to("file://outputdir")
```

READ FROM A DIRECTORY AND WRITE TO ANOTHER DIRECTORY USING A OVERRULE DYNAMIC NAME

```
from("file://inputdir/?delete=true").to("file://outputdir?overruleFile=copy-of-${file:name}")
```

Listen on a directory and create a message for each file dropped there. Copy the contents to the **outputdir** and delete the file in the **inputdir**.

READING RECURSIVELY FROM A DIRECTORY AND WRITING TO ANOTHER

```
from("file://inputdir/?recursive=true&delete=true").to("file://outputdir")
```

Listen on a directory and create a message for each file dropped there. Copy the contents to the **outputdir** and delete the file in the **inputdir**. Will scan recursively into sub-directories. Will lay out the files in the same directory structure in the **outputdir** as the **inputdir**, including any sub-directories.

```
inputdir/foo.txt
inputdir/sub/bar.txt
```

Will result in the following output layout:

```
outputdir/foo.txt
outputdir/sub/bar.txt
```

USING FLATTEN

If you want to store the files in the outputdir directory in the same directory, disregarding the source directory layout (e.g. to flatten out the path), you just add the **flatten=true** option on the file producer side:

```
from("file://inputdir/?recursive=true&delete=true").to("file://outputdir?flatten=true")
```

Will result in the following output layout:

```
outputdir/foo.txt
outputdir/bar.txt
```

READING FROM A DIRECTORY AND THE DEFAULT MOVE OPERATION

Apache Camel will by default move any processed file into a **.camel** subdirectory in the directory the file was consumed from.

```
from("file://inputdir/?recursive=true&delete=true").to("file://outputdir")
```

Affects the layout as follows: **before**

```
inputdir/foo.txt
inputdir/sub/bar.txt
```

after

```
inputdir/.camel/foo.txt
inputdir/sub/.camel/bar.txt
outputdir/foo.txt
outputdir/sub/bar.txt
```

READ FROM A DIRECTORY AND PROCESS THE MESSAGE IN JAVA

```
from("file://inputdir/").process(new Processor() {
  public void process(Exchange exchange) throws Exception {
    Object body = exchange.getIn().getBody();
    // do some business logic with the input body
  }
});
```

The body will be a **File** object that points to the file that was just dropped into the **inputdir** directory.

READ FILES FROM A DIRECTORY AND SEND THE CONTENT TO A JMS QUEUE

```
from("file://inputdir/").convertBodyTo(String.class).to("jms:test.queue")
```

By default the file endpoint sends a **FileMessage** which contains a **File** object as the body. If you send this directly to the JMS component the JMS message will only contain the **File** object but not the content. By converting the **File** to a **String**, the message will contain the file contents, which is probably what you want.

The route above using Spring DSL:

```
  <route>
    <from uri="file://inputdir/"/>
    <convertBodyTo type="java.lang.String"/>
    <to uri="jms:test.queue"/>
  </route>
```

WRITING TO FILES

Apache Camel is of course also able to write files, i.e. produce files. In the sample below we receive some reports on the SEDA queue that we process before they are written to a directory.

```
public void testToFile() throws Exception {
    MockEndpoint mock = getMockEndpoint("mock:result");
    mock.expectedMessageCount(1);
    mock.expectedFileExists("target/test-reports/report.txt");

    template.sendBody("direct:reports", "This is a great report");

    assertMockEndpointsSatisfied();
}

protected JndiRegistry createRegistry() throws Exception {
```

```
    // bind our processor in the registry with the given id
    JndiRegistry reg = super.createRegistry();
    reg.bind("processReport", new ProcessReport());
    return reg;
}

protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            // the reports from the seda queue is processed by our processor
            // before they are written to files in the target/reports directory
            from("direct:reports").processRef("processReport").to("file://target/test-reports", "mock:result");
        }
    };
}

private static class ProcessReport implements Processor {

    public void process(Exchange exchange) throws Exception {
        String body = exchange.getIn().getBody(String.class);
        // do some business logic here

        // set the output to the file
        exchange.getOut().setBody(body);

        // set the output filename using java code logic, notice that this is done by setting
        // a special header property of the out exchange
        exchange.getOut().setHeader(Exchange.FILE_NAME, "report.txt");
    }

}
```

WRITE TO SUBDIRECTORY USING EXCHANGE.FILE_NAME

Using a single route, it is possible to write a file to any number of subdirectories. If you have a route setup as such:

```
<route>
  <from uri="bean:myBean"/>
  <to uri="file:/rootDirectory"/>
</route>
```

You can have **myBean** set the header **Exchange.FILE_NAME** to values such as:

```
Exchange.FILE_NAME = hello.txt => /rootDirectory/hello.txt
Exchange.FILE_NAME = foo/bye.txt => /rootDirectory/foo/bye.txt
```

This allows you to have a single route to write files to multiple destinations.

WRITING FILE THROUGH THE TEMPORARY DIRECTORY RELATIVE TO THE FINAL DESTINATION

Sometime you need to temporarily write the files to some directory relative to the destination directory.

Such situation usually happens when some external process with limited filtering capabilities is reading from the directory you are writing to. In the example below files will be written to the **/var/myapp/filesInProgress** directory and after data transfer is done, they will be atomically moved to the **/var/myapp/finalDirectory** directory.

```
from("direct:start").
  to("file:///var/myapp/finalDirectory?tempPrefix=/../filesInProgress/");
```

USING EXPRESSION FOR FILENAMES

In this sample we want to move consumed files to a backup folder using today's date as a sub-folder name:

```
from("file://inbox?move=backup/${date:now:yyyyMMdd}/${file:name}").to("...");
```

See File Language for more samples.

AVOIDING READING THE SAME FILE MORE THAN ONCE (IDEMPOTENT CONSUMER)

Apache Camel supports Idempotent Consumer directly within the component so it will skip already processed files. This feature can be enabled by setting the **idempotent=true** option.

```
from("file://inbox?idempotent=true").to("...");
```

Camel uses the absolute file name as the idempotent key, to detect duplicate files. From **Camel 2.11** onwards you can customize this key by using an expression in the idempotentKey option. For example to use both the name and the file size as the key

```
<route>
  <from uri="file://inbox?idempotent=true&dempotentKey=${file:name}-${file:size}"/>
  <to uri="bean:processInbox"/>
</route>
```

By default Apache Camel uses an in-memory based store for keeping track of consumed files, it uses a least recently used cache holding up to 1000 entries. You can plugin your own implementation of this store by using the **idempotentRepository** option using the **#** sign in the value to indicate it's a referring to a bean in the Registry with the specified **id**.

```
 <!-- define our store as a plain spring bean -->
 <bean id="myStore" class="com.mycompany.MyIdempotentStore"/>

<route>
  <from uri="file://inbox?idempotent=true&dempotentRepository=#myStore"/>
  <to uri="bean:processInbox"/>
</route>
```

Apache Camel will log at **DEBUG** level if it skips a file because it has been consumed before:

```
DEBUG FileConsumer is idempotent and the file has been consumed before. Will skip this file:
target\idempotent\report.txt
```

USING A FILE BASED IDEMPOTENT REPOSITORY

In this section we will use the file based idempotent repository **org.apache.camel.processor.idempotent.FileIdempotentRepository** instead of the in-memory based that is used as default. This repository uses a 1st level cache to avoid reading the file repository. It will only use the file repository to store the content of the 1st level cache. Thereby the repository can survive server restarts. It will load the content of the file into the 1st level cache upon startup. The file structure is very simple as it stores the key in separate lines in the file. By default, the file store has a size limit of 1mb and when the file grows larger, Apache Camel will truncate the file store and rebuild the content by flushing the 1st level cache into a fresh empty file.

We configure our repository using Spring XML creating our file idempotent repository and define our file consumer to use our repository with the **idempotentRepository** using **\#** sign to indicate Registry lookup:

```
<!-- this is our file based idempotent store configured to use the .filestore.dat as file -->
<bean id="fileStore" class="org.apache.camel.processor.idempotent.FileIdempotentRepository">
    <!-- the filename for the store -->
    <property name="fileStore" value="target/fileidempotent/.filestore.dat"/>
    <!-- the max filesize in bytes for the file. Apache Camel will trunk and flush the cache
         if the file gets bigger -->
    <property name="maxFileStoreSize" value="512000"/>
    <!-- the number of elements in our store -->
    <property name="cacheSize" value="250"/>
</bean>

<camelContext xmlns="http://camel.apache.org/schema/spring">
    <route>
        <from uri="file://target/fileidempotent/?
idempotent=true&dempotentRepository=#fileStore&ove=done/${file:name}"/>
        <to uri="mock:result"/>
    </route>
</camelContext>
```

USING A JPA BASED IDEMPOTENT REPOSITORY

In this section we will use the JPA based idempotent repository instead of the in-memory based that is used as default.

First we need a persistence-unit in **META-INF/persistence.xml** where we need to use the class **org.apache.camel.processor.idempotent.jpa.MessageProcessed** as model.

```
<persistence-unit name="idempotentDb" transaction-type="RESOURCE_LOCAL">
  <class>org.apache.camel.processor.idempotent.jpa.MessageProcessed</class>

  <properties>
    <property name="openjpa.ConnectionURL"
value="jdbc:derby:target/idempotentTest;create=true"/>
    <property name="openjpa.ConnectionDriverName"
value="org.apache.derby.jdbc.EmbeddedDriver"/>
    <property name="openjpa.jdbc.SynchronizeMappings" value="buildSchema"/>
    <property name="openjpa.Log" value="DefaultLevel=WARN, Tool=INFO"/>
  </properties>
</persistence-unit>
```

Then we need to setup a Spring **jpaTemplate** in the spring XML file:

```
<!-- this is standard spring JPA configuration -->
<bean id="jpaTemplate" class="org.springframework.orm.jpa.JpaTemplate">
    <property name="entityManagerFactory" ref="entityManagerFactory"/>
</bean>

<bean id="entityManagerFactory"
class="org.springframework.orm.jpa.LocalEntityManagerFactoryBean">
    <!-- we use idempotentDB as the persitence unit name defined in the persistence.xml file -->
    <property name="persistenceUnitName" value="idempotentDb"/>
</bean>
```

And finally we can create our JPA idempotent repository in the spring XML file as well:

```
<!-- we define our jpa based idempotent repository we want to use in the file consumer -->
<bean id="jpaStore" class="org.apache.camel.processor.idempotent.jpa.JpaMessageIdRepository">
    <!-- Here we refer to the spring jpaTemplate -->
    <constructor-arg index="0" ref="jpaTemplate"/>
    <!-- This 2nd parameter is the name  (= a cateogry name).
        You can have different repositories with different names -->
    <constructor-arg index="1" value="FileConsumer"/>
</bean>
```

And then we just need to reference the **jpaStore** bean in the file consumer endpoint, using the **idempotentRepository** option and the **#** syntax:

```
  <route>
    <from uri="file://inbox?idempotent=true&dempotentRepository=#jpaStore"/>
    <to uri="bean:processInbox"/>
  </route>
```

FILTER USING ORG.APACHE.CAMEL.COMPONENT.FILE.GENERICFILEFILTER

Apache Camel supports pluggable filtering strategies. You can then configure the endpoint with such a filter to skip certain files being processed.

In the sample we have built our own filter that skips files starting with **skip** in the filename:

```
public class MyFileFilter implements GenericFileFilter {
    public boolean accept(GenericFile pathname) {
        // we dont accept any files starting with skip in the name
        return !pathname.getFileName().startsWith("skip");
    }
}
```

And then we can configure our route using the **filter** attribute to reference our filter (using **#** notation) that we have defined in the spring XML file:

```
    <!-- define our filter as a plain spring bean -->
    <bean id="myFilter" class="com.mycompany.MyFileFilter"/>
```

```
<route>
  <from uri="file://inbox?filter=#myFilter"/>
  <to uri="bean:processInbox"/>
</route>
```

FILTERING USING ANT PATH MATCHER

The ANT path matcher is shipped out-of-the-box in the **camel-spring** jar. So you need to depend on **camel-spring** if you are using Maven. The reasons is that we leverage Spring's AntPathMatcher to do the actual matching.

The file paths is matched with the following rules:

- **?** matches one character
- ***** matches zero or more characters
- ****** matches zero or more directories in a path

The sample below demonstrates how to use it:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
    <template id="camelTemplate"/>

    <!-- use myFilter as filter to allow setting ANT paths for which files to scan for -->
    <endpoint id="myFileEndpoint" uri="file://target/antpathmatcher?
recursive=true&ilter=#myAntFilter"/>

    <route>
        <from ref="myFileEndpoint"/>
        <to uri="mock:result"/>
    </route>
</camelContext>

<!-- we use the antpath file filter to use ant paths for includes and exlucde -->
<bean id="myAntFilter" class="org.apache.camel.component.file.AntPathMatcherGenericFileFilter">
    <!-- include and file in the subfolder that has day in the name -->
    <property name="includes" value="**/subfolder/**/*day*"/>
    <!-- exclude all files with bad in name or .xml files. Use comma to seperate multiple excludes -->
    <property name="excludes" value="**/*bad*,**/*.xml"/>
</bean>
```

SORTING USING COMPARATOR

Apache Camel supports pluggable sorting strategies. This strategy it to use the build in **java.util.Comparator** in Java. You can then configure the endpoint with such a comparator and have Apache Camel sort the files before being processed.

In the sample we have built our own comparator that just sorts by file name:

```
public class MyFileSorter implements Comparator<GenericFile> {
    public int compare(GenericFile o1, GenericFile o2) {
        return o1.getFileName().compareToIgnoreCase(o2.getFileName());
```

```
    }
}
```

And then we can configure our route using the **sorter** option to reference to our sorter (**mySorter**) we have defined in the spring XML file:

```
  <!-- define our sorter as a plain spring bean -->
  <bean id="mySorter" class="com.mycompany.MyFileSorter"/>

 <route>
   <from uri="file://inbox?sorter=#mySorter"/>
   <to uri="bean:processInbox"/>
 </route>
```

URI OPTIONS CAN REFERENCE BEANS USING THE # SYNTAX

In the Spring DSL route about notice that we can reference beans in the Registry by prefixing the id with **#**. So writing **sorter=#mySorter**, will instruct Apache Camel to go look in the Registry for a bean with the ID, **mySorter**.

SORTING USING SORTBY

Apache Camel supports pluggable sorting strategies. This strategy it to use the File Language to configure the sorting. The **sortBy** option is configured as follows:

```
sortBy=group 1;group 2;group 3;...
```

Where each group is separated with semi colon. In the simple situations you just use one group, so a simple example could be:

```
sortBy=file:name
```

This will sort by file name, you can reverse the order by prefixing **reverse:** to the group, so the sorting is now Z..A:

```
sortBy=reverse:file:name
```

As we have the full power of File Language we can use some of the other parameters, so if we want to sort by file size we do:

```
sortBy=file:length
```

You can configure to ignore the case, using **ignoreCase:** for string comparison, so if you want to use file name sorting but to ignore the case then we do:

```
sortBy=ignoreCase:file:name
```

You can combine ignore case and reverse, however reverse must be specified first:

```
sortBy=reverse:ignoreCase:file:name
```

In the sample below we want to sort by last modified file, so we do:

```
sortBy=file:modified
```

And then we want to group by name as a 2nd option so files with same modifcation is sorted by name:

```
sortBy=file:modified;file:name
```

Now there is an issue here, can you spot it? Well the modified timestamp of the file is too fine as it will be in milliseconds, but what if we want to sort by date only and then subgroup by name? Well as we have the true power of File Language we can use the its date command that supports patterns. So this can be solved as:

```
sortBy=date:file:yyyyMMdd;file:name
```

Yeah, that is pretty powerful, oh by the way you can also use reverse per group, so we could reverse the file names:

```
sortBy=date:file:yyyyMMdd;reverse:file:name
```

USING GENERICFILEPROCESSSTRATEGY

The option **processStrategy** can be used to use a custom **GenericFileProcessStrategy** that allows you to implement your own *begin*, *commit* and *rollback* logic. For instance lets assume a system writes a file in a folder you should consume. But you should not start consuming the file before another *ready* file have been written as well.

So by implementing our own **GenericFileProcessStrategy** we can implement this as:

- In the **begin()** method we can test whether the special *ready* file exists. The begin method returns a **boolean** to indicate if we can consume the file or not.
- in the **commit()** method we can move the actual file and also delete the *ready* file.

IMPORTANT WHEN USING CONSUMER.BRIDGEERRORHANDLER

When using **consumer.bridgeErrorHandler**, then interceptors, OnCompletion does **not** apply. The Exchange is processed directly by the Camel Error Handler, and does not allow prior actions such as interceptors, onCompletion to take action.

DEBUG LOGGING

This component has log level **TRACE** that can be helpful if you have problems.

See also:

- File Language
- FTP2

CHAPTER 44. FLATPACK

FLATPACK COMPONENT

The Flatpack component supports fixed width and delimited file parsing using the FlatPack library.
Notice: This component only supports consuming from flatpack files to Object model. You can not (yet) write from Object model to flatpack format.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-flatpack</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
flatpack:[delim|fixed]:flatPackConfig.pzmap.xml[?options]
```

Or for a delimited file handler with no configuration file just use:

```
flatpack:someName[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

URI OPTIONS

Name	Default Value	Description
delimiter	**,**	The default character delimiter for delimited files.
textQualifier	**"**	The text qualifier for delimited files.
ignoreFirstRecord	**true**	Whether the first line is ignored for delimited files (for the column headers).
splitRows	**true**	As of Apache Camel 1.5, the component can either process each row one by one or the entire content at once.

allowShortLines	**false**	*Camel 2.9.3:* Allows for lines to be shorter than expected and ignores the extra characters.
ignoreExtraColumns	**false**	*Camel 2.9.3:* Allows for lines to be longer than expected and ignores the extra characters.

EXAMPLES

- **flatpack:fixed:foo.pzmap.xml** creates a fixed-width endpoint using the **foo.pzmap.xml** file configuration.
- **flatpack:delim:bar.pzmap.xml** creates a delimited endpoint using the **bar.pzmap.xml** file configuration.
- **flatpack:foo** creates a delimited endpoint called **foo** with no file configuration.

MESSAGE HEADERS

Apache Camel will store the following headers on the IN message:

Header	Description
camelFlatpackCounter	The current row index. For **splitRows=false** the counter is the total number of rows.

MESSAGE BODY

The component delivers the data in the IN message as a **org.apache.camel.component.flatpack.DataSetList** object that has converters for **java.util.Map** or **java.util.List**. Usually you want the **Map** if you process one row at a time (**splitRows=true**). Use **List** for the entire content (**splitRows=false**), where each element in the list is a **Map**. Each **Map** contains the key for the column name and its corresponding value.

For example to get the firstname from the sample below:

```
Map row = exchange.getIn().getBody(Map.class);
String firstName = row.get("FIRSTNAME");
```

However, you can also always get it as a **List** (even for **splitRows=true**). The same example:

```
List data = exchange.getIn().getBody(List.class);
Map row = (Map)data.get(0);
String firstName = row.get("FIRSTNAME");
```

HEADER AND TRAILER RECORDS

The header and trailer notions in Flatpack are supported. However, you **must** use fixed record IDs:

- **header** for the header record (must be lowercase)
- **trailer** for the trailer record (must be lowercase)

The example below illustrates this fact that we have a header and a trailer. You can omit one or both of them if not needed.

```
<RECORD id="header" startPosition="1" endPosition="3" indicator="HBT">
    <COLUMN name="INDICATOR" length="3"/>
    <COLUMN name="DATE" length="8"/>
</RECORD>

<COLUMN name="FIRSTNAME" length="35" />
<COLUMN name="LASTNAME" length="35" />
<COLUMN name="ADDRESS" length="100" />
<COLUMN name="CITY" length="100" />
<COLUMN name="STATE" length="2" />
<COLUMN name="ZIP" length="5" />

<RECORD id="trailer" startPosition="1" endPosition="3" indicator="FBT">
    <COLUMN name="INDICATOR" length="3"/>
    <COLUMN name="STATUS" length="7"/>
</RECORD>
```

USING THE ENDPOINT

A common use case is sending a file to this endpoint for further processing in a separate route. For example:

```
<camelContext xmlns="http://activemq.apache.org/camel/schema/spring">
  <route>
    <from uri="file://someDirectory"/>
    <to uri="flatpack:foo"/>
  </route>

  <route>
    <from uri="flatpack:foo"/>
    ...
  </route>
</camelContext>
```

You can also convert the payload of each message created to a **Map** for easy Bean Integration

CHAPTER 45. FOP

FOP COMPONENT

Available as of Camel 2.10

The FOP component allows you to render a message into different output formats using Apache FOP.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-fop</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
fop://outputFormat?[options]
```

OUTPUT FORMATS

The primary output format is PDF but other output formats are also supported:

Name	Output Format	Description
PDF	**application/pdf**	Portable Document Format
PS	**application/postscript**	Adobe Postscript
PCL	**application/x-pcl**	Printer Control Language
PNG	**image/png**	PNG images
JPEG	**image/jpeg**	JPEG images
SVG	**image/svg+xml**	Scalable Vector Graphics
XML	**application/X-fop-areatree**	Area tree representation
MIF	**application/mif**	FrameMaker's MIF
RTF	**application/rtf**	Rich Text Format
TXT	**text/plain**	Text

The complete list of valid output formats can be found here

ENDPOINT OPTIONS

name	default value	description
outputFormat		See table above.
userConfigURL	none	The location of a configuration file with the following structure. From **Camel 2.12** onwards the file is loaded from the classpath by default. You can use **file:**, or **classpath:** as prefix to load the resource from file or classpath. In previous releases the file is always loaded from file system.
fopFactory		Allows you to use a custom configured or custom implementation of **org.apache.fop.apps.FopFactory**.

MESSAGE OPERATIONS

name	default value	description
CamelFop.Output.Format		Overrides the output format for that message
CamelFop.Encrypt.userPassword		PDF user password
CamelFop.Encrypt.ownerPassword		PDF owner passoword
CamelFop.Encrypt.allowPrint	**true**	Allows printing the PDF
CamelFop.Encrypt.allowCopyContent	**true**	Allows copying content of the PDF
CamelFop.Encrypt.allowEditContent	**true**	Allows editing content of the PDF

CamelFop.Encrypt.allowEditAnnotations	**true**	Allows editing annotation of the PDF
CamelFop.Render.producer	Apache FOP	Metadata element for the system/software that produces the document
CamelFop.Render.creator		Metadata element for the user that created the document
CamelFop.Render.creationDate		Creation Date
CamelFop.Render.author		Author of the content of the document
CamelFop.Render.title		Title of the document
CamelFop.Render.subject		Subject of the document
CamelFop.Render.keywords		Set of keywords applicable to this document

EXAMPLE

Below is an example route that renders PDFs from XML data and XSLT template and saves the PDF files in target folder:

```
from("file:source/data/xml")
    .to("xslt:xslt/template.xsl")
    .to("fop:application/pdf")
    .to("file:target/data");
```

CHAPTER 46. FREEMARKER

FREEMARKER

The **freemarker:** component allows you to process a message using a FreeMarker template. This can be ideal when using Templating to generate responses for requests.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-freemarker</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
freemarker:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template (for example, **file://folder/myfile.ftl**).

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
contentCache	**true**	Cache for the resource content when it's loaded. Note: as of **Camel 2.9** cached resource content can be cleared via JMX using the endpoint's **clearContentCache** operation.
encoding	**null**	Character encoding of the resource content.
templateUpdateDelay	**5**	*Camel 2.9:* Number of seconds the loaded template resource will remain in the cache.

FREEMARKER CONTEXT

Apache Camel will provide exchange information in the FreeMarker context (just a **Map**). The **Exchange** is transferred as:

Key	Value

exchange	The **Exchange** itself.
exchange.properties	The **Exchange** properties.
headers	The headers of the In message.
camelContext	The Camel Context.
request	The In message.
body	The In message body.
response	The Out message (only for InOut message exchange pattern).

From Camel 2.14, you can set up your custom FreeMarker context in the message header with the key, **CamelFreemarkerDataModel**, like this:

```
Map<String, Object> variableMap = new HashMap<String, Object>();
variableMap.put("headers", headersMap);
variableMap.put("body", "Monday");
variableMap.put("exchange", exchange);
exchange.getIn().setHeader("CamelFreemarkerDataModel", variableMap);
```

HOT RELOADING

The FreeMarker template resource is by default **not** hot reloadable for both file and classpath resources (expanded jar). If you set **contentCache=false**, then Apache Camel will not cache the resource and hot reloading is thus enabled. This scenario can be used in development.

DYNAMIC TEMPLATES

Available as of Camel 2.1 Camel provides two headers by which you can define a different resource location for a template or the template content itself. If any of these headers is set then Camel uses this over the endpoint configured resource. This allows you to provide a dynamic template at runtime.

Header	Type	Description	Support Version
FreemarkerConstants.FREEMARKER_RESOURCE	**org.springframework.core.io.Resource**	The template resource	<= 1.6.2, <= 2.1
FreemarkerConstants.FREEMARKER_RESOURCE_URI	**String**	A URI for the template resource to use instead of the endpoint configured.	>= 2.1

FreemarkerConstants.FREEMARKER_TEMPLATE	**String**	The template to use instead of the endpoint configured.	>= 2.1

SAMPLES

For example, you can define a route like the following:

```
from("activemq:My.Queue").
  to("freemarker:com/acme/MyResponse.ftl");
```

To use a FreeMarker template to formulate a response to *InOut* message exchanges (where there is a **JMSReplyTo** header).

If you want to process *InOnly* exchanges, you could use a FreeMarker template to transform the message before sending it on to another endpoint:

```
from("activemq:My.Queue").
  to(ExchangePattern.InOut,"freemarker:com/acme/MyResponse.ftl").
  to("activemq:Another.Queue");
```

And to disable the content cache (for example, for development usage where the **.ftl** template should be hot reloaded):

```
from("activemq:My.Queue").
  to(ExchangePattern.InOut,"freemarker:com/acme/MyResponse.ftl?contentCache=false").
  to("activemq:Another.Queue");
```

And for a file-based resource:

```
from("activemq:My.Queue").
  to(ExchangePattern.InOut,"freemarker:file://myfolder/MyResponse.ftl?contentCache=false").
  to("activemq:Another.Queue");
```

In **Camel 2.1** it's possible to specify what template the component should use dynamically via a header, so for example:

```
from("direct:in").

setHeader(FreemarkerConstants.FREEMARKER_RESOURCE_URI).constant("path/to/my/template.ftl
").
  to("freemarker:dummy");
```

THE EMAIL SAMPLE

In this sample we want to use FreeMarker templating for an order confirmation email. The email template is laid out in FreeMarker as:

```
Dear ${headers.lastName}, ${headers.firstName}

Thanks for the order of ${headers.item}.
```

```
Regards Camel Riders Bookstore
${body}
```

And the java code:

```
private Exchange createLetter() {
    Exchange exchange = context.getEndpoint("direct:a").createExchange();
    Message msg = exchange.getIn();
    msg.setHeader("firstName", "Claus");
    msg.setHeader("lastName", "Ibsen");
    msg.setHeader("item", "Camel in Action");
    msg.setBody("PS: Next beer is on me, James");
    return exchange;
}

@Test
public void testFreemarkerLetter() throws Exception {
    MockEndpoint mock = getMockEndpoint("mock:result");
    mock.expectedMessageCount(1);
    mock.expectedBodiesReceived("Dear Ibsen, Claus\n\nThanks for the order of Camel in Action."
      + "\n\nRegards Camel Riders Bookstore\nPS: Next beer is on me, James");

    template.send("direct:a", createLetter());

    mock.assertIsSatisfied();
}

protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            from("direct:a")
                .to("freemarker:org/apache/camel/component/freemarker/letter.ftl")
                .to("mock:result");
        }
    };
}
```

CHAPTER 47. FTP2

FTP/SFTP COMPONENT

This component provides access to remote file systems over the FTP and SFTP protocols.

CONSUMING FROM REMOTE FTP SERVER

Make sure you read the section titled *Default when consuming files* further below for details related to consuming files.

URI FORMAT

```
ftp://[username@]hostname[:port]/directoryname[?options]
sftp://[username@]hostname[:port]/directoryname[?options]
ftps://[username@]hostname[:port]/directoryname[?options]
```

Where **directoryname** represents the underlying directory. Can contain nested folders.

If no **username** is provided, then **anonymous** login is attempted using no password. If no **port** number is provided, Apache Camel will provide default values according to the protocol (ftp = 21, sftp = 22, ftps = 21).

This component uses two different libraries for the actual FTP work. FTP and FTPS use Apache Commons Net while SFTP uses JCraft JSCH.

You can append query options to the URI in the following format, **?option=value&option=value&...**

URI OPTIONS

The options below are exclusive to the FTP component:

Name	Default Value	Description
username	**null**	Specifies the username to use to log in to the remote file systen.
password	**null**	Specifies the password to use to log in to the remote file system.
binary	**false**	Specifies the file transfer mode, BINARY or ASCII. Default is ASCII (**false**).

disconnect	**false**	**Camel 2.2:** Whether or not to disconnect from remote FTP server right after use. Can be used for both consumer and producer. Disconnect will only disconnect the current connection to the FTP server. If you have a consumer which you want to stop, then you need to stop the consumer/route instead.
localWorkDirectory	**null**	When consuming, a local work directory can be used to store the remote file content directly in local files, to avoid loading the content into memory. This is beneficial, if you consume a very big remote file and thus can conserve memory. See below for more details.
passiveMode	**false**	**FTP only**: Specifies whether to use passive mode connections. Default is active mode **{false**).
securityProtocol	**TLS**	**FTPS only:** Sets the underlying security protocol. The following values are defined: **TLS**: Transport Layer Security **SSL**: Secure Sockets Layer
disableSecureDataChannelDefaults	**false**	**Camel 2.4: FTPS only** : Whether or not to disable using default values for **execPbsz** and **execProt** when using secure data transfer. You can set this option to **true** if you want to be in absolute full control what the options **execPbsz** and **execProt** should be used.
download	**true**	**Camel 2.11:** Whether the FTP consumer should download the file. If this option is set to **false**, then the message body will be **null**, but the consumer will still trigger a Camel Exchange that has details about the file such as file name, file size, etc. It's just that the file will not be downloaded.

streamDownload	false	**Camel 2.11:** hether the consumer should download the entire file up front, the default behavior, or if it should pass an InputStream ead from the remote resource rather than an in-memory array as the in body of the amel Exchange. his option is ignored if download s false r is localWorkDirectory is provided. his option is useful for working with large remote files.
execProt	**null**	**Camel 2.4: FTPS only** : Will by default use option **P** if secure data channel defaults hasn't been disabled. Possible values are: **C**: Clear **S**: Safe (SSL protocol only) **E**: Confidential (SSL protocol only) **P**: Private
execPbsz	**null**	**Camel 2.4: FTPS only** : This option specifies the buffer size of the secure data channel. If option **useSecureDataChannel** has been enabled and this option has not been explicit set, then value **0** is used.
isImplicit	**false**	**FTPS only:** Sets the security mode(implicit/explicit). Default is explicit (**false**).
knownHostsFile	**null**	**SFTP only:** Sets the **known_hosts** file, so that the SFTP endpoint can do host key verification.
knownHostsUri	**null**	**SFTP only:Camel 2.11.1:** Sets the **known_hosts** file (loaded from classpath by default), so that the SFTP endpoint can do host key verification.
keyPair	**null**	**SFTP only:Camel 2.12.0:** Sets the Java KeyPair for SSH public key authentication, it supports DSA or RSA keys.
privateKeyFile	**null**	**SFTP only:** Set the private key file to that the SFTP endpoint can do private key verification.

privateKeyUri	**null**	**SFTP only:Camel 2.11.1:** Set the private key file (loaded from classpath by default) to that the SFTP endpoint can do private key verification.
privateKey	**null**	**SFTP only:Camel 2.11.1:** Set the private key as byte[] to that the SFTP endpoint can do private key verification.
privateKeyFilePassphrase	**null**	**SFTP only:** Set the private key file passphrase to that the SFTP endpoint can do private key verification.
privateKeyPassphrase	**null**	**SFTP only:Camel 2.11.1:** Set the private key file passphrase to that the SFTP endpoint can do private key verification.
preferredAuthentications	**null**	**SFTP only:Camel 2.10.7, 2.11.2,2.12.0:** set the preferred authentications which SFTP endpoint will used. Some example include:password,publickey. If not specified the default list from JSCH will be used.
ciphers	**null**	**Camel 2.8.2, 2.9: SFTP only** Set a comma separated list of ciphers that will be used in order of preference. Possible cipher names are defined by JCraft JSCH. Some examples include: aes128-ctr,aes128-cbc,3des-ctr,3des-cbc,blowfish-cbc,aes192-cbc,aes256-cbc. If not specified the default list from JSCH will be used.

fastExistsCheck	**false**	**Camel 2.8.2, 2.9:** If set this option to be true, camel-ftp will use the list file directly to check if the file exists. Since some FTP server may not support to list the file directly, if the option is false, camel-ftp will use the old way to list the directory and check if the file exists. Note from **Camel 2.10.1** onwards this option also influences **readLock=changed** to control whether it performs a fast check to update file information or not. This can be used to speed up the process if the FTP server has a lot of files.
strictHostKeyChecking	**no**	**SFTP only:Camel 2.2:** Sets whether to use strict host key checking. Possible values are: **no**, **yes** and **ask**. **ask** does not make sense to use as Camel cannot answer the question for you as its meant for human intervention. **Note:** The default in Camel 2.1 and below was **ask**.
maximumReconnectAttempts	3	Specifies the maximum reconnect attempts Apache Camel performs when it tries to connect to the remote FTP server. Use 0 to disable this behavior.
reconnectDelay	1000	Delay in millis Apache Camel will wait before performing a reconnect attempt.
connectTimeout	**10000**	**Camel 2.4:** Is the connect timeout in millis. This corresponds to using **ftpClient.connectTimeout** for the FTP/FTPS. For SFTP this option is also used when attempting to connect.
soTimeout	**null**	**FTP and FTPS Only: Camel 2.4:** Is the **SocketOptions.SO_TIMEOUT** value in millis. Note SFTP will automatic use the **connectTimeout** as the **soTimeout**.

timeout	**30000**	**FTP and FTPS Only: Camel 2.4:** Is the data timeout in millis. This corresponds to using **ftpClient.dataTimeout** for the FTP/FTPS. For SFTP there is no data timeout.
throwExceptionOnConnectFailed	**false**	**Camel 2.5:** Whether or not to thrown an exception if a successful connection and login could not be establish. This allows a custom **pollStrategy** to deal with the exception, for example to stop the consumer or the likes.
siteCommand	**null**	**FTP and FTPS Only: Camel 2.5:** To execute site commands after successful login. Multiple site commands can be separated using a new line character (\n). Use **help site** to see which site commands your FTP server supports.
stepwise	**true**	When consuming directories, specifies whether or not to use stepwise mode for traversing the directory tree. Stepwise means that it will CD one directory at a time. For more details, see the section called “Stepwise changing directories”.
separator	**Auto**	**Camel 2.6:** Dictates what path separator **char** to use when uploading files. **Auto** means use the path provided without altering it. **UNIX** means use UNIX style path separators. **Windows** means use Windows style path separators.
chmod	**null**	*SFTP Producer Only:* **Camel 2.9:** Allows you to set chmod on the stored file. For example **chmod=640**.

compression	0	*SFTP Only:* **Camel 2.8.3/2.9:** To use compression. Specify a level from 1 to 10. **Important:** You must manually add the needed JSCH zlib JAR to the classpath for compression support.
ftpClient	**null**	**FTP and FTPS Only: Camel 2.1:** Allows you to use a custom **org.apache.commons.net.ftp.FTPClient** instance.
ftpClientConfig	**null**	**FTP and FTPS Only: Camel 2.1:** Allows you to use a custom **org.apache.commons.net.ftp.FTPClientConfig** instance.
serverAliveInterval	**0**	**SFTP Only: Camel 2.8** Allows you to set the serverAliveInterval of the sftp session
serverAliveCountMax	**1**	**SFTP Only: Camel 2.8** Allows you to set the serverAliveCountMax of the sftp session
ftpClient.trustStore.file	**null**	**FTPS Only:** Sets the trust store file, so that the FTPS client can look up for trusted certificates.
ftpClient.trustStore.type	**JKS**	**FTPS Only:** Sets the trust store type.
ftpClient.trustStore.algorithm	**SunX509**	**FTPS Only:** Sets the trust store algorithm.
ftpClient.trustStore.password	**null**	**FTPS Only:** Sets the trust store password.
ftpClient.keyStore.file	**null**	**FTPS Only:** Sets the key store file, so that the FTPS client can look up for the private certificate.
ftpClient.keyStore.type	**JKS**	**FTPS Only:** Sets the key store type.
ftpClient.keyStore.algorithm	**SunX509**	**FTPS Only:** Sets the key store algorithm.
ftpClient.keyStore.password	**null**	**FTPS Only:** Sets the key store password.

ftpClient.keyStore.keyPassword	**null**	**FTPS Only:** Sets the private key password.
sslContextParameters	**null**	**FTPS Only: Camel 2.9:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSL related options on ftpClient as well as the securityProtocol (SSL, TLS, etc.) set on FtpsConfiguration. See Using the JSSE Configuration Utility.
proxy	**null**	**SFTP Only: Camel 2.10.7, 2.11.1:** Reference to a **com.jcraft.jsch.Proxy** in the Registry. This proxy is used to consume/send messages from the target SFTP host.
useList	**true**	**FTP/FTPS Only: Camel 2.12.1:** Whether the consumer should use FTP LIST command to retrieve directory listing to see which files exists. If this option is set to **false**, then **stepwise=false** must be configured, and also **fileName** must be configured to a fixed name, so the consumer knows the name of the file to retrieve. When doing this only that single file can be retrieved. See further below for more details.
ignoreFileNotFoundOrPermissionError	**false**	**Camel 2.12.1:** Whether the consumer should ignore when a file was attempted to be retrieved but did not exist (for some reason), or failure due insufficient file permission error.

FTPS COMPONENT DEFAULT TRUST STORE

When using the **ftpClient.** properties related to SSL with the FTPS component, the trust store accept all certificates. If you only want trust selective certificates, you have to configure the trust store with the **ftpClient.trustStore.xxx** options or by configuring a custom **ftpClient**.

When using **sslContextParameters**, the trust store is managed by the configuration of the provided SSLContextParameters instance.

MORE OPTIONS

See File for more options, as all the options from File are inherited by FTP2.

You can configure additional options on the **ftpClient** and **ftpClientConfig** from the URI directly by using the **ftpClient.** or **ftpClientConfig.** prefix.

For example to set the **setDataTimeout** on the **FTPClient** to 30 seconds you can do:

```
from("ftp://foo@myserver?password=secret&ftpClient.dataTimeout=30000")
    .to("bean:foo");
```

You can mix and match and have use both prefixes, for example to configure date format or timezones.

```
from("ftp://foo@myserver?
password=secret&ftpClient.dataTimeout=30000&ftpClientConfig.serverLanguageCode=fr")
    .to("bean:foo");
```

You can have as many of these options as you like.

See the documentation of the Apache Commons FTP FTPClientConfig for possible options and more details. And as well for Apache Commons FTP FTPClient.

If you do not like having many and long configuration in the url you can refer to the **ftpClient** or **ftpClientConfig** to use by letting Camel lookup in the Registry for it.

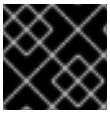
For example:

```
<bean id="myConfig" class="org.apache.commons.net.ftp.FTPClientConfig">
    <property name="lenientFutureDates" value="true"/>
    <property name="serverLanguageCode" value="fr"/>
</bean>
```

And then let Camel lookup this bean when you use the # notation in the url.

```
from("ftp://foo@myserver?password=secret&ftpClientConfig=#myConfig").to("bean:foo");
```

MORE URI OPTIONS



IMPORTANT

See File2 as all the options there also applies for this component.

EXAMPLES

Here are some examples of FTP endpoint URIs:

```
ftp://someone@someftpserver.com/public/upload/images/holiday2008?password=secret&binary=true
ftp://someoneelse@someotherftpserver.co.uk:12049/reports/2008/password=secret&binary=false
ftp://publicftpserver.com/download
```

FTP CONSUMER DOES NOT SUPPORT CONCURRENCY

The FTP consumer (with the same endpoint) does not support concurrency (the backing FTP client is not thread safe). You can use multiple FTP consumers to poll from different endpoints. It is only a single endpoint that does not support concurrent consumers.

The FTP producer does **not** have this issue, it supports concurrency.

MORE INFORMATION

This component is an extension of the File2 component. So there are more samples and details on the File2 component page.

DEFAULT WHEN CONSUMING FILES

The FTP consumer will by default leave the consumed files untouched on the remote FTP server. You have to configure it explicit if you want it to delete the files or move them to another location. For example you can use **delete=true** to delete the files, or use **move=.done** to move the files into a hidden done sub directory.

The regular File consumer is different as it will by default move files to a **.camel** sub directory. The reason Camel does **not** do this by default for the FTP consumer is that it may lack permissions by default to be able to move or delete files.

LIMITATIONS

The option **readLock** can be used to force Apache Camel **not** to consume files that are currently in the process of being written. However, this option is turned off by default, as it requires that the user has write access. There are other solutions to avoid consuming files that are currently being written over FTP; for instance, you can write to a temporary destination and move the file after it has been written.

The ftp producer does **not** support appending to existing files. Any existing files on the remote server will be deleted before the file is written.

MESSAGE HEADERS

The following message headers can be used to affect the behavior of the component

Header	Description
CamelFileName	Specifies the output file name (relative to the endpoint directory) to be used for the output message when sending to the endpoint. If this is not present and no expression either, then a generated message ID is used as the filename instead.

CamelFileNameProduced	The actual absolute filepath (path + name) for the output file that was written. This header is set by Apache Camel and its purpose is providing end-users the name of the file that was written.
CamelFileBatchIndex	Current index out of total number of files being consumed in this batch.
CamelFileBatchSize	Total number of files being consumed in this batch.
CamelFileHost	The remote hostname.
CamelFileLocalWorkPath	Path to the local work file, if local work directory is used.

In addition the FTP/FTPS consumer and producer will enrich the Camel **Message** with the following headers:

Header	Description
CamelFtpReplyCode	**Camel 2.11.1:** The FTP client reply code (the type is a integer)
CamelFtpReplyString	**Camel 2.11.1:** The FTP client reply string

ABOUT TIMEOUTS

The two sets of libraries (see above) have different APIs for setting the timeout. You can use the **connectTimeout** option for both of them to set a timeout in milliseconds to establish a network connection. An individual **soTimeout** can also be set on the FTP/FTPS, which corresponds to using **ftpClient.soTimeout**. Notice SFTP will automatically use **connectTimeout** as its **soTimeout**. The **timeout** option only applies for FTP/FTSP as the data timeout, which corresponds to the **ftpClient.dataTimeout** value. All timeout values are in milliseconds.

USING LOCAL WORK DIRECTORY

Apache Camel supports consuming from remote FTP servers and downloading the files directly into a local work directory. This avoids reading the entire remote file content into memory as it is streamed directly into the local file using **FileOutputStream**.

Apache Camel will store to a local file with the same name as the remote file, though with **.inprogress** as extension while the file is being downloaded. Afterwards, the file is renamed to remove the **.inprogress** suffix. And finally, when the Exchange is complete the local file is deleted.

So if you want to download files from a remote FTP server and store it as files then you need to route to a file endpoint such as:

```
from("ftp://someone@someserver.com?password=secret&localWorkDirectory=/tmp").to("file://inbox");
```

OPTIMIZATION BY RENAMING WORK FILE

The route above is ultra efficient as it avoids reading the entire file content into memory. It will download the remote file directly to a local file stream. The **java.io.File** handle is then used as the Exchange body. The file producer leverages this fact and can work directly on the work file **java.io.File** handle and perform a **java.io.File.rename** to the target filename. As Apache Camel knows it's a local work file, it can optimize and use a rename instead of a file copy, as the work file is meant to be deleted anyway.

STEPWISE CHANGING DIRECTORIES

Camel FTP can operate in two modes in terms of traversing directories when consuming files (for example, downloading) or producing files (for example, uploading):

- stepwise
- not stepwise

You may want to pick either one depending on your situation and security issues. Some Camel end users can only download files if they use stepwise, while others can only download if they do not. At least you have the choice to pick.

Note that stepwise changing of directory will in most cases only work when the user is confined to it's home directory and when the home directory is reported as /.

The difference between the two of them is best illustrated with an example. Suppose we have the following directory structure on the remote FTP server we need to traverse and download files:

```
/
/one
/one/two
/one/two/sub-a
/one/two/sub-b
```

And that we have a file in each of **sub-a** (**a.txt**) and **sub-b** (**b.txt**) folder.

USING STEPWISE=TRUE (DEFAULT MODE)

The following log shows the conversation between the FTP endpoint and the remote FTP server when the FTP endpoint is operating in *stepwise* mode:

```
TYPE A
200 Type set to A
PWD
257 "/" is current directory.
CWD one
250 CWD successful. "/one" is current directory.
CWD two
250 CWD successful. "/one/two" is current directory.
SYST
215 UNIX emulated by FileZilla
PORT 127,0,0,1,17,94
200 Port command successful
LIST
150 Opening data channel for directory list.
226 Transfer OK
```

```
CWD sub-a
250 CWD successful. "/one/two/sub-a" is current directory.
PORT 127,0,0,1,17,95
200 Port command successful
LIST
150 Opening data channel for directory list.
226 Transfer OK
CDUP
200 CDUP successful. "/one/two" is current directory.
CWD sub-b
250 CWD successful. "/one/two/sub-b" is current directory.
PORT 127,0,0,1,17,96
200 Port command successful
LIST
150 Opening data channel for directory list.
226 Transfer OK
CDUP
200 CDUP successful. "/one/two" is current directory.
CWD /
250 CWD successful. "/" is current directory.
PWD
257 "/" is current directory.
CWD one
250 CWD successful. "/one" is current directory.
CWD two
250 CWD successful. "/one/two" is current directory.
PORT 127,0,0,1,17,97
200 Port command successful
RETR foo.txt
150 Opening data channel for file transfer.
226 Transfer OK
CWD /
250 CWD successful. "/" is current directory.
PWD
257 "/" is current directory.
CWD one
250 CWD successful. "/one" is current directory.
CWD two
250 CWD successful. "/one/two" is current directory.
CWD sub-a
250 CWD successful. "/one/two/sub-a" is current directory.
PORT 127,0,0,1,17,98
200 Port command successful
RETR a.txt
150 Opening data channel for file transfer.
226 Transfer OK
CWD /
250 CWD successful. "/" is current directory.
PWD
257 "/" is current directory.
CWD one
250 CWD successful. "/one" is current directory.
CWD two
250 CWD successful. "/one/two" is current directory.
CWD sub-b
250 CWD successful. "/one/two/sub-b" is current directory.
```

```
PORT 127,0,0,1,17,99
200 Port command successful
RETR b.txt
150 Opening data channel for file transfer.
226 Transfer OK
CWD /
250 CWD successful. "/" is current directory.
QUIT
221 Goodbye
disconnected.
```

As you can see when stepwise is enabled, it will traverse the directory structure using CD xxx.

USING STEPWISE=FALSE

The following log shows the conversation between the FTP endpoint and the remote FTP server when the FTP endpoint is operating in *non-stepwise* mode:

```
230 Logged on
TYPE A
200 Type set to A
SYST
215 UNIX emulated by FileZilla
PORT 127,0,0,1,4,122
200 Port command successful
LIST one/two
150 Opening data channel for directory list
226 Transfer OK
PORT 127,0,0,1,4,123
200 Port command successful
LIST one/two/sub-a
150 Opening data channel for directory list
226 Transfer OK
PORT 127,0,0,1,4,124
200 Port command successful
LIST one/two/sub-b
150 Opening data channel for directory list
226 Transfer OK
PORT 127,0,0,1,4,125
200 Port command successful
RETR one/two/foo.txt
150 Opening data channel for file transfer.
226 Transfer OK
PORT 127,0,0,1,4,126
200 Port command successful
RETR one/two/sub-a/a.txt
150 Opening data channel for file transfer.
226 Transfer OK
PORT 127,0,0,1,4,127
200 Port command successful
RETR one/two/sub-b/b.txt
150 Opening data channel for file transfer.
226 Transfer OK
QUIT
```

```
    221 Goodbye
    disconnected.
```

As you can see when not using stepwise, there are no CD operation invoked at all.

SAMPLES

In the sample below we set up Apache Camel to download all the reports from the FTP server once every hour (60 min) as BINARY content and store it as files on the local file system.

```
protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            // we use a delay of 60 minutes (eg. once pr. hour we poll the FTP server
            long delay = 60 * 60 * 1000L;

            // from the given FTP server we poll (= download) all the files
            // from the public/reports folder as BINARY types and store this as files
            // in a local directory. Apache Camel will use the filenames from the FTPServer

            // notice that the FTPConsumer properties must be prefixed with "consumer." in the URL
            // the delay parameter is from the FileConsumer component so we should use consumer.delay
as
            // the URI parameter name. The FTP Component is an extension of the File Component.
            from("ftp://tiger:scott@localhost/public/reports?binary=true&consumer.delay=" + delay).
                to("file://target/test-reports");
        }
    };
}
```

And the route using Spring DSL:

```
  <route>
    <from uri="ftp://scott@localhost/public/reports?password=tiger&inary=true&elay=60000"/>
    <to uri="file://target/test-reports"/>
  </route>
```

CONSUMING A REMOTE FTP SERVER TRIGGERED BY A ROUTE

The FTP consumer is built as a scheduled consumer to be used in the **from** route. However, if you want to start consuming from an FTP server triggered within a route, use a route like the following:

```
from("seda:start")
   // define the file name so that only a single file is polled and deleted once retrieved
   .pollEnrich("ftp://admin@localhost:21/getme?
password=admin&binary=false&fileName=myFile.txt&delete=true")
   .to("mock:result");
```

CONSUMING A REMOTE FTPS SERVER (IMPLICIT SSL) AND CLIENT AUTHENTICATION

```
from("ftps://admin@localhost:2222/public/camel?
password=admin&securityProtocol=SSL&isImplicit=true
      &ftpClient.keyStore.file=./src/test/resources/server.jks
      &ftpClient.keyStore.password=password&ftpClient.keyStore.keyPassword=password")
  .to("bean:foo");
```

CONSUMING A REMOTE FTPS SERVER (EXPLICIT TLS) AND A CUSTOM TRUST STORE CONFIGURATION

```
from("ftps://admin@localhost:2222/public/camel?
password=admin&ftpClient.trustStore.file=./src/test/resources/server.jks&ftpClient.trustStore.password=
password")
  .to("bean:foo");
```

FILTER USING ORG.APACHE.CAMEL.COMPONENT.FILE.GENERICFILEFILTER

Apache Camel supports pluggable filtering strategies. You define a filter strategy by implementing the **org.apache.camel.component.file.GenericFileFilter** interface in Java. You can then configure the endpoint with the filter to skip certain files.

In the following sample we define a filter that only accepts files whose filename starts with **report**.

```
public class MyFileFilter<T> implements GenericFileFilter<T> {

    public boolean accept(GenericFile<T> file) {
        // we only want report files
        return file.getFileName().startsWith("report");
    }
}
```

And then we can configure our route using the **filter** attribute to reference our filter (using **#** notation) that we have defined in the spring XML file:

```
  <!-- define our sorter as a plain spring bean -->
  <bean id="myFilter" class="com.mycompany.MyFileFilter"/>

 <route>
   <from uri="ftp://someuser@someftpserver.com?password=secret&filter=#myFilter"/>
   <to uri="bean:processInbox"/>
 </route>
```

FILTERING USING ANT PATH MATCHER

The ANT path matcher is a filter that is shipped out-of-the-box in the **camel-spring** jar. So you need to depend on **camel-spring** if you are using Maven. The reason is that we leverage Spring's AntPathMatcher to do the actual matching.

The file paths are matched with the following rules:

- **?** matches one character
- ***** matches zero or more characters
- ****** matches zero or more directories in a path

The sample below demonstrates how to use it:

```
<bean class="org.springframework.beans.factory.config.PropertyPlaceholderConfigurer"/>
<camelContext xmlns="http://camel.apache.org/schema/spring">

    <template id="camelTemplate"/>

    <!-- use myFilter as filter to allow setting ANT paths for which files to scan for -->
    <endpoint id="myFTPEndpoint"
uri="ftp://admin@localhost:${SpringFileAntPathMatcherRemoteFileFilterTest.ftpPort}/antpath?
password=admin&ecursive=true&elay=10000&nitialDelay=2000&ilter=#myAntFilter"/>

    <route>
        <from ref="myFTPEndpoint"/>
        <to uri="mock:result"/>
    </route>
</camelContext>

<!-- we use the AntPathMatcherRemoteFileFilter to use ant paths for includes and exclude -->
<bean id="myAntFilter" class="org.apache.camel.component.file.AntPathMatcherGenericFileFilter">
    <!-- include any files in the sub-folder that have day in the name -->
    <property name="includes" value="**/subfolder/**/*day*"/>
    <!-- exclude all files with bad in name or .xml files. Use comma to seperate multiple excludes -->
    <property name="excludes" value="**/*bad*,**/*.xml"/>
</bean>
```

USING A PROXY WITH SFTP

To use an HTTP proxy to connect to your remote host, you can configure your route in the following way:

```
<!-- define our sorter as a plain spring bean -->
<bean id="proxy" class="com.jcraft.jsch.ProxyHTTP">
  <constructor-arg value="localhost"/>
  <constructor-arg value="7777"/>
</bean>

<route>
  <from uri="sftp://localhost:9999/root?username=admin&password=admin&proxy=#proxy"/>
  <to uri="bean:processFile"/>
</route>
```

You can also assign a user name and password to the proxy, if necessary. Please consult the documentation for **com.jcraft.jsch.Proxy** to discover all options.

SETTING PREFERRED SFTP AUTHENTICATION METHOD

If you want to explicitly specify the list of authentication methods that should be used by **sftp** component, use **preferredAuthentications** option. If for example you would like Camel to attempt to authenticate

with private/public SSH key and fallback to user/password authentication in the case when no public key is available, use the following route configuration:

```
from("sftp://localhost:9999/root?
username=admin&password=admin&preferredAuthentications=publickey,password")
  .to("bean:processFile");
```

CONSUMING A SINGLE FILE USING A FIXED NAME

When you want to download a single file and knows the file name, you can use **fileName=myFileName.txt** to tell Camel the name of the file to download. By default the consumer will still do a FTP LIST command to do a directory listing and then filter these files based on the **fileName** option. Though in this use-case it may be desirable to turn off the directory listing by setting **useList=false**. For example the user account used to login to the FTP server may not have permission to do a FTP LIST command. So you can turn off this with **useList=false**, and then provide the fixed name of the file to download with **fileName=myFileName.txt**, then the FTP consumer can still download the file. If the file for some reason does not exist, then Camel will by default throw an exception, you can turn this off and ignore this by setting **ignoreFileNotFoundOrPermissionError=true**.

For example to have a Camel route that pickup a single file, and delete it after use you can do

```
from("ftp://admin@localhost:21/nolist/?
password=admin&stepwise=false&useList=false&ignoreFileNotFoundOrPermissionError=true&fileName
=report.txt&delete=true")
  .to("activemq:queue:report");
```

Notice that we have use all the options we talked above above.

You can also use this with **ConsumerTemplate**. For example to download a single file (if it exists) and grab the file content as a String type:

```
String data = template.retrieveBodyNoWait("ftp://admin@localhost:21/nolist/?
password=admin&stepwise=false&useList=false&ignoreFileNotFoundOrPermissionError=true&fileName
=report.txt&delete=true", String.class);
```

DEBUG LOGGING

This component has log level **TRACE** that can be helpful if you have problems.

CHAPTER 48. GAE

48.1. INTRODUCTION TO THE GAE COMPONENTS

Apache Camel Components for Google App Engine

TUTORIALS

- A good starting point for using Apache Camel on GAE is the Tutorial for Camel on Google App Engine
- The OAuth tutorial demonstrates how to implement OAuth in web applications.

The Apache Camel components for Google App Engine (GAE) are part of the **camel-gae** project and provide connectivity to GAE's cloud computing services. They make the GAE cloud computing environment accessible to applications via Apache Camel interfaces. Following this pattern for other cloud computing environments could make it easier to port Apache Camel applications from one cloud computing provider to another. The following table lists the cloud computing services provided by Google App Engine and the supporting Apache Camel components. The documentation of each component can be found by following the link in the *Camel Component* column.

GAE service	Camel component	Component description
URL fetch service	ghttp	Provides connectivity to the GAE URL fetch service but can also be used to receive messages from servlets.
Task queueing service	gtask	Supports asynchronous message processing on GAE by using the task queueing service as message queue.
Mail service	gmail	Supports sending of emails via the GAE mail service. Receiving mails is not supported yet but will be added later.
Memcache service		Not supported yet.
XMPP service		Not supported yet.
Images service		Not supported yet.
Datastore service		Not supported yet.

Accounts service	gauth glogin	These components interact with the Google Accounts API for authentication and authorization. Google Accounts is not specific to Google App Engine but is often used by GAE applications for implementing security. The gauth component is used by web applications to implement a Google-specific OAuth consumer. This component can also be used to OAuth-enable non-GAE web applications. The glogin component is used by Java clients (outside GAE) for programmatic login to GAE applications. For instructions how to protect GAE applications against unauthorized access refer to the Security for page.

Camel context

Setting up a **SpringCamelContext** on Google App Engine differs between Camel 2.1 and higher versions. The problem is that usage of the Camel-specific Spring configuration XML schema from the **http://camel.apache.org/schema/spring** namespace requires JAXB and Camel 2.1 depends on a Google App Engine SDK version that doesn't support JAXB yet. This limitation has been removed since Camel 2.2.

JMX must be disabled in any case because the **javax.management** package isn't on the App Engine JRE whitelist.

Apache Camel 2.1

camel-gae 2.1 comes with the following **CamelContext** implementations.

- **org.apache.camel.component.gae.context.GaeDefaultCamelContext** (extends **org.apache.camel.impl.DefaultCamelContext**)
- **org.apache.camel.component.gae.context.GaeSpringCamelContext** (extends **org.apache.camel.spring.SpringCamelContext**)

Both disable JMX before startup. The **GaeSpringCamelContext** additionally provides setter methods adding route builders as shown in the next example.

APPCTX.XML

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xsi:schemaLocation="
http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.5.xsd">

    <bean id="camelContext"
        class="org.apache.camel.component.gae.context.GaeSpringCamelContext">
        <property name="routeBuilder" ref="myRouteBuilder" />
    </bean>

    <bean id="myRouteBuilder"
        class="org.example.MyRouteBuilder">
    </bean>

</beans>
```

Alternatively, use the **routeBuilders** property of the **GaeSpringCamelContext** for setting a list of route builders. Using this approach, a **SpringCamelContext** can be configured on GAE without the need for JAXB.

Apache Camel 2.2

With Camel 2.2 or higher, applications can use the **http://camel.apache.org/schema/spring** namespace for configuring a **SpringCamelContext** but still need to disable JMX. Here's an example.

APPCTX.XML

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:camel="http://camel.apache.org/schema/spring"
       xsi:schemaLocation="
http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.5.xsd
http://camel.apache.org/schema/spring
http://camel.apache.org/schema/spring/camel-spring.xsd">

    <camel:camelContext id="camelContext">
        <camel:jmxAgent id="agent" disabled="true" />
        <camel:routeBuilder ref="myRouteBuilder"/>
    </camel:camelContext>

    <bean id="myRouteBuilder"
        class="org.example.MyRouteBuilder">
    </bean>

</beans>
```

The web.xml

Running Apache Camel on GAE requires usage of the **CamelHttpTransportServlet** from **camel-servlet**. The following example shows how to configure this servlet together with a Spring application context XML file.

WEB.XML

```
<web-app
xmlns="http://java.sun.com/xml/ns/javaee"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:web="http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
xsi:schemaLocation="
http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" version="2.5">

    <servlet>
        <servlet-name>CamelServlet</servlet-name>
        <servlet-
class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-
class>
        <init-param>
            <param-name>contextConfigLocation</param-name>
            <param-value>appctx.xml</param-value>
        </init-param>
    </servlet>

    <!--
        Mapping used for external requests
     -->
    <servlet-mapping>
        <servlet-name>CamelServlet</servlet-name>
        <url-pattern>/camel/*</url-pattern>
    </servlet-mapping>

    <!--
        Mapping used for web hooks accessed by task queueing service.
     -->
    <servlet-mapping>
        <servlet-name>CamelServlet</servlet-name>
        <url-pattern>/worker/*</url-pattern>
    </servlet-mapping>

</web-app>
```

The location of the Spring application context XML file is given by the **contextConfigLocation** init parameter. The **appctx.xml** file must be on the classpath. The servlet mapping makes the Apache Camel application accessible under **http://<appname>.appspot.com/camel/...** when deployed to Google App Engine where **<appname>** must be replaced by a real GAE application name. The second servlet mapping is used internally by the task queueing service for background processing via web hooks. This mapping is relevant for the gtask component and is explained there in more detail.

48.2. GAUTH

gauth Component

Available in Apache Camel 2.3

The **gauth** component is used by web applications to implement a Google-specific OAuth consumer. It will be later extended to support other OAuth providers as well. Although this component belongs to the Camel Components for Google App Engine (GAE), it can also be used to OAuth-enable non-GAE web applications. For a detailed description of Google's OAuth implementation refer to the Google OAuth API reference.

URI format

```
gauth://name[?options]
```

The endpoint **name** can be either **authorize** or **upgrade**. An **authorize** endpoint is used to obtain an unauthorized request token from Google and to redirect the user to the authorization page. The **upgrade** endpoint is used to process OAuth callbacks from Google and to upgrade an authorized request token to a long-lived access token. Refer to the usage section for an example.

Options

Name	Default Value	Required	Description
callback	**null**	true (can alternatively be set via **GAuthAuthorizeBinding.GAUTH_CALLBACK** message header)	URL where to redirect the user after having granted or denied access.
scope	**null**	true (can alternatively be set via **GAuthAuthorizeBinding.GAUTH_SCOPE** message header)	URL identifying the service(s) to be accessed. Scopes are defined by each Google service; see the service's documentation for the correct value. To specify more than one scope, list each one separated with a comma. Example: **http://www.google.com/calendar/feeds/** .
consumerKey	**null**	true (can alternatively be set on component-level).	Domain identifying the web application. This is the domain used when registering the application with Google. Example: **camelcloud.appspot.com**. For a non-registered application use **anonymous**.

consumerSecret	**null**	one of **consumerSecret** or **keyLoaderRef** is required (can alternatively be set on component-level).	Consumer secret of the web application. The consumer secret is generated when when registering the application with Google. It is needed if the HMAC-SHA1 signature method shall be used. For a non-registered application use **anonymous**.
keyLoaderRef	**null**	one of **consumerSecret** or **keyLoaderRef** is required (can be alternatively set on component-level)	Reference to a private key loader in the registry. Part of **camel-gae** are two key loaders: **GAuthPk8Loader** for loading a private key from a PKCS#8 file and **GAuthJksLoader** to load a private key from a Java key store. It is needed if the RSA-SHA1 signature method shall be used. These classes are defined in the **org.apache.camel.component.gae.auth** package.
authorizeBindingRef	Reference to **GAuthAuthorizeBinding**	false	Reference to a **OutboundBinding<GAuthEndpoint, GoogleOAuthParameters, GoogleOAuthParameters>** in the registry for customizing how an **Exchange** is bound to **GoogleOAuthParameters**. This binding is used for teh authorization phase. Most applications won't change the default value.

upgradeBindingRef	Reference to **GAuthAuthorizeBinding**	false	Reference to a **OutboundBinding<GAuthEndpoint, GoogleOAuthParameters, GoogleOAuthParameters>** in the registry. for customizing how an **Exchange** is bound to **GoogleOAuthParameters**. This binding is used for teh token upgrade phase. Most applications won't change the default value.

Message headers

Name	Type	Endpoint	Message	Description
GAuthAuthorizeBinding.GAUTH_CALLBACK	**String**	**gauth:authorize**	in	Overrides the **callback** option.
GAuthAuthorizeBinding.GAUTH_SCOPE	**String**	**gauth:authorize**	in	Overrides the **scope** option.
GAuthUpgradeBinding.GAUTH_ACCESS_TOKEN	**String**	**gauth:upgrade**	out	Contains the long-lived access token. This token should be stored by the applications in context of a user.
GAuthUpgradeBinding.GAUTH_ACCESS_TOKEN_SECRET	**String**	**gauth:upgrade**	out	Contains the access token secret. This token secret should be stored by the applications in context of a user.

Message body

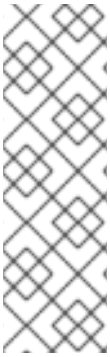
The **gauth** component doesn't read or write message bodies.

Component configuration

Some endpoint options such as **consumerKey**, **consumerSecret** or **keyLoader** are usually set to the same values on **gauth:authorize** and **gauth:upgrade** endpoints. The **gauth** component allows to configure them on component-level. These settings are then inherited by **gauth** endpoints and need not be set redundantly in the endpoint URIs. Here are some configuration examples.

COMPONENT CONFIGURATION FOR A REGISTERED WEB APPLICATION USING THE HMAC-SHA1 SIGNATURE METHOD

```
<bean id="gauth" class="org.apache.camel.component.gae.auth.GAuthComponent">
    <property name="consumerKey" value="example.appspot.com" />
    <property name="consumerSecret" value="QAtA...HfQ" />
</bean>
```



COMPONENT CONFIGURATION FOR AN UNREGISTERED WEB APPLICATION USING THE HMAC-SHA1 SIGNATURE METHOD

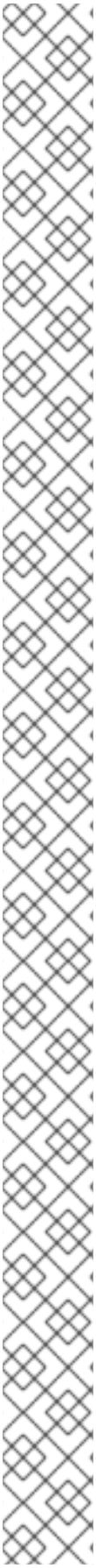
```
<bean id="gauth" class="org.apache.camel.component.gae.auth.GAuthComponent">
    <!-- Google will display a warning message on the authorization page -->
    <property name="consumerKey" value="anonymous" />
    <property name="consumerSecret" value="anonymous" />
</bean>
```

COMPONENT CONFIGURATION FOR A REGISTERED WEB APPLICATION USING THE RSA-SHA1 SIGNATURE METHOD

```
<bean id="gauth" class="org.apache.camel.component.gae.auth.GAuthComponent">
    <property name="consumerKey" value="ipfcloud.appspot.com" />
    <property name="keyLoader" ref="jksLoader" />
    <!--<property name="keyLoader" ref="pk8Loader" />-->
</bean>

<!-- Loads the private key from a Java key store -->
<bean id="jksLoader"
    class="org.apache.camel.component.gae.auth.GAuthJksLoader">
    <property name="keyStoreLocation" value="myKeytore.jks" />
    <property name="keyAlias" value="myKey" />
    <property name="keyPass" value="myKeyPassword" />
    <property name="storePass" value="myStorePassword" />
</bean>

<!-- Loads the private key from a PKCS#8 file -->
<bean id="pk8Loader"
    class="org.apache.camel.component.gae.auth.GAuthPk8Loader">
    <property name="keyStoreLocation" value="myKeyfile.pk8" />
</bean>
```

Usage

Here's the minimum setup for adding OAuth to a (non-GAE) web application. In the following example, it is assumed that the web application is running on **gauth.example.org**.



GAUTHROUTEBUILDER.JAVA

```
import java.net.URLEncoder;
import org.apache.camel.builder.RouteBuilder;

public class GAuthRouteBuilder extends RouteBuilder {

    @Override
    public void configure() throws Exception {

        // Calback URL to redirect user from Google Authorization back to the web
application
        String encodedCallback =
URLEncoder.encode("https://gauth.example.org:8443/handler", "UTF-8");
        // Application will request for authorization to access a user's Google Calendar
        String encodedScope =
URLEncoder.encode("http://www.google.com/calendar/feeds/", "UTF-8");

        // Route 1: A GET request to http://gauth.example.org/authorize will trigger the the
OAuth
        // sequence of interactions. The gauth:authorize endpoint obtains an unauthorized
request
        // token from Google and then redirects the user (browser) to a Google
authorization page.
        from("jetty:http://0.0.0.0:8080/authorize")
            .to("gauth:authorize?callback=" + encodedCallback + "&scope=" +
encodedScope);

        // Route 2: Handle callback from Google. After the user granted access to Google
Calendar
        // Google redirects the user to https://gauth.example.org:8443/handler (see
callback) along
        // with an authorized request token. The gauth:access endpoint exchanges the
authorized
        // request token against a long-lived access token.
        from("jetty:https://0.0.0.0:8443/handler")
            .to("gauth:upgrade")
            // The access token can be obtained from
            //
exchange.getOut().getHeader(GAuthUpgradeBinding.GAUTH_ACCESS_TOKEN)
            // The access token secret can be obtained from
            //
exchange.getOut().getHeader(GAuthUpgradeBinding.GAUTH_ACCESS_TOKEN_SEC
RET)
            .process(/* store the tokens in context of the current user ... */);
    }

}
```

The OAuth sequence is triggered by sending a GET request to **http://gauth.example.org/authorize** . The user is then redirected to a Google authorization page. After having granted access on this page,

Google redirects the user to the web application which handles the callback and finally obtains a long-lived access token from Google.

These two routes can perfectly co-exist with any other web application framework. The framework provides the basis for web application-specific functionality whereas the OAuth service provider integration is done with Apache Camel. The OAuth integration part could even use resources from an existing servlet container by using the **servlet** component instead of the **jetty** component.

WHAT TO DO WITH THE OAUTH ACCESS TOKEN?

- Application should store the access token in context of the current user. If the user logs in next time, the access token can directly be loaded from the database, for example, without doing the *OAuth dance* again.
- The access token is then used to get access to Google services, such as a Google Calendar API, on behalf of the user. Java applications will most likely use the GData Java library for that. See below for an example how to use the access token with the GData Java library to read a user's calendar feed.
- The user can revoke the access token at any time from his Google Accounts page. In this case, access to the corresponding Google service will throw an authorization exception. The web application should remove the stored access token and redirect the user again to the Google authorization page for creating another one.

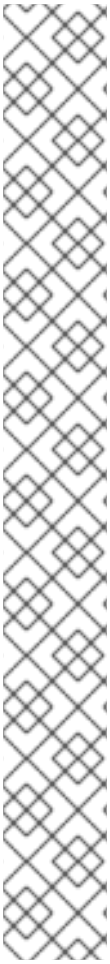
The above example relies on the following component configuration.

```
<bean id="gauth" class="org.apache.camel.component.gae.auth.GAuthComponent">
    <property name="consumerKey" value="anonymous" />
    <property name="consumerSecret" value="anonymous" />
</bean>
```

If you don't want that Google displays a warning message on the authorization page, you'll need to register your web application and change the **consumerKey** and **consumerSecret** settings.

GAE example

To OAuth-enable a Google App Engine application, only some small changes in the route builder are required. Assuming the GAE application hostname is **camelcloud.appspot.com** a configuration might look as follows. Here, the ghttp component is used to handle HTTP(S) requests instead of the **jetty** component.



GAUTHROUTEBUILDER

```
import java.net.URLEncoder;
import org.apache.camel.builder.RouteBuilder;

public class TutorialRouteBuilder extends RouteBuilder {

    @Override
    public void configure() throws Exception {

        String encodedCallback =
URLEncoder.encode("https://camelcloud.appspot.com/handler", "UTF-8");
        String encodedScope =
URLEncoder.encode("http://www.google.com/calendar/feeds/", "UTF-8");

        from("ghttp:///authorize")
            .to("gauth:authorize?callback=" + encodedCallback + "&scope=" +
encodedScope);

        from("ghttp:///handler")
            .to("gauth:upgrade")
            .process(/* store the tokens in context of the current user ... */);
    }

}
```

Access token usage

Here's an example how to use an access token to access a user's Google Calendar data with the GData Java library. The example application writes the titles of the user's public and private calendars to **stdout**.

ACCESS TOKEN USAGE

```
import com.google.gdata.client.authn.oauth.OAuthHmacSha1Signer;
import com.google.gdata.client.authn.oauth.OAuthParameters;
import com.google.gdata.client.calendar.CalendarService;
import com.google.gdata.data.calendar.CalendarEntry;
import com.google.gdata.data.calendar.CalendarFeed;

import java.net.URL;

public class AccessExample {

    public static void main(String... args) throws Exception {
        String accessToken = ...
        String accessTokenSecret = ...

        CalendarService myService = new CalendarService("exampleCo-exampleApp-
1.0");
        OAuthParameters params = new OAuthParameters();
        params.setOAuthConsumerKey("anonymous");
        params.setOAuthConsumerSecret("anonymous");
        params.setOAuthToken(accessToken);
        params.setOAuthTokenSecret(accessTokenSecret);
        myService.setOAuthCredentials(params, new OAuthHmacSha1Signer());

        URL feedUrl = new URL("http://www.google.com/calendar/feeds/default/");
        CalendarFeed resultFeed = myService.getFeed(feedUrl, CalendarFeed.class);

        System.out.println("Your calendars:");
        System.out.println();

        for (int i = 0; i < resultFeed.getEntries().size(); i++) {
            CalendarEntry entry = resultFeed.getEntries().get(i);
            System.out.println(entry.getTitle().getPlainText());
        }
    }
}
```

48.3. GHTTP

ghttp Component

The **ghttp** component contributes to the Camel Components for Google App Engine (GAE). It provides connectivity to the GAE URL fetch service but can also be used to receive messages from servlets (the only way to receive HTTP requests on GAE). This is achieved by extending the Servlet component. As a consequence, **ghttp** URI formats and options sets differ on the consumer-side (**from**) and producer-side (**to**).

URI format

Format	Context	Comment

ghttp:///path[?options]	Consumer	See also Servlet component
ghttp://hostname[:port][/path][?options] ghttps://hostname[:port][/path][?options]	Producer	See also Http component

Options

Name	Default Value	Context	Description
bridgeEndpoint	**true**	Producer	If set to **true** the **Exchange.HTTP_URI** header will be ignored. To override the default endpoint URI with the **Exchange.HTTP_URI** header set this option to **false**.
throwExceptionOnFailure	**true**	Producer	Throw a **org.apache.camel.component.gae.http** if the response code is >= 400. To disable throwing an exception set this option to **false**.
inboundBindingRef	reference to **GHttpBinding**	Consumer	Reference to an **InboundBinding<GHttpEndpoint, HttpServletRequest, HttpServletResponse>** in the Registry for customizing the binding of an **Exchange** to the Servlet API. The referenced binding is used as post-processor to **org.apache.camel.component.http.HttpBinding**.

outboundBindingRef	reference to **GHttpBinding**	Producer	Reference to an **OutboundBinding<GHttpEndpoint, HTTPRequest, HTTPResponse>** in the Registry for customizing the binding of an **Exchange** to the **URLFetchService**.

On the consumer-side, all options of the Servlet component are supported.

Message headers

On the producer side, the following headers of the Http component are supported.

Name	Type	Description
Exchange.CONTENT_TYPE	**String**	The HTTP content type. Is set on both the **in** and **out** message to provide a content type, such as **text/html**.
Exchange.CONTENT_ENCODING	**String**	The HTTP content encoding. Is set on both the **in** and **out** message to provide a content encoding, such as **gzip**.
Exchange.HTTP_METHOD	**String**	The HTTP method to execute. One of **GET**, **POST**, **PUT** and **DELETE**. If not set, **POST** will be used if the message body is not **null**, **GET** otherwise.
Exchange.HTTP_QUERY	**String**	Overrides the query part of the endpoint URI or the the query part of **Exchange.HTTP_URI** (if defined). The query string must be in decoded form.
Exchange.HTTP_URI	**String**	Overrides the default endpoint URI if the **bridgeEndpoint** option is set to **false**. The URI string must be in decoded form.
Exchange.RESPONSE_CODE	**int**	The HTTP response code from URL fetch service responses.

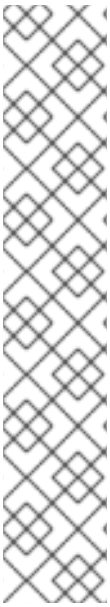
On the consumer-side all headers of the Servlet component component are supported.

Message body

On the producer side the **in** message body is converted to a **byte[]**. The **out** message body is made available as **InputStream**. If the reponse size exceeds 1 megabyte a ResponseTooLargeException is thrown by the URL fetch service (see quotas and limits).

Receiving messages

For receiving messages via the **ghttp** component, a **CamelHttpTransportServlet** must be configured and mapped in the application's **web.xml** (see the section called “The web.xml”). For example, to handle requests targeted at **http://<appname>.appspot.com/camel/*** or **http://localhost/camel/*** (when using a local development server) the following servlet mapping must be defined:



WEB.XML

```
...
<servlet>
    <servlet-name>CamelServlet</servlet-name>
    <servlet-
class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-
class>
    ...
</servlet>
...
<servlet-mapping>
    <servlet-name>CamelServlet</servlet-name>
    <url-pattern>/camel/*</url-pattern>
</servlet-mapping>
...
```

Endpoint URI path definitions are relative to this servlet mapping e.g. the route

```
from("ghttp:///greeting").transform().constant("Hello")
```

processes requests targeted at **http://<appname>.appspot.com/camel/greeting**. In this example, the request body is ignored and the response body is set to **Hello**. Requests targeted at **http://<appname>.appspot.com/camel/greeting/*** are not processed by default. This requires setting the option **matchOnUriPrefix** to **true**.

```
from("ghttp:///greeting?matchOnUriPrefix=true").transform().constant("Hello")
```

Sending messages

For sending resquests to external HTTP services the **ghttp** component uses the URL fetch service. For example, the Apache Camel homepage can the retrieved with the following endpoint definition on the producer-side.

```
from(...)
...
.to("ghttp://camel.apache.org")
...
```

The HTTP method used depends on the **Exchange.HTTP_METHOD** message header or on the presence of an in-message body (**GET** if **null**, **POST** otherwise). Retrieving the Camel homepage via a GAE application is as simple as

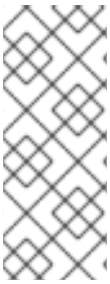
```
from("ghttp:///home")
.to("ghttp://camel.apache.org")
```

Sending a **GET** request to **http://<appname>.appspot.com/camel/home** returns the Camel homepage. HTTPS-based communication with external services can be enabled with the **ghttps** scheme.

```
from(...)
...
.to("ghttps://svn.apache.org/repos/asf/camel/trunk/")
...
```

Dependencies

Maven users will need to add the following dependency to their **pom.xml**.



POM.XML

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-gae</artifactId>
   <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Apache Camel (2.1.0 or higher).

48.4. GLOGIN

glogin Component

Available in Apache Camel 2.3 (or latest development snapshot).

The **glogin** component is used by Apache Camel applications outside Google App Engine (GAE) for programmatic login to GAE applications. It is part of the Chapter 48, *GAE*. Security-enabled GAE applications normally redirect the user to a login page. After submitting username and password for authentication, the user is redirected back to the application. That works fine for applications where the client is a browser. For all other applications, the login process must be done programmatically. All the necessary steps for programmatic login are implemented by the **glogin** component. These are

1. Get an authentication token from Google Accounts via the ClientLogin API.
2. Get an authorization cookie from Google App Engine's login API.

The authorization cookie must then be send with subsequent HTTP requests to the GAE application. It expires after 24 hours and must then be renewed.

URI format

```
glogin://hostname[:port][?options]
```

The **hostname** is either the internet hostname of a GAE application (e.g. **camelcloud.appspot.com**) or the name of the host where the development server is running (e.g. **localhost**). The **port** is only used when connecting to a development server (i.e. when **devMode=true**, see options) and defaults to **8080**.

Options

Name	Default Value	Required	Description
clientName	**apache-camel-2.x**	false	A client name with recommended (but not required) format **<organization>\-<appname>\-<version>**.
userName	**null**	true (can alternatively be set via **GLoginBinding.GLOGIN_USER_NAME** message header)	Login username (an email address).
password	**null**	true (can alternatively be set via **GLoginBinding.GLOGIN_PASSWORD** message header)	Login password.
devMode	**false**	false	If set to **true** a login to a development server is attempted.
devAdmin	**false**	false	If set to **true** a login to a development server in admin role is attempted.

Message headers

Name	Type	Message	Description
GLoginBinding.GLOGIN_HOST_NAME	**String**	in	Overrides the hostname defined in the endpoint URI.
GLoginBinding.GLOGIN_USER_NAME	**String**	in	Overrides the **userName** option.

GLoginBinding.GLOGIN_PASSWORD	**String**	in	Overrides the **password** option.
GLoginBinding.GLOGIN_TOKEN	**String**	out	Contains the authentication token obtained from Google Accounts. Login to a development server does not set this header.
GLoginBinding.GLOGIN_COOKIE	**String**	out	Contains the application-specific authorization cookie obtained from Google App Engine (or a development server).

Message body

The **glogin** component doesn't read or write message bodies.

Usage

The following JUnit test show an example how to login to a development server as well as to a deployed GAE application located at http://camelcloud.appspot.com.

GLOGINTEST.JAVA

```
import org.apache.camel.Exchange;
import org.apache.camel.Processor;
import org.apache.camel.ProducerTemplate;
import org.junit.Ignore;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.test.context.ContextConfiguration;
import org.springframework.test.context.junit4.SpringJUnit4ClassRunner;

import static org.apache.camel.component.gae.login.GLoginBinding.*;
import static org.junit.Assert.*;

public class GLoginTest {

    private ProducerTemplate template = ...

    @Test
    public void testDevLogin() {
        Exchange result = template.request("glogin://localhost:8888?
userName=test@example.org&devMode=true", null);
        assertNotNull(result.getOut().getHeader(GLOGIN_COOKIE));
    }

    @Test
    public void testRemoteLogin() {
        Exchange result = template.request("glogin://camelcloud.appspot.com", new
Processor() {
            public void process(Exchange exchange) throws Exception {
                exchange.getIn().setHeader(GLOGIN_USER_NAME,
"replaceme@gmail.com");
                exchange.getIn().setHeader(GLOGIN_PASSWORD, "replaceme");
            }
        });
        assertNotNull(result.getOut().getHeader(GLOGIN_COOKIE));
    }

}
```

The resulting authorization cookie from login to a development server looks like

```
ahlogincookie=test@example.org:false:11223191102230730701;Path=/
```

The resulting authorization cookie from login to a deployed GAE application looks (shortened) like

```
ACSID=AJKiYcE...XxhH9P_jR_V3; expires=Sun, 07-Feb-2010 15:14:51 GMT; path=/
```

48.5. GMAIL

gmail Component

The **gmail** component contributes to the Camel Components for Google App Engine (GAE). It supports sending of emails via the GAE mail service. Receiving mails is not supported yet but will be added later. Currently, only Google accounts that are application administrators can send emails.

URI format

```
gmail://user@gmail.com[?options]
gmail://user@googlemail.com[?options]
```

Options

Name	Default Value	Context	Description
to	**null**	Producer	To-receiver of the email. This can be a single receiver or a comma-separated list of receivers.
cc	**null**	Producer	Cc-receiver of the email. This can be a single receiver or a comma-separated list of receivers.
bcc	**null**	Producer	Bcc-receiver of the email. This can be a single receiver or a comma-separated list of receivers.
subject	**null**	Producer	Subject of the email.
outboundBindingRef	reference to **GMailBinding**	Producer	Reference to an **OutboundBinding<GMailEndpoint, MailService.Message, void>** in the Registry for customizing the binding of an **Exchange** to the mail service.

Message headers

Name	Type	Context	Description

GMailBinding.GMAIL_SUBJECT	**String**	Producer	Subject of the email. Overrides **subject** endpoint option.
GMailBinding.GMAIL_SENDER	**String**	Producer	Sender of the email. Overrides sender definition in endpoint URI.
GMailBinding.GMAIL_TO	**String**	Producer	To-receiver(s) of the email. Overrides **to** endpoint option.
GMailBinding.GMAIL_CC	**String**	Producer	Cc-receiver(s) of the email. Overrides **cc** endpoint option.
GMailBinding.GMAIL_BCC	**String**	Producer	Bcc-receiver(s) of the email. Overrides **bcc** endpoint option.

Message body

On the producer side the **in** message body is converted to a **String**.

Usage

```
...
.setHeader(GMailBinding.GMAIL_SUBJECT, constant("Hello"))
.setHeader(GMailBinding.GMAIL_TO, constant("account2@somewhere.com"))
.to("gmail://account1@gmail.com");
```

Sends an email with subject **Hello** from **account1@gmail.com** to **account2@somewhere.com**. The mail message body is taken from the **in** message body. Please note that **account1@gmail.com** must be an administrator account for the current GAE application.

Dependencies

Maven users will need to add the following dependency to their **pom.xml**.

POM.XML

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-gae</artifactId>
   <version>${camel-version}</version>
</dependency>
```

where **$\{camel-version\}** must be replaced by the actual version of Apache Camel (2.1.0 or higher).

48.6. GSEC

Security for Apache Camel GAE Applications

Securing GAE applications from unauthorized access is described in the Security and Authentication section of the Google App Engine documentation. Authorization constraints are declared in the **web.xml** file (see the section called “The web.xml”). This applies to Apache Camel applications as well. In the following example, the application is configured to only allow authenticated users (in any role) to access the application. Additionally, access to /**worker**/* URLs masy only be done by users in the admin role. By default, web hook URLs installed by the gtask component match the /**worker**/* pattern and should not be accessed by normal users. With this authorization constraint, only the task queuing service (which is always in the admin role) is allowed to access the web hooks. For implementing custom, non-declarative authorization logic, Apache Camel GAE applications should use the Google Accounts Java API.

Example 48.1. web.xml with authorization constraint

```
<web-app
xmlns="http://java.sun.com/xml/ns/javaee"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:web="http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
xsi:schemaLocation="
http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" version="2.5">

    <servlet>
        <servlet-name>CamelServlet</servlet-name>
        <servlet-class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-
class>
        <init-param>
            <param-name>contextConfigLocation</param-name>
            <param-value>appctx.xml</param-value>
        </init-param>
    </servlet>

    <!--
        Mapping used for external requests
     -->
    <servlet-mapping>
        <servlet-name>CamelServlet</servlet-name>
        <url-pattern>/camel/*</url-pattern>
    </servlet-mapping>

    <!--
        Mapping used for web hooks accessed by task queueing service.
     -->
    <servlet-mapping>
        <servlet-name>CamelServlet</servlet-name>
        <url-pattern>/worker/*</url-pattern>
    </servlet-mapping>

    <!--
        By default allow any user who is logged in to access the whole
        application.
     -->
    <security-constraint>
```

```
        <web-resource-collection>
            <url-pattern>/*</url-pattern>
        </web-resource-collection>
        <auth-constraint>
            <role-name>*</role-name>
        </auth-constraint>
    </security-constraint>

    <!--
        Allow only admin users to access /worker/* URLs e.g. to prevent
        normal user to access gtask web hooks.
     -->
    <security-constraint>
        <web-resource-collection>
            <url-pattern>/worker/*</url-pattern>
        </web-resource-collection>
        <auth-constraint>
            <role-name>admin</role-name>
        </auth-constraint>
    </security-constraint>

</web-app>
```

48.7. GTASK

gtask Component

The **gtask** component contributes to the Camel Components for Google App Engine (GAE). It supports asynchronous message processing on GAE by using the task queueing service as message queue. For adding messages to a queue it uses the task queue API. For receiving messages from a queue it installs an HTTP callback handler. The handler is called by an HTTP POST callback (a web hook) initiated by the task queueing service. Whenever a new task is added to a queue a callback will be sent. The **gtask** component abstracts from these details and supports endpoint URIs that make message queueing on GAE as easy as message queueing with JMS or SEDA.

URI format

```
gtask://queue-name
```

Options

Name	Default Value	Context	Description

workerRoot	**worker**	Producer	The servlet mapping for callback handlers. By default, this component requires a callback servlet mapping of /**worker**/*. If another servlet mapping is used e.g. /**myworker**/* it must be set as option on the producer side: **to("gtask:myqueue?workerRoot=myworker")**.
inboundBindingRef	reference to **GTaskBinding**	Consumer	Reference to an **InboundBinding<GTaskEndpoint, HttpServletRequest, HttpServletResponse>** in the Registry for customizing the binding of an **Exchange** to the Servlet API. The referenced binding is used as post-processor to **org.apache.camel.component.http.HttpBinding**.
outboundBindingRef	reference to **GTaskBinding**	Producer	Reference to an **OutboundBinding<GTaskEndpoint, TaskOptions, void>** in the Registry for customizing the binding of an **Exchange** to the task queueing service.

On the consumer-side, all options of the Servlet component are supported.

Message headers

On the consumer-side all headers of the Servlet component component are supported plus the following.

Name	Type	Context	Description
GTaskBinding.GTASK_QUEUE_NAME	**String**	Consumer	Name of the task queue.

GTaskBinding.GTASK_TASK_NAME	**String**	Consumer	Name of the task (generated value).
GTaskBinding.GTASK_RETRY_COUNT	**int**	Consumer	Number of callback retries.

Message body

On the producer side the **in** message body is converted to a **byte[]** and is POSTed to the callback handler as content-type **application/octet-stream**.

Usage

Setting up tasks queues is an administrative task on Google App Engine. Only one queue is pre-configured and can be referenced by name out-of-the-box: the **default** queue. This queue will be used in the following examples. Please note that when using task queues on the local development server, tasks must be executed manually from the developer console.

Default queue

```
...
.to(gtask:default) // add message to default queue

from(gtask:default) // receive message from default queue (via a web hook)
...
```

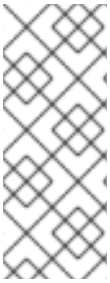
This example requires the following servlet mapping.

WEB.XML

```
    ...
    <servlet>
        <servlet-name>CamelServlet</servlet-name>
        <servlet-
class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-
class>
        ...
    </servlet>
    ...
    <servlet-mapping>
        <servlet-name>CamelServlet</servlet-name>
        <url-pattern>/worker/*</url-pattern>
    </servlet-mapping>
    ...
```

Dependencies

Maven users will need to add the following dependency to their **pom.xml**.



POM.XML

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-gae</artifactId>
   <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Apache Camel (2.1.0 or higher).

CHAPTER 49. GEOCODER

GEOCODER COMPONENT

Available as of Camel 2.12

The **geocoder:** component is used for looking up geocodes (latitude and longitude) for a given address, or reverse lookup. The component uses the Java API for Google Geocoder library.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-geocoder</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
geocoder:address:name[?options]
geocoder:latlng:latitude,longitude[?options]
```

OPTIONS

Property	Default	Description
language	**en**	The language to use.
headersOnly	**false**	Whether to only enrich the Exchange with headers, and leave the body as-is.
clientId		To use google premium with this client id
clientKey		To use google premium with this client key

You can append query options to the URI in the following format, **?option=value&option=value&...**

EXCHANGE DATA FORMAT

Camel will deliver the body as a **com.google.code.geocoder.model.GeocodeResponse** type. And if the address is **"current"** then the response is a String type with a JSON representation of the current location.

If the option **headersOnly** is set to **true** then the message body is left as-is, and only headers will be added to the Exchange.

MESSAGE HEADERS

Header	Description
CamelGeoCoderStatus	Mandatory. Status code from the geocoder library. If status is **GeocoderStatus.OK** then additional headers is enriched
CamelGeoCoderAddress	The formatted address
CamelGeoCoderLat	The latitude of the location.
CamelGeoCoderLng	The longitude of the location.
CamelGeoCoderLatlng	The latitude and longitude of the location. Separated by comma.
CamelGeoCoderCity	The city long name.
CamelGeoCoderRegionCode	The region code.
CamelGeoCoderRegionName	The region name.
CamelGeoCoderCountryLong	The country long name.
CamelGeoCoderCountryShort	The country short name.

Notice not all headers may be provided depending on available data and mode in use (address vs latlng).

SAMPLES

In the example below we get the latitude and longitude for Paris, France

```
from("direct:start")
  .to("geocoder:address:Paris, France")
```

If you provide a header with the **CamelGeoCoderAddress** then that overrides the endpoint configuration, so to get the location of Copenhagen, Denmark we can send a message with a headers as shown:

```
template.sendBodyAndHeader("direct:start", "Hello", GeoCoderConstants.ADDRESS, "Copenhagen, Denmark");
```

To get the address for a latitude and longitude we can do:

```
  from("direct:start")
    .to("geocoder:latlng:40.714224,-73.961452")
    .log("Location ${header.CamelGeocoderAddress} is at lat/lng: ${header.CamelGeocoderLatlng}
and in country ${header.CamelGeoCoderCountryShort}")
```

Which will log

```
Location 285 Bedford Avenue, Brooklyn, NY 11211, USA is at lat/lng: 40.71412890,-73.96140740
and in country US
```

To get the current location you can use "current" as the address as shown:

```
  from("direct:start")
    .to("geocoder:address:current")
```

CHAPTER 50. GITHUB

GITHUB COMPONENT

Available as of Camel 2.15

The GitHub component interacts with the GitHub API by encapsulating egit-github. It currently provides polling for new pull requests, pull request comments, tags, and commits. It is also able to produce comments on pull requests, as well as close the pull request entirely.

Rather than webhooks, this endpoint relies on simple polling. Reasons include:

- Concern for reliability/stability
- The types of payloads we're polling aren't typically large (plus, paging is available in the API)
- The need to support apps running somewhere not publicly accessible where a webhook would fail

Note that the GitHub API is fairly expansive. Therefore, this component could be easily expanded to provide additional interactions.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-github</artifactId>
    <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
gihub://endpoint[?options]
```

MANDATORY OPTIONS:

Note that these can be configured directly through the endpoint.

Option	Description
username	GitHub username, required unless oauthToken is provided
password	GitHub password, required unless oauthToken is provided
oauthToken	GitHub OAuth token, required unless username & password are provided
repoOwner	GitHub repository owner (organization)

repoName	GitHub repository name

CONSUMER ENDPOINTS:

Endpoint	Context	Body Type
pullRequest	polling	org.eclipse.egit.github.core.PullRequest
pullRequestComment	polling	org.eclipse.egit.github.core.Comment (comment on the general pull request discussion) or org.eclipse.egit.github.core.CommitComment (inline comment on a pull request diff)
tag	polling	org.eclipse.egit.github.core.RepositoryTag
commit	polling	org.eclipse.egit.github.core.RepositoryCommit

PRODUCER ENDPOINTS:

Endpoint	Body	Message Headers
pullRequestComment	String (comment text)	• GitHubPullRequest (integer) (REQUIRED): Pull request number. • GitHubInResponseTo (integer): Required if responding to another inline comment on the pull request diff. If left off, a general comment on the pull request discussion is assumed.
closePullRequest	none	• GitHubPullRequest (integer) (REQUIRED): Pull request number.

URI OPTIONS

Name	Default Value	Description
delay	**60**	in seconds

CHAPTER 51. GOOGLECALENDAR

GOOGLECALENDAR COMPONENT

Available as of Camel 2.15

COMPONENT DESCRIPTION

The Google Calendar component provides access to Google Calendar via the Google Calendar Web APIs.

Google Calendar uses the OAuth 2.0 protocol for authenticating a Google account and authorizing access to user data. Before you can use this component, you will need to create an account and generate OAuth credentials. Credentials comprise of a clientId, clientSecret, and a refreshToken. A handy resource for generating a long-lived refreshToken is the OAuth playground.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-google-calendar</artifactId>
    <version>2.15-SNAPSHOT</version>
</dependency>
```

URI FORMAT

The GoogleCalendar Component uses the following URI format:

```
google-calendar://endpoint-prefix/endpoint?[options]
```

Endpoint prefix can be one of:

- acl
- calendars
- channels
- colors
- events
- freebusy
- list
- settings

GOOGLECALENDARCOMPONENT

The GoogleCalendar Component can be configured with the options below. These options can be provided using the component's bean property **configuration** of type **org.apache.camel.component.google.calendar.GoogleCalendarConfiguration**.

Option	Type	
accessToken	String	OAuth 2 access token. This typically expires after an hour so refreshToken is recommended for long term usage.
applicationName	String	Google calendar application name. Example would be "camel-google-calendar/1.0"
clientId	String	Client ID of the calendar application
clientSecret	String	Client secret of the calendar application
refreshToken	String	OAuth 2 refresh token. Using this, the Google Calendar component can obtain a new accessToken whenever the current one expires - a necessity if the application is long-lived.
scopes	List<String>	Specifies the level of permissions you want a calendar application to have to a user account. See https://developers.google.com/google-apps/calendar/auth for more info.

PRODUCER ENDPOINTS

Producer endpoints can use endpoint prefixes followed by endpoint names and associated options described next. A shorthand alias can be used for some endpoints. The endpoint URI MUST contain a prefix.

Endpoint options that are not mandatory are denoted by []. When there are no mandatory options for an endpoint, one of the set of [] options MUST be provided. Producer endpoints can also use a special option **inBody** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message.

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelGoogleCalendar.<option>**. Note that the **inBody** option overrides message header, i.e. the endpoint option **inBody=option** would override a **CamelGoogleCalendar.option** header.

1. ENDPOINT PREFIX *ACL*

The following endpoints can be invoked with the prefix **acl** as follows:

```
google-calendar://acl/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		calendarId, ruleId	
get		calendarId, ruleId	com.google.api.services.calendar.model.AclRule
insert		calendarId, content	com.google.api.services.calendar.model.AclRule
list		calendarId	**com.google.api.services.calendar.model.Acl**
patch		calendarId, content, ruleId	com.google.api.services.calendar.model.AclRule
update		calendarId, content, ruleId	com.google.api.services.calendar.model.AclRule
watch		calendarId, contentChannel	com.google.api.services.calendar.model.Channel

URI OPTIONS FOR *ACL*

Name	Type
calendarId	String
content	com.google.api.services.calendar.model.AclRule
contentChannel	com.google.api.services.calendar.model.Channel
ruleId	String

2. ENDPOINT PREFIX *CALENDARS*

The following endpoints can be invoked with the prefix **calendars** as follows:

```
google-calendar://calendars/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type

clear		calendarId	
delete		calendarId	
get		calendarId	**com.google.api.services.calendar.Calendar**
insert		content	**com.google.api.services.calendar.Calendar**
patch		calendarId, content	**com.google.api.services.calendar.Calendar**
update		calendarId, content	**com.google.api.services.calendar.Calendar**

URI OPTIONS FOR *CALENDARS*

Name	Type
calendarId	String
content	com.google.api.services.calendar.model.Calendar

3. ENDPOINT PREFIX *CHANNELS*

The following endpoints can be invoked with the prefix **channels** as follows:

```
google-calendar://channels/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
stop		contentChannel	

URI OPTIONS FOR *CHANNELS*

Name	Type
contentChannel	com.google.api.services.calendar.model.Channel

4. ENDPOINT PREFIX *COLORS*

The following endpoints can be invoked with the prefix **colors** as follows:

```
google-calendar://colors/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get			**com.google.api.services.calendar.model.Colors**

URI OPTIONS FOR *COLORS*

Name	Type

5. ENDPOINT PREFIX *EVENTS*

The following endpoints can be invoked with the prefix **events** as follows:

```
    google-calendar://events/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
calendarImport		calendarId, content	com.google.api.services.calendar.model.Event
delete		calendarId, eventId	
get		calendarId, eventId	com.google.api.services.calendar.model.Event
insert		calendarId, content	com.google.api.services.calendar.model.Event
instances		calendarId, eventId	**com.google.api.services.calendar.model.Events**
list		calendarId	**com.google.api.services.calendar.model.Events**
move		calendarId, destination, eventId	com.google.api.services.calendar.model.Event

patch		calendarId, content, eventId	com.google.api.services.calendar.model.Event
quickAdd		calendarId, text	com.google.api.services.calendar.model.Event
update		calendarId, content, eventId	com.google.api.services.calendar.model.Event
watch		calendarId, contentChannel	com.google.api.services.calendar.model.Channel

URI OPTIONS FOR *EVENTS*

Name	Type
calendarId	String
content	com.google.api.services.calendar.model.Event
contentChannel	com.google.api.services.calendar.model.Channel
destination	String
eventId	String
text	String

6. ENDPOINT PREFIX *FREEBUSY*

The following endpoints can be invoked with the prefix **freebusy** as follows:

```
google-calendar://freebusy/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
query		content	com.google.api.services.calendar.model.FreeBusyResponse

URI OPTIONS FOR *FREEBUSY*

Name	Type

content	com.google.api.services.calendar.model.FreeBusyRequest

7. ENDPOINT PREFIX *LIST*

The following endpoints can be invoked with the prefix **list** as follows:

```
google-calendar://list/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		calendarId	
get		calendarId	**com.google.api.services.calendar.model.CalendarListEntry**
insert		content	**com.google.api.services.calendar.model.CalendarListEntry**
list			**com.google.api.services.calendar.model.CalendarList**
patch		calendarId, content	**com.google.api.services.calendar.model.CalendarListEntry**
update		calendarId, content	**com.google.api.services.calendar.model.CalendarListEntry**
watch		contentChannel	com.google.api.services.calendar.model.Channel

URI OPTIONS FOR *LIST*

Name	Type
calendarId	String
content	com.google.api.services.calendar.model.CalendarListEntry
contentChannel	com.google.api.services.calendar.model.Channel

8. ENDPOINT PREFIX *SETTINGS*

The following endpoints can be invoked with the prefix **settings** as follows:

```
google-calendar://settings/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get		setting	**com.google.api.services.calendar.model.Setting**
list			**com.google.api.services.calendar.model.Settings**
watch		contentChannel	com.google.api.services.calendar.model.Channel

URI OPTIONS FOR *SETTINGS*

Name	Type
contentChannel	com.google.api.services.calendar.model.Channel
setting	String

CONSUMER ENDPOINTS

Any of the producer endpoints can be used as a consumer endpoint. Consumer endpoints can use Scheduled Poll Consumer Options with a **consumer.** prefix to schedule endpoint invocation. Consumer endpoints that return an array or collection will generate one exchange per element, and their routes will be executed once for each exchange.

MESSAGE HEADERS

Any URI option can be provided in a message header for producer endpoints with a **CamelGoogleCalendar.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the underlying APIs used by the GoogleCalendarComponent. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint URI parameter. For endpoints that return an array or collection, a consumer endpoint will map every element to distinct messages.

CHAPTER 52. GOOGLEDRIVE

GOOGLEDRIVE COMPONENT

Available as of Camel 2.14

The Google Drive component provides access to the Google Drive file storage service via the Google Drive Web APIs.

Google Drive uses the OAuth 2.0 protocol for authenticating a Google account and authorizing access to user data. Before you can use this component, you will need to create an account and generate OAuth credentials. Credentials comprise of a clientId, clientSecret, and a refreshToken. A handy resource for generating a long-lived refreshToken is the OAuth playground.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-google-drive</artifactId>
    <version>2.14-SNAPSHOT</version>
</dependency>
```

URI FORMAT

The GoogleDrive Component uses the following URI format:

```
google-drive://endpoint-prefix/endpoint?[options]
```

Endpoint prefix can be one of:

- **drive-about**
- **drive-apps**
- **drive-changes**
- **drive-channels**
- **drive-children**
- **drive-comments**
- **drive-files**
- **drive-parents**
- **drive-permissions**
- **drive-properties**
- **drive-realtime**
- **drive-replies**
- **drive-revisions**

GOOGLEDRIVECOMPONENT

The GoogleDrive Component can be configured with the options below. These options can be provided using the component's bean property **configuration** of type **org.apache.camel.component.google.drive.GoogleDriveConfiguration**.

Option	Type	Description
accessToken	**String**	OAuth 2 access token. This typically expires after an hour so **refreshToken** is recommended for long term usage.
applicationName	**String**	Google drive application name. Example would be **camel-google-drive/1.0**.
clientId	**String**	Client ID of the drive application
clientSecret	**String**	Client secret of the drive application
refreshToken	**String**	OAuth 2 refresh token. Using this, the Google Drive component can obtain a new **accessToken** whenever the current one expires - a necessity if the application is long-lived.
scopes	**List<String>**	Specifies the level of permissions you want a drive application to have to a user account. See https://developers.google.com/drive/web/scopes for more info.

PRODUCER ENDPOINTS

Producer endpoints can use endpoint prefixes followed by endpoint names and associated options described next. A shorthand alias can be used for some endpoints. The endpoint URI MUST contain a prefix.

Endpoint options that are not mandatory are denoted by []. When there are no mandatory options for an endpoint, one of the set of [] options MUST be provided. Producer endpoints can also use a special option **inBody** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message.

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelGoogleDrive.<option>**. Note that the **inBody** option overrides message header, i.e. the endpoint option **inBody=option** would override a **CamelGoogleDrive.option** header.

For more information on the endpoints and options see API documentation at:
https://developers.google.com/drive/v2/reference/

1. ENDPOINT PREFIX DRIVE-ABOUT

The following endpoints can be invoked with the prefix **drive-about** as follows:

```
google-drive://drive-about/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get			**com.google.api.services.drive.model.About**

URI OPTIONS FOR DRIVE-ABOUT

Name	Type

2. ENDPOINT PREFIX DRIVE-APPS

The following endpoints can be invoked with the prefix **drive-apps** as follows:

```
google-drive://drive-apps/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get		**appId**	**com.google.api.services.drive.model.App**
list			**com.google.api.services.drive.model.AppList**

URI OPTIONS FOR DRIVE-APPS

Name	Type
appId	**String**

3. ENDPOINT PREFIX DRIVE-CHANGES

The following endpoints can be invoked with the prefix **drive-changes** as follows:

```
google-drive://drive-changes/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get		**changeId**	**com.google.api.services.drive.model.Change**
list			**com.google.api.services.drive.model.ChangeList**
watch		**contentChannel**	**com.google.api.services.drive.model.Channel**

URI OPTIONS FOR DRIVE-CHANGES

Name	Type
changeId	**String**
contentChannel	**com.google.api.services.drive.model.Channel**

4. ENDPOINT PREFIX DRIVE-CHANNELS

The following endpoints can be invoked with the prefix **drive-channels** as follows:

```
google-drive://drive-channels/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
stop		**contentChannel**	

URI OPTIONS FOR DRIVE-CHANNELS

Name	Type
contentChannel	**com.google.api.services.drive.model.Channel**

5. ENDPOINT PREFIX DRIVE-CHILDREN

The following endpoints can be invoked with the prefix **drive-children** as follows:

```
google-drive://drive-children/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		**childId**, **folderId**	
get		**childId**, **folderId**	**com.google.api.services.drive.model.ChildReference**
insert		**content**, **folderId**	**com.google.api.services.drive.model.ChildReference**
list		**folderId**	**com.google.api.services.drive.model.ChildList**

URI OPTIONS FOR DRIVE-CHILDREN

Name	Type
childId	**String**
content	**com.google.api.services.drive.model.ChildReference**
folderId	**String**

6. ENDPOINT PREFIX DRIVE-COMMENTS

The following endpoints can be invoked with the prefix **drive-comments** as follows:

```
google-drive://drive-comments/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		**commentId**, **fileId**	
get		**commentId**, **fileId**	**com.google.api.services.drive.model.Comment**

insert		**content**, **fileId**	**com.google.api.services.drive.model.Comment**
list		**fileId**	**com.google.api.services.drive.model.CommentList**
patch		**commentId**, **content**, **fileId**	**com.google.api.services.drive.model.Comment**
update		**commentId**, **content**, **fileId**	**com.google.api.services.drive.model.Comment**

URI OPTIONS FOR DRIVE-COMMENTS

Name	Type
commentId	**String**
content	**com.google.api.services.drive.model.Comment**
fileId	**String**

7. ENDPOINT PREFIX DRIVE-FILES

The following endpoints can be invoked with the prefix **drive-files** as follows:

```
google-drive://drive-files/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
copy		**content**, **fileId**	**com.google.api.services.drive.model.File**
delete		**fileId**	
get		**fileId**	**com.google.api.services.drive.model.File**
insert		**[mediaContent]**, **content**	**com.google.api.services.drive.model.File**

list			**com.google.api.services.drive.model.FileList**
patch		**content**, **fileId**	**com.google.api.services.drive.model.File**
touch		**fileId**	**com.google.api.services.drive.model.File**
trash		**fileId**	**com.google.api.services.drive.model.File**
untrash		**fileId**	**com.google.api.services.drive.model.File**
update		**[mediaContent]**, **content**, **fileId**	**com.google.api.services.drive.model.File**
watch		**contentChannel**, **fileId**	**com.google.api.services.drive.model.Channel**

URI OPTIONS FOR DRIVE-FILES

Name	Type
content	**com.google.api.services.drive.model.File**
contentChannel	**com.google.api.services.drive.model.Channel**
fileId	**String**
mediaContent	**com.google.api.client.http.AbstractInputStreamContent**

8. ENDPOINT PREFIX DRIVE-PARENTS

The following endpoints can be invoked with the prefix **drive-parents** as follows:

```
google-drive://drive-parents/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type

delete		**fileId**, **parentId**	
get		**fileId**, **parentId**	**com.google.api.services.drive.model.ParentReference**
insert		**content**, **fileId**	**com.google.api.services.drive.model.ParentReference**
list		**fileId**	**com.google.api.services.drive.model.ParentList**

URI OPTIONS FOR DRIVE-PARENTS

Name	Type
content	**com.google.api.services.drive.model.ParentReference**
fileId	**String**
parentId	**String**

9. ENDPOINT PREFIX DRIVE-PERMISSIONS

The following endpoints can be invoked with the prefix **drive-permissions** as follows:

```
google-drive://drive-permissions/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		**fileId**, **permissionId**	
get		**fileId**, **permissionId**	**com.google.api.services.drive.model.Permission**
getIdForEmail		**email**	**com.google.api.services.drive.model.PermissionId**

insert		**content**, **fileId**	**com.google.api.services.drive.model.Permission**
list		**fileId**	**com.google.api.services.drive.model.PermissionList**
patch		**content**, **fileId**, **permissionId**	**com.google.api.services.drive.model.Permission**
update		**content**, **fileId**, **permissionId**	**com.google.api.services.drive.model.Permission**

URI OPTIONS FOR DRIVE-PERMISSIONS

Name	Type
content	**com.google.api.services.drive.model.Permission**
email	**String**
fileId	**String**
permissionId	**String**

10. ENDPOINT PREFIX DRIVE-PROPERTIES

The following endpoints can be invoked with the prefix **drive-properties** as follows:

```
google-drive://drive-properties/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		**fileId**, **propertyKey**	
get		**fileId**, **propertyKey**	**com.google.api.services.drive.model.Property**

insert		**content**, **fileId**	**com.google.api.services.drive.model.Property**
list		**fileId**	**com.google.api.services.drive.model.PropertyList**
patch		**content**, **fileId**, **propertyKey**	**com.google.api.services.drive.model.Property**
update		**content**, **fileId**, **propertyKey**	**com.google.api.services.drive.model.Property**

URI OPTIONS FOR DRIVE-PROPERTIES

Name	Type
content	**com.google.api.services.drive.model.Property**
fileId	**String**
propertyKey	**String**

11. ENDPOINT PREFIX DRIVE-REALTIME

The following endpoints can be invoked with the prefix **drive-realtime** as follows:

```
google-drive://drive-realtime/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get		**fileId**	
update		**[mediaContent]**, **fileId**	

URI OPTIONS FOR DRIVE-REALTIME

Name	Type

fileId	**String**
mediaContent	**com.google.api.client.http.AbstractInputStreamContent**

12. ENDPOINT PREFIX DRIVE-REPLIES

The following endpoints can be invoked with the prefix **drive-replies** as follows:

```
google-drive://drive-replies/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		**commentId**, **fileId**, **replyId**	
get		**commentId**, **fileId**, **replyId**	**com.google.api.services.drive.model.CommentReply**
insert		**commentId**, **content**, **fileId**	**com.google.api.services.drive.model.CommentReply**
list		**commentId**, **fileId**	**com.google.api.services.drive.model.CommentReplyList**
patch		**commentId**, **content**, **fileId**, **replyId**	**com.google.api.services.drive.model.CommentReply**
update		**commentId**, **content**, **fileId**, **replyId**	**com.google.api.services.drive.model.CommentReply**

URI OPTIONS FOR DRIVE-REPLIES

Name	Type
commentId	**String**
content	**com.google.api.services.drive.model.CommentReply**

fileId	**String**
replyId	**String**

13. ENDPOINT PREFIX DRIVE-REVISIONS

The following endpoints can be invoked with the prefix **drive-revisions** as follows:

```
google-drive://drive-revisions/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		**fileId**, **revisionId**	
get		**fileId**, **revisionId**	**com.google.api.services.drive.model.Revision**
list		**fileId**	**com.google.api.services.drive.model.RevisionList**
patch		**content**, **fileId**, **revisionId**	**com.google.api.services.drive.model.Revision**
update		**content**, **fileId**, **revisionId**	**com.google.api.services.drive.model.Revision**

URI OPTIONS FOR DRIVE-REVISIONS

Name	Type
content	**com.google.api.services.drive.model.Revision**
fileId	**String**
revisionId	**String**

CONSUMER ENDPOINTS

Any of the producer endpoints can be used as a consumer endpoint. Consumer endpoints can use Scheduled Poll Consumer Options with a **consumer.** prefix to schedule endpoint invocation. Consumer

endpoints that return an array or collection will generate one exchange per element, and their routes will be executed once for each exchange.

MESSAGE HEADERS

Any URI option can be provided in a message header for producer endpoints with a **CamelGoogleDrive.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the underlying APIs used by the GoogleDriveComponent. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint URI parameter. For endpoints that return an array or collection, a consumer endpoint will map every element to distinct messages.

CHAPTER 53. GOOGLEMAIL

GOOGLEMAIL COMPONENT

Available as of Camel 2.15

COMPONENT DESCRIPTION

The Google Mail component provides access to Gmail via the Google Mail Web APIs.

Google Mail uses the OAuth 2.0 protocol for authenticating a Google account and authorizing access to user data. Before you can use this component, you will need to create an account and generate OAuth credentials. Credentials comprise of a clientId, clientSecret, and a refreshToken. A handy resource for generating a long-lived refreshToken is the OAuth playground.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-google-mail</artifactId>
    <version>2.15-SNAPSHOT</version>
</dependency>
```

URI FORMAT

The GoogleMail Component uses the following URI format:

```
google-mail://endpoint-prefix/endpoint?[options]
```

Endpoint prefix can be one of:

- attachments
- drafts
- history
- labels
- messages
- threads
- users

GOOGLEMAILCOMPONENT

The GoogleMail Component can be configured with the options below. These options can be provided using the component's bean property **configuration** of type **org.apache.camel.component.google.mail.GoogleMailConfiguration**.

Option	Type

accessToken	String	OAuth 2 access token. This typically expires after an hour so refreshToken is recommended for long term usage.
applicationName	String	Google drive application name. Example would be "camel-google-mail/1.0"
clientId	String	Client ID of the drive application
clientSecret	String	Client secret of the drive application
refreshToken	String	OAuth 2 refresh token. Using this, the Google Mail component can obtain a new accessToken whenever the current one expires - a necessity if the application is long-lived.
scopes	List<String>	Specifies the level of permissions you want a drive application to have to a user account. See https://developers.google.com/gmail/api/auth/scopes for more info.

PRODUCER ENDPOINTS

Producer endpoints can use endpoint prefixes followed by endpoint names and associated options described next. A shorthand alias can be used for some endpoints. The endpoint URI MUST contain a prefix.

Endpoint options that are not mandatory are denoted by []. When there are no mandatory options for an endpoint, one of the set of [] options MUST be provided. Producer endpoints can also use a special option **inBody** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message.

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelGoogleMail.<option>**. Note that the **inBody** option overrides message header, i.e. the endpoint option **inBody=option** would override a **CamelGoogleMail.option** header.

For more information on the endpoints and options see API documentation at: https://developers.google.com/gmail/api/v1/reference/

1. ENDPOINT PREFIX *ATTACHMENTS*

The following endpoints can be invoked with the prefix **attachments** as follows:

```
google-mail://attachments/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
get		id, messageId, userId	com.google.api.services.gmail.model.MessagePartBody

URI OPTIONS FOR *ATTACHMENTS*

Name	Type
id	String
messageId	String
userId	String

2. ENDPOINT PREFIX *DRAFTS*

The following endpoints can be invoked with the prefix **drafts** as follows:

```
google-mail://drafts/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
create		[mediaContent], content, userId	**com.google.api.services.gmail.model.Draft**
delete		id, userId	
get		id, userId	**com.google.api.services.gmail.model.Draft**
list		userId	**com.google.api.services.gmail.model.ListDraftsResponse**
send		[mediaContent], content, userId	**com.google.api.services.gmail.model.Message**
update		[mediaContent], content, id, userId	**com.google.api.services.gmail.model.Draft**

URI OPTIONS FOR *DRAFTS*

Name	Type
content	com.google.api.services.gmail.model.Draft
id	String
mediaContent	com.google.api.client.http.AbstractInputStreamContent
userId	String

3. ENDPOINT PREFIX *HISTORY*

The following endpoints can be invoked with the prefix **history** as follows:

```
google-mail://history/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
list		userId	**com.google.api.services.gmail.model.ListHistoryResponse**

URI OPTIONS FOR *HISTORY*

Name	Type
userId	String

4. ENDPOINT PREFIX *LABELS*

The following endpoints can be invoked with the prefix **labels** as follows:

```
google-mail://labels/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
create		content, userId	**com.google.api.services.gmail.model.Label**
delete		id, userId	

get		id, userId	**com.google.api.services.gmail.model.Label**
list		userId	**com.google.api.services.gmail.model.ListLabelsResponse**
patch		content, id, userId	**com.google.api.services.gmail.model.Label**
update		content, id, userId	**com.google.api.services.gmail.model.Label**

URI OPTIONS FOR *LABELS*

Name	Type
content	com.google.api.services.gmail.model.Label
id	String
userId	String

5. ENDPOINT PREFIX *MESSAGES*

The following endpoints can be invoked with the prefix **messages** as follows:

```
google-mail://messages/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		id, userId	
get		id, userId	**com.google.api.services.gmail.model.Message**
gmailImport		[mediaContent], content, userId	**com.google.api.services.gmail.model.Message**

insert		[mediaContent], content, userId	**com.google.api.services.gmail.model.Message**
list		userId	**com.google.api.services.gmail.model.ListMessagesResponse**
modify		id, modifyMessageRequest, userId	**com.google.api.services.gmail.model.Message**
send		[mediaContent], content, userId	**com.google.api.services.gmail.model.Message**
trash		id, userId	
untrash		id, userId	

URI OPTIONS FOR *MESSAGES*

Name	Type
content	com.google.api.services.gmail.model.Message
id	String
mediaContent	com.google.api.client.http.AbstractInputStreamContent
modifyMessageRequest	com.google.api.services.gmail.model.ModifyMessageRequest
userId	String

6. ENDPOINT PREFIX *THREADS*

The following endpoints can be invoked with the prefix **threads** as follows:

```
google-mail://threads/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
delete		id, userId	

get		id, userId	**com.google.api.services.gmail.model.Thread**
list		userId	**com.google.api.services.gmail.model.ListThreadsResponse**
modify		content, id, userId	**com.google.api.services.gmail.model.Thread**
trash		id, userId	
untrash		id, userId	

URI OPTIONS FOR *THREADS*

Name	Type
content	com.google.api.services.gmail.model.ModifyThreadRequest
id	String
userId	String

7. ENDPOINT PREFIX *USERS*

The following endpoints can be invoked with the prefix **users** as follows:

```
google-mail://users/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
getProfile		userId	com.google.api.services.gmail.model.Profile

URI OPTIONS FOR *USERS*

Name	Type
userId	String

CONSUMER ENDPOINTS

Any of the producer endpoints can be used as a consumer endpoint. Consumer endpoints can use Scheduled Poll Consumer Options with a **consumer.** prefix to schedule endpoint invocation. Consumer endpoints that return an array or collection will generate one exchange per element, and their routes will be executed once for each exchange.

MESSAGE HEADERS

Any URI option can be provided in a message header for producer endpoints with a **CamelGoogleMail.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the underlying APIs used by the GoogleMailComponent. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint URI parameter. For endpoints that return an array or collection, a consumer endpoint will map every element to distinct messages.

CHAPTER 54. GUAVA EVENTBUS

GUAVA EVENTBUS COMPONENT

Available since Camel 2.10.0

The Google Guava EventBus allows publish-subscribe-style communication between components without requiring the components to explicitly register with one another (and thus be aware of each other). The **guava-eventbus:** component provides integration bridge between Camel and Google Guava EventBus infrastructure. With the latter component, messages exchanged with the Guava **EventBus** can be transparently forwarded to the Camel routes. EventBus component allows also to route body of Camel exchanges to the Guava **EventBus**.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-guava-eventbus</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
guava-eventbus:busName[?options]
```

Where **busName** represents the name of the **com.google.common.eventbus.EventBus** instance located in the Camel registry.

OPTIONS

Name	Default Value	Description
eventClass	**null**	**Camel 2.10:** If used on the consumer side of the route, will filter events received from the **EventBus** to the instances of the class and superclasses of **eventClass**. Null value of this option is equal to setting it to the **java.lang.Object** i.e. the consumer will capture all messages incoming to the event bus. This option cannot be used together with **listenerInterface** option.

listenerInterface	**null**	**Camel 2.11:** The interface with method(s) marked with the **@Subscribe** annotation. Dynamic proxy will be created over the interface so it could be registered as the **EventBus** listener. Particularly useful when creating multi-event listeners and for handling **DeadEvent** properly. This option cannot be used together with **eventClass** option.

USAGE

Using **guava-eventbus** component on the consumer side of the route will capture messages sent to the Guava **EventBus** and forward them to the Camel route. Guava EventBus consumer processes incoming messages asynchronously.

```
SimpleRegistry registry = new SimpleRegistry();
EventBus eventBus = new EventBus();
registry.put("busName", eventBus);
CamelContext camel = new DefaultCamelContext(registry);

from("guava-eventbus:busName").to("seda:queue");

eventBus.post("Send me to the SEDA queue.");
```

Using **guava-eventbus** component on the producer side of the route will forward body of the Camel exchanges to the Guava **EventBus** instance.

```
SimpleRegistry registry = new SimpleRegistry();
EventBus eventBus = new EventBus();
registry.put("busName", eventBus);
CamelContext camel = new DefaultCamelContext(registry);

from("direct:start").to("guava-eventbus:busName");

ProducerTemplate producerTemplate = camel.createProducerTemplate();
producer.sendBody("direct:start", "Send me to the Guava EventBus.");

eventBus.register(new Object(){
  @Subscribe
  public void messageHander(String message) {
    System.out.println("Message received from the Camel: " + message);
  }
});
```

DEADEVENT CONSIDERATIONS

Keep in mind that due to the limitations caused by the design of the Guava EventBus, you cannot specify event class to be received by the listener without creating class annotated with **@Subscribe** method.

This limitation implies that endpoint with **eventClass** option specified actually listens to all possible events (**java.lang.Object**) and filter appropriate messages programmatically at runtime. The snipped below demonstrates an appropriate excerpt from the Camel code base.

```
@Subscribe
public void eventReceived(Object event) {
  if (eventClass == null || eventClass.isAssignableFrom(event.getClass())) {
    doEventReceived(event);
...
```

This drawback of this approach is that **EventBus** instance used by Camel will never generate **com.google.common.eventbus.DeadEvent** notifications. If you want Camel to listen only to the precisely specified event (and therefore enable **DeadEvent** support), use **listenerInterface** endpoint option. Camel will create dynamic proxy over the interface you specify with the latter option and listen only to messages specified by the interface handler methods. The example of the listener interface with single method handling only **SpecificEvent** instances is demonstrated below.

```
package com.example;

public interface CustomListener {

  @Subscribe
  void eventReceived(SpecificEvent event);

}
```

The listener presented above could be used in the endpoint definition as follows.

```
from("guava-eventbus:busName?listenerInterface=com.example.CustomListener").to("seda:queue");
```

CONSUMING MULTIPLE TYPE OF EVENTS

In order to define multiple type of events to be consumed by Guava EventBus consumer use **listenerInterface** endpoint option, as listener interface could provide multiple methods marked with the **@Subscribe** annotation.

```
package com.example;

public interface MultipleEventsListener {

  @Subscribe
  void someEventReceived(SomeEvent event);

  @Subscribe
  void anotherEventReceived(AnotherEvent event);

}
```

The listener presented above could be used in the endpoint definition as follows.

```
from("guava-eventbus:busName?
listenerInterface=com.example.MultipleEventsListener").to("seda:queue");
```

CHAPTER 55. HAWTDB

HAWTDB

Available as of Apache Camel 2.3

HawtDB is a very lightweight and embeddable key value database. It allows together with Apache Camel to provide persistent support for various Apache Camel features such as section "Aggregator" in "Apache Camel Development Guide".

DEPRECATED

The HawtDB project is being deprecated and replaced by leveldb as the lightweight and embedable key value database. To make using leveldb easy there is a leveldbjni project for that. The Apache ActiveMQ project is planning on using leveldb as their primary file based message store in the future, to replace kahadb.

There os a camel-leveldb component we recommend to use instead of this.

Current features it provides:

- HawtDBAggregationRepository

USING HAWTDBAGGREGATIONREPOSITORY

HawtDBAggregationRepository is an **AggregationRepository** which on the fly persists the aggregated messages. This ensures that you will not loose messages, as the default aggregator will use an in memory only **AggregationRepository**.

It has the following options:

Option	Type	Description
repositoryName	String	A mandatory repository name. Allows you to use a shared **HawtDBFile** for multiple repositories.
persistentFileName	String	Filename for the persistent storage. If no file exists on startup a new file is created.
bufferSize	int	The size of the memory segment buffer which is mapped to the file store. By default its 8mb. The value is in bytes.

sync	boolean	Whether or not the **HawtDBFile** should sync on write or not. Default is **true**. By sync on write ensures that its always waiting for all writes to be spooled to disk and thus will not loose updates. If you disable this option, then HawtDB will auto sync when it has batched up a number of writes.
pageSize	short	The size of memory pages. By default its 512 bytes. The value is in bytes.
hawtDBFile	HawtDBFile	Use an existing configured **org.apache.camel.component.hawtdb.HawtDBFile** instance.
returnOldExchange	boolean	Whether the get operation should return the old existing Exchange if any existed. By default this option is **false** to optimize as we do not need the old exchange when aggregating.
useRecovery	boolean	Whether or not recovery is enabled. This option is by default **true**. When enabled the Apache Camel section "Aggregator" in "Apache Camel Development Guide" automatic recover failed aggregated exchange and have them resubmitted.
recoveryInterval	long	If recovery is enabled then a background task is run every x'th time to scan for failed exchanges to recover and resubmit. By default this interval is 5000 millis.
maximumRedeliveries	int	Allows you to limit the maximum number of redelivery attempts for a recovered exchange. If enabled then the Exchange will be moved to the dead letter channel if all redelivery attempts failed. By default this option is disabled. If this option is used then the **deadLetterUri** option must also be provided.

deadLetterUri	String	An endpoint uri for a Dead Letter Channel where exhausted recovered Exchanges will be moved. If this option is used then the **maximumRedeliveries** option must also be provided.
optimisticLocking	**false**	**Camel 2.12:** To turn on optimistic locking, which often would be needed in clustered environments where multiple Camel applications shared the same HawtDB based aggregation repository.

The **repositoryName** option must be provided. Then either the **persistentFileName** or the **hawtDBFile** must be provided.

WHAT IS PRESERVED WHEN PERSISTING

HawtDBAggregationRepository will only preserve any **Serializable** compatible data types. If a data type is not such a type its dropped and a **WARN** is logged. And it only persists the **Message** body and the **Message** headers. The **Exchange** properties are **not** persisted.

RECOVERY

The **HawtDBAggregationRepository** will by default recover any failed Exchange. It does this by having a background tasks that scans for failed Exchanges in the persistent store. You can use the **checkInterval** option to set how often this task runs. The recovery works as transactional which ensures that Apache Camel will try to recover and redeliver the failed Exchange. Any Exchange which was found to be recovered will be restored from the persistent store and resubmitted and send out again.

The following headers is set when an Exchange is being recovered/redelivered:

Header	Type	Description
Exchange.REDELIVERED	Boolean	Is set to true to indicate the Exchange is being redelivered.
Exchange.REDELIVERY_COUNTER	Integer	The redelivery attempt, starting from 1.

Only when an Exchange has been successfully processed it will be marked as complete which happens when the **confirm** method is invoked on the **AggregationRepository**. This means if the same Exchange fails again it will be kept retried until it success.

You can use option **maximumRedeliveries** to limit the maximum number of redelivery attempts for a given recovered Exchange. You must also set the **deadLetterUri** option so Apache Camel knows where to send the Exchange when the **maximumRedeliveries** was hit.

You can see some examples in the unit tests of camel-hawtdb, for example this test.

USING HAWTDBAGGREGATIONREPOSITORY IN JAVA DSL

In this example we want to persist aggregated messages in the **target/data/hawtdb.dat** file.

```
public void configure() throws Exception {
    // create the hawtdb repo
    HawtDBAggregationRepository repo = new HawtDBAggregationRepository("repo1",
"target/data/hawtdb.dat");

    // here is the Camel route where we aggregate
    from("direct:start")
        .aggregate(header("id"), new MyAggregationStrategy())
            // use our created hawtdb repo as aggregation repository
            .completionSize(5).aggregationRepository(repo)
            .to("mock:aggregated");
}
```

USING HAWTDBAGGREGATIONREPOSITORY IN SPRING XML

The same example but using Spring XML instead:

```
<!-- a persistent aggregation repository using camel-hawtdb -->
<bean id="repo" class="org.apache.camel.component.hawtdb.HawtDBAggregationRepository">
    <!-- store the repo in the hawtdb.dat file -->
    <property name="persistentFileName" value="target/data/hawtdb.dat"/>
    <!-- and use repo2 as the repository name -->
    <property name="repositoryName" value="repo2"/>
</bean>

<!-- aggregate the messages using this strategy -->
<bean id="myAggregatorStrategy"
class="org.apache.camel.component.hawtdb.HawtDBSpringAggregateTest$MyAggregationStrategy"/>


<!-- this is the camel routes -->
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">

    <route>
        <from uri="direct:start"/>
        <!-- aggregate using our strategy and hawtdb repo, and complete when we have 5 messages
aggregated -->
        <aggregate strategyRef="myAggregatorStrategy" aggregationRepositoryRef="repo"
completionSize="5">
            <!-- correlate by header with the key id -->
            <correlationExpression><header>id</header></correlationExpression>
            <!-- send aggregated messages to the mock endpoint -->
            <to uri="mock:aggregated"/>
        </aggregate>
    </route>

</camelContext>
```

DEPENDENCIES

To use HawtDB in your Apache Camel routes you need to add the a dependency on **camel-hawtdb**.

If you use maven you could just add the following to your pom.xml, substituting the version number for the latest & greatest release (see the download page for the latest versions).

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-hawtdb</artifactId>
  <version>2.3.0</version>
</dependency>
```

See Also:

- section "Aggregator" in "Apache Camel Development Guide"
- SQL
- Components

CHAPTER 56. HAZELCAST COMPONENT

HAZELCAST COMPONENT

Available as of Apache Camel 2.7

The **hazelcast:** component allows you to work with the Hazelcast distributed data grid / cache. Hazelcast is a in memory data grid, entirely written in Java (single jar). It offers a great palette of different data stores like map, multi map (same key, n values), queue, list and atomic number. The main reason to use Hazelcast is its simple cluster support. If you have enabled multicast on your network you can run a cluster with hundred nodes with no extra configuration. Hazelcast can simply configured to add additional features like n copies between nodes (default is 1), cache persistence, network configuration (if needed), near cache, enviction and so on. For more information consult the Hazelcast documentation on http://www.hazelcast.com/docs.jsp.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-hazelcast</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
hazelcast:[ map | multimap | queue | topic | seda | set | atomicvalue | instance | list]:cachename[?
options]
```

OPTIONS

Name	Required	Description
hazelcastInstance	No	**Camel 2.14:** The hazelcast instance reference which can be used for hazelcast endpoint. If you don't specify the instance reference, camel use the default hazelcast instance from the camel-hazelcast instance.
hazelcastInstanceName	No	
defaultOperation	**-1**	**Camel 2.15:** To specify a default operation to use, if no operation header has been provided.

WARNING

You have to use the second prefix to define which type of data store you want to use.

SECTIONS

1. Usage of map
2. Usage of multimap
3. Usage of queue
4. Usage of topic
5. Usage of list
6. Usage of seda
7. Usage of atomic number
8. Usage of cluster support (instance)

USAGE OF MAP

MAP CACHE PRODUCER - TO("HAZELCAST:MAP:FOO")

If you want to store a value in a map you can use the map cache producer. The map cache producer provides 5 operations (put, get, update, delete, query). For the first 4 you have to provide the operation inside the "hazelcast.operation.type" header variable. In Java DSL you can use the constants from **org.apache.camel.component.hazelcast.HazelcastConstants**.

Header Variables for the request message:

Name	Type	Description
hazelcast.operation.type	**String**	valid values are: put, delete, get, update, query
hazelcast.objectId	**String**	the object id to store / find your object inside the cache (not needed for the query operation)

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastOperationType	**String**	valid values are: put, delete, get, update, query **Version 2.8**
CamelHazelcastObjectId	**String**	the object id to store / find your object inside the cache (not needed for the query operation) **Version 2.8**

You can call the samples with:

```
template.sendBodyAndHeader("direct:[put|get|update|delete|query]", "my-foo",
HazelcastConstants.OBJECT_ID, "4711");
```

SAMPLE FOR PUT:

Java DSL:

```
from("direct:put")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.PUT_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:put" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>put</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
</route>
```

SAMPLE FOR GET:

Java DSL:

```
from("direct:get")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.GET_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX)
.to("seda:out");
```

-

Spring DSL:

```
<route>
 <from uri="direct:get" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>get</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
 <to uri="seda:out" />
</route>
```

SAMPLE FOR UPDATE:

Java DSL:

```
from("direct:update")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.UPDATE_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:update" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>update</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
</route>
```

SAMPLE FOR DELETE:

Java DSL:

```
from("direct:delete")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.DELETE_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:delete" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>delete</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
</route>
```

SAMPLE FOR QUERY

Java DSL:

```
from("direct:query")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.QUERY_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX)
.to("seda:out");
```

Spring DSL:

```
<route>
 <from uri="direct:query" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>query</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
 <to uri="seda:out" />
</route>
```

For the query operation Hazelcast offers a SQL like syntax to query your distributed map.

```
String q1 = "bar > 1000";
template.sendBodyAndHeader("direct:query", null, HazelcastConstants.QUERY, q1);
```

MAP CACHE CONSUMER - FROM("HAZELCAST:MAP:FOO")

Hazelcast provides event listeners on their data grid. If you want to be notified if a cache will be manipulated, you can use the map consumer. There're 4 events: **put**, **update**, **delete** and **envict**. The event type will be stored in the "**hazelcast.listener.action**" header variable. The map consumer provides some additional information inside these variables:

Header Variables inside the response message:

Name	Type	Description
hazelcast.listener.time	**Long**	time of the event in millis
hazelcast.listener.type	**String**	the map consumer sets here "cachelistener"
hazelcast.listener.action	**String**	type of event - here **added**, **updated**, **envicted** and **removed**
hazelcast.objectId	**String**	the oid of the object
hazelcast.cache.name	**String**	the name of the cache - e.g. "foo"
hazelcast.cache.type	**String**	the type of the cache - here map

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastListenerTime	**Long**	time of the event in millis **Version 2.8**
CamelHazelcastListenerType	**String**	the map consumer sets here "cachelistener" **Version 2.8**
CamelHazelcastListenerAction	**String**	type of event - here **added**, **updated**, **envicted** and **removed**. **Version 2.8**
CamelHazelcastObjectId	**String**	the oid of the object **Version 2.8**
CamelHazelcastCacheName	**String**	the name of the cache - e.g. "foo" **Version 2.8**
CamelHazelcastCacheType	**String**	the type of the cache - here map **Version 2.8**

The object value will be stored within **put** and **update** actions inside the message body.

Here's a sample:

```
fromF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX)
.log("object...")
.choice()
    .when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ADDED))
        .log("...added")
        .to("mock:added")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ENVICTED))

        .log("...envicted")
        .to("mock:envicted")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.UPDATED))
        .log("...updated")
        .to("mock:updated")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.REMOVED))

        .log("...removed")
```

```
        .to("mock:removed")
    .otherwise()
        .log("fail!");
```

USAGE OF MULTI MAP

MULTIMAP CACHE PRODUCER - TO("HAZELCAST:MULTIMAP:FOO")

A multimap is a cache where you can store n values to one key. The multimap producer provides 4 operations (put, get, removevalue, delete).

Header Variables for the request message:

Name	Type	Description
hazelcast.operation.type	**String**	valid values are: put, get, removevalue, delete
hazelcast.objectId	**String**	the object id to store / find your object inside the cache

WARNING

Header variables have changed in Apache Camel 2.8

Header Variables for the request message in Apache Camel 2.8:

Name	Type	Description
CamelHazelcastOperationType	**String**	valid values are: put, delete, get, update, query **Available as of Apache Camel 2.8**
CamelHazelcastObjectId	**String**	the object id to store / find your object inside the cache (not needed for the query operation) **Version 2.8**

You can call the samples with:

```
template.sendBodyAndHeader("direct:[put|get|update|delete|query]", "my-foo",
HazelcastConstants.OBJECT_ID, "4711");
```

SAMPLE FOR PUT:

Java DSL:

```
from("direct:put")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.PUT_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:put" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>put</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
</route>
```

SAMPLE FOR GET:

Java DSL:

```
from("direct:get")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.GET_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX)
.to("seda:out");
```

Spring DSL:

```
<route>
 <from uri="direct:get" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>get</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
 <to uri="seda:out" />
</route>
```

SAMPLE FOR UPDATE:

Java DSL:

```
from("direct:update")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.UPDATE_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX);
```

Spring DSL:

```
<route>
```

```
 <from uri="direct:update" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>update</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
</route>
```

SAMPLE FOR DELETE:

Java DSL:

```
from("direct:delete")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.DELETE_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:delete" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>delete</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
</route>
```

SAMPLE FOR QUERY

Java DSL:

```
from("direct:query")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.QUERY_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX)
.to("seda:out");
```

Spring DSL:

```
<route>
 <from uri="direct:query" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>query</constant>
 </setHeader>
 <to uri="hazelcast:map:foo" />
 <to uri="seda:out" />
</route>
```

For the query operation Hazelcast offers a SQL like syntax to query your distributed map.

```
String q1 = "bar > 1000";
template.sendBodyAndHeader("direct:query", null, HazelcastConstants.QUERY, q1);
```

MAP CACHE CONSUMER - FROM("HAZELCAST:MAP:FOO")

Hazelcast provides event listeners on their data grid. If you want to be notified if a cache will be manipulated, you can use the map consumer. There're 4 events: **put**, **update**, **delete** and **envict**. The event type will be stored in the "**hazelcast.listener.action**" header variable. The map consumer provides some additional information inside these variables:

Header Variables inside the response message:

Name	Type	Description
hazelcast.listener.time	**Long**	time of the event in millis
hazelcast.listener.type	**String**	the map consumer sets here "cachelistener"
hazelcast.listener.action	**String**	type of event - here **added**, **updated**, **envicted** and **removed**
hazelcast.objectId	**String**	the oid of the object
hazelcast.cache.name	**String**	the name of the cache - e.g. "foo"
hazelcast.cache.type	**String**	the type of the cache - here map

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastListenerTime	**Long**	time of the event in millis **Version 2.8**
CamelHazelcastListenerType	**String**	the map consumer sets here "cachelistener" **Version 2.8**
CamelHazelcastListenerAction	**String**	type of event - here **added**, **updated**, **envicted** and **removed**. **Version 2.8**

CamelHazelcastObjectId	**String**	the oid of the object **Version 2.8**
CamelHazelcastCacheName	**String**	the name of the cache - e.g. "foo" **Version 2.8**
CamelHazelcastCacheType	**String**	the type of the cache - here map **Version 2.8**

The object value will be stored within **put** and **update** actions inside the message body.

Here's a sample:

```
fromF("hazelcast:%sfoo", HazelcastConstants.MAP_PREFIX)
.log("object...")
.choice()
    .when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ADDED))
        .log("...added")
        .to("mock:added")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ENVICTED))

        .log("...envicted")
        .to("mock:envicted")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.UPDATED))
        .log("...updated")
        .to("mock:updated")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.REMOVED))

        .log("...removed")
        .to("mock:removed")
    .otherwise()
        .log("fail!");
```

USAGE OF MULTI MAP

MULTIMAP CACHE PRODUCER - TO("HAZELCAST:MULTIMAP:FOO")

A multimap is a cache where you can store n values to one key. The multimap producer provides 4 operations (put, get, removevalue, delete).

Header Variables for the request message:

Name	Type	Description
hazelcast.operation.type	**String**	valid values are: put, get, removevalue, delete

hazelcast.objectId	**String**	the object id to store / find your object inside the cache

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastOperationType	**String**	valid values are: put, get, removevalue, delete **Version 2.8**
CamelHazelcastObjectId	**String**	the object id to store / find your object inside the cache **Version 2.8**

SAMPLE FOR PUT:

Java DSL:

```
from("direct:put")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.PUT_OPERATION))
.to(String.format("hazelcast:%sbar", HazelcastConstants.MULTIMAP_PREFIX));
```

Spring DSL:

```
<route>
 <from uri="direct:put" />
 <log message="put.."/>
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>put</constant>
 </setHeader>
 <to uri="hazelcast:multimap:foo" />
</route>
```

SAMPLE FOR REMOVEVALUE:

Java DSL:

```
from("direct:removevalue")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.REMOVEVALUE_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.MULTIMAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:removevalue" />
 <log message="removevalue..."/>
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>removevalue</constant>
 </setHeader>
 <to uri="hazelcast:multimap:foo" />
</route>
```

To remove a value you have to provide the value you want to remove inside the message body. If you have a multimap object } you have to put "my-foo" inside the message body to remove the "my-foo" value.

SAMPLE FOR GET:

Java DSL:

```
from("direct:get")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.GET_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.MULTIMAP_PREFIX)
.to("seda:out");
```

Spring DSL:

```
<route>
 <from uri="direct:get" />
 <log message="get.."/>
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>get</constant>
 </setHeader>
 <to uri="hazelcast:multimap:foo" />
 <to uri="seda:out" />
</route>
```

SAMPLE FOR DELETE:

Java DSL:

```
from("direct:delete")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.DELETE_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.MULTIMAP_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:delete" />
 <log message="delete.."/>
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
```

```
 <setHeader headerName="hazelcast.operation.type">
  <constant>delete</constant>
 </setHeader>
 <to uri="hazelcast:multimap:foo" />
</route>
```

you can call them in your test class with:

```
template.sendBodyAndHeader("direct:[put|get|removevalue|delete]", "my-foo",
HazelcastConstants.OBJECT_ID, "4711");
```

MULTIMAP CACHE CONSUMER - FROM("HAZELCAST:MULTIMAP:FOO")

For the multimap cache this component provides the same listeners / variables as for the map cache consumer (except the update and enviction listener). The only difference is the **multimap** prefix inside the URI. Here is a sample:

```
fromF("hazelcast:%sbar", HazelcastConstants.MULTIMAP_PREFIX)
.log("object...")
.choice()
 .when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ADDED))
  .log("...added")
            .to("mock:added")

//.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ENVICTED))

      //        .log("...envicted")
      //        .to("mock:envicted")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.REMOVED))

            .log("...removed")
            .to("mock:removed")
      .otherwise()
            .log("fail!");
```

Header Variables inside the response message:

Name	Type	Description
hazelcast.listener.time	**Long**	time of the event in millis
hazelcast.listener.type	**String**	the map consumer sets here "cachelistener"
hazelcast.listener.action	**String**	type of event - here **added** and **removed** (and soon **envicted**)
hazelcast.objectId	**String**	the oid of the object

hazelcast.cache.name	**String**	the name of the cache - e.g. "foo"
hazelcast.cache.type	**String**	the type of the cache - here multimap

Eviction will be added as feature, soon (this is a Hazelcast issue).

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastListenerTime	**Long**	time of the event in millis **Version 2.8**
CamelHazelcastListenerType	**String**	the map consumer sets here "cachelistener" **Version 2.8**
CamelHazelcastListenerAction	**String**	type of event - here **added** and **removed** (and soon **envicted**) **Version 2.8**
CamelHazelcastObjectId	**String**	the oid of the object **Version 2.8**
CamelHazelcastCacheName	**String**	the name of the cache - e.g. "foo" **Version 2.8**
CamelHazelcastCacheType	**String**	the type of the cache - here multimap **Version 2.8**

USAGE OF QUEUE

QUEUE PRODUCER TO("HAZELCAST:QUEUE:FOO")

The queue producer provides 6 operations (add, put, poll, peek, offer, removevalue).

SAMPLE FOR ADD:

```
from("direct:add")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.ADD_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.QUEUE_PREFIX);
```

SAMPLE FOR PUT:

```
from("direct:put")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.PUT_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.QUEUE_PREFIX);
```

SAMPLE FOR POLL:

```
from("direct:poll")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.POLL_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.QUEUE_PREFIX);
```

SAMPLE FOR PEEK:

```
from("direct:peek")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.PEEK_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.QUEUE_PREFIX);
```

SAMPLE FOR OFFER:

```
from("direct:offer")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.OFFER_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.QUEUE_PREFIX);
```

SAMPLE FOR REMOVEVALUE:

```
from("direct:removevalue")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.REMOVEVALUE_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.QUEUE_PREFIX);
```

QUEUE CONSUMER FROM("HAZELCAST:QUEUE:FOO")

The queue consumer provides 2 operations (add, remove).

```
fromF("hazelcast:%smm", HazelcastConstants.QUEUE_PREFIX)
   .log("object...")
   .choice()
 .when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ADDED))
        .log("...added")
  .to("mock:added")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.REMOVED))

  .log("...removed")
  .to("mock:removed")
 .otherwise()
  .log("fail!");
```

USAGE OF TOPIC

TOPIC PRODUCER – TO(“HAZELCAST:TOPIC:FOO”)

The topic producer provides only one operation (publish).

SAMPLE FOR PUBLISH

```
from("direct:add")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.PUBLISH_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.PUBLISH_OPERATION);
```

TOPIC CONSUMER – FROM(“HAZELCAST:TOPIC:FOO”)

The topic consumer provides only one operation (received). This component is supposed to support multiple consumption as it's expected when it comes to topics so you are free to have as much consumers as you need on the same hazelcast topic.

```
fromF("hazelcast:%sfoo", HazelcastConstants.TOPIC_PREFIX)
  .choice()

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.RECEIVED))

      .log("...message received")
    .otherwise()
      .log("...this should never have happened")
```

USAGE OF LIST

LIST PRODUCER TO("HAZELCAST:LIST:FOO")

The list producer provides 4 operations (add, set, get, removevalue).

SAMPLE FOR ADD:

```
from("direct:add")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.ADD_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.LIST_PREFIX);
```

SAMPLE FOR GET:

```
from("direct:get")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.GET_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.LIST_PREFIX)
.to("seda:out");
```

SAMPLE FOR SETVALUE:

```
from("direct:set")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.SETVALUE_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.LIST_PREFIX);
```

SAMPLE FOR REMOVEVALUE:

```
from("direct:removevalue")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.REMOVEVALUE_OPERATION))
.toF("hazelcast:%sbar", HazelcastConstants.LIST_PREFIX);
```

WARNING

Please note that set,get and removevalue and not yet supported by hazelcast, will be added in the future..

LIST CONSUMER FROM("HAZELCAST:LIST:FOO")

The list consumer provides 2 operations (add, remove).

```
fromF("hazelcast:%smm", HazelcastConstants.LIST_PREFIX)
 .log("object...")
 .choice()
  .when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ADDED))
   .log("...added")
                    .to("mock:added")

.when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.REMOVED))

   .log("...removed")
                    .to("mock:removed")
               .otherwise()
                    .log("fail!");
```

USAGE OF SEDA

SEDA component differs from the rest components provided. It implements a work-queue in order to support asynchronous SEDA architectures, similar to the core "SEDA" component.

SEDA PRODUCER TO("HAZELCAST:SEDA:FOO")

The SEDA producer provides no operations. You only send data to the specified queue.

Name	default value	Description

transferExchange	**false**	**Apache Camel 2.8.0:** if set to true the whole Exchange will be transfered. If header or body contains not serializable objects, they will be skipped.

Java DSL :

```
from("direct:foo")
.to("hazelcast:seda:foo");
```

Spring DSL :

```
<route>
  <from uri="direct:start" />
  <to uri="hazelcast:seda:foo" />
</route>
```

SEDA CONSUMER FROM("HAZELCAST:SEDA:FOO")

The SEDA consumer provides no operations. You only retrieve data from the specified queue.

Name	default value	Description
pollInterval	**1000**	Deprecated since Camel 2.15. Use **pollTimeout** instead.
pollTimeout	**1000**	The timeout used when consuming from the SEDA queue. When a timeout occurs, the consumer can check whether it is allowed to continue running. Setting a lower value allows the consumer to react more quickly upon shutdown.
concurrentConsumers	**1**	To use concurrent consumers polling from the SEDA queue.
transferExchange	**false**	**Camel 2.8.0:** if set to true the whole Exchange will be transfered. If header or body contains not serializable objects, they will be skipped.

transacted	**false**	**Camel 2.10.4:** if set to true then the consumer runs in transaction mode, where the messages in the seda queue will only be removed if the transaction commits, which happens when the processing is complete.

Java DSL :

```
from("hazelcast:seda:foo")
.to("mock:result");
```

Spring DSL:

```
<route>
  <from uri="hazelcast:seda:foo" />
  <to uri="mock:result" />
</route>
```

USAGE OF ATOMIC NUMBER

WARNING

There is no consumer for this endpoint\!

ATOMIC NUMBER PRODUCER - TO("HAZELCAST:ATOMICNUMBER:FOO")

An atomic number is an object that simply provides a grid wide number (long). The operations for this producer are setvalue (set the number with a given value), get, increase (+1), decrease (-1) and destroy.

Header Variables for the request message:

Name	Type	Description
hazelcast.operation.type	**String**	valid values are: setvalue, get, increase, decrease, destroy

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastOperationType	**String**	valid values are: setvalue, get, increase, decrease, destroy **Available as of Apache Camel version 2.8**

SAMPLE FOR SET:

Java DSL:

```
from("direct:set")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.SETVALUE_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.ATOMICNUMBER_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:set" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>setvalue</constant>
 </setHeader>
 <to uri="hazelcast:atomicvalue:foo" />
</route>
```

Provide the value to set inside the message body (here the value is 10):
template.sendBody("direct:set", 10);

SAMPLE FOR GET:

Java DSL:

```
from("direct:get")
.setHeader(HazelcastConstants.OPERATION, constant(HazelcastConstants.GET_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.ATOMICNUMBER_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:get" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
```

```
 <setHeader headerName="hazelcast.operation.type">
  <constant>get</constant>
 </setHeader>
 <to uri="hazelcast:atomicvalue:foo" />
</route>
```

You can get the number with **long body = template.requestBody("direct:get", null, Long.class);**.

SAMPLE FOR INCREMENT:

Java DSL:

```
from("direct:increment")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.INCREMENT_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.ATOMICNUMBER_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:increment" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>increment</constant>
 </setHeader>
 <to uri="hazelcast:atomicvalue:foo" />
</route>
```

The actual value (after increment) will be provided inside the message body.

SAMPLE FOR DECREMENT:

Java DSL:

```
from("direct:decrement")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.DECREMENT_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.ATOMICNUMBER_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:decrement" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>decrement</constant>
 </setHeader>
 <to uri="hazelcast:atomicvalue:foo" />
</route>
```

The actual value (after decrement) will be provided inside the message body.

SAMPLE FOR DESTROY

WARNING

There's a bug inside Hazelcast. So this feature may not work properly. Will be fixed in 1.9.3.

Java DSL:

```
from("direct:destroy")
.setHeader(HazelcastConstants.OPERATION,
constant(HazelcastConstants.DESTROY_OPERATION))
.toF("hazelcast:%sfoo", HazelcastConstants.ATOMICNUMBER_PREFIX);
```

Spring DSL:

```
<route>
 <from uri="direct:destroy" />
       <!-- If using version 2.8 and above set headerName to "CamelHazelcastOperationType" -->
 <setHeader headerName="hazelcast.operation.type">
  <constant>destroy</constant>
 </setHeader>
 <to uri="hazelcast:atomicvalue:foo" />
</route>
```

CLUSTER SUPPORT

WARNING

This endpoint provides no producer!

INSTANCE CONSUMER - FROM("HAZELCAST:INSTANCE:FOO")

Hazelcast makes sense in one single "server node", but it's extremly powerful in a clustered environment. The instance consumer fires if a new cache instance will join or leave the cluster.

Here's a sample:

```
fromF("hazelcast:%sfoo", HazelcastConstants.INSTANCE_PREFIX)
.log("instance...")
.choice()
 .when(header(HazelcastConstants.LISTENER_ACTION).isEqualTo(HazelcastConstants.ADDED))
  .log("...added")
```

```
    .to("mock:added")
  .otherwise()
    .log("...removed")
    .to("mock:removed");
```

Each event provides the following information inside the message header:

Header Variables inside the response message:

Name	Type	Description
hazelcast.listener.time	**Long**	time of the event in millis
hazelcast.listener.type	**String**	the map consumer sets here "instancelistener"
hazelcast.listener.action	**String**	type of event - here **added** or **removed**
hazelcast.instance.host	**String**	host name of the instance
hazelcast.instance.port	**Integer**	port number of the instance

WARNING

Header variables have changed in Apache Camel 2.8

Name	Type	Description
CamelHazelcastListenerTime	**Long**	time of the event in millis **Version 2.8**
CamelHazelcastListenerType	**String**	the map consumer sets here "instancelistener" **Version 2.8**
CamelHazelcastListenerActionn	**String**	type of event - here **added** or **removed**. **Version 2.8**
CamelHazelcastInstanceHost	**String**	host name of the instance **Version 2.8**
CamelHazelcastInstancePort	**Integer**	port number of the instance **Version 2.8**

USING HAZELCAST REFERENCE

BY ITS NAME

```
<bean id="hazelcastLifecycle" class="com.hazelcast.core.LifecycleService"
      factory-bean="hazelcastInstance" factory-method="getLifecycleService"
      destroy-method="shutdown" />

<bean id="config" class="com.hazelcast.config.Config">
   <constructor-arg type="java.lang.String" value="HZ.INSTANCE" />
</bean>

<bean id="hazelcastInstance" class="com.hazelcast.core.Hazelcast" factory-
method="newHazelcastInstance">
   <constructor-arg type="com.hazelcast.config.Config" ref="config"/>
</bean>
<camelContext xmlns="http://camel.apache.org/schema/spring">
   <route id="testHazelcastInstanceBeanRefPut">
      <from uri="direct:testHazelcastInstanceBeanRefPut"/>
      <setHeader headerName="CamelHazelcastOperationType">
         <constant>put</constant>
      </setHeader>
      <to uri="hazelcast:map:testmap?hazelcastInstanceName=HZ.INSTANCE"/>
   </route>

   <route id="testHazelcastInstanceBeanRefGet">
      <from uri="direct:testHazelcastInstanceBeanRefGet" />
      <setHeader headerName="CamelHazelcastOperationType">
         <constant>get</constant>
      </setHeader>
      <to uri="hazelcast:map:testmap?hazelcastInstanceName=HZ.INSTANCE"/>
      <to uri="seda:out" />
   </route>
</camelContext>
```

BY INSTANCE

```
<bean id="hazelcastInstance" class="com.hazelcast.core.Hazelcast"
      factory-method="newHazelcastInstance" />
<bean id="hazelcastLifecycle" class="com.hazelcast.core.LifecycleService"
      factory-bean="hazelcastInstance" factory-method="getLifecycleService"
      destroy-method="shutdown" />

<camelContext xmlns="http://camel.apache.org/schema/spring">
   <route id="testHazelcastInstanceBeanRefPut">
      <from uri="direct:testHazelcastInstanceBeanRefPut"/>
      <setHeader headerName="CamelHazelcastOperationType">
         <constant>put</constant>
      </setHeader>
      <to uri="hazelcast:map:testmap?hazelcastInstance=#hazelcastInstance"/>
   </route>

   <route id="testHazelcastInstanceBeanRefGet">
```

```
        <from uri="direct:testHazelcastInstanceBeanRefGet" />
        <setHeader headerName="CamelHazelcastOperationType">
            <constant>get</constant>
        </setHeader>
        <to uri="hazelcast:map:testmap?hazelcastInstance=#hazelcastInstance"/>
        <to uri="seda:out" />
    </route>
</camelContext>
```

PUBLISHING HAZELCAST INSTANCE AS AN OSGI SERVICE

If operating in an OSGI container and you would want to use one instance of hazelcast across all bundles in the same container. You can publish the instance as an OSGI service and bundles using the cache al need is to reference the service in the hazelcast endpoint.

BUNDLE A CREATE AN INSTANCE AND PUBLISHES IT AS AN OSGI SERVICE

```
<bean id="config" class="com.hazelcast.config.FileSystemXmlConfig">
    <argument type="java.lang.String" value="${hazelcast.config}"/>
</bean>

<bean id="hazelcastInstance" class="com.hazelcast.core.Hazelcast" factory-
method="newHazelcastInstance">
    <argument type="com.hazelcast.config.Config" ref="config"/>
</bean>

<!-- publishing the hazelcastInstance as a service -->
<service ref="hazelcastInstance" interface="com.hazelcast.core.HazelcastInstance" />
```

BUNDLE B USES THE INSTANCE

```
<!-- referencing the hazelcastInstance as a service -->
<reference ref="hazelcastInstance" interface="com.hazelcast.core.HazelcastInstance" />

<camelContext xmlns="http://camel.apache.org/schema/blueprint">
    <route id="testHazelcastInstanceBeanRefPut">
        <from uri="direct:testHazelcastInstanceBeanRefPut"/>
        <setHeader headerName="CamelHazelcastOperationType">
            <constant>put</constant>
        </setHeader>
        <to uri="hazelcast:map:testmap?hazelcastInstance=#hazelcastInstance"/>
    </route>

    <route id="testHazelcastInstanceBeanRefGet">
        <from uri="direct:testHazelcastInstanceBeanRefGet" />
        <setHeader headerName="CamelHazelcastOperationType">
            <constant>get</constant>
        </setHeader>
        <to uri="hazelcast:map:testmap?hazelcastInstance=#hazelcastInstance"/>
```

```
        <to uri="seda:out" />
    </route>
</camelContext>
```

CHAPTER 57. HBASE

HBASE COMPONENT

Available as of Camel 2.10

This component provides an idemptotent repository, producers and consumers for Apache HBase.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-hbase</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

APACHE HBASE OVERVIEW

HBase is an open-source, distributed, versioned, column-oriented store modeled after Google's Bigtable: A Distributed Storage System for Structured Data. You can use HBase when you need random, realtime read/write access to your Big Data. More information at Apache HBase.

CAMEL AND HBASE

When using a datasotre inside a camel route, there is always the chalenge of specifying how the camel message will stored to the datastore. In document based stores things are more easy as the message body can be directly mapped to a document. In relational databases an ORM solution can be used to map properties to columns etc. In column based stores things are more challenging as there is no standard way to perform that kind of mapping.

HBase adds two additional challenges:

- HBase groups columns into families, so just mapping a property to a column using a name convention is just not enough.
- HBase doesn't have the notion of type, which means that it stores everything as byte[] and doesn't know if the byte[] represents a String, a Number, a serialized Java object or just binary data.

To overcome these challenges, camel-hbase makes use of the message headers to specify the mapping of the message to HBase columns. It also provides the ability to use some camel-hbase provided classes that model HBase data and can be easily convert to and from xml/json etc. Finally it provides the ability to the user to implement and use his own mapping strategy.

Regardless of the mapping strategy camel-hbase will convert a message into an org.apache.camel.component.hbase.model.HBaseData object and use that object for its internal operations.

CONFIGURING THE COMPONENT

The HBase component can be provided a custom HBaseConfiguration object as a property or it can create an HBase configuration object on its own based on the HBase related resources that are found on classpath.

```
<bean id="hbase" class="org.apache.camel.component.hbase.HBaseComponent">
    <property name="configuration" ref="config"/>
</bean>
```

If no configuration object is provided to the component, the component will create one. The created configuration will search the class path for an hbase-site.xml file, from which it will draw the configuration. You can find more information about how to configure HBase clients at: HBase client configuration and dependencies

HBASE PRODUCER

As mentioned above camel provides produers endpoints for HBase. This allows you to store, delete, retrieve or query data from HBase using your camel routes.

```
hbase://table[?options]
```

where **table** is the table name.

The supported operations are:

- Put
- Get
- Delete
- Scan

SUPPORTED URI OPTIONS ON PRODUCER

Name	Default Value	Description
operation	**CamelHBasePut**	The HBase operation to perform. **Supported values**: **CamelHBasePut**, **CamelHBaseGet**, **CamelHBaseDelete**, and **CamelHBaseScan**.
maxResults	**100**	The maximum number of rows to scan.**Supported operations**: **CamelHBaseScan**.
mappingStrategyName	**header**	The strategy to use for mapping Camel messages to HBase columns. Supported values: **header**, or **body**.

mappingStrategyClassName	**null**	The class name of a custom mapping strategy implementation.
filters	**null**	A list of filters. **Supported operations**: **CamelHBaseScan**.

Header mapping options:

Name	Default Value	Description
rowId		The id of the row. This has limited use as the row usually changes per Exchange.
rowType	String	The type to covert row id to. **Supported operations**: **CamelHBaseScan**.
family		The column family. **Supports** a number suffix for referring to more than one columns
qualifier		The column qualifier. **Supports** a number suffix for referring to more than one columns
value		The value. **Supports** a number suffix for referring to more than one columns
valueType	String	The value type. Supports a number suffix for referring to more than one columns. **Supported operations**: **CamelHBaseGet**, and **CamelHBaseScan**.

PUT OPERATIONS.

HBase is a column based store, which allows you to store data into a specific column of a specific row. Columns are grouped into families, so in order to specify a column you need to specify the column family and the qualifier of that column. To store data into a specific column you need to specify both the column and the row.

The simplest scenario for storing data into HBase from a camel route, would be to store part of the message body to specified HBase column.

```
<route>
  <from uri="direct:in"/>
  <!-- Set the HBase Row -->
  <setHeader headerName="CamelHBaseRowId">
```

```
            <el>${in.body.id}</el>
        </setHeader>
        <!-- Set the HBase Value -->
        <setHeader headerName="CamelHBaseValue">
            <el>${in.body.value}</el>
        </setHeader>
        <to uri="hbase:mytable?operation=CamelHBasePut&amily=myfamily&ualifier=myqualifier"/>
    </route>
```

The route above assumes that the message body contains an object that has an id and value property and will store the content of value in the HBase column myfamily:myqualifier in the row specified by id. If we needed to specify more than one column/value pairs we could just specify additional column mappings. Notice that you must use numbers from the second header onwards, for example **RowId2**, **RowId3**, **RowId4**, and so on. Only the first header does not have the number **1**.

```
    <route>
        <from uri="direct:in"/>
        <!-- Set the HBase Row 1st column -->
        <setHeader headerName="CamelHBaseRowId">
            <el>${in.body.id}</el>
        </setHeader>
        <!-- Set the HBase Row 2nd column -->
        <setHeader headerName="CamelHBaseRowId2">
            <el>${in.body.id}</el>
        </setHeader>
        <!-- Set the HBase Value for 1st column -->
        <setHeader headerName="CamelHBaseValue">
            <el>${in.body.value}</el>
        </setHeader>
        <!-- Set the HBase Value for 2nd column -->
        <setHeader headerName="CamelHBaseValue2">
            <el>${in.body.othervalue}</el>
        </setHeader>
        <to uri="hbase:mytable?
operation=CamelHBasePut&amily=myfamily&ualifier=myqualifier&amily2=myfamily&ualifier2=myqualifie
2"/>
    </route>
```

It is important to remember that you can use uri options, message headers or a combination of both. It is recommended to specify constants as part of the uri and dynamic values as headers. If something is defined both as header and as part of the uri, the header will be used.

GET OPERATIONS.

A Get Operation is an operation that is used to retrieve one or more values from a specified HBase row. To specify what are the values that you want to retrieve you can just specify them as part of the uri or as message headers.

```
    <route>
        <from uri="direct:in"/>
        <!-- Set the HBase Row of the Get -->
        <setHeader headerName="CamelHBaseRowId">
            <el>${in.body.id}</el>
        </setHeader>
        <to uri="hbase:mytable?
```

```
operation=CamelHBaseGet&amily=myfamily&ualifier=myqualifier&alueType=java.lang.Long"/>
            <to uri="log:out"/>
        </route>
```

In the example above the result of the get operation will be stored as a header with name CamelHBaseValue.

DELETE OPERATIONS.

You can also you camel-hbase to perform HBase delete operation. The delete operation will remove an entire row. All that needs to be specified is one or more rows as part of the message headers.

```
        <route>
            <from uri="direct:in"/>
            <!-- Set the HBase Row of the Get -->
            <setHeader headerName="CamelHBaseRowId">
                <el>${in.body.id}</el>
            </setHeader>
            <to uri="hbase:mytable?operation=CamelHBaseDelete"/>
        </route>
```

SCAN OPERATIONS.

A scan operation is the equivalent of a query in HBase. You can use the scan operation to retrieve multiple rows. To specify what columns should be part of the result and also specify how the values will be converted to objects you can use either uri options or headers.

```
        <route>
            <from uri="direct:in"/>
            <to uri="hbase:mytable?
operation=CamelHBaseScan&amily=myfamily&ualifier=myqualifier&alueType=java.lang.Long&owType=
ava.lang.String"/>
            <to uri="log:out"/>
        </route>
```

In this case its probable that you also also need to specify a list of filters for limiting the results. You can specify a list of filters as part of the uri and camel will return only the rows that satisfy **ALL** the filters. To have a filter that will be aware of the information that is part of the message, camel defines the ModelAwareFilter. This will allow your filter to take into consideration the model that is defined by the message and the mapping strategy. When using a ModelAwareFilter camel-hbase will apply the selected mapping strategy to the in message, will create an object that models the mapping and will pass that object to the Filter.

For example to perform scan using as criteria the message headers, you can make use of the **ModelAwareColumnMatchingFilter** as shown below.

```
        <route>
            <from uri="direct:scan"/>
            <!-- Set the Criteria -->
            <setHeader headerName="CamelHBaseFamily">
                <constant>name</constant>
            </setHeader>
            <setHeader headerName="CamelHBaseQualifier">
                <constant>first</constant>
```

```
            </setHeader>
            <setHeader headerName="CamelHBaseValue">
               <el>in.body.firstName</el>
            </setHeader>
            <setHeader headerName="CamelHBaseFamily2">
               <constant>name</constant>
            </setHeader>
            <setHeader headerName="CamelHBaseQualifier2">
               <constant>last</constant>
            </setHeader>
            <setHeader headerName="CamelHBaseValue2">
               <el>in.body.lastName</el>
            </setHeader>
            <!-- Set additional fields that you want to be return by skipping value -->
            <setHeader headerName="CamelHBaseFamily3">
               <constant>address</constant>
            </setHeader>
            <setHeader headerName="CamelHBaseQualifier3">
               <constant>country</constant>
            </setHeader>
            <to uri="hbase:mytable?operation=CamelHBaseScan&ilters=#myFilterList"/>
         </route>

         <bean id="myFilters" class="java.util.ArrayList">
            <constructor-arg>
               <list>
                  <bean
class="org.apache.camel.component.hbase.filters.ModelAwareColumnMatchingFilter"/>
               </list>
            </constructor-arg>
         </bean>
```

The route above assumes that a pojo is with properties firstName and lastName is passed as the message body, it takes those properties and adds them as part of the message headers. The default mapping strategy will create a model object that will map the headers to HBase columns and will pass that model the the ModelAwareColumnMatchingFilter. The filter will filter out any rows, that do not contain columns that match the model. It is like query by example.

HBASE CONSUMER

The Camel HBase Consumer, will perform repeated scan on the specified HBase table and will return the scan results as part of the message. You can either specify header mapping (default) or body mapping. The later will just add the org.apache.camel.component.hbase.model.HBaseData as part of the message body.

```
hbase://table[?options]
```

You can specify the columns that you want to be return and their types as part of the uri options:

```
hbase:mutable?
family=name&qualifer=first&valueType=java.lang.String&family=address&qualifer=number&valueType2=j
ava.lang.Integer&rowType=java.lang.Long
```

The example above will create a model object that is consisted of the specified fields and the scan results will populate the model object with values. Finally the mapping strategy will be used to map this model to the camel message.

SUPPORTED URI OPTIONS ON CONSUMER

Name	Default Value	Description
initialDelay	**1000**	Milliseconds before the first polling starts.
delay	**500**	Milliseconds before the next poll.
useFixedDelay	**true**	Controls if fixed delay or fixed rate is used. See ScheduledExecutorService in JDK for details.
timeUnit	**TimeUnit.MILLISECONDS**	time unit for **initialDelay** and **delay** options.
runLoggingLevel	**TRACE**	**Camel 2.8:** The consumer logs a start/complete log line when it polls. This option allows you to configure the logging level for that.
operation	**CamelHBasePut**	The HBase operation to perform. **Supported values**: **CamelHBasePut**, **CamelHBaseGet**, **CamelHBaseDelete**, and **CamelHBaseScan**.
maxResults	**100**	The maximum number of rows to scan. **Supported operations:CamelHBaseScan**.
mappingStrategyName	**header**	The strategy to use for mapping Camel messages to HBase columns. Supported values: **header**, or **body**.
mappingStrategyClassName	**null**	The class name of a custom mapping strategy implementation.
filters	**null**	A list of filters. **Supported operations**: **CamelHBaseScan**

Header mapping options:

Name	Default Value	Description
rowId		The id of the row. This has limited use as the row usually changes per Exchange.
rowType	String	The type to covert row id to. **Supported operations**: CamelHBaseScan
family		The column family. *upports a number suffix for referring to more than one columns
qualifier		The column qualifier. *Supports a number suffix for referring to more than one columns
value		The value. Supports a number suffix for referring to more than one columns
rowModel	String	An instance of org.apache.camel.component.hbase.model.HBaseRow which describes how each row should be modeled

If the role of the rowModel is not clear, it allows you to construct the HBaseRow modle programmatically instead of "describing" it with uri options (such as family, qualifier, type etc).

HBASE IDEMPOTENT REPOSITORY

The camel-hbase component also provides an idempotent repository which can be used when you want to make sure that each message is processed only once. The HBase idempotent repository is configured with a table, a column family and a column qualifier and will create to that table a row per message.

```
HBaseConfiguration configuration = HBaseConfiguration.create();
HBaseIdempotentRepository repository = new HBaseIdempotentRepository(configuration,
tableName, family, qualifier);

from("direct:in")
  .idempotentConsumer(header("messageId"), repository)
  .to("log:out);
```

HBASE MAPPING

It was mentioned above that you the default mapping strategies are **header** and **body** mapping. Below you can find some detailed examples of how each mapping strategy works.

HBASE HEADER MAPPING EXAMPLES

The header mapping is the default mapping. To put the value "myvalue" into HBase row "myrow" and column "myfamily:mycolum" the message should contain the following headers:

Header	Value
CamelHBaseRowId	myrow
CamelHBaseFamily	myfamily
CamelHBaseQualifier	myqualifier
CamelHBaseValue	myvalue

To put more values for different columns and / or different rows you can specify additional headers suffixed with the index of the headers, e.g:

Header	Value
CamelHBaseRowId	myrow
CamelHBaseFamily	myfamily
CamelHBaseQualifier	myqualifier
CamelHBaseValue	myvalue
CamelHBaseRowId2	myrow2
CamelHBaseFamily2	myfamily
CamelHBaseQualifier2	myqualifier
CamelHBaseValue2	myvalue2

In the case of retrieval operations such as get or scan you can also specify for each column the type that you want the data to be converted to. For exampe:

Header	Value
CamelHBaseFamily	myfamily
CamelHBaseQualifier	myqualifier
CamelHBaseValueType	Long

Please note that in order to avoid boilerplate headers that are considered constant for all messages, you can also specify them as part of the endpoint uri, as you will see below.

BODY MAPPING EXAMPLES

In order to use the body mapping strategy you will have to specify the option mappingStrategy as part of the uri, for example:

```
hbase:mytable?mappingStrategy=body
```

To use the body mapping strategy the body needs to contain an instance of org.apache.camel.component.hbase.model.HBaseData. You can construct t

```
HBaseData data = new HBaseData();
HBaseRow row = new HBaseRow();
row.setId("myRowId");
HBaseCell cell = new HBaseCell();
cell.setFamily("myfamily");
cell.setQualifier("myqualifier");
cell.setValue("myValue");
row.getCells().add(cell);
data.addRows().add(row);
```

The object above can be used for example in a put operation and will result in creating or updating the row with id myRowId and add the value myvalue to the column myfamily:myqualifier. The body mapping strategy might not seem very appealing at first. The advantage it has over the header mapping strategy is that the HBaseData object can be easily converted to or from xml/json.

SEE ALSO

- Polling Consumer
- Apache HBase

CHAPTER 58. HDFS

HDFS COMPONENT

Available as of Camel 2.8

The **hdfs** component enables you to read and write messages from/to an HDFS file system. HDFS is the distributed file system at the heart of Hadoop.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-hdfs</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
hdfs://hostname[:port][/path][?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...** The path is treated in the following way:

1. as a consumer, if it's a file, it just reads the file, otherwise if it represents a directory it scans all the file under the path satisfying the configured pattern. All the files under that directory must be of the same type.
2. as a producer, if at least one split strategy is defined, the path is considered a directory and under that directory the producer creates a different file per split named using the configured **UuidGenerator**.

NOTE

When consuming from HDFS in normal mode, a file is split into chunks, producing a message per chunk. You can configure the size of the chunk using the **chunkSize** option. If you want to read from HDFS and write to a regular file using the File component, you can set **fileMode=Append** to concatenate the chunks.

OPTIONS

Name	Default Value	Description
overwrite	**true**	The file can be overwritten
append	**false**	Append to existing file. Notice that not all HDFS file systems support the append option.

bufferSize	**4096**	The buffer size used by HDFS
replication	**3**	The HDFS replication factor
blockSize	**67108864**	The size of the HDFS blocks
fileType	**NORMAL_FILE**	It can be SEQUENCE_FILE, MAP_FILE, ARRAY_FILE, or BLOOMMAP_FILE, see Hadoop
fileSystemType	**HDFS**	It can be LOCAL for local filesystem
keyType	**NULL**	The type for the key in case of sequence or map files. See below.
valueType	**TEXT**	The type for the key in case of sequence or map files. See below.
splitStrategy		A string describing the strategy on how to split the file based on different criteria. See below.
openedSuffix	**opened**	When a file is opened for reading/ writing the file is renamed with this suffix to avoid to read it during the writing phase.
readSuffix	**read**	Once the file has been read is renamed with this suffix to avoid to read it again.
initialDelay	**0**	For the consumer, how much to wait (milliseconds) before to start scanning the directory.
delay	**0**	The interval (milliseconds) between the directory scans.
pattern	*	The pattern used for scanning the directory
chunkSize	**4096**	When reading a normal file, this is split into chunks producing a message per chunk

connectOnStartup	**true**	**Camel 2.9.3/2.10.1:** Whether to connect to the HDFS file system on starting the producer/consumer. If **false** then the connection is created on-demand. Notice that HDFS may take up till 15 minutes to establish a connection, as it has hardcoded 45 x 20 sec redelivery. By setting this option to **false** allows your application to startup, and not block for up till 15 minutes.
owner		**Camel 2.13/2.12.4:** The file owner must match this owner for the consumer to pickup the file. Otherwise the file is skipped.

KEYTYPE AND VALUETYPE

- NULL it means that the key or the value is absent
- BYTE for writing a byte, the java Byte class is mapped into a BYTE
- BYTES for writing a sequence of bytes. It maps the java ByteBuffer class
- INT for writing java integer
- FLOAT for writing java float
- LONG for writing java long
- DOUBLE for writing java double
- TEXT for writing java strings

BYTES is also used with everything else, for example, in Camel a file is sent around as an InputStream, int this case is written in a sequence file or a map file as a sequence of bytes.

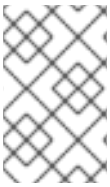
SPLITTING STRATEGY

In the current version of Hadoop opening a file in append mode is disabled, since it's not reliable enough. So, for the moment, it's only possible to create new files. The Camel HDFS endpoint tries to solve this problem in this way:

- If the split strategy option has been defined, the hdfs path will be used as a directory and files will be created using the configured **UuidGenerator**.
- Every time a splitting condition is met, a new file is created. The **splitStrategy** option is defined as a string with the following syntax: **splitStrategy=<ST>:<value>,<ST>:<value>,***

Where **<ST>** can be:

- BYTES a new file is created, and the old is closed when the number of written bytes is more than <value>
- MESSAGES a new file is created, and the old is closed when the number of written messages is more than <value>
- IDLE a new file is created, and the old is closed when no writing happened in the last <value> milliseconds



NOTE

This strategy currently requires either setting an IDLE value or setting the **HdfsConstants.HDFS_CLOSE** header to **false** to use the **BYTES**/**MESSAGES** configuration, otherwise the file will be closed with each message

For example:

```
hdfs://localhost/tmp/simple-file?splitStrategy=IDLE:1000,BYTES:5
```

it means: a new file is created either when it has been idle for more than 1 second or if more than 5 bytes have been written. So, running **hadoop fs ls /tmp/simplefile** you'll see that multiple files have been created.

MESSAGE HEADERS

The following headers are supported by this component:

Producer only

Header	Description
CamelFileName	**Camel 2.13:** Specifies the name of the file to write (relative to the endpoint path). The name can be a **String** or an Expression object. Only relevant when not using a split strategy.

CONTROLLING TO CLOSE FILE STREAM

Available as of Camel 2.10.4

When using the HDFS producer **without** a split strategy, the file output stream is by default closed after the write. However you may want to keep the stream open, and only explicitly close the stream later. For that you can use the header **HdfsConstants.HDFS_CLOSE** (value = **"CamelHdfsClose"**) to control this. Setting this value to a boolean allows you to explicit control whether the stream should be closed or not.

Notice this does not apply if you use a split strategy, as there are various strategies that can control when the stream is closed.

USING THIS COMPONENT IN OSGI

This component is fully functional in an OSGi environment however, it requires some actions from the

user. Hadoop uses the thread context class loader in order to load resources. Usually, the thread context classloader will be the bundle class loader of the bundle that contains the routes. So, the default configuration files need to be visible from the bundle class loader. A typical way to deal with it is to keep a copy of core-default.xml in your bundle root. That file can be found in the hadoop-common.jar.

CHAPTER 59. HDFS2

HDFS2 COMPONENT

Available as of Camel 2.13

The **hdfs2** component enables you to read and write messages from/to an HDFS file system using Hadoop 2.x. HDFS is the distributed file system at the heart of Hadoop.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-hdfs2</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
hdfs2://hostname[:port][/path][?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...** The path is treated in the following way:

1. as a consumer, if it's a file, it just reads the file, otherwise if it represents a directory it scans all the file under the path satisfying the configured pattern. All the files under that directory must be of the same type.

2. as a producer, if at least one split strategy is defined, the path is considered a directory and under that directory the producer creates a different file per split named using the configured UuidGenerator.

NOTE

When consuming from HDFS in normal mode, a file is split into chunks, producing a message per chunk. You can configure the size of the chunk using the **chunkSize** option. If you want to read from HDFS and write to a regular file using the File component, you can set **fileMode=Append** to concatenate the chunks.

OPTIONS

Name	Default Value	Description
overwrite	**true**	The file can be overwritten
append	**false**	Append to existing file. Notice that not all HDFS file systems support the append option.

bufferSize	**4096**	The buffer size used by HDFS
replication	**3**	The HDFS replication factor
blockSize	**67108864**	The size of the HDFS blocks
fileType	**NORMAL_FILE**	It can be SEQUENCE_FILE, MAP_FILE, ARRAY_FILE, or BLOOMMAP_FILE, see Hadoop
fileSystemType	**HDFS**	It can be LOCAL for local filesystem
keyType	**NULL**	The type for the key in case of sequence or map files. See below.
valueType	**TEXT**	The type for the key in case of sequence or map files. See below.
splitStrategy		A string describing the strategy on how to split the file based on different criteria. See below.
openedSuffix	**opened**	When a file is opened for reading/writing the file is renamed with this suffix to avoid to read it during the writing phase.
readSuffix	**read**	Once the file has been read is renamed with this suffix to avoid to read it again.
initialDelay	**0**	For the consumer, how much to wait (milliseconds) before to start scanning the directory.
delay	**0**	The interval (milliseconds) between the directory scans.
pattern	*****	The pattern used for scanning the directory
chunkSize	**4096**	When reading a normal file, this is split into chunks producing a message per chunk.

connectOnStartup	**true**	*Camel 2.9.3/2.10.1:* Whether to connect to the HDFS file system on starting the producer/consumer. If **false** then the connection is created on-demand. Notice that HDFS may take up till 15 minutes to establish a connection, as it has hardcoded 45 x 20 sec redelivery. By setting this option to **false** allows your application to startup, and not block for up till 15 minutes.
owner		The file owner must match this owner for the consumer to pickup the file. Otherwise the file is skipped.

KEYTYPE AND VALUETYPE

- NULL it means that the key or the value is absent
- BYTE for writing a byte, the java Byte class is mapped into a BYTE
- BYTES for writing a sequence of bytes. It maps the java ByteBuffer class
- INT for writing java integer
- FLOAT for writing java float
- LONG for writing java long
- DOUBLE for writing java double
- TEXT for writing java strings

BYTES is also used with everything else, for example, in Camel a file is sent around as an InputStream, int this case is written in a sequence file or a map file as a sequence of bytes.

SPLITTING STRATEGY

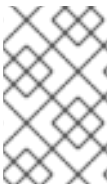
In the current version of Hadoop opening a file in append mode is disabled since it's not very reliable. So, for the moment, it's only possible to create new files. The Camel HDFS endpoint tries to solve this problem in this way:

- If the split strategy option has been defined, the hdfs path will be used as a directory and files will be created using the configured UuidGenerator
- Every time a splitting condition is met, a new file is created. The splitStrategy option is defined as a string with the following syntax: splitStrategy=<ST>:<value>,<ST>:<value>,*

where <ST> can be:

- BYTES a new file is created, and the old is closed when the number of written bytes is more than <value>

- MESSAGES a new file is created, and the old is closed when the number of written messages is more than <value>
- IDLE a new file is created, and the old is closed when no writing happened in the last <value> milliseconds



NOTE

note that this strategy currently requires either setting an IDLE value or setting the HdfsConstants.HDFS_CLOSE header to false to use the BYTES/MESSAGES configuration...otherwise, the file will be closed with each message

for example:

```
hdfs2://localhost/tmp/simple-file?splitStrategy=IDLE:1000,BYTES:5
```

it means: a new file is created either when it has been idle for more than 1 second or if more than 5 bytes have been written. So, running **hadoop fs -ls /tmp/simple-file** you'll see that multiple files have been created.

MESSAGE HEADERS

The following headers are supported by this component:

PRODUCER ONLY

Header	Description
CamelFileName	**Camel 2.13:** Specifies the name of the file to write (relative to the endpoint path). The name can be a **String** or an **Expression** object. Only relevant when not using a split strategy.

CONTROLLING TO CLOSE FILE STREAM

When using the HDFS2 producer **without** a split strategy, then the file output stream is by default closed after the write. However you may want to keep the stream open, and only explicitly close the stream later. For that you can use the header **HdfsConstants.HDFS_CLOSE** (value = **"CamelHdfsClose"**) to control this. Setting this value to a boolean allows you to explicit control whether the stream should be closed or not.

Notice this does not apply if you use a split strategy, as there are various strategies that can control when the stream is closed.

USING THIS COMPONENT IN OSGI

There are some quirks when running this component in an OSGi environment related to the mechanism Hadoop 2.x uses to discover different **org.apache.hadoop.fs.FileSystem** implementations. Hadoop 2.x uses **java.util.ServiceLoader** which looks for **/META-INF/services/org.apache.hadoop.fs.FileSystem** files defining available filesystem types and implementations. These resources are not available when running inside OSGi.

As with **camel-hdfs** component, the default configuration files need to be visible from the bundle class loader. A typical way to deal with it is to keep a copy of **core-default.xml** (and e.g., **hdfs-default.xml**) in your bundle root.

USING THIS COMPONENT WITH MANUALLY DEFINED ROUTES

There are two options:

1. Package **/META-INF/services/org.apache.hadoop.fs.FileSystem** resource with bundle that defines the routes. This resource should list all the required Hadoop 2.x filesystem implementations.

2. Provide boilerplate initialization code which populates internal, static cache inside **org.apache.hadoop.fs.FileSystem** class:

```
org.apache.hadoop.conf.Configuration conf = new org.apache.hadoop.conf.Configuration();
conf.setClass("fs.file.impl", org.apache.hadoop.fs.LocalFileSystem.class, FileSystem.class);
conf.setClass("fs.hdfs.impl", org.apache.hadoop.hdfs.DistributedFileSystem.class, FileSystem.class);
...
FileSystem.get("file:///", conf);
FileSystem.get("hdfs://localhost:9000/", conf);
...
```

USING THIS COMPONENT WITH BLUEPRINT CONTAINER

Two options:

1. Package **/META-INF/services/org.apache.hadoop.fs.FileSystem** resource with bundle that contains blueprint definition.

2. Add the following to the blueprint definition file:

```
<bean id="hdfsOsgiHelper" class="org.apache.camel.component.hdfs2.HdfsOsgiHelper">
  <argument>
    <map>
      <entry key="file:///" value="org.apache.hadoop.fs.LocalFileSystem"  />
      <entry key="hdfs://localhost:9000/" value="org.apache.hadoop.hdfs.DistributedFileSystem" />
      ...
    </map>
  </argument>
</bean>

<bean id="hdfs2" class="org.apache.camel.component.hdfs2.HdfsComponent" depends-
on="hdfsOsgiHelper" />
```

This way Hadoop 2.x will have correct mapping of URI schemes to filesystem implementations.

CHAPTER 60. HIPCHAT

HIPCHAT COMPONENT

Available as of Camel 2.15.0

The Hipchat component supports producing and consuming messages from/to Hipchat service.

You must have a valid Hipchat user account and get a personal access token that you can use to produce/consume messages.

URI FORMAT

```
hipchat://[host][:port]?options
```

You can append query options to the URI in the following format, ?options=value&option2=value&...

URI OPTIONS

Name	Default Value	Context	Required	Producer/Consumer	Description
authToken	**null**	Shared	Yes	Both	Authorization token(personal access token) obtained from Hipchat
protocol	**http**	Shared	No	Both	Default protocol to connect to the Hipchat server
consumeUsers	**null**	Shared	No	Consumer	Comma separated list of user @Mentions or emails whose messages to the owner of authToken must be consumed
host	api.hipchat.com	Shared	No	Both	The API host of the Hipchat to connect to

port	80	Shared	No	Both	The port to connect to on the Hipchat host
delay	5000	Shared	No	Consumer	The poll interval in millisec for consuming messages from consumeUsers provided. Please read about rate limits before decreasing this.

SCHEDULED POLL CONSUMER

This component implements the ScheduledPollConsumer. Only the last message from the provided 'consumeUsers' are retrieved and sent as Exchange body. If you do not want the same message to be retrieved again when there are no new messages on next poll then you can add the idempotent consumer as shown below. All the options on the ScheduledPollConsumer can also be used for more control on the consumer.

```
@Override
public void configure() throws Exception {
 String hipchatEndpointUri = "hipchat://?authToken=XXXX&consumeUsers=@Joe,@John";
 from(hipchatEndpointUri)
  .idempotentConsumer(
    simple("${in.header.HipchatMessageDate} ${in.header.HipchatFromUser}"),
    MemoryIdempotentRepository.memoryIdempotentRepository(200)
  )
  .to("mock:result");
}
```

MESSAGE HEADERS SET BY THE HIPCHAT CONSUMER

Header	Constant	Type	Description
HipchatFromUser	HipchatConstants.FROM_USER	*String*	The body has the message that was sent from this user to the owner of authToken
HipchatMessageDate	HipchatConstants.MESSAGE_DATE	*String*	The date message was sent. The format is ISO-8601 as present in the Hipchat response.
HipchatFromUserResponseStatus	HipchatConstants.FROM_USER_RESPONSE_STATUS	*StatusLine*	The status of the API response received.

HIPCHAT PRODUCER

Producer can send messages to both Room's and User's simultaneously. The body of the exchange is sent as message. Sample usage is shown below. Appropriate headers needs to be set.

```
@Override
 public void configure() throws Exception {
  String hipchatEndpointUri = "hipchat://?authToken=XXXX";
  from("direct:start")
    .to(hipchatEndpointUri)
    .to("mock:result");
 }
```

MESSAGE HEADERS EVALUATED BY THE HIPCHAT PRODUCER

Header	Constant	Type	Description
HipchatToUser	HipchatConstants.TO_USER	*String*	The Hipchat user to which the message needs to be sent.
HipchatToRoom	HipchatConstants.TO_ROOM	*String*	The Hipchat room to which the message needs to be sent.
HipchatMessageFormat	HipchatConstants.MESSAGE_FORMAT	String	Valid formats are 'text' or 'html'. **Default: 'text'**
HipchatMessageBackgroundColor	HipchatConstants.MESSAGE_BACKGROUND_COLOR	*String*	Valid color values are 'yellow', 'green', 'red', 'purple', 'gray', 'random'. **Default: 'yellow' (Room Only)**
HipchatTriggerNotification	HipchatConstants.TRIGGER_NOTIFY	*String*	Valid values are 'true' or 'false'. Whether this message should trigger a user notification (change the tab color, play a sound, notify mobile phones, etc). **Default: 'false' (Room Only)**

MESSAGE HEADERS SET BY THE HIPCHAT PRODUCER

Header	Constant	Type	Description
HipchatToUserResponseStatus	HipchatConstants.TO_USER_RESPONSE_STATUS	*StatusLine*	The status of the API response received when message sent to the user.
HipchatFromUserResponseStatus	HipchatConstants.TO_ROOM_RESPONSE_STATUS	*StatusLine*	The status of the API response received when message sent to the room.

DEPENDENCIES

Maven users will need to add the following dependency to their pom.xml.

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-hipchat</artifactId>
```

```
    <version>${camel-version}</version>
</dependency>
```

where **${camel-version**} must be replaced by the actual version of Camel (2.15.0 or higher)

CHAPTER 61. HL7

HL7 COMPONENT

The **HL7** component is used for working with the HL7 MLLP protocol and HL7 v2 messages using the HAPI library.

This component supports the following:

- HL7 MLLP codec for Mina
- HL7 MLLP codec forý Netty4 fromý**Camel 2.15** onwards
- Type Converter from/to HAPI and String
- HL7 DataFormat using the HAPI library
- Even more ease-of-use as it's integrated well with the Chapter 93, *MINA2 - Deprecated* component.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-hl7</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

HL7 MLLP PROTOCOL

HL7 is often used with the HL7 MLLP protocol, which is a text based TCP socket based protocol. This component ships with a Mina and Netty4 Codec that conforms to the MLLP protocol so you can easily expose an HL7 listener accepting HL7 requests over the TCP transport layer.

To expose a HL7 listener service, the **camel-mina2** or **camel-netty4** component is used with the HL7MLLPCodec (mina2) or HL7MLLPNettyDecoder/HL7MLLPNettyEncoder (Netty4).

The HL7 MLLP codec has the following options:

Name	Default Value	Description
startByte	**0x0b**	The start byte spanning the HL7 payload.
endByte1	**0x1c**	The first end byte spanning the HL7 payload.
endByte2	**0x0d**	The 2nd end byte spanning the HL7 payload.

charset	JVM Default	The encoding (a charset name) to use for the codec. If not provided, Camel will use the JVM default Charset.
produceString	**true**	**Camel 2.14.1:** If **true**, the codec creates a string using the defined charset. If **false**, the codec sends a plain byte array into the route, so that the HL7 Data Format can determine the actual charset from the HL7 message content.
convertLFtoCR	**false**	Will convert **\n** to **\r** (**0x0d**, 13 decimal) as HL7 stipulates **\r** as segment terminators. The HAPI library requires the use of **\r**.

EXPOSING A HL7 LISTENER USING MINA

In the Spring XML file, we configure a Mina2 endpoint to listen for HL7 requests using TCP on port 8888:

```
<endpoint id="hl7MinaListener" uri="mina2:tcp://localhost:8888?sync=true&amp;codec=#hl7codec"/>
```

sync=true indicates that this listener is synchronous and therefore will return a HL7 response to the caller. The HL7 codec is set up with **codec=#hl7codec**. Note that **hl7codec** is just a Spring bean ID, so it could be named **mygreatcodecforhl7** or whatever you like. The codec is also set up in the Spring XML file:

```
<bean id="hl7codec" class="org.apache.camel.component.hl7.HL7MLLPCodec">
   <property name="charset" value="iso-8859-1"/>
</bean>
```

The endpoint **hl7MinaListener** can then be used in a route as a consumer, as this Java DSL example illustrates:

```
from("hl7MinaListener").beanRef("patientLookupService");
```

This is a very simple route that will listen for HL7 and route it to a service named **patientLookupService**. This is also Spring bean ID, configured in the Spring XML as:

```
<bean id="patientLookupService"
class="com.mycompany.healthcare.service.PatientLookupService"/>
```

Another powerful feature of Camel is that we can have our business logic in POJO classes that is not tied to Camel as shown here:

```
import ca.uhn.hl7v2.HL7Exception;
import ca.uhn.hl7v2.model.Message;
import ca.uhn.hl7v2.model.v24.segment.QRD;
```

```
public class PatientLookupService {
    public Message lookupPatient(Message input) throws HL7Exception {
        QRD qrd = (QRD)input.get("QRD");
        String patientId = qrd.getWhoSubjectFilter(0).getIDNumber().getValue();

        // find patient data based on the patient id and create a HL7 model object with the response
        Message response = ... create and set response data
        return response
    }
```

Notice that this class uses just imports from the HAPI library and **not** from Camel.

EXPOSING AN HL7 LISTENER USING NETTY (AVAILABLE FROM CAMEL 2.15 ONWARDS)

In the Spring XML file, we configure a Netty4 endpoint to listen for HL7 requests using TCP on port 8888:

```
<endpoint id="hl7NettyListener" uri="netty4:tcp://localhost:8888?
sync=true&amp;encoder=#hl7encoder&amp;decoder=#hl7decoder"/>
```

sync=true indicates that this listener is synchronous and therefore will return a HL7 response to the caller. The HL7 codec is set up with **encoder=#hl7encoder** and **decoder=#hl7decoder**. Note that **hl7encoder** and **hl7decoder** are just bean IDs, so they could be named differently. The beans can be set in the Spring XML file:

```
<bean id="hl7decoder" class="org.apache.camel.component.hl7.HL7MLLPNettyDecoderFactory"/>
<bean id="hl7encoder" class="org.apache.camel.component.hl7.HL7MLLPNettyEncoderFactory"/>
```

The **hl7NettyListener** endpoint can then be used in a route as a consumer, as this Java DSL example illustrates:

```
from("hl7NettyListener").beanRef("patientLookupService");
```

HL7 MODEL USING JAVA.LANG.STRING OR BYTE[]

The HL7 MLLP codec uses plain **String** as its data format. Camel uses its Type Converter to convert to/from strings to the HAPI HL7 model objects, but you can use the plain **String** objects if you prefer, for instance if you wish to parse the data yourself.

As of Camel 2.14.1 you can also let both the Mina and Netty codecs use a plain **byte[]** as its data format by setting the **produceString** property to **false**. The Type Converter is also capable of converting the **byte[]** to/from HAPI HL7 model objects.

HL7V2 MODEL USING HAPI

The HL7v2 model uses Java objects from the HAPI library. Using this library, you can encode and decode from the EDI format (ER7) that is mostly used with HL7v2.

The sample below is a request to lookup a patient with the patient ID **0101701234**.

```
MSH|^~\\&|MYSENDER|MYRECEIVER|MYAPPLICATION||200612211200||QRY^A19|1234|P|2.4
QRD|200612211200|R|I|GetPatient|||1^RD|0101701234|DEM||
```

Using the HL7 model, you can work with a **ca.uhn.hl7v2.model.Message** object, for example to retrieve a patient ID:

```
Message msg = exchange.getIn().getBody(Message.class);
QRD qrd = (QRD)msg.get("QRD");
String patientId = qrd.getWhoSubjectFilter(0).getIDNumber().getValue();  // 0101701234
```

This is powerful when combined with the HL7 listener, because you don't have to work with **byte[]**, **String** or any other simple object formats. You can just use the HAPI HL7v2 model objects. If you know the message type in advance, you can be more type-safe:

```
QRY_A19 msg = exchange.getIn().getBody(QRY_A19.class);
String patientId = msg.getQRD().getWhoSubjectFilter(0).getIDNumber().getValue();
```

HL7 DATAFORMAT

The HL7 component ships with a HL7 data format that can be used to marshal or unmarshal HL7 model objects.

- **marshal** = from Message to byte stream (can be used when responding using the HL7 MLLP codec)
- **unmarshal** = from byte stream to Message (can be used when receiving streamed data from the HL7 MLLP

To use the data format, simply instantiate an instance and invoke the **marshal** or **unmarshal** operation in the route builder:

```
DataFormat hl7 = new HL7DataFormat();
...
from("direct:hl7in").marshal(hl7).to("jms:queue:hl7out");
```

In the sample above, the HL7 is marshalled from a HAPI Message object to a byte stream and put on a JMS queue. The next example is the opposite:

```
DataFormat hl7 = new HL7DataFormat();
...
from("jms:queue:hl7out").unmarshal(hl7).to("patientLookupService");
```

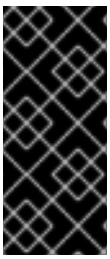
Here we unmarshal the byte stream into a HAPI Message object that is passed to our patient lookup service.

NOTE

As of HAPI 2.0 (used by Camel 2.11), the HL7v2 model classes are fully serializable. So you can put HL7v2 messages directly into a JMS queue (i.e. without calling **marshal()** and read them again directly from the queue (i.e. without calling **unmarshal()**).

IMPORTANT

As of Camel 2.11, **unmarshal** does not automatically fix segment separators any more by converting **n** to **r**. If you need this conversion, **org.apache.camel.component.hl7.HL7#convertLFToCR** provides a handy **Expression** for this purpose.



IMPORTANT

As of Camel 2.14.1, both **marshal** and **unmarshal** evaluate the **charset** provided in the field MSH-18. If this field is empty, by default the charset contained in the corresponding Camel charset property/header is assumed. You can even change this default behaviour by overriding the **guessCharsetName** method when inheriting from the **HL7DataFormat** class.

There is a shorthand syntax in Camel for well-known data formats that are commonly used. Then you don't need to create an instance of the **HL7DataFormat** object:

```
from("direct:hl7in").marshal().hl7().to("jms:queue:hl7out");
from("jms:queue:hl7out").unmarshal().hl7().to("patientLookupService");
```

MESSAGE HEADERS

The **unmarshal** operation adds these fields from the MSH segment as headers on the Camel message:

Key	MSH field	Example
CamelHL7SendingApplication	**MSH-3**	**MYSERVER**
CamelHL7SendingFacility	**MSH-4**	**MYSERVERAPP**
CamelHL7ReceivingApplication	**MSH-5**	**MYCLIENT**
CamelHL7ReceivingFacility	**MSH-6**	**MYCLIENTAPP**
CamelHL7Timestamp	**MSH-7**	**20071231235900**
CamelHL7Security	**MSH-8**	**null**
CamelHL7MessageType	**MSH-9-1**	**ADT**
CamelHL7TriggerEvent	**MSH-9-2**	**A01**
CamelHL7MessageControl	**MSH-10**	**1234**
CamelHL7ProcessingId	**MSH-11**	**P**

CamelHL7VersionId	**MSH-12**	**2.4**
CamelHL7Context	**-**	**Camel 2.14:** contains the **HapiContext** that was used to parse the message
CamelHL7Charset	**MSH-18**	**Camel 2.14.1:** Unicode UTF-8

All headers except **CamelHL7Context** are **String** types. If a header value is missing, its value is **null**.

OPTIONS

The HL7 Data Format supports the following options:

Option	Default	Description
validate	**true**	Whether the HAPI Parser should validate the message using the default validation rules. It is recommended to use the parser or hapiContext option and initialize it with the desired HAPI ValidationContext.
parser	**ca.uhn.hl7v2.parser.GenericParser**	Custom parser to be used. Must be of type ca.uhn.hl7v2.parser.Parser. Note that GenericParser also allows to parse XML-encoded HL7v2 messages
hapiContext	**ca.uhn.hl7v2.DefaultHapiContext**	**Camel 2.14:** Custom HAPI context that can define a custom parser, custom ValidationContext etc. This gives you full control over the HL7 parsing and rendering process.

DEPENDENCIES

To use HL7 in your Camel routes you'll need to add a dependency on **camel-hl7** listed above, which implements this data format.

The HAPI library is been split into a base library and several structure libraries, one for each HL7v2 message version:

- v2.1 structures library
- v2.2 structures library
- v2.3 structures library

- v2.3.1 structures library
- v2.4 structures library
- v2.5 structures library
- v2.5.1 structures library
- v2.6 structures library

By default **camel-hl7** only references the HAPI base library. Applications are responsible for including structure libraries themselves. For example, if an application works with HL7v2 message versions 2.4 and 2.5 then the following dependencies must be added:

```
<dependency>
   <groupId>ca.uhn.hapi</groupId>
   <artifactId>hapi-structures-v24</artifactId>
   <version>2.2</version>
   <!-- use the same version as your hapi-base version -->
</dependency>
<dependency>
   <groupId>ca.uhn.hapi</groupId>
   <artifactId>hapi-structures-v25</artifactId>
   <version>2.2</version>
   <!-- use the same version as your hapi-base version -->
</dependency>
```

Alternatively, an OSGi bundle containing the base library, all structures libraries and required dependencies (on the bundle classpath) can be downloaded from the central Maven repository.

```
<dependency>
   <groupId>ca.uhn.hapi</groupId>
   <artifactId>hapi-osgi-base</artifactId>
   <version>2.2</version>
</dependency>
```

TERSER LANGUAGE

HAPI provides a Terser class that provides access to fields using a commonly used terse location specification syntax. The Terser language allows to use this syntax to extract values from messages and to use them as expressions and predicates for filtering, content-based routing etc.

Sample:

```
import static org.apache.camel.component.hl7.HL7.terser;
...

   // extract patient ID from field QRD-8 in the QRY_A19 message above and put into message
header
   from("direct:test1")
      .setHeader("PATIENT_ID",terser("QRD-8(0)-1"))
      .to("mock:test1");
   // continue processing if extracted field equals a message header
```

```
from("direct:test2")
  .filter(terser("QRD-8(0)-1").isEqualTo(header("PATIENT_ID"))
  .to("mock:test2");
```

HL7 VALIDATION PREDICATE

Often it is preferable first to parse a HL7v2 message and in a separate step validate it against a HAPI ValidationContext.

Sample:

```
import static org.apache.camel.component.hl7.HL7.messageConformsTo;
import ca.uhn.hl7v2.validation.impl.DefaultValidation;
...

 // Use standard or define your own validation rules
  ValidationContext defaultContext = new DefaultValidation();

  // Throws PredicateValidationException if message does not validate
  from("direct:test1").validate(messageConformsTo(defaultContext)).to("mock:test1");
```

HL7 VALIDATION PREDICATE USING THE HAPICONTEXT (CAMEL 2.14)

The HAPI Context is always configured with a ValidationContext (or a ValidationRuleBuilder), so you can access the validation rules indirectly. Furthermore, when unmarshalling the HL7DataFormat forwards the configured HAPI context in the **CamelHL7Context** header, and the validation rules of this context can be easily reused:

```
import static org.apache.camel.component.hl7.HL7.messageConformsTo;
import static org.apache.camel.component.hl7.HL7.messageConforms
...

 HapiContext hapiContext = new DefaultHapiContext();
 hapiContext.getParserConfiguration().setValidating(false); // don't validate during parsing

 // customize HapiContext some more ... e.g. enforce that PID-8 in ADT_A01 messages of version
2.4 is not empty
 ValidationRuleBuilder builder = new ValidationRuleBuilder() {
    @Override
    protected void configure() {
      forVersion(Version.V24)
          .message("ADT", "A01")
          .terser("PID-8", not(empty()));
      }
    };
 hapiContext.setValidationRuleBuilder(builder);

 HL7DataFormat hl7 = new HL7DataFormat();
 hl7.setHapiContext(hapiContext);

 from("direct:test1")
   .unmarshal(hl7)              // uses the GenericParser returned from the HapiContext
```

```
    .validate(messageConforms())   // uses the validation rules returned from the HapiContext
                                   // equivalent with .validate(messageConformsTo(hapiContext))
    // route continues from here
```

HL7 ACKNOWLEDGEMENT EXPRESSION

A common task in HL7v2 processing is to generate an acknowledgement message as response to an incoming HL7v2 message, e.g. based on a validation result. The **ack** expression lets us accomplish this very elegantly:

```
import static org.apache.camel.component.hl7.HL7.messageConformsTo;
import static org.apache.camel.component.hl7.HL7.ack;
import ca.uhn.hl7v2.validation.impl.DefaultValidation;
...

  // Use standard or define your own validation rules
   ValidationContext defaultContext = new DefaultValidation();

   from("direct:test1")
     .onException(Exception.class)
       .handled(true)
       .transform(ack()) // auto-generates negative ack because of exception in Exchange
       .end()
     .validate(messageConformsTo(defaultContext))
     // do something meaningful here
     ...
     // acknowledgement
     .transform(ack())
```

MORE SAMPLES

In the following example, a plain **String** HL7 request is sent to an HL7 listener that sends back a response:

```
String line1 =
"MSH|^~\\&|MYSENDER|MYRECEIVER|MYAPPLICATION||200612211200||QRY^A19|1234|P|2.4";
String line2 = "QRD|200612211200|R|I|GetPatient|||1^RD|0101701234|DEM||";

StringBuilder in = new StringBuilder();
in.append(line1);
in.append("\n");
in.append(line2);

String out = (String)template.requestBody("mina2:tcp://127.0.0.1:8888?
sync=true&codec=#hl7codec", in.toString());
```

In the next sample, HL7 requests from the HL7 listener are routed to the business logic, which is implemented as plain POJO registered in the registry as hl7service:

```
public class MyHL7BusinessLogic {

    // This is a plain POJO that has NO imports whatsoever on Apache Camel.
    // its a plain POJO only importing the HAPI library so we can much easier work with the HL7
```

```
format.

    public Message handleA19(Message msg) throws Exception {
        // here you can have your business logic for A19 messages
        assertTrue(msg instanceof QRY_A19);
        // just return the same dummy response
        return createADR19Message();
    }

    public Message handleA01(Message msg) throws Exception {
        // here you can have your business logic for A01 messages
        assertTrue(msg instanceof ADT_A01);
        // just return the same dummy response
        return createADT01Message();
    }
}
```

Then the Camel routes using the **RouteBuilder** are as follows:

```
DataFormat hl7 = new HL7DataFormat();
// we setup or HL7 listener on port 8888 (using the hl7codec) and in sync mode so we can return a
response
from("mina2:tcp://127.0.0.1:8888?sync=true&codec=#hl7codec")
    // we use the HL7 data format to unmarshal from HL7 stream to the HAPI Message model
    // this ensures that the camel message has been enriched with hl7 specific headers to
    // make the routing much easier (see below)
    .unmarshal(hl7)
    // using choice as the content base router
    .choice()
        // where we choose that A19 queries invoke the handleA19 method on our hl7service bean
        .when(header("CamelHL7TriggerEvent").isEqualTo("A19"))
            .beanRef("hl7service", "handleA19")
            .to("mock:a19")
        // and A01 should invoke the handleA01 method on our hl7service bean
        .when(header("CamelHL7TriggerEvent").isEqualTo("A01")).to("mock:a01")
            .beanRef("hl7service", "handleA01")
            .to("mock:a19")
        // other types should go to mock:unknown
        .otherwise()
            .to("mock:unknown")
    // end choice block
    .end()
    // marshal response back
    .marshal(hl7);
```

Note that by using the HL7 DataFormat the Camel message headers are populated with the fields from the MSH segment. The headers are particularly useful for filtering or content-based routing as shown in the example above.

CHAPTER 62. HTTP

HTTP COMPONENT

The **http:** component provides HTTP based endpoints for consuming external HTTP resources (as a client to call external servers using HTTP).

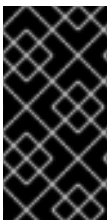
Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-http</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
http:hostname[:port][/resourceUri][?param1=value1][&param2=value2]
```

Will by default use port 80 for HTTP and 443 for HTTPS.



CAMEL-HTTP VS CAMEL-JETTY

You can only produce to endpoints generated by the HTTP component. Therefore it should never be used as input into your camel Routes. To bind/expose an HTTP endpoint via a HTTP server as input to a camel route, you can use the Jetty Component or the Servlet component.

EXAMPLES

Call the url with the body using POST and return response as out message. If body is null call URL using GET and return response as out message

Java DSL	Spring DSL
`from("direct:start")` `  .to("http://myhost/mypath");`	`<from uri="direct:start"/>` `<to uri="http://oldhost"/>`

You can override the HTTP endpoint URI by adding a header. Camel will call the http://newhost. This is very handy for e.g. REST urls.

Java DSL

```
from("direct:start")
  .setHeader(Exchange.HTTP_URI, simple("http://myserver/orders/${header.orderId}"))
  .to("http://dummyhost");
```

URI parameters can either be set directly on the endpoint URI or as a header

Java DSL

```
from("direct:start")
  .to("http://oldhost?order=123&detail=short");
from("direct:start")
  .setHeader(Exchange.HTTP_QUERY, constant("order=123&detail=short"))
  .to("http://oldhost");
```

Set the HTTP request method to POST

Java DSL

```
from("direct:start")
  .setHeader(Exchange.HTTP_METHOD,
constant("POST"))
  .to("http://www.google.com");
```

Spring DSL

```
<from uri="direct:start"/>
<setHeader
headerName="CamelHttpMethod">
  <constant>POST</constant>
</setHeader>
<to uri="http://www.google.com"/>
<to uri="mock:results"/>
```

HTTPENDPOINT OPTIONS

Name	Default Value	Description
throwExceptionOnFailure	**true**	Option to disable throwing the **HttpOperationFailedException** in case of failed responses from the remote server. This allows you to get all responses regardless of the HTTP status code.

bridgeEndpoint	**false**	If the option is true , HttpProducer will ignore the Exchange.HTTP_URI header, and use the endpoint's URI for request. You may also set the **throwExceptionOnFailure** to be false to let the HttpProducer send all the fault response back. **Camel 2.3:** If the option is true, HttpProducer and CamelServlet will skip the gzip processing if the content-encoding is "gzip".
disableStreamCache	**false**	DefaultHttpBinding will copy the request input stream into a stream cache and put it into message body if this option is false to support read it twice, otherwise DefaultHttpBinding will set the request input stream direct into the message body.
httpBindingRef	**null**	**Deprecated and will be removed in Camel 3.0:** Reference to a **org.apache.camel.component.http.HttpBinding** in the Registry. Use the **httpBinding** option instead.
httpBinding	**null**	Reference to a **org.apache.camel.component.http.HttpBinding** in the Registry.
httpClientConfigurerRef	**null**	**Deprecated and will be removed in Camel 3.0:** Reference to a **org.apache.camel.component.http.HttpClientConfigurer** in the Registry. Use the **httpClientConfigurer** option instead.
httpClientConfigurer	**null**	Reference to a **org.apache.camel.component.http.HttpClientConfigurer** in the Registry.
httpClient.XXX	**null**	Setting options on the HttpClientParams. For instance **httpClient.soTimeout=5000** will set the **SO_TIMEOUT** to 5 seconds.

clientConnectionManager	**null**	To use a custom **org.apache.http.conn.ClientConnectionManager**.
transferException	**false**	**Camel 2.6:** If enabled and an Exchange failed processing on the consumer side, and if the caused **Exception** was send back serialized in the response as a **application/x-java-serialized-object** content type (for example using Jetty or Servlet Camel components). On the producer side the exception will be deserialized and thrown as is, instead of the **HttpOperationFailedException**. The caused exception is required to be serialized.
headerFilterStrategy	**null**	**Camel 2.11:** Reference to a instance of **org.apache.camel.spi.HeaderFilterStrategy** in the Registry. It will be used to apply the custom headerFilterStrategy on the new create HttpEndpoint.
urlRewrite	**null**	**Camel 2.11:Producer only** Refers to a custom **org.apache.camel.component.http.UrlRewrite** which allows you to rewrite urls when you bridge/proxy endpoints. See more details at UrlRewrite and How to use Camel as a HTTP proxy between a client and server.

AUTHENTICATION AND PROXY

The following authentication options can also be set on the HttpEndpoint:

Name	Default Value	Description
authMethod	**null**	Authentication method, either as **Basic**, **Digest** or **NTLM**.

authMethodPriority	**null**	Priority of authentication methods. Is a list separated with comma. For example: **Basic,Digest** to exclude **NTLM**.
authUsername	**null**	Username for authentication
authPassword	**null**	Password for authentication
authDomain	**null**	Domain for NTML authentication
authHost	**null**	Optional host for NTML authentication
proxyHost	**null**	The proxy host name
proxyPort	**null**	The proxy port number
proxyAuthMethod	**null**	Authentication method for proxy, either as **Basic**, **Digest** or **NTLM**.
proxyAuthUsername	**null**	Username for proxy authentication
proxyAuthPassword	**null**	Password for proxy authentication
proxyAuthDomain	**null**	Domain for proxy NTML authentication
proxyAuthHost	**null**	Optional host for proxy NTML authentication

When using authentication you **must** provide the choice of method for the **authMethod** or **authProxyMethod** options. You can configure the proxy and authentication details on either the **HttpComponent** or the **HttpEndoint**. Values provided on the **HttpEndpoint** will take precedence over **HttpComponent**. Its most likely best to configure this on the **HttpComponent** which allows you to do this once.

The HTTP component uses convention over configuration which means that if you have not explicit set a **authMethodPriority** then it will fallback and use the select(ed)**authMethod** as priority as well. So if you use **authMethod.Basic** then the **auhtMethodPriority** will be **Basic** only.

HTTPCOMPONENT OPTIONS

Name	Default Value	Description

httpBinding	**null**	To use a custom **org.apache.camel.component.http.HttpBinding**.
httpClientConfigurer	**null**	To use a custom **org.apache.camel.component.http.HttpClientConfigurer**.
httpConnectionManager	**null**	To use a custom **org.apache.commons.httpclient.HttpConnectionManager**.
httpConfiguration	**null**	To use a custom **org.apache.camel.component.http.HttpConfiguration**

MESSAGE HEADERS

Name	Type	Description
Exchange.HTTP_URI	**String**	URI to call. Will override existing URI set directly on the endpoint.
Exchange.HTTP_METHOD	**String**	HTTP Method / Verb to use (GET/POST/PUT/DELETE/HEAD/OPTIONS/TRACE)
Exchange.HTTP_PATH	**String**	Request URI's path, the header will be used to build the request URI with the HTTP_URI. **Camel 2.3.0:** If the path is start with "/", http producer will try to find the relative path based on the Exchange.HTTP_BASE_URI header or the exchange.getFromEndpoint().getEndpointUri();
Exchange.HTTP_QUERY	**String**	URI parameters. Will override existing URI parameters set directly on the endpoint.
Exchange.HTTP_RESPONSE_CODE	**int**	The HTTP response code from the external server. Is 200 for OK.
Exchange.HTTP_CHARACTER_ENCODING	**String**	Character encoding.

Exchange.CONTENT_TYPE	**String**	The HTTP content type. Is set on both the IN and OUT message to provide a content type, such as **text/html**.
Exchange.CONTENT_ENCODING	**String**	The HTTP content encoding. Is set on both the IN and OUT message to provide a content encoding, such as **gzip**.
Exchange.HTTP_SERVLET_REQUEST	**HttpServletRequest**	The **HttpServletRequest** object.
Exchange.HTTP_SERVLET_RESPONSE	**HttpServletResponse**	The **HttpServletResponse** object.
Exchange.HTTP_PROTOCOL_VERSION	**String**	**Camel 2.5:** You can set the http protocol version with this header, eg. "HTTP/1.0". If you didn't specify the header, HttpProducer will use the default value "HTTP/1.1"

The header name above are constants. For the spring DSL you have to use the value of the constant instead of the name.

MESSAGE BODY

Camel will store the HTTP response from the external server on the OUT body. All headers from the IN message will be copied to the OUT message, so headers are preserved during routing. Additionally Camel will add the HTTP response headers as well to the OUT message headers.

RESPONSE CODE

Camel will handle according to the HTTP response code:

- Response code is in the range 100..299, Camel regards it as a success response.
- Response code is in the range 300..399, Camel regards it as a redirection response and will throw a **HttpOperationFailedException** with the information.
- Response code is 400+, Camel regards it as an external server failure and will throw a **HttpOperationFailedException** with the information.

THROWEXCEPTIONONFAILURE

The option, **throwExceptionOnFailure**, can be set to **false** to prevent the **HttpOperationFailedException** from being thrown for failed response codes. This allows you to get any response from the remote server. There is a sample below demonstrating this.

HTTPOPERATIONFAILEDEXCEPTION

This exception contains the following information:

- The HTTP status code
- The HTTP status line (text of the status code)
- Redirect location, if server returned a redirect
- Response body as a **java.lang.String**, if server provided a body as response

CALLING USING GET OR POST

The following algorithm is used to determine if either **GET** or **POST** HTTP method should be used: 1. Use method provided in header. 2. **GET** if query string is provided in header. 3. **GET** if endpoint is configured with a query string. 4. **POST** if there is data to send (body is not null). 5. **GET** otherwise.

HOW TO GET ACCESS TO HTTPSERVLETREQUEST AND HTTPSERVLETRESPONSE

You can get access to these two using the Camel type converter system using

```
HttpServletRequest request = exchange.getIn().getBody(HttpServletRequest.class);
HttpServletRequest response = exchange.getIn().getBody(HttpServletResponse.class);
```

USING CLIENT TIMEOUT - SO_TIMEOUT

See the unit test in this link

CONFIGURING A PROXY

Java DSL

```
from("direct:start")
  .to("http://oldhost?proxyHost=www.myproxy.com&proxyPort=80");
```

There is also support for proxy authentication via the **proxyUsername** and **proxyPassword** options.

USING PROXY SETTINGS OUTSIDE OF URI

Java DSL	Spring DSL

```
context.getProperties().put("http.proxyHost",
"172.168.18.9");
context.getProperties().put("http.proxyPort"
"8080");
```

```
<camelContext>
  <properties>
    <property key="http.proxyHost"
value="172.168.18.9"/>
    <property key="http.proxyPort"
value="8080"/>
  </properties>
</camelContext>
```

Options on Endpoint will override options on the context.

CONFIGURING CHARSET

If you are using **POST** to send data you can configure the **charset**

```
setProperty(Exchange.CHARSET_NAME, "iso-8859-1");
```

SAMPLE WITH SCHEDULED POLL

The sample polls the Google homepage every 10 seconds and write the page to the file **message.html**:

```
from("timer://foo?fixedRate=true&delay=0&period=10000")
  .to("http://www.google.com")
  .setHeader(FileComponent.HEADER_FILE_NAME, "message.html").to("file:target/google");
```

GETTING THE RESPONSE CODE

You can get the HTTP response code from the HTTP component by getting the value from the Out message header with **Exchange.HTTP_RESPONSE_CODE**.

```
Exchange exchange = template.send("http://www.google.com/search", new Processor() {
    public void process(Exchange exchange) throws Exception {
        exchange.getIn().setHeader(Exchange.HTTP_QUERY, constant("hl=en&q=activemq"));
    }
});
Message out = exchange.getOut();
int responseCode = out.getHeader(Exchange.HTTP_RESPONSE_CODE, Integer.class);
```

USING THROWEXCEPTIONONFAILURE=FALSE TO GET ANY RESPONSE BACK

In the route below we want to route a message that we enrich with data returned from a remote HTTP call. As we want any response from the remote server, we set the **throwExceptionOnFailure** option to **false** so we get any response in the **AggregationStrategy**. As the code is based on a unit test that simulates a HTTP status code 404, there is some assertion code etc.

```
// We set throwExceptionOnFailure to false to let Camel return any response from the remove HTTP
server without thrown
// HttpOperationFailedException in case of failures.
// This allows us to handle all responses in the aggregation strategy where we can check the HTTP
response code
// and decide what to do. As this is based on an unit test we assert the code is 404
from("direct:start").enrich("http://localhost:{{port}}/myserver?
throwExceptionOnFailure=false&user=Camel", new AggregationStrategy() {
    public Exchange aggregate(Exchange original, Exchange resource) {
        // get the response code
        Integer code = resource.getIn().getHeader(Exchange.HTTP_RESPONSE_CODE, Integer.class);
        assertEquals(404, code.intValue());
        return resource;
    }
}).to("mock:result");

// this is our jetty server where we simulate the 404
from("jetty://http://localhost:{{port}}/myserver")
        .process(new Processor() {
            public void process(Exchange exchange) throws Exception {
                exchange.getOut().setBody("Page not found");
                exchange.getOut().setHeader(Exchange.HTTP_RESPONSE_CODE, 404);
            }
        });
```

DISABLING COOKIES

To disable cookies you can set the HTTP Client to ignore cookies by adding this URI option: **httpClient.cookiePolicy=ignoreCookies**

ADVANCED USAGE

If you need more control over the HTTP producer you should use the **HttpComponent** where you can set various classes to give you custom behavior.

SETTING MAXCONNECTIONSPERHOST

The HTTP Component has a **org.apache.commons.httpclient.HttpConnectionManager** where you can configure various global configuration for the given component. By global, we mean that any endpoint the component creates has the same shared **HttpConnectionManager**. So, if we want to set a different value for the max connection per host, we need to define it on the HTTP component and **not** on the endpoint URI that we usually use. So here comes:

First, we define the **http** component in Spring XML. Yes, we use the same scheme name, **http**, because otherwise Camel will auto-discover and create the component with default settings. What we need is to overrule this so we can set our options. In the sample below we set the max connection to 5 instead of the default of 2.

```
<bean id="http" class="org.apache.camel.component.http.HttpComponent">
    <property name="camelContext" ref="camel"/>
    <property name="httpConnectionManager" ref="myHttpConnectionManager"/>
</bean>

<bean id="myHttpConnectionManager"
```

```
class="org.apache.commons.httpclient.MultiThreadedHttpConnectionManager">
    <property name="params" ref="myHttpConnectionManagerParams"/>
</bean>

<bean id="myHttpConnectionManagerParams"
class="org.apache.commons.httpclient.params.HttpConnectionManagerParams">
    <property name="defaultMaxConnectionsPerHost" value="5"/>
</bean>
```

And then we can just use it as we normally do in our routes:

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring" trace="true">
    <route>
        <from uri="direct:start"/>
        <to uri="http://www.google.com"/>
        <to uri="mock:result"/>
    </route>
</camelContext>
```

USING PREEMPTIVE AUTHENTICATION

An end user reported that he had problem with authenticating with HTTPS. The problem was eventually resolved when he discovered the HTTPS server did not return a HTTP code 401 Authorization Required. The solution was to set the following URI option: **httpClient.authenticationPreemptive=true**

ACCEPTING SELF SIGNED CERTIFICATES FROM REMOTE SERVER

See this link from a mailing list discussion with some code to outline how to do this with the Apache Commons HTTP API.

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.8, the HTTP4 component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the HTTP4 component.

The version of the Apache HTTP client used in this component resolves SSL/TLS information from a global "protocol" registry. This component provides an implementation, **org.apache.camel.component.http.SSLContextParametersSecureProtocolSocketFactory**, of the HTTP client's protocol socket factory in order to support the use of the Camel JSSE Configuration utility. The following example demonstrates how to configure the protocol registry and use the registered protocol information in a route.

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");
```

```
SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);

ProtocolSocketFactory factory =
   new SSLContextParametersSecureProtocolSocketFactory(scp);

Protocol.registerProtocol("https",
       new Protocol(
       "https",
       factory,
       443));

from("direct:start")
       .to("https://mail.google.com/mail/").to("mock:results");
```

CONFIGURING APACHE HTTP CLIENT DIRECTLY

Basically the HTTP component is built on the top of Apache HTTP client, and you can implement a custom **org.apache.camel.component.http.HttpClientConfigurer** to do some configuration on the http client if you need full control of it.

However if you *just* want to specify the keystore and truststore you can do this with Apache HTTP **HttpClientConfigurer**, for example:

```
Protocol authhttps = new Protocol("https", new AuthSSLProtocolSocketFactory(
  new URL("file:my.keystore"), "mypassword",
  new URL("file:my.truststore"), "mypassword"), 443);

Protocol.registerProtocol("https", authhttps);
```

And then you need to create a class that implements **HttpClientConfigurer**, and registers https protocol providing a keystore or truststore per example above. Then, from your camel route builder class you can hook it up like so:

```
HttpComponent httpComponent = getContext().getComponent("http", HttpComponent.class);
httpComponent.setHttpClientConfigurer(new MyHttpClientConfigurer());
```

If you are doing this using the Spring DSL, you can specify your **HttpClientConfigurer** using the URI. For example:

```
<bean id="myHttpClientConfigurer"
 class="my.https.HttpClientConfigurer">
</bean>

<to uri="https://myhostname.com:443/myURL?httpClientConfigurerRef=myHttpClientConfigurer"/>
```

As long as you implement the HttpClientConfigurer and configure your keystore and truststore as described above, it will work fine.

- Jetty

CHAPTER 63. HTTP4

HTTP4 COMPONENT

Available as of Camel 2.3

The **http4:** component provides HTTP based endpoints for calling external HTTP resources (as a client to call external servers using HTTP).

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-http4</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

CAMEL-HTTP4 VS CAMEL-HTTP

Camel-http4 uses Apache HttpClient 4.x while camel-http uses Apache HttpClient 3.x.

URI FORMAT

```
http4:hostname[:port][/resourceUri][?options]
```

Will by default use port 80 for HTTP and 443 for HTTPS.

You can append query options to the URI in the following format, **?option=value&option=value&...**

CAMEL-HTTP4 VS CAMEL-JETTY

You can only produce to endpoints generated by the HTTP4 component. Therefore it should never be used as input into your Camel Routes. To bind/expose an HTTP endpoint via a HTTP server as input to a Camel route, use the Jetty Component instead.

HTTPCOMPONENT OPTIONS

Name	Default Value	Description
maxTotalConnections	**200**	The maximum number of connections.
connectionsPerRoute	**20**	The maximum number of connections per route.

cookieStore	**null**	**Camel 2.11.2/2.12.0:** To use a custom **org.apache.http.client.CookieStore**. By default the **org.apache.http.impl.client.BasicCookieStore** is used which is an in-memory only cookie store. Notice if **bridgeEndpoint=true** then the cookie store is forced to be a noop cookie store as cookies shouldn't be stored as we are just bridging (eg acting as a proxy).
httpClientConfigurer	**null**	Reference to a **org.apache.camel.component.http.HttpClientConfigurer** in the Registry.
clientConnectionManager	**null**	To use a custom **org.apache.http.conn.ClientConnectionManager**.
httpBinding	**null**	To use a custom **org.apache.camel.component.http.HttpBinding**.
httpContext	**null**	**Camel 2.9.2:** To use a custom **org.apache.http.protocol.HttpContext** when executing requests.
sslContextParameters	**null**	**Camel 2.8:** To use a custom **org.apache.camel.util.jsse.SSLContextParameters**. See Using the JSSE Configuration Utility.
x509HostnameVerifier	**BrowserCompatHostnameVerifier**	**Camel 2.7:** You can refer to a different **org.apache.http.conn.ssl.X509HostnameVerifier** instance in the Registry such as **org.apache.http.conn.ssl.StrictHostnameVerifier** or **org.apache.http.conn.ssl.AllowAllHostnameVerifier**.
connectionTimeToLive	**-1**	**Camel 2.11.0:** The time for connection to live, the time unit is millisecond, the default value is always keep alive.

HTTPENDPOINT OPTIONS

Name	Default Value	Description
throwExceptionOnFailure	**true**	Option to disable throwing the **HttpOperationFailedException** in case of failed responses from the remote server. This allows you to get all responses regardless of the HTTP status code.
bridgeEndpoint	**false**	If true, HttpProducer will ignore the Exchange.HTTP_URI header, and use the endpoint's URI for request. You may also set the **throwExcpetionOnFailure** to be false to let the HttpProducer send all fault responses back. Also if set to true HttpProducer and CamelServlet will skip the gzip processing if the content-encoding is "gzip".
clearExpiredCookies	**true**	**Camel 2.11.2/2.12.0:** Whether to clear expired cookies before sending the HTTP request. This ensures the cookies store does not keep growing by adding new cookies which is newer removed when they are expired.
cookieStore	**null**	**Camel 2.11.2/2.12.0:** To use a custom **org.apache.http.client.CookieStore**. By default the **org.apache.http.impl.client.BasicCookieStore** is used which is an in-memory only cookie store. Notice if **bridgeEndpoint=true** then the cookie store is forced to be a noop cookie store as cookies shouldn't be stored as we are just bridging (eg acting as a proxy).
disableStreamCache	**false**	DefaultHttpBinding will copy the request input stream into a stream cache and put it into the message body if this option is false to support multiple reads, otherwise DefaultHttpBinding will set the request input stream directly in the message body.

headerFilterStrategy	**null**	**Camel 2.10.4:** Reference to a instance of **org.apache.camel.spi.HeaderFilterStrategy** in the Registry. t will be used to apply the custom headerFilterStrategy on the new create HttpEndpoint.
httpBindingRef	**null**	**Deprecated and will be removed in Camel 3.0:** Reference to a **org.apache.camel.component.http.HttpBinding** in the Registry. Use the **httpBinding** option instead.
httpBinding	**null**	To use a custom **org.apache.camel.component.http.HttpBinding**.
httpClientConfigurerRef	**null**	**Deprecated and will be removed in Camel 3.0:** Reference to a **org.apache.camel.component.http.HttpClientConfigurer** in the Registry. Use the **httpClientConfigurer** option instead.
httpClientConfigurer	**null**	Reference to a **org.apache.camel.component.http.HttpClientConfigurer** in the Registry.
httpContextRef	**null**	**Deprecated and will be removed in Camel 3.0:Camel 2.9.2:** Reference to a custom **org.apache.http.protocol.HttpContext** in the Registry. Use the **httpContext** option instead.
httpContext	**null**	**Camel 2.9.2:** To use a custom **org.apache.http.protocol.HttpContext** when executing requests.

httpClient.XXX	**null**	Setting options on the BasicHttpParams. For instance **httpClient.soTimeout=5000** will set the **SO_TIMEOUT** to 5 seconds. Look on the setter methods of the following parameter beans for a complete reference: AuthParamBean, ClientParamBean, ConnConnectionParamBean, ConnRouteParamBean, CookieSpecParamBean, HttpConnectionParamBean and HttpProtocolParamBean **Since Camel 2.13.0: httpClient** is changed to configure the HttpClientBuilder and RequestConfig.Builder, please check out API document for a complete reference.
clientConnectionManager	**null**	To use a custom **org.apache.http.conn.ClientConnectionManager**.
transferException	**false**	If enabled and an Exchange failed processing on the consumer side, and if the caused **Exception** was send back serialized in the response as a **application/x-java-serialized-object** content type (for example using Jetty or SERVLET Camel components). On the producer side the exception will be deserialized and thrown as is, instead of the **HttpOperationFailedException**. The caused exception is required to be serialized.

sslContextParametersRef	**null**	**Deprecated and will be removed in Camel 3.0:Camel 2.8:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. **Important:** Only one instance of **org.apache.camel.util.jsse.SSLContextParameters** is supported per HttpComponent. If you need to use 2 or more different instances, you need to define a new HttpComponent per instance you need. See further below for more details. See Using the JSSE Configuration Utility. Use the **sslContextParameters** option instead.
sslContextParameters	**null**	**Camel 2.11.1:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. **Important:** Only one instance of **org.apache.camel.util.jsse.SSLContextParameters** is supported per HttpComponent. If you need to use 2 or more different instances, you need to define a new HttpComponent per instance you need. See further below for more details. See Using the JSSE Configuration Utility.
x509HostnameVerifier	**BrowserCompatHostnameVerifier**	**Camel 2.7:** You can refer to a different **org.apache.http.conn.ssl.X509HostnameVerifier** instance in the Registry such as **org.apache.http.conn.ssl.StrictHostnameVerifier** or **org.apache.http.conn.ssl.AllowAllHostnameVerifier**.

urlRewrite	**null**	**Camel 2.11:Producer only** Refers to a custom **org.apache.camel.component.http4.UrlRewrite** which allows you to rewrite urls when you bridge/proxy endpoints. See more details at UrlRewrite and How to use Camel as a HTTP proxy between a client and server.
maxTotalConnections	**null**	**Camel 2.14:** The maximum number of total connections that the connection manager has. If this option is not set, camel will use the component's setting instead.
connectionsPerRoute	**null**	**Camel 2.14:** The maximum number of connections per route. If this option is not set, camel will use the component's setting instead.
authenticationPreemptive	**false**	**Camel 2.11.3/2.12.2:** If this option is true, camel-http4 sends preemptive basic authentication to the server.

The following authentication options can also be set on the HttpEndpoint:

SETTING BASIC AUTHENTICATION AND PROXY

Before Camel 2.8.0

Name	Default Value	Description
username	**null**	Username for authentication.
password	**null**	Password for authentication.
domain	**null**	The domain name for authentication.
host	**null**	The host name authentication.
proxyHost	**null**	The proxy host name
proxyPort	**null**	The proxy port number
proxyUsername	**null**	Username for proxy authentication

proxyPassword	**null**	Password for proxy authentication
proxyDomain	**null**	The proxy domain name
proxyNtHost	**null**	The proxy Nt host name

Name	Default Value	Description
authUsername	**null**	Username for authentication
authPassword	**null**	Password for authentication
authDomain	**null**	The domain name for authentication
authHost	**null**	The host name authentication
proxyAuthHost	**null**	The proxy host name
proxyAuthPort	**null**	The proxy port number
proxyAuthScheme	**null**	The proxy scheme, will fallback and use the scheme from the endpoint if not configured.
proxyAuthUsername	**null**	Username for proxy authentication
proxyAuthPassword	**null**	Password for proxy authentication
proxyAuthDomain	**null**	The proxy domain name
proxyAuthNtHost	**null**	The proxy Nt host name

MESSAGE HEADERS

Name	Type	Description
Exchange.HTTP_URI	**String**	URI to call. Will override existing URI set directly on the endpoint.
Exchange.HTTP_PATH	**String**	Request URI's path, the header will be used to build the request URI with the HTTP_URI.

Exchange.HTTP_QUERY	**String**	URI parameters. Will override existing URI parameters set directly on the endpoint.
Exchange.HTTP_RESPONSE_CODE	**int**	The HTTP response code from the external server. Is 200 for OK.
Exchange.HTTP_CHARACTER_ENCODING	**String**	Character encoding.
Exchange.CONTENT_TYPE	**String**	The HTTP content type. Is set on both the IN and OUT message to provide a content type, such as **text/html**.
Exchange.CONTENT_ENCODING	**String**	The HTTP content encoding. Is set on both the IN and OUT message to provide a content encoding, such as **gzip**.

MESSAGE BODY

Camel will store the HTTP response from the external server on the OUT body. All headers from the IN message will be copied to the OUT message, so headers are preserved during routing. Additionally Camel will add the HTTP response headers as well to the OUT message headers.

RESPONSE CODE

Camel will handle according to the HTTP response code:

- Response code is in the range 100..299, Camel regards it as a success response.
- Response code is in the range 300..399, Camel regards it as a redirection response and will throw a **HttpOperationFailedException** with the information.
- Response code is 400+, Camel regards it as an external server failure and will throw a **HttpOperationFailedException** with the information.

THROWEXCEPTIONONFAILURE

The option, **throwExceptionOnFailure**, can be set to **false** to prevent the **HttpOperationFailedException** from being thrown for failed response codes. This allows you to get any response from the remote server. There is a sample below demonstrating this.

HTTPOPERATIONFAILEDEXCEPTION

This exception contains the following information:

- The HTTP status code
- The HTTP status line (text of the status code)

- Redirect location, if server returned a redirect
- Response body as a **java.lang.String**, if server provided a body as response

CALLING USING GET OR POST

The following algorithm is used to determine whether the **GET** or **POST** HTTP method should be used: 1. Use method provided in header. 2. **GET** if query string is provided in header. 3. **GET** if endpoint is configured with a query string. 4. **POST** if there is data to send (body is not null). 5. **GET** otherwise.

HOW TO GET ACCESS TO HTTPSERVLETREQUEST AND HTTPSERVLETRESPONSE

You can get access to these two using the Camel type converter system using **NOTE** You can get the request and response not just from the processor after the camel-jetty or camel-cxf endpoint.

```
HttpServletRequest request = exchange.getIn().getBody(HttpServletRequest.class);
HttpServletRequest response = exchange.getIn().getBody(HttpServletResponse.class);
```

CONFIGURING URI TO CALL

You can set the HTTP producer's URI directly form the endpoint URI. In the route below, Camel will call out to the external server, **oldhost**, using HTTP.

```
from("direct:start")
    .to("http4://oldhost");
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://activemq.apache.org/camel/schema/spring">
  <route>
    <from uri="direct:start"/>
    <to uri="http4://oldhost"/>
  </route>
</camelContext>
```

You can override the HTTP endpoint URI by adding a header with the key, **Exchange.HTTP_URI**, on the message.

```
from("direct:start")
  .setHeader(Exchange.HTTP_URI, constant("http://newhost"))
  .to("http4://oldhost");
```

In the sample above Camel will call the http://newhost despite the endpoint is configured with http4://oldhost. If the http4 endpoint is working in bridge mode, it will ignore the message header of **Exchange.HTTP_URI**.

CONFIGURING URI PARAMETERS

The **http** producer supports URI parameters to be sent to the HTTP server. The URI parameters can either be set directly on the endpoint URI or as a header with the key **Exchange.HTTP_QUERY** on the message.

```
from("direct:start")
 .to("http4://oldhost?order=123&detail=short");
```

Or options provided in a header:

```
from("direct:start")
  .setHeader(Exchange.HTTP_QUERY, constant("order=123&detail=short"))
  .to("http4://oldhost");
```

HOW TO SET THE HTTP METHOD (GET/POST/PUT/DELETE/HEAD/OPTIONS/TRACE) TO THE HTTP PRODUCER

The HTTP4 component provides a way to set the HTTP request method by setting the message header. Here is an example:

```
from("direct:start")
  .setHeader(Exchange.HTTP_METHOD,
constant(org.apache.camel.component.http4.HttpMethods.POST))
  .to("http4://www.google.com")
  .to("mock:results");
```

The method can be written a bit shorter using the string constants:

```
.setHeader("CamelHttpMethod", constant("POST"))
```

And the equivalent Spring sample:

```
<camelContext xmlns="http://activemq.apache.org/camel/schema/spring">
  <route>
    <from uri="direct:start"/>
    <setHeader headerName="CamelHttpMethod">
        <constant>POST</constant>
    </setHeader>
    <to uri="http4://www.google.com"/>
    <to uri="mock:results"/>
  </route>
</camelContext>
```

USING CLIENT TIMEOUT - SO_TIMEOUT

See the HttpSOTimeoutTest unit test.

CONFIGURING A PROXY

The HTTP4 component provides a way to configure a proxy.

```
from("direct:start")
  .to("http4://oldhost?proxyAuthHost=www.myproxy.com&proxyAuthPort=80");
```

There is also support for proxy authentication via the **proxyAuthUsername** and **proxyAuthPassword** options.

USING PROXY SETTINGS OUTSIDE OF URI

To avoid System properties conflicts, you can set proxy configuration only from the CamelContext or URI. Java DSL :

```
context.getProperties().put("http.proxyHost", "172.168.18.9");
context.getProperties().put("http.proxyPort" "8080");
```

Spring XML

```
<camelContext>
   <properties>
      <property key="http.proxyHost" value="172.168.18.9"/>
      <property key="http.proxyPort" value="8080"/>
   </properties>
</camelContext>
```

Camel will first set the settings from Java System or CamelContext Properties and then the endpoint proxy options if provided. So you can override the system properties with the endpoint options.

Notice in **Camel 2.8** there is also a **http.proxyScheme** property you can set to explicit configure the scheme to use.

CONFIGURING CHARSET

If you are using **POST** to send data you can configure the **charset** using the **Exchange** property:

```
exchange.setProperty(Exchange.CHARSET_NAME, "ISO-8859-1");
```

SAMPLE WITH SCHEDULED POLL

This sample polls the Google homepage every 10 seconds and write the page to the file **message.html**:

```
from("timer://foo?fixedRate=true&delay=0&period=10000")
   .to("http4://www.google.com")
   .setHeader(FileComponent.HEADER_FILE_NAME, "message.html")
   .to("file:target/google");
```

URI PARAMETERS FROM THE ENDPOINT URI

In this sample we have the complete URI endpoint that is just what you would have typed in a web browser. Multiple URI parameters can of course be set using the **&** character as separator, just as you would in the web browser. Camel does no tricks here.

```
// we query for Camel at the Google page
template.sendBody("http4://www.google.com/search?q=Camel", null);
```

URI PARAMETERS FROM THE MESSAGE

```
Map headers = new HashMap();
headers.put(Exchange.HTTP_QUERY, "q=Camel&lr=lang_en");
// we query for Camel and English language at Google
template.sendBody("http4://www.google.com/search", null, headers);
```

In the header value above notice that it should **not** be prefixed with **?** and you can separate parameters as usual with the **&** char.

GETTING THE RESPONSE CODE

You can get the HTTP response code from the HTTP4 component by getting the value from the Out message header with **Exchange.HTTP_RESPONSE_CODE**.

```
Exchange exchange = template.send("http4://www.google.com/search", new Processor() {
  public void process(Exchange exchange) throws Exception {
    exchange.getIn().setHeader(Exchange.HTTP_QUERY, constant("hl=en&q=activemq"));
  }
});
Message out = exchange.getOut();
int responseCode = out.getHeader(Exchange.HTTP_RESPONSE_CODE, Integer.class);
```

DISABLING COOKIES

To disable cookies you can set the HTTP Client to ignore cookies by adding this URI option: **httpClient.cookiePolicy=ignoreCookies**

ADVANCED USAGE

If you need more control over the HTTP producer you should use the **HttpComponent** where you can set various classes to give you custom behavior.

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.8, the HTTP4 component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the HTTP4 component.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);
```

```
HttpComponent httpComponent = getContext().getComponent("https4", HttpComponent.class);
httpComponent.setSslContextParameters(scp);
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
     id="sslContextParameters">
    <camel:keyManagers
       keyPassword="keyPassword">
      <camel:keyStore
         resource="/users/home/server/keystore.jks"
         password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>...
...
  <to uri="https4://127.0.0.1/mail/?sslContextParametersRef=sslContextParameters"/>...
```

CONFIGURING APACHE HTTP CLIENT DIRECTLY

Basically camel-http4 component is built on the top of Apache HttpClient. Please refer to SSL/TLS customization for details or have a look into the **org.apache.camel.component.http4.HttpsServerTestSupport** unit test base class. You can also implement a custom **org.apache.camel.component.http4.HttpClientConfigurer** to do some configuration on the http client if you need full control of it.

However if you *just* want to specify the keystore and truststore you can do this with Apache HTTP **HttpClientConfigurer**, for example:

```
KeyStore keystore = ...;
KeyStore truststore = ...;

SchemeRegistry registry = new SchemeRegistry();
registry.register(new Scheme("https", 443, new SSLSocketFactory(keystore, "mypassword",
truststore)));
```

And then you need to create a class that implements **HttpClientConfigurer**, and registers https protocol providing a keystore or truststore per example above. Then, from your camel route builder class you can hook it up like so:

```
HttpComponent httpComponent = getContext().getComponent("http4", HttpComponent.class);
httpComponent.setHttpClientConfigurer(new MyHttpClientConfigurer());
```

If you are doing this using the Spring DSL, you can specify your **HttpClientConfigurer** using the URI. For example:

```
<bean id="myHttpClientConfigurer"
 class="my.https.HttpClientConfigurer">
</bean>

<to uri="https4://myhostname.com:443/myURL?httpClientConfigurer=myHttpClientConfigurer"/>
```

As long as you implement the HttpClientConfigurer and configure your keystore and truststore as described above, it will work fine.

USING HTTPS TO AUTHENTICATE GOTCHAS

An end user reported that he had problem with authenticating with HTTPS. The problem was eventually resolved by providing a custom configured **org.apache.http.protocol.HttpContext**:

1. Create a (Spring) factory for HttpContexts:

```
public class HttpContextFactory {

  private String httpHost = "localhost";
  private String httpPort = 9001;

  private BasicHttpContext httpContext = new BasicHttpContext();
  private BasicAuthCache authCache = new BasicAuthCache();
  private BasicScheme basicAuth = new BasicScheme();

  public HttpContext getObject() {
    authCache.put(new HttpHost(httpHost, httpPort), basicAuth);

    httpContext.setAttribute(ClientContext.AUTH_CACHE, authCache);

    return httpContext;
  }

  // getter and setter
}
```

2. Declare an HttpContext in the Spring application context file:

```
<bean id="myHttpContext" factory-bean="httpContextFactory" factory-method="getObject"/>
```

3. Reference the context in the http4 URL:

```
<to uri="https4://myhostname.com:443/myURL?httpContext=myHttpContext"/>
```

USING DIFFERENT SSLCONTEXTPARAMETERS

The HTTP4 component only support one instance of **org.apache.camel.util.jsse.SSLContextParameters** per component. If you need to use 2 or more different instances, then you need to setup multiple HTTP4 components as shown below. Where we have 2 components, each using their own instance of **sslContextParameters** property.

```
<bean id="http4-foo" class="org.apache.camel.component.http4.HttpComponent">
   <property name="sslContextParameters" ref="sslContextParams1"/>
   <property name="x509HostnameVerifier" ref="hostnameVerifier"/>
</bean>

<bean id="http4-bar" class="org.apache.camel.component.http4.HttpComponent">
```

```
    <property name="sslContextParameters" ref="sslContextParams2"/>
    <property name="x509HostnameVerifier" ref="hostnameVerifier"/>
</bean>
```

CHAPTER 64. IBATIS

IBATIS

The **ibatis:** component allows you to query, poll, insert, update and delete data in a relational database using Apache iBATIS.

PREFER MYBATIS

The Apache iBatis project is no longer active. The project is moved outside Apache and is now know as the MyBatis project. Therefore we encourage users to use MyBatis instead. This camel-ibatis component will be removed in Camel 3.0.

iBatis does not support Spring 4.x. So you can only use Spring 3.x or older with iBatis.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-ibatis</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
ibatis:statementName[?options]
```

Where **statementName** is the name in the iBATIS XML configuration file which maps to the query, insert, update or delete operation you wish to evaluate.

You can append query options to the URI in the following format, **?option=value&option=value&...**

This component will by default load the iBatis SqlMapConfig file from the root of the classpath and expected named as **SqlMapConfig.xml**. It uses Spring resource loading so you can define it using **classpath**, **file** or **http** as prefix to load resources with those schemes. In Camel 2.2 you can configure this on the iBatisComponent with the **setSqlMapConfig(String)** method.

OPTIONS

Option	Type	Default	Description

consumer.onConsume	**String**	**null**	Statements to run after consuming. Can be used, for example, to update rows after they have been consumed and processed in Apache Camel. See sample later. Multiple statements can be separated with comma.
consumer.useIterator	**boolean**	**true**	If **true** each row returned when polling will be processed individually. If **false** the entire **List** of data is set as the IN body.
consumer.routeEmptyResultSet	**boolean**	**false**	**Apache Camel 2.0:** Sets whether empty result set should be routed or not. By default, empty result sets are not routed.
statementType	**StatementType**	**null**	**Apache Camel 1.6.1/2.0:** Mandatory to specify for IbatisProducer to control which iBatis **SqlMapClient** method to invoke. The enum values are: **QueryForObject**, **QueryForList**, **Insert**, **Update**, **Delete**.
maxMessagesPerPoll	**int**	**0**	**Apache Camel 2.0:** An integer to define a maximum messages to gather per poll. By default, no maximum is set. Can be used to set a limit of e.g. 1000 to avoid when starting up the server that there are thousands of files. Set a value of 0 or negative to disabled it.

isolation	**String**	**TRANSACTION_REPEATABLE_READ**	*Camel 2.9:* A String the defines the transaction isolation level of the will be used. Allowed values are TRANSACTION_NONE, TRANSACTION_READ_UNCOMMITTED, TRANSACTION_READ_COMMITTED, TRANSACTION_REPEATABLE_READ, TRANSACTION_SERIALIZABLE

isolation	**String**	**TRANSACTION_REPEATABLE_READ**	*Camel 2.9:* A String the defines the transaction isolation level of the will be used. Allowed values are TRANSACTION_NONE, TRANSACTION_READ_UNCOMMITTED, TRANSACTION_READ_COMMITTED, TRANSACTION_REPEATABLE_READ, TRANSACTION_SERIALIZABLE

MESSAGE HEADERS

Apache Camel will populate the result message, either IN or OUT with a header with the operationName used:

Header	Type	Description
CamelIBatisStatementName	**String**	Apache Camel 2.0: The **statementName** used (for example: insertAccount).
CamelIBatisResult	**Object**	Apache Camel 1.6.2/2.0: The **response** returned from iBatis in any of the operations. For instance an **INSERT** could return the auto-generated key, or number of rows etc.

MESSAGE BODY

Apache Camel 1.6.2/2.0: The response from iBatis will only be set as body if it's a **SELECT** statement. That means, for example, for **INSERT** statements Apache Camel will not replace the body. This allows you to continue routing and keep the original body. The response from iBatis is always stored in the header with the key **CamelIBatisResult**.

SAMPLES

For example if you wish to consume beans from a JMS queue and insert them into a database you could do the following:

```
from("activemq:queue:newAccount").
  to("ibatis:insertAccount?statementType=Insert");
```

Notice we have to specify the **statementType**, as we need to instruct Apache Camel which **SqlMapClient** operation to invoke.

Where **insertAccount** is the iBatis ID in the SQL map file:

```
<!-- Insert example, using the Account parameter class -->
<insert id="insertAccount" parameterClass="Account">
  insert into ACCOUNT (
    ACC_ID,
    ACC_FIRST_NAME,
    ACC_LAST_NAME,
    ACC_EMAIL
  )
  values (
    #id#, #firstName#, #lastName#, #emailAddress#
  )
</insert>
```

USING STATEMENTTYPE FOR BETTER CONTROL OF IBATIS

Available as of Apache Camel 1.6.1/2.0 When routing to an iBatis endpoint you want more fine grained control so you can control whether the SQL statement to be executed is a **SELEECT**, **UPDATE**, **DELETE** or **INSERT** etc. This is now possible in Apache Camel 1.6.1/2.0. So for instance if we want to route to an iBatis endpoint in which the IN body contains parameters to a **SELECT** statement we can do:

```
from("direct:start")
    .to("ibatis:selectAccountById?statementType=QueryForObject")
    .to("mock:result");
```

In the code above we can invoke the iBatis statement **selectAccountById** and the IN body should contain the account id we want to retrieve, such as an **Integer** type.

We can do the same for some of the other operations, such as **QueryForList**:

```
from("direct:start")
    .to("ibatis:selectAllAccounts?statementType=QueryForList")
    .to("mock:result");
```

And the same for **UPDATE**, where we can send an **Account** object as IN body to iBatis:

```
from("direct:start")
    .to("ibatis:updateAccount?statementType=Update")
    .to("mock:result");
```

SCHEDULED POLLING EXAMPLE

Since this component does not support scheduled polling, you need to use another mechanism for triggering the scheduled polls, such as the Timer or Quartz components.

In the sample below we poll the database, every 30 seconds using the Timer component and send the data to the JMS queue:

```
from("timer://pollTheDatabase?delay=30000").to("ibatis:selectAllAccounts?
statementType=QueryForList").to("activemq:queue:allAccounts");
```

And the iBatis SQL map file used:

```
<!-- Select with no parameters using the result map for Account class. -->
<select id="selectAllAccounts" resultMap="AccountResult">
  select * from ACCOUNT
</select>
```

USING ONCONSUME

This component supports executing statements **after** data have been consumed and processed by Apache Camel. This allows you to do post updates in the database. Notice all statements must be **UPDATE** statements. Apache Camel supports executing multiple statements whose name should be separated by comma.

The route below illustrates we execute the **consumeAccount** statement data is processed. This allows us to change the status of the row in the database to processed, so we avoid consuming it twice or more.

```
from("ibatis:selectUnprocessedAccounts?
consumer.onConsume=consumeAccount").to("mock:results");
```

And the statements in the sqlmap file:

```
<select id="selectUnprocessedAccounts" resultMap="AccountResult">
    select * from ACCOUNT where PROCESSED = false
</select>
```

```
<update id="consumeAccount" parameterClass="Account">
    update ACCOUNT set PROCESSED = true where ACC_ID = #id#
</update>
```

CHAPTER 65. IRC

IRC COMPONENT

The **irc** component implements an IRC (Internet Relay Chat) transport.

URI FORMAT

```
irc:nick@host[:port]/#room[?options]
```

In Apache Camel 2.0, you can also use the following format:

```
irc:nick@host[:port]?channels=#channel1,#channel2,#channel3[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Description	Example	Default Value
channels	New in 2.0, comma separated list of IRC channels to join.	**channels=#channel1,#channel2**	**null**
nickname	The nickname used in chat.	**irc:MyNick@irc.server.org#channel** or **irc:irc.server.org#channel?nickname=MyUser**	**null**
username	The IRC server user name.	**irc:MyUser@irc.server.org#channel** or **irc:irc.server.org#channel?username=MyUser**	Same as nickname.
password	The IRC server password.	**password=somepass**	*None*
realname	The IRC user's actual name.	**realname=MyName**	*None*
colors	Whether or not the server supports color codes.	**true, false**	**true**

onReply	Whether or not to handle general responses to commands or informational messages.	**true, false**	**false**
onNick	Handle nickname change events.	**true, false**	**true**
onQuit	Handle user quit events.	**true, false**	**true**
onJoin	Handle user join events.	**true, false**	**true**
onKick	Handle kick events.	**true, false**	**true**
onMode	Handle mode change events.	**true, false**	**true**
onPart	Handle user part events.	**true, false**	**true**
onTopic	Handle topic change events.	**true, false**	**true**
onPrivmsg	Handle message events.	**true, false**	**true**
trustManager	New in 2.0, the trust manager used to verify the SSL server's certificate.	**trustManager=#referenceToTrustManagerBean**	The default trust manager, which accepts *all* certificates, will be used.
keys	**Camel 2.2:** Comma separated list of IRC channel keys. Important to be listed in same order as channels. When joining multiple channels with only some needing keys just insert an empty value for that channel.	**irc:MyNick@irc.server.org/#channel?keys=chankey**	**null**

sslContextParameters	*Camel 2.9:* Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility. Note that this setting overrides the trustManager option.	\#mySslContextParameters	**null**

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.9, the IRC component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the IRC component.

PROGRAMMATIC CONFIGURATION OF THE ENDPOINT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/truststore.jks");
ksp.setPassword("keystorePassword");

TrustManagersParameters tmp = new TrustManagersParameters();
tmp.setKeyStore(ksp);

SSLContextParameters scp = new SSLContextParameters();
scp.setTrustManagers(tmp);

Registry registry = ...
registry.bind("sslContextParameters", scp);

...

from(...)
    .to("ircs://camel-prd-user@server:6669/#camel-test?nickname=camel-
prd&password=password&sslContextParameters=#sslContextParameters");
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
      id="sslContextParameters">
    <camel:trustManagers>
      <camel:keyStore
          resource="/users/home/server/truststore.jks"
```

```
        password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>...
...
  <to uri="ircs://camel-prd-user@server:6669/#camel-test?nickname=camel-
prd&password=password&sslContextParameters=#sslContextParameters"/>...
```

USING THE LEGACY BASIC CONFIGURATION OPTIONS

You can also connect to an SSL enabled IRC server, as follows:

```
ircs:host[:port]/#room?username=user&password=pass
```

By default, the IRC transport uses SSLDefaultTrustManager. If you need to provide your own custom trust manager, use the **trustManager** parameter as follows:

```
ircs:host[:port]/#room?
username=user&password=pass&trustManager=#referenceToMyTrustManagerBean
```

USING KEYS

Available as of Camel 2.2 Some irc rooms requires you to provide a key to be able to join that channel. The key is just a secret word.

For example we join 3 channels where as only channel 1 and 3 uses a key.

```
irc:nick@irc.server.org?channels=#chan1,#chan2,#chan3&keys=chan1Key,,chan3key
```

CHAPTER 66. JASYPT

JASYPT COMPONENT

Available as of Camel 2.5

Jasypt is a simplified encryption library which makes encryption and decryption easy. Camel integrates with Jasypt to allow sensitive information in Properties files to be encrypted. By dropping **camel-jasypt** on the classpath those encrypted values will automatic be decrypted on-the-fly by Camel. This ensures that human eyes can't easily spot sensitive information such as usernames and passwords.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-jasypt</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

TOOLING

The Jasypt component provides a little command line tooling to encrypt or decrypt values.

The console output the syntax and which options it provides:

```
Apache Camel Jasypt takes the following options

  -h or -help = Displays the help screen
  -c or -command <command> = Command either encrypt or decrypt
  -p or -password <password> = Password to use
  -i or -input <input> = Text to encrypt or decrypt
  -a or -algorithm <algorithm> = Optional algorithm to use
```

For example to encrypt the value **tiger** you run with the following parameters. In the apache camel kit, you cd into the lib folder and run the following java cmd, where **<CAMEL_HOME>** is where you have downloaded and extract the Camel distribution.

```
$ cd <CAMEL_HOME>/lib
$ java -jar camel-jasypt-2.5.0.jar -c encrypt -p secret -i tiger
```

Which outputs the following result

```
Encrypted text: qaEEacuW7BUti8LcMgyjKw==
```

This means the encrypted representation **qaEEacuW7BUti8LcMgyjKw==** can be decrypted back to **tiger** if you know the master password which was **secret**. If you run the tool again then the encrypted value will return a different result. But decrypting the value will always return the correct original value.

So you can test it by running the tooling using the following parameters:

```
$ cd <CAMEL_HOME>/lib
$ java -jar camel-jasypt-2.5.0.jar -c decrypt -p secret -i qaEEacuW7BUti8LcMgyjKw==
```

Which outputs the following result:

```
Decrypted text: tiger
```

The idea is then to use those encrypted values in your Properties files. Notice how the password value is encrypted and the value has the tokens surrounding **ENC(value here)**

```
# refer to a mock endpoint name by that encrypted password
cool.result=mock:{{cool.password}}

# here is a password which is encrypted
cool.password=ENC(bsW9uV37gQ0QHFu7KO03Ww==)
```

TOOLING DEPENDENCIES FOR CAMEL 2.5 AND 2.6

The tooling requires the following JARs in the classpath, which has been enlisted in the **MANIFEST.MF** file of **camel-jasypt** with **optional**/ as prefix. Hence why the java cmd above can pickup the needed JARs from the Apache Distribution in the **optional** directory.

```
jasypt-1.6.jar commons-lang-2.4.jar commons-codec-1.4.jar icu4j-4.0.1.jar
```

JAVA 1.5 USERS

The **icu4j-4.0.1.jar** is only needed when running on JDK 1.5.

This JAR is not distributed by Apache Camel and you have to download it manually and copy it to the **lib**/**optional** directory of the Camel distribution. You can download it from Apache Central Maven repo.

TOOLING DEPENDENCIES FOR CAMEL 2.7 OR BETTER

Jasypt 1.7 onwards is now fully standalone, so no additional JARs are needed.

URI OPTIONS

The options below are exclusive for the Jasypt component.

Name	Default Value	Type	Description
password	**null**	**String**	Specifies the master password to use for decrypting. This option is mandatory. See below for more details.
algorithm	**null**	**String**	Name of an optional algorithm to use.

PROTECTING THE MASTER PASSWORD

The master password used by Jasypt must be provided, so its capable of decrypting the values. However having this master password out in the opening may not be an ideal solution. Therefore you could for example provided it as a JVM system property or as a OS environment setting. If you decide to do so then the **password** option supports prefixes which dictates this. **sysenv:** means to lookup the OS system environment with the given key. **sys:** means to lookup a JVM system property.

For example you could provided the password before you start the application

```
$ export CAMEL_ENCRYPTION_PASSWORD=secret
```

Then start the application, such as running the start script.

When the application is up and running you can unset the environment

```
$ unset CAMEL_ENCRYPTION_PASSWORD
```

The **password** option is then a matter of defining as follows:
password=sysenv:CAMEL_ENCRYPTION_PASSWORD.

EXAMPLE WITH JAVA DSL

In Java DSL you need to configure Jasypt as a **JasyptPropertiesParser** instance and set it on the Properties component as show below:

```
// create the jasypt properties parser
JasyptPropertiesParser jasypt = new JasyptPropertiesParser();
// and set the master password
jasypt.setPassword("secret");

// create the properties component
PropertiesComponent pc = new PropertiesComponent();
pc.setLocation("classpath:org/apache/camel/component/jasypt/myproperties.properties");
// and use the jasypt properties parser so we can decrypt values
pc.setPropertiesParser(jasypt);

// add properties component to camel context
context.addComponent("properties", pc);
```

The properties file **myproperties.properties** then contain the encrypted value, such as shown below. Notice how the password value is encrypted and the value has the tokens surrounding **ENC(value here)**

```
# refer to a mock endpoint name by that encrypted password
cool.result=mock:{{cool.password}}

# here is a password which is encrypted
cool.password=ENC(bsW9uV37gQ0QHFu7KO03Ww==)
```

EXAMPLE WITH SPRING XML

In Spring XML you need to configure the **JasyptPropertiesParser** which is shown below. Then the Camel Properties component is told to use **jasypt** as the properties parser, which means Jasypt have its chance to decrypt values looked up in the properties.

```
<!-- define the jasypt properties parser with the given password to be used -->
<bean id="jasypt" class="org.apache.camel.component.jasypt.JasyptPropertiesParser">
    <property name="password" value="secret"/>
</bean>

<!-- define the camel properties component -->
<bean id="properties" class="org.apache.camel.component.properties.PropertiesComponent">
    <!-- the properties file is in the classpath -->
    <property name="location"
value="classpath:org/apache/camel/component/jasypt/myproperties.properties"/>
    <!-- and let it leverage the jasypt parser -->
    <property name="propertiesParser" ref="jasypt"/>
</bean>
```

The Properties component can also be inlined inside the **<camelContext>** tag which is shown below. Notice how we use the **propertiesParserRef** attribute to refer to Jasypt.

```
<!-- define the jasypt properties parser with the given password to be used -->
<bean id="jasypt" class="org.apache.camel.component.jasypt.JasyptPropertiesParser">
    <!-- password is mandatory, you can prefix it with sysenv: or sys: to indicate it should use
         an OS environment or JVM system property value, so you dont have the master password
defined here -->
    <property name="password" value="secret"/>
</bean>

<camelContext xmlns="http://camel.apache.org/schema/spring">
    <!-- define the camel properties placeholder, and let it leverage jasypt -->
    <propertyPlaceholder id="properties"
                         location="classpath:org/apache/camel/component/jasypt/myproperties.properties"
                         propertiesParserRef="jasypt"/>
    <route>
        <from uri="direct:start"/>
        <to uri="{{cool.result}}"/>
    </route>
</camelContext>
```

SEE ALSO

- Security
- Properties
- Encrypted passwords in ActiveMQ - ActiveMQ has a similar feature as this **camel-jasypt** component

CHAPTER 67. JCLOUDS

JCLOUDS COMPONENT

Available as of Camel 2.9

This component allows interaction with cloud provider key-value engines (blobstores) and compute services. The component uses jclouds which is a library that provides abstractions for blobstores and compute services.

ComputeService simplifies the task of managing machines in the cloud. For example, you can use ComputeService to start 5 machines and install your software on them. **BlobStore** simplifies dealing with key-value providers such as Amazon S3. For example, BlobStore can give you a simple Map view of a container.

The camel jclouds component allows you to use both abstractions, as it specifes two types of endpoint the JcloudsBlobStoreEndpoint and the JcloudsComputeEndpoint. You can have both producers and consumers on a blobstore endpoint but you can only have producers on compute endpoints.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-jclouds</artifactId>
   <version>x.x.x</version>
   <!-- use the same version as your Camel core version -->
</dependency>
```

CONFIGURING THE COMPONENT

The camel jclouds component will make use of multiple jclouds blobstores and compute services as long as they are passed to the component during initialization. The component accepts a list blobstores and compute services. Here is how it can be configured.

```
   <bean id="jclouds" class="org.apache.camel.component.jclouds.JcloudsComponent">
      <property name="computeServices">
         <list>
            <ref bean="computeService"/>
         </list>
      </property>
      <property name="blobStores">
         <list>
            <ref bean="blobStore"/>
         </list>
      </property>
   </bean>

   <!-- Creating a blobstore from spring / blueprint xml -->
   <bean id="blobStoreContextFactory" class="org.jclouds.blobstore.BlobStoreContextFactory"/>

   <bean id="blobStoreContext" factory-bean="blobStoreContextFactory" factory-
method="createContext">
      <constructor-arg name="provider" value="PROVIDER_NAME"/>
      <constructor-arg name="identity"  value="IDENTITY"/>
```

```
        <constructor-arg name="credential" value="CREDENTIAL"/>
    </bean>

    <bean id="blobStore" factory-bean="blobStoreContext" factory-method="getBlobStore"/>

    <!-- Creating a compute service from spring / blueprint xml -->
    <bean id="computeServiceContextFactory"
class="org.jclouds.compute.ComputeServiceContextFactory"/>

    <bean id="computeServiceContext" factory-bean="computeServiceContextFactory" factory-
method="createContext">
        <constructor-arg name="provider" value="PROVIDER_NAME"/>
        <constructor-arg name="identity"  value="IDENTITY"/>
        <constructor-arg name="credential" value="CREDENTIAL"/>
    </bean>

    <bean id="computeService" factory-bean="computeServiceContext" factory-
method="getComputeService"/>
```

As you can see the component is capable of handling multiple blobstores and compute services. The actual implementation that will be used by each endpoint is specified by passing the provider inside the URI.

URI FORMAT

```
jclouds:blobstore:[provider id][?options]
jclouds:compute:[provider id][?options]
```

The **provider id** is the name of the cloud provider that provides the target service (*e.g. aws-s3 or aws_ec2*).

You can append query options to the URI in the following format, **?option=value&option=value&...**

BLOBSTORE URI OPTIONS

Name	Default Value	Description
operation	PUT	*Producer Only*. Specifies the type of operation that will be performed to the blobstore. Allowed values are PUT, GET.
container	null	The name of the blob container.
blobName	null	The name of the blob.

You can have as many of these options as you like.

```
jclouds:blobstore:aws-s3?
operation=CamelJcloudsGet&container=mycontainer&blobName=someblob
```

For producer endpoint you can override all of the above URI options by passing the appropriate headers to the message.

MESSAGE HEADERS FOR BLOBSTORE

Header	Description
CamelJcloudsOperation	The operation to be performed on the blob. The valid options are • PUT • GET
CamelJcloudsContainer	The name of the blob container.
CamelJcloudsBlobName	The name of the blob.

BLOBSTORE USAGE SAMPLES

EXAMPLE 1: PUTTING TO THE BLOB

This example will show you how you can store any message inside a blob using the jclouds component.

```
from("direct:start")
    .to("jclouds:blobstore:aws-s3" +
        "?operation=PUT" +
        "&container=mycontainer" +
        "&blobName=myblob");
```

In the above example you can override any of the URI parameters with headers on the message. Here is how the above example would look like using xml to define our route.

```
<route>
    <from uri="direct:start"/>
    <to uri="jclouds:blobstore:aws-s3?operation=PUT&container=mycontainer&blobName=myblob"/>
</route>
```

EXAMPLE 2: GETTING/READING FROM A BLOB

This example will show you how you can read the contnet of a blob using the jclouds component.

```
from("direct:start")
    .to("jclouds:blobstore:aws-s3" +
        "?operation=GET" +
        "&container=mycontainer" +
        "&blobName=myblob");
```

In the above example you can override any of the URI parameters with headers on the message. Here is how the above example would look like using xml to define our route.

```
<route>
    <from uri="direct:start"/>
    <to uri="jclouds:blobstore:aws-s3?operation=PUT&container=mycontainer&blobName=myblob"/>
</route>
```

EXAMPLE 3: CONSUMING A BLOB

This example will consume all blob that are under the specified container. The generated exchange will contain the payload of the blob as body.

```
    from("jclouds:blobstore:aws-s3" +
        "?container=mycontainer")
        .to("direct:next");
```

You can achieve the same goal by using xml, as you can see below.

```
<route>
    <from uri="jclouds:blobstore:aws-s3?
operation=GET&container=mycontainer&blobName=myblob"/>
    <to uri="direct:next"/>
</route>
```

COMPUTE SERVICE URI OPTIONS

Name	Default Value	Description
operation	CamelJcloudsPut	Specifies the type of operation that will be performed to the compute service. Allowed values are CamelJcloudsCreateNode, CamelJcloudsRunScript, CamelJcloudsDestroyNode, CamelJcloudsListNodes, CamelJCloudsListImages, CamelJCloudsListHardware.
imageId	null	*CamelJcloudsCreateNode operation only* The imageId that will be used for creating a node. Values depend on the actual cloud provider.
locationId	null	*CamelJcloudsCreateNode operation only* The location that will be used for creating a node. Values depend on the actual cloud provider.

hardwareId	null	*CamelJcloudsCreateNode operation only* The hardware that will be used for creating a node. Values depend on the actual cloud provider.
group	null	*CamelJcloudsCreateNode operation only* The group that will be assigned to the newly created node. Values depend on the actual cloud provider.
nodeId	null	*CamelJcloudsRunScript & CamelJcloudsDestroyNode operation only* The id of the node that will run the script or destroyed.
user	null	*CamelJcloudsRunScript operation only* The user on the target node that will run the script.

The combination of parameters for use with the compute service depend on the operation.

```
jclouds:compute:aws-ec2?
operation=CamelJcloudsCreateNode&imageId=AMI_XXXXX&locationId=eu-west-1&group=mygroup
```

COMPUTE USAGE SAMPLES

Below are some examples that demonstrate the use of jclouds compute producer in java dsl and spring/blueprint xml.

EXAMPLE 1: LISTING THE AVAILABLE IMAGES.

```
    from("jclouds:compute:aws-ec2" +
        "&operation=CamelJCloudsListImages")
        .to("direct:next");
```

This will create a message that will contain the list of images inside its body. You can also do the same using xml.

```
<route>
    <from uri="jclouds:compute:aws-ec2?operation=CamelJCloudsListImages"/>
    <to uri="direct:next"/>
</route>
```

EXAMPLE 2: CREATE A NEW NODE.

```
    from("direct:start").
    to("jclouds:compute:aws-ec2" +
```

```
        "?operation=CamelJcloudsCreateNode" +
        "&imageId=AMI_XXXXX" +
        "&locationId=XXXXX" +
        "&group=myGroup");
```

This will create a new node on the cloud provider. The out message in this case will be a set of metadata that contains information about the newly created node (e.g. the ip, hostname etc). Here is the same using spring xml.

```
<route>
    <from uri="direct:start"/>
    <to uri="jclouds:compute:aws-ec2?
operation=CamelJcloudsCreateNode&imageId=AMI_XXXXX&locationId=XXXXX&group=myGroup"/>
</route>
```

EXAMPLE 3: RUN A SHELL SCRIPT ON RUNNING NODE.

```
    from("direct:start").
    to("jclouds:compute:aws-ec2" +
        "?operation=CamelJcloudsRunScript" +
        "?nodeId=10" +
        "&user=ubuntu");
```

The sample above will retrieve the body of the in message, which is expected to contain the shell script to be executed. Once the script is retrieved, it will be sent to the node for execution under the specified user (*in order case ubuntu*). The target node is specified using its **nodeId**. The nodeId can be retrieved either upon the creation of the node, it will be part of the resulting metadata or by a executing a **CamelJcloudsListNodes** operation.

Note This will require that the compute service that will be passed to the component, to be initialized with the appropriate JClouds SSH capable module (*e.g. jsch or sshj*).

Here is the same using spring xml.

```
<route>
    <from uri="direct:start"/>
    <to uri="jclouds:compute:aws-ec2?operation=CamelJcloudsRunScript&?
nodeId=10&user=ubuntu"/>
</route>
```

SEE ALSO

If you want to find out more about jclouds here is list of interesting resources Jclouds BlobStore Guide Jclouds Compute Guide

CHAPTER 68. JCR

JCR COMPONENT

The **jcr** component allows you to add/read nodes to/from a JCR compliant content repository (for example, Apache Jackrabbit) with its producer, or register an **EventListener** with the consumer.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-jcr</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
jcr://user:password@repository/path/to/node
```

CONSUMER ADDED

From **Camel 2.10** onwards you can use consumer as an EventListener in JCR or a producer to read a node by identifier.

USAGE

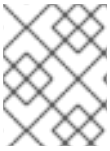
The **repository** element of the URI is used to look up the JCR **Repository** object in the Camel context registry.

PRODUCER

Name	Default Value	Description
CamelJcrOperation	**CamelJcrInsert**	CamelJcrInsert or CamelJcrGetById operation to use
CamelJcrNodeName	**null**	Used to determine the node name to use.

When a message is sent to a JCR producer endpoint:

- If the operation is CamelJcrInsert: A new node is created in the content repository, all the message headers of the IN message are transformed to **javax.jcr.Value** instances and added to the new node and the node's UUID is returned in the OUT message.
- If the operation is **CamelJcrGetById**: A new node is retrieved from the repository using the message body as node identifier.



NOTE

Please note that the JCR Producer used message properties instead of message headers in Camel versions earlier than 2.12.3.

CONSUMER

The consumer will connect to JCR periodically and return a **List<javax.jcr.observation.Event>** in the message body.

Name	Default Value	Description
eventTypes	**0**	A combination of one or more event types encoded as a bit mask value such as javax.jcr.observation.Event.NODE_ADDED, javax.jcr.observation.Event.NODE_REMOVED, etc.
deep	**false**	When it is true, events whose associated parent node is at current path or within its subgraph are received.
uuids	**null**	Only events whose associated parent node has one of the identifiers in the comma separated uuid list will be received.
nodeTypeNames	**null**	Only events whose associated parent node has one of the node types (or a subtype of one of the node types) in this list will be received.
noLocal	**false**	If **noLocal** is **true**, then events generated by the session through which the listener was registered are ignored. Otherwise, they are not ignored.
sessionLiveCheckInterval	**60000**	Interval in milliseconds to wait before each session live checking.
sessionLiveCheckIntervalOnStart	**3000**	Interval in milliseconds to wait before the first session live checking.

username		**Camel 2.15:** Allows to specify the username as a uri parameter instead of in the authority section of the uri
password		**Camel 2.15:** Allows to specify the password as a uri parameter instead of in the authority section of the uri

EXAMPLE

The snippet below creates a node named **node** under the /**home**/**test** node in the content repository. One additional property is added to the node as well: **my.contents.property** which will contain the body of the message being sent.

```
from("direct:a").setHeader(JcrConstants.JCR_NODE_NAME, constant("node"))
    .setHeader("my.contents.property", body())
    .to("jcr://user:pass@repository/home/test");
```

The following code will register an EventListener under the path import-application/inbox for Event.NODE_ADDED and Event.NODE_REMOVED events (event types 1 and 2, both masked as 3) and listening deep for all the children.

```
<route>
    <from uri="jcr://user:pass@repository/import-application/inbox?eventTypes=3&deep=true" />
    <to uri="direct:execute-import-application" />
</route>
```

CHAPTER 69. JDBC

JDBC COMPONENT

The **JDBC** component enables you to access databases through JDBC, where SQL queries (**SELECT**) and operations (**INSERT**, **UPDATE**, and so on) are sent in the message body. This component uses the standard JDBC API, unlike the SQL Component component, which uses spring-jdbc.

WARNING

This component can only be used to define producer endpoints, which means that you cannot use the JDBC component in a **from()** statement.

URI FORMAT

```
jdbc:dataSourceName[?options]
```

This component only supports producer endpoints.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
readSize	**0**	The default maximum number of rows that can be read by a polling query.
statement.<xxx>	**null**	**Apache Camel 2.1:** Sets additional options on the **java.sql.Statement** that is used behind the scenes to execute the queries. For instance, **statement.maxRows=10**. For detailed documentation, see the **java.sql.Statement** javadoc documentation.

useJDBC4ColumnNameAndLabelSemantics	**true**	Sets whether to use JDBC 4/3 column label/name semantics. You can use this option to turn it **false** in case you have issues with your JDBC driver to select data. This only applies when using **SQL SELECT** using aliases (e.g. **SQL SELECT id as identifier, name as given_name from persons**).
resetAutoCommit	**true**	**Camel 2.9:** Camel will set the autoCommit on the JDBC connection to be false, commit the change after executed the statement and reset the autoCommit flag of the connection at the end, if the resetAutoCommit is true. If the JDBC connection doesn't support to reset the autoCommit flag, you can set the resetAutoCommit flag to be false, and Camel will not try to reset the autoCommit flag. When used with XA transactions you most likely need to set it to **false** so that the transaction manager is in charge of committing this tx.
allowNamedParameters	**true**	**Camel 2.12:** Whether to allow using named parameters in the queries.
prepareStatementStrategy		**Camel 2.12:** Allows to plugin to use a custom **org.apache.camel.component.jdbc.JdbcPrepareStatementStrategy** to control preparation of the query and prepared statement.
useHeadersAsParameters	**false**	**Camel 2.12:** Set this option to **true** to use the **prepareStatementStrategy** with named parameters. This allows to define queries with named placeholders, and use headers with the dynamic values for the query placeholders.

outputType	**SelectList**	**Camel 2.12.1:** Make the output of the producer to SelectList as List of Map, or SelectOne as single Java object in the following way: a) If the query has only single column, then that JDBC Column object is returned. (such as SELECT COUNT(*) FROM PROJECT will return a Long object. b) If the query has more than one column, then it will return a Map of that result. c) If the outputClass is set, then it will convert the query result into an Java bean object by calling all the setters that match the column names. It will assume your class has a default constructor to create instance with. From **Camel 2.14** onwards, **SelectList** is also supported. d) If the query resulted in more than one rows, it throws an non-unique result exception. **Camel 2.14.0:** New **StreamList** output type value that streams the result of the query using an **Iterator<Map<String, Object>>**, it can be used along with the Splitter EIP.
outputClass	**null**	**Camel 2.12.1:** Specify the full package and class name to use as conversion when outputType=SelectOne. From **Camel 2.14** onwards then **SelectList** is also supported.
beanRowMapper		**Camel 2.12.1:** To use a custom **org.apache.camel.component.jdbc.BeanRowMapper** when using **outputClass**. The default implementation will lower case the row names and skip underscores, and dashes. For example **"CUST_ID"** is mapped as **"custId"**.

RESULT

By default, the result is returned in the OUT body as an **ArrayList<HashMap<String, Object>>**. The **List** object contains the list of rows and the **Map** objects contain each row with the **String** key as the column name.

NOTE

This component fetches **ResultSetMetaData** to be able to return the column name as the key in the **Map**.

MESSAGE HEADERS

Header	Description
CamelJdbcRowCount	If the query is a **SELECT**, the row count is returned in this OUT header.
CamelJdbcUpdateCount	If the query is an **UPDATE**, the update count is returned in this OUT header.
CamelGeneratedKeysRows	**Camel 2.10:** Rows that contains the generated kets.
CamelGeneratedKeysRowCount	**Camel 2.10:** The number of rows in the header that contains generated keys.
CamelJdbcColumnNames	**Camel 2.11.1:** The column names from the ResultSet as a **java.util.Set** type.
CamelJdbcParametes	**Camel 2.12:** A **java.util.Map** which has the headers to be used if **useHeadersAsParameters** has been enabled.

GENERATED KEYS

Available as of Camel 2.10

If you insert data using SQL INSERT, then the RDBMS may support auto generated keys. You can instruct the JDBC producer to return the generated keys in headers. To do that set the header **CamelRetrieveGeneratedKeys=true**. Then the generated keys will be provided as headers with the keys listed in the table above.

You can see more details in this unit test.

IMPORTANT

Using generated keys does not work with together with named parameters.

USING NAMED PARAMETERS

Available as of Camel 2.12

In the given route below, we want to get all the projects from the projects table. Notice the SQL query has 2 named parameters, :?lic and :?min. Camel will then lookup these parameters from the message headers. Notice in the example above we set two headers with constant value for the named parameters:

```
from("direct:projects")
   .setHeader("lic", constant("ASF"))
   .setHeader("min", constant(123))
   .setBody("select * from projects where license = :?lic and id > :?min order by id")
   .to("jdbc:myDataSource?useHeadersAsParameters=true")
```

You can also store the header values in a **java.util.Map** and store the map on the headers with the key **CamelJdbcParameters**.

SAMPLES

In the following example, we fetch the rows from the customer table.

First we register our datasource in the Apache Camel registry as **testdb**:

```
JndiRegistry reg = super.createRegistry();
reg.bind("testdb", db);
return reg;
```

Then we configure a route that routes to the JDBC component, so the SQL will be executed. Note how we refer to the **testdb** datasource that was bound in the previous step:

```
// lets add simple route
public void configure() throws Exception {
    from("direct:hello").to("jdbc:testdb?readSize=100");
}
```

Or you can create a **DataSource** in Spring like this:

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
  <route>
  <!-- trigger every second -->
     <from uri="timer://kickoff?period=1s"/>
     <setBody>
       <constant>select * from customer</constant>
     </setBody>
     <to uri="jdbc:testdb"/>
     <to uri="mock:result"/>
  </route>
</camelContext>
<!-- Just add a demo to show how to bind a date source for camel in Spring-->
<jdbc:embedded-database id="testdb" type="DERBY">
 <jdbc:script location="classpath:sql/init.sql"/>
</jdbc:embedded-database>
```

We create an endpoint, add the SQL query to the body of the IN message, and then send the exchange. The result of the query is returned in the OUT body:

```
// first we create our exchange using the endpoint
Endpoint endpoint = context.getEndpoint("direct:hello");
Exchange exchange = endpoint.createExchange();
// then we set the SQL on the in body
exchange.getIn().setBody("select * from customer order by ID");
```

```
// now we send the exchange to the endpoint, and receives the response from Camel
Exchange out = template.send(endpoint, exchange);

// assertions of the response
assertNotNull(out);
assertNotNull(out.getOut());
List<Map<String, Object>> data = out.getOut().getBody(List.class);
assertNotNull(data);
assertEquals(3, data.size());
Map<String, Object> row = data.get(0);
assertEquals("cust1", row.get("ID"));
assertEquals("jstrachan", row.get("NAME"));
row = data.get(1);
assertEquals("cust2", row.get("ID"));
assertEquals("nsandhu", row.get("NAME"));
```

If you want to work on the rows one by one instead of the entire ResultSet at once you need to use the Splitter EIP such as:

```
from("direct:hello")
// here we split the data from the testdb into new messages one by one
// so the mock endpoint will receive a message per row in the table
// the StreamList option allows to stream the result of the query without creating a List of rows
// and notice we also enable streaming mode on the splitter
.to("jdbc:testdb?outputType=StreamList")
  .split(body()).streaming()
  .to("mock:result");
```

SAMPLE - POLLING THE DATABASE EVERY MINUTE

If we want to poll a database using the JDBC component, we need to combine it with a polling scheduler such as the Timer or Quartz etc. In the following example, we retrieve data from the database every 60 seconds:

```
from("timer://foo?period=60000").setBody(constant("select * from
customer")).to("jdbc:testdb").to("activemq:queue:customers");
```

SAMPLE - MOVE DATA BETWEEN DATA SOURCES

A common use case is to query for data, process it and move it to another data source (ETL operations). In the following example, we retrieve new customer records from the source table every hour, filter/transform them and move them to a destination table:

```
from("timer://MoveNewCustomersEveryHour?period=3600000")
    .setBody(constant("select * from customer where create_time > (sysdate-1/24)"))
    .to("jdbc:testdb")
    .split(body())
  .process(new MyCustomerProcessor()) //filter/transform results as needed
        .setBody(simple("insert into processed_customer values('${body[ID]}','${body[NAME]}')"))
        .to("jdbc:testdb");
```

SEE ALSO

- SQL

CHAPTER 70. JETTY

JETTY COMPONENT

The **jetty** component provides HTTP-based endpoints for consuming and producing HTTP requests. That is, the Jetty component behaves as a simple Web server. Jetty can also be used as a http client which mean you can also use it with Camel as a producer.

STREAM

Jetty is stream based, which means the input it receives is submitted to Camel as a stream. That means you will only be able to read the content of the stream **once**. If you find a situation where the message body appears to be empty or you need to access the **Exchange.HTTP_RESPONSE_CODE** data multiple times (eg: doing multicasting, or redelivery error handling) you should use Stream Caching or convert the message body to a **String** which is safe to be re-read multiple times.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-jetty</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
jetty:http://hostname[:port][/resourceUri][?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
sessionSupport	**false**	Specifies whether to enable the session manager on the server side of Jetty.
httpClient.XXX	**null**	Configuration of Jetty's HttpClient. For example, setting **httpClient.idleTimeout=30000** sets the idle timeout to 30 seconds.

httpClient	**null**	To use a shared **org.eclipse.jetty.client.HttpClient** for all producers created by this endpoint. This option should only be used in special circumstances.
httpClientMinThreads	**null**	**Camel 2.11:Producer only**: To set a value for minimum number of threads in **HttpClient** thread pool. This setting override any setting configured on component level. Notice that both a min and max size must be configured. If not set it default to min 8 threads used in Jetty's thread pool.
httpClientMaxThreads	**null**	**Camel 2.11:Producer only**: To set a value for maximum number of threads in **HttpClient** thread pool. This setting override any setting configured on component level. Notice that both a min and max size must be configured. If not set it default to min 8 threads used in Jetty's thread pool.
httpBindingRef	**null**	Reference to an **org.apache.camel.component.http.HttpBinding** in the Registry. **HttpBinding** can be used to customize how a response should be written for the consumer.
jettyHttpBindingRef	**null**	**Camel 2.6.0+:** Reference to an **org.apache.camel.component.jetty.JettyHttpBinding** in the Registry. **JettyHttpBinding** can be used to customize how a response should be written for the producer.
matchOnUriPrefix	**false**	Whether or not the **CamelServlet** should try to find a target consumer by matching the URI prefix if no exact match is found. See here How do I let Jetty match wildcards.

handlers	**null**	Specifies a comma-delimited set of **org.mortbay.jetty.Handler** instances in your Registry (such as your Spring **ApplicationContext**). These handlers are added to the Jetty servlet context (for example, to add security).
chunked	**true**	**Camel 2.2:** If this option is false Jetty servlet will disable the HTTP streaming and set the content-length header on the response
enableJmx	**false**	**Camel 2.3:** If this option is true, Jetty JMX support will be enabled for this endpoint. See Jetty JMX support for more details.
disableStreamCache	**false**	**Camel 2.3:** Determines whether or not the raw input stream from Jetty is cached or not (Camel will read the stream into a in memory/overflow to file, Stream caching) cache. By default Camel will cache the Jetty input stream to support reading it multiple times to ensure it Camel can retrieve all data from the stream. However you can set this option to **true** when you for example need to access the raw stream, such as streaming it directly to a file or other persistent store. DefaultHttpBinding will copy the request input stream into a stream cache and put it into message body if this option is **false** to support reading the stream multiple times. If you use Jetty to bridge/proxy an endpoint then consider enabling this option to improve performance, in case you do not need to read the message payload multiple times.
throwExceptionOnFailure	**true**	Option to disable throwing the **HttpOperationFailedException** in case of failed responses from the remote server. This allows you to get all responses regardles of the HTTP status code.

transferException	**false**	**Camel 2.6:** If enabled and an Exchange failed processing on the consumer side, and if the caused Exception was send back serialized in the response as a **application/x-java-serialized-object** content type. On the producer side the exception will be deserialized and thrown as is, instead of the **HttpOperationFailedException**. The caused exception is required to be serialized.
bridgeEndpoint	**false**	>**Camel 2.1:** If the option is true , HttpProducer will ignore the Exchange.HTTP_URI header, and use the endpoint's URI for request. You may also set the **throwExceptionOnFailure** to be false to let the HttpProducer send all the fault response back. **Camel 2.3:** If the option is true, HttpProducer and CamelServlet will skip the gzip processing if the content-encoding is "gzip". Also consider setting **disableStreamCache** to true to optimize when bridging.
enableMultipartFilter	**true**	**Camel 2.5:** Whether Jetty **org.eclipse.jetty.servlets.MultiPartFilter** is enabled or not. You should set this value to **false** when bridging endpoints, to ensure multipart requests is proxied/bridged as well.
multipartFilterRef	**null**	**Camel 2.6:** Allows using a custom multipart filter. Note: setting **multipartFilterRef** forces the value of **enableMultipartFilter** to **true**.
FiltersRef	**null**	**Camel 2.9:** Allows using a custom filters which is putted into a list and can be find in the Registry

continuationTimeout	**null**	**Camel 2.6:** Allows to set a timeout in millis when using Jetty as consumer (server). By default Jetty uses 30000. You can use a value of **<= 0** to never expire. If a timeout occurs then the request will be expired and Jetty will return back a http error 503 to the client. This option is only in use when using Jetty with the Asynchronous Routing Engine.
useContinuation	**true**	**Camel 2.6:** Whether or not to use Jetty continuations for the Jetty Server.
sslContextParametersRef	**null**	**Camel 2.8:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the CAMEL:Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility.
traceEnabled	**false**	Specifies whether to enable HTTP TRACE for this Jetty consumer. By default TRACE is turned off.
headerFilterStrategy	**null**	**Camel 2.11:** Reference to a instance of **org.apache.camel.spi.HeaderFilterStrategy** in the Registry. It will be used to apply the custom headerFilterStrategy on the new create HttpJettyEndpoint.
httpMethodRestrict	**null**	*Camel 2.11: Consumer only*: Used to only allow consuming if the **HttpMethod** matches, such as **GET**/**POST**/**PUT** etc. From **Camel 2.15** onwards multiple methods can be specified separated by comma.

urlRewrite	**null**	**Camel 2.11:Producer only** Refers to a custom **org.apache.camel.component.http.UrlRewrite** which allows you to rewrite urls when you bridge/proxy endpoints. See more details at UrlRewrite and How to use Camel as a HTTP proxy between a client and server.
responseBufferSize	**null**	**Camel 2.12:** To use a custom buffer size on the **javax.servlet.ServletResponse**.
proxyHost	**null**	*Camel 2.11: Producer only* The http proxy Host url which will be used by Jetty client.
proxyPort	**null**	*Camel 2.11: Producer only* The http proxy port which will be used by Jetty client.
sendServerVersion	**true**	*Camel 2.13:* if the option is true, jetty will send the server header with the jetty version information to the client which sends the request. NOTE please make sure there is no any other camel-jetty endpoint is share the same port, otherwise this option may not work as expected.
sendDateHeader	**false**	*Camel 2.14:* if the option is true, jetty server will send the date header to the client which sends the request. NOTE please make sure there is no any other camel-jetty endpoint is share the same port, otherwise this option may not work as expected.
enableCORS	**false**	*Camel 2.15:* if the option is **true**, Jetty server will set up the **CrossOriginFilter** which supports the CORS out of box.

MESSAGE HEADERS

Camel uses the same message headers as the HTTP component. From Camel 2.2, it also uses (Exchange.HTTP_CHUNKED,CamelHttpChunked) header to turn on or turn off the chuched encoding on the camel-jetty consumer.

Camel also populates **all** request.parameter and request.headers. For example, given a client request with the URL, **http://myserver/myserver?orderid=123**, the exchange will contain a header named **orderid** with the value 123.

Starting with Camel 2.2.0, you can get the request.parameter from the message header not only from Get Method, but also other HTTP method.

USAGE

The Jetty component supports both consumer and producer endpoints. Another option for producing to other HTTP endpoints, is to use the HTTP Component

COMPONENT OPTIONS

The **JettyHttpComponent** provides the following options:

Name	Default Value	Description
enableJmx	**false**	**Camel 2.3:** If this option is true, Jetty JMX support will be enabled for this endpoint. See Jetty JMX support for more details.
sslKeyPassword	**null**	**Consumer only**: The password for the keystore when using SSL.
sslPassword	**null**	**Consumer only**: The password when using SSL.
sslKeystore	**null**	**Consumer only**: The path to the keystore.
minThreads	**null**	**Camel 2.5 Consumer only**: To set a value for minimum number of threads in server thread pool.
maxThreads	**null**	**Camel 2.5 Consumer only**: To set a value for maximum number of threads in server thread pool.
threadPool	**null**	**Camel 2.5 Consumer only**: To use a custom thread pool for the server.
sslSocketConnectors	**null**	**Camel 2.3 Consumer only:** A map which contains per port number specific SSL connectors. See section *SSL support* for more details.

socketConnectors	**null**	**Camel 2.5 Consumer only:** A map which contains per port number specific HTTP connectors. Uses the same principle as **sslSocketConnectors** and therefore see section *SSL support* for more details.
sslSocketConnectorProperties	**null**	**Camel 2.5 Consumer only**. A map which contains general SSL connector properties. See section *SSL support* for more details.
socketConnectorProperties	**null**	**Camel 2.5 Consumer only**. A map which contains general HTTP connector properties. Uses the same principle as **sslSocketConnectorProperties** and therefore see section *SSL support* for more details.
httpClient	**null**	**Deprecated:Producer only**: To use a custom **HttpClient** with the jetty producer. This option is removed from Camel 2.11 onwards, instead you can set the option on the endpoint instead.
httpClientMinThreads	**null**	**Producer only**: To set a value for minimum number of threads in **HttpClient** thread pool. Notice that both a min and max size must be configured.
httpClientMaxThreads	**null**	**Producer only**: To set a value for maximum number of threads in **HttpClient** thread pool. Notice that both a min and max size must be configured.
httpClientThreadPool	**null**	**Deprecated:Producer only**: To use a custom thread pool for the client. This option is removed from Camel 2.11 onwards.
sslContextParameters	**null**	**Camel 2.8:** To configure a custom SSL/TLS configuration options at the component level. See Using the JSSE Configuration Utility for more details.

requestBufferSize	**null**	**Camel 2.11.2:** Allows to configure a custom value of the request buffer size on the Jetty connectors.
requestHeaderSize	**null**	**Camel 2.11.2:** Allows to configure a custom value of the request header size on the Jetty connectors.
responseBufferSize	**null**	**Camel 2.11.2:** Allows to configure a custom value of the response buffer size on the Jetty connectors.
responseHeaderSize	**null**	**Camel 2.11.2:** Allows to configure a custom value of the response header size on the Jetty connectors.
proxyHost	**null**	*Camel 2.12.2/2.11.3* To use a http proxy.
proxyPort	**null**	*Camel 2.12.2/2.11.3:* To use a http proxy.
errorHandler	**null**	*Camel 2.15:* This option is used to set the ErrorHandler that Jetty server uses.

PRODUCER EXAMPLE

The following is a basic example of how to send an HTTP request to an existing HTTP endpoint.

in Java DSL

```
from("direct:start").to("jetty://http://www.google.com");
```

or in Spring XML

```
<route>
    <from uri="direct:start"/>
    <to uri="jetty://http://www.google.com"/>
<route>
```

CONSUMER EXAMPLE

In this sample we define a route that exposes a HTTP service at **http://localhost:8080/myapp/myservice**:

```
from("jetty:http://localhost:{{port}}/myapp/myservice").process(new MyBookService());
```

USAGE OF LOCALHOST

When you specify **localhost** in a URL, Camel exposes the endpoint only on the local TCP/IP network interface, so it cannot be accessed from outside the machine it operates on.

If you need to expose a Jetty endpoint on a specific network interface, the numerical IP address of this interface should be used as the host. If you need to expose a Jetty endpoint on all network interfaces, the **0.0.0.0** address should be used.

TIP

To listen across an entire URI prefix, see How do I let Jetty match wildcards.

TIP

If you actually want to expose routes by HTTP and already have a Servlet, you should instead refer to the Servlet Transport.

Our business logic is implemented in the **MyBookService** class, which accesses the HTTP request contents and then returns a response. **Note:** The **assert** call appears in this example, because the code is part of an unit test.

```
public class MyBookService implements Processor {
    public void process(Exchange exchange) throws Exception {
        // just get the body as a string
        String body = exchange.getIn().getBody(String.class);

        // we have access to the HttpServletRequest here and we can grab it if we need it
        HttpServletRequest req = exchange.getIn().getBody(HttpServletRequest.class);
        assertNotNull(req);

        // for unit testing
        assertEquals("bookid=123", body);

        // send a html response
        exchange.getOut().setBody("<html><body>Book 123 is Camel in Action</body></html>");
    }
}
```

The following sample shows a content-based route that routes all requests containing the URI parameter, **one**, to the endpoint, **mock:one**, and all others to **mock:other**.

```
from("jetty:" + serverUri)
    .choice()
    .when().simple("${header.one}").to("mock:one")
    .otherwise()
    .to("mock:other");
```

So if a client sends the HTTP request, **http://serverUri?one=hello**, the Jetty component will copy the HTTP request parameter, **one** to the exchange's **in.header**. We can then use the **simple** language to route exchanges that contain this header to a specific endpoint and all others to another. If we used a language more powerful than Simple\-\--such as- El or OGNL\--we could also test for the parameter value and do routing based on the header value as well.

SESSION SUPPORT

The session support option, **sessionSupport**, can be used to enable a **HttpSession** object and access the session object while processing the exchange. For example, the following route enables sessions:

```
<route>
   <from uri="jetty:http://0.0.0.0/myapp/myservice/?sessionSupport=true"/>
   <processRef ref="myCode"/>
<route>
```

The **myCode** Processor can be instantiated by a Spring **bean** element:

```
<bean id="myCode"class="com.mycompany.MyCodeProcessor"/>
```

Where the processor implementation can access the **HttpSession** as follows:

```
public void process(Exchange exchange) throws Exception {
   HttpSession session = exchange.getIn(HttpMessage.class).getRequest().getSession();
   ...
}
```

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.8, the Jetty component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the Jetty component.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);

JettyComponent jettyComponent = getContext().getComponent("jetty", JettyComponent.class);
jettyComponent.setSslContextParameters(scp);
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
     id="sslContextParameters">
   <camel:keyManagers
      keyPassword="keyPassword">
     <camel:keyStore
```

```
        resource="/users/home/server/keystore.jks"
        password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>...
...
  <to uri="jetty:https://127.0.0.1/mail/?sslContextParametersRef=sslContextParameters"/>
...
```

CONFIGURING JETTY DIRECTLY

Jetty provides SSL support out of the box. To enable Jetty to run in SSL mode, simply format the URI with the **https:**// prefix---for example:

```
<from uri="jetty:https://0.0.0.0/myapp/myservice/"/>
```

Jetty also needs to know where to load your keystore from and what passwords to use in order to load the correct SSL certificate. Set the following JVM System Properties:

until Camel 2.2

- **jetty.ssl.keystore** specifies the location of the Java keystore file, which contains the Jetty server's own X.509 certificate in a *key entry*. A key entry stores the X.509 certificate (effectively, the *public key*) and also its associated private key.
- **jetty.ssl.password** the store password, which is required to access the keystore file (this is the same password that is supplied to the **keystore** command's **-storepass** option).
- **jetty.ssl.keypassword** the key password, which is used to access the certificate's key entry in the keystore (this is the same password that is supplied to the **keystore** command's **-keypass** option).

from Camel 2.3 onwards

- **org.eclipse.jetty.ssl.keystore** specifies the location of the Java keystore file, which contains the Jetty server's own X.509 certificate in a *key entry*. A key entry stores the X.509 certificate (effectively, the *public key*) and also its associated private key.
- **org.eclipse.jetty.ssl.password** the store password, which is required to access the keystore file (this is the same password that is supplied to the **keystore** command's **-storepass** option).
- **org.eclipse.jetty.ssl.keypassword** the key password, which is used to access the certificate's key entry in the keystore (this is the same password that is supplied to the **keystore** command's **-keypass** option).

For details of how to configure SSL on a Jetty endpoint, read the following documentation at the Jetty Site: http://docs.codehaus.org/display/JETTY/How+to+configure+SSL

Some SSL properties aren't exposed directly by Camel, however Camel does expose the underlying SslSocketConnector, which will allow you to set properties like needClientAuth for mutual authentication requiring a client certificate or wantClientAuth for mutual authentication where a client doesn't need a certificate but can have one. There's a slight difference between the various Camel versions:

Up to Camel 2.2

```
<bean id="jetty" class="org.apache.camel.component.jetty.JettyHttpComponent">
```

```
    <property name="sslSocketConnectors">
      <map>
        <entry key="8043">
          <bean class="org.mortbay.jetty.security.SslSocketConnector">
            <property name="password"value="..."/>
            <property name="keyPassword"value="..."/>
            <property name="keystore"value="..."/>
            <property name="needClientAuth"value="..."/>
            <property name="truststore"value="..."/>
          </bean>
        </entry>
      </map>
    </property>
</bean>
```

Camel 2.3, 2.4

```
<bean id="jetty" class="org.apache.camel.component.jetty.JettyHttpComponent">
    <property name="sslSocketConnectors">
      <map>
        <entry key="8043">
          <bean class="org.eclipse.jetty.server.ssl.SslSocketConnector">
            <property name="password"value="..."/>
            <property name="keyPassword"value="..."/>
            <property name="keystore"value="..."/>
            <property name="needClientAuth"value="..."/>
            <property name="truststore"value="..."/>
          </bean>
        </entry>
      </map>
    </property>
</bean>
```

*From Camel 2.5 we switch to use SslSelectChannelConnector *

```
<bean id="jetty" class="org.apache.camel.component.jetty.JettyHttpComponent">
    <property name="sslSocketConnectors">
      <map>
        <entry key="8043">
          <bean class="org.eclipse.jetty.server.ssl.SslSelectChannelConnector">
            <property name="password"value="..."/>
            <property name="keyPassword"value="..."/>
            <property name="keystore"value="..."/>
            <property name="needClientAuth"value="..."/>
            <property name="truststore"value="..."/>
          </bean>
        </entry>
      </map>
    </property>
</bean>
```

The value you use as keys in the above map is the port you configure Jetty to listen on.

CONFIGURING GENERAL SSL PROPERTIES

Available as of Camel 2.5

Instead of a per port number specific SSL socket connector (as shown above) you can now configure general properties which applies for all SSL socket connectors (which is not explicit configured as above with the port number as entry).

```
<bean id="jetty" class="org.apache.camel.component.jetty.JettyHttpComponent">
   <property name="sslSocketConnectorProperties">
      <map>
         <entry key="password"value="..."/>
         <entry key="keyPassword"value="..."/>
         <entry key="keystore"value="..."/>
         <entry key="needClientAuth"value="..."/>
         <entry key="truststore"value="..."/>
      </map>
   </property>
</bean>
```

HOW TO OBTAIN REFERENCE TO THE X509CERTIFICATE

Jetty stores a reference to the certificate in the HttpServletRequest which you can access from code as follows:

```
HttpServletRequest req = exchange.getIn().getBody(HttpServletRequest.class);
X509Certificate cert = (X509Certificate) req.getAttribute("javax.servlet.request.X509Certificate")
```

CONFIGURING GENERAL HTTP PROPERTIES

Available as of Camel 2.5

Instead of a per port number specific HTTP socket connector (as shown above) you can now configure general properties which applies for all HTTP socket connectors (which is not explicit configured as above with the port number as entry).

```
<bean id="jetty" class="org.apache.camel.component.jetty.JettyHttpComponent">
   <property name="socketConnectorProperties">
      <map>
         <entry key="acceptors" value="4"/>
         <entry key="maxIdleTime" value="300000"/>
      </map>
   </property>
</bean>
```

OBTAINING X-FORWARDED-FOR HEADER WITH HTTPSERVLETREQUEST.GETREMOTEADDR()

If the HTTP requests are handled by an Apache server and forwarded to Jetty with **mod_proxy**, the original client IP address is in the **X-Forwarded-For** header and the **HttpServletRequest.getRemoteAddr()** will return the address of the Apache proxy.

Jetty has a forwarded property which takes the value from **X-Forwarded-For** and places it in the **HttpServletRequest remoteAddr** property. This property is not available directly through the endpoint configuration but it can be easily added using the **socketConnectors** property:

```
<bean id="jetty" class="org.apache.camel.component.jetty.JettyHttpComponent">
   <property name="socketConnectors">
      <map>
         <entry key="8080">
            <bean class="org.eclipse.jetty.server.nio.SelectChannelConnector">
               <property name="forwarded" value="true"/>
            </bean>
         </entry>
      </map>
   </property>
</bean>
```

This is particularly useful when an existing Apache server handles TLS connections for a domain and proxies them to application servers internally.

DEFAULT BEHAVIOUR FOR RETURNING HTTP STATUS CODES

The default behavior of HTTP status codes is defined by the **org.apache.camel.component.http.DefaultHttpBinding** class, which handles how a response is written and also sets the HTTP status code.

If the exchange was processed successfully, the 200 HTTP status code is returned. If the exchange failed with an exception, the 500 HTTP status code is returned, and the stacktrace is returned in the body. If you want to specify which HTTP status code to return, set the code in the **Exchange.HTTP_RESPONSE_CODE** header of the OUT message.

CUSTOMIZING HTTPBINDING

By default, Camel uses the **org.apache.camel.component.http.DefaultHttpBinding** to handle how a response is written. If you like, you can customize this behavior either by implementing your own **HttpBinding** class or by extending **DefaultHttpBinding** and overriding the appropriate methods.

The following example shows how to customize the **DefaultHttpBinding** in order to change how exceptions are returned:

```
public class MyHttpBinding extends DefaultHttpBinding {
   public MyHttpBinding(HttpEndpoint ep) {
      super(ep);
   }
   @Override
   public void doWriteExceptionResponse(Throwable exception, HttpServletResponse response)
throws IOException {
      // we override the doWriteExceptionResponse as we only want to alter the binding how
exceptions is
      // written back to the client.

      // we just return HTTP 200 so the client thinks its okay
      response.setStatus(200);
      // and we return this fixed text
```

```
        response.getWriter().write("Something went wrong but we dont care");
    }
}
```

We can then create an instance of our binding and register it in the Spring registry as follows:

```
<bean id="mybinding"class="com.mycompany.MyHttpBinding"/>
```

And then we can reference this binding when we define the route:

```
<route><from uri="jetty:http://0.0.0.0:8080/myapp/myservice?httpBindingRef=mybinding"/><to
uri="bean:doSomething"/></route>
```

JETTY HANDLERS AND SECURITY CONFIGURATION

You can configure a list of Jetty handlers on the endpoint, which can be useful for enabling advanced Jetty security features. These handlers are configured in Spring XML as follows:

```
<-- Jetty Security handling -->
<bean id="userRealm" class="org.mortbay.jetty.plus.jaas.JAASUserRealm">
    <property name="name" value="tracker-users"/>
    <property name="loginModuleName" value="ldaploginmodule"/>
</bean>

<bean id="constraint" class="org.mortbay.jetty.security.Constraint">
    <property name="name" value="BASIC"/>
    <property name="roles" value="tracker-users"/>
    <property name="authenticate" value="true"/>
</bean>

<bean id="constraintMapping" class="org.mortbay.jetty.security.ConstraintMapping">
    <property name="constraint" ref="constraint"/>
    <property name="pathSpec" value="/*"/>
</bean>

<bean id="securityHandler" class="org.mortbay.jetty.security.SecurityHandler">
    <property name="userRealm" ref="userRealm"/>
    <property name="constraintMappings" ref="constraintMapping"/>
</bean>
```

And from Camel 2.3 onwards you can configure a list of Jetty handlers as follows:

```
<-- Jetty Security handling -->
<bean id="constraint" class="org.eclipse.jetty.http.security.Constraint">
    <property name="name" value="BASIC"/>
    <property name="roles" value="tracker-users"/>
    <property name="authenticate" value="true"/>
</bean>

<bean id="constraintMapping" class="org.eclipse.jetty.security.ConstraintMapping">
    <property name="constraint" ref="constraint"/>
    <property name="pathSpec" value="/*"/>
</bean>
```

```
<bean id="securityHandler" class="org.eclipse.jetty.security.ConstraintSecurityHandler">
   <property name="authenticator">
      <bean class="org.eclipse.jetty.security.authentication.BasicAuthenticator"/>
   </property>
   <property name="constraintMappings">
      <list>
         <ref bean="constraintMapping"/>
      </list>
   </property>
</bean>
```

You can then define the endpoint as:

```
from("jetty:http://0.0.0.0:9080/myservice?handlers=securityHandler")
```

If you need more handlers, set the **handlers** option equal to a comma-separated list of bean IDs.

HOW TO RETURN A CUSTOM HTTP 500 REPLY MESSAGE

You may want to return a custom reply message when something goes wrong, instead of the default reply message Camel Jetty replies with. You could use a custom **HttpBinding** to be in control of the message mapping, but often it may be easier to use Camel's Exception Clause to construct the custom reply message. For example as show here, where we return **Dude something went wrong** with HTTP error code 500:

```
from("jetty://http://localhost:{{port}}/myserver")
   // use onException to catch all exceptions and return a custom reply message
   .onException(Exception.class)
      .handled(true)
      // create a custom failure response
      .transform(constant("Dude something went wrong"))
      // we must remember to set error code 500 as handled(true)
      // otherwise would let Camel thing its a OK response (200)
      .setHeader(Exchange.HTTP_RESPONSE_CODE, constant(500))
   .end()
   // now just force an exception immediately
   .throwException(new IllegalArgumentException("I cannot do this"));
```

MULTI-PART FORM SUPPORT

From Camel 2.3.0, camel-jetty support to multipart form post out of box. The submitted form-data are mapped into the message header. Camel-jetty creates an attachment for each uploaded file. The file name is mapped to the name of the attachment. The content type is set as the content type of the attachment file name. You can find the example here.

```
// Set the jetty temp directory which store the file for multi part form
// camel-jetty will clean up the file after it handled the request.
// The option works rightly from Camel 2.4.0
getContext().getProperties().put("CamelJettyTempDir", "target");

from("jetty://http://localhost:{{port}}/test").process(new Processor() {

   public void process(Exchange exchange) throws Exception {
      Message in = exchange.getIn();
```

```
        assertEquals("Get a wrong attachement size", 1, in.getAttachments().size());
        // The file name is attachment id
        DataHandler data = in.getAttachment("NOTICE.txt");

        assertNotNull("Should get the DataHandle NOTICE.txt", data);
        // This assert is wrong, but the correct content-type (application/octet-stream)
        // will not be returned until Jetty makes it available - currently the content-type
        // returned is just the default for FileDataHandler (for the implentation being used)
        //assertEquals("Get a wrong content type", "text/plain", data.getContentType());
        assertEquals("Got the wrong name", "NOTICE.txt", data.getName());

        assertTrue("We should get the data from the DataHandle", data.getDataSource()
            .getInputStream().available() > 0);

        // The other form date can be get from the message header
        exchange.getOut().setBody(in.getHeader("comment"));
    }

});
```

JETTY JMX SUPPORT

From Camel 2.3.0, camel-jetty supports the enabling of Jetty's JMX capabilities at the component and endpoint level with the endpoint configuration taking priority. Note that JMX must be enabled within the Camel context in order to enable JMX support in this component as the component provides Jetty with a reference to the MBeanServer registered with the Camel context. Because the camel-jetty component caches and reuses Jetty resources for a given protocol/host/port pairing, this configuration option will only be evaluated during the creation of the first endpoint to use a protocol/host/port pairing. For example, given two routes created from the following XML fragments, JMX support would remain enabled for all endpoints listening on "https://0.0.0.0".

```
<from uri="jetty:https://0.0.0.0/myapp/myservice1/?enableJmx=true"/>
```

```
<from uri="jetty:https://0.0.0.0/myapp/myservice2/?enableJmx=false"/>
```

The camel-jetty component also provides for direct configuration of the Jetty MBeanContainer. Jetty creates MBean names dynamically. If you are running another instance of Jetty outside of the Camel context and sharing the same MBeanServer between the instances, you can provide both instances with a reference to the same MBeanContainer in order to avoid name collisions when registering Jetty MBeans.

- HTTP

CHAPTER 71. JGROUPS

JGROUPS COMPONENT

Available since Camel 2.10.0

JGroups is a toolkit for reliable multicast communication. The **jgroups:** component provides exchange of messages between Camel infrastructure and JGroups clusters.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache-extra.camel</groupId>
  <artifactId>camel-jgroups</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
jgroups:clusterName[?options]
```

Where **clusterName** represents the name of the JGroups cluster the component should connect to.

OPTIONS

Name	Default Value	Description
channelProperties	**null**	*Camel 2.10.0:* Specifies configuration properties of the JChannel used by the endpoint.

USAGE

Using **jgroups** component on the consumer side of the route will capture messages received by the **JChannel** associated with the endpoint and forward them to the Camel route. JGroups consumer processes incoming messages asynchronously.

```
// Capture messages from cluster named
// 'clusterName' and send them to Camel route.
from("jgroups:clusterName").to("seda:queue");
```

Using **jgroups** component on the producer side of the route will forward body of the Camel exchanges to the **JChannel** instance managed by the endpoint.

```
// Send message to the cluster named 'clusterName'
from("direct:start").to("jgroups:clusterName");
```

CHAPTER 72. JING

JING COMPONENT

The Jing component uses the Jing Library to perform XML validation of the message body using either:

- RelaxNG XML Syntax
- RelaxNG Compact Syntax

Note that the MSV component can also support RelaxNG XML syntax.

URI FORMAT

```
rng:someLocalOrRemoteResource
rnc:someLocalOrRemoteResource
```

Where **rng** means use the RelaxNG XML Syntax whereas **rnc** means use RelaxNG Compact Syntax. The following examples show possible URI values

Example	Description
rng:foo/bar.rng	References the XML file **foo/bar.rng** on the classpath
rnc:http://foo.com/bar.rnc	References the RelaxNG Compact Syntax file from the URL, **http://foo.com/bar.rnc**.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
compactSyntax	**false**	Whether to validate using RelaxNG compact syntax or not.

EXAMPLE

The following example shows how to configure a route from the endpoint **direct:start** which then goes to one of two endpoints, either **mock:valid** or **mock:invalid** based on whether or not the XML matches the given RelaxNG Compact Syntax schema (which is supplied on the classpath).

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct:start"/>
    <doTry>
      <to uri="rnc:org/apache/camel/component/validator/jing/schema.rnc"/>
      <to uri="mock:valid"/>
```

```
            <doCatch>
               <exception>org.apache.camel.ValidationException</exception>
               <to uri="mock:invalid"/>
            </doCatch>
            <doFinally>
               <to uri="mock:finally"/>
            </doFinally>
         </doTry>
      </route>
   </camelContext>
```

CHAPTER 73. JIRA

JIRA COMPONENT

Available as of Camel 2.15

The JIRA component interacts with the JIRA API by encapsulating Atlassian's REST Java Client for JIRA. It currently provides polling for new issues and new comments. It is also able to create new issues.

Rather than webhooks, this endpoint relies on simple polling. Reasons include:

- Concern for reliability/stability
- The types of payloads we're polling aren't typically large (plus, paging is available in the API)
- The need to support apps running somewhere not publicly accessible where a webhook would fail

Note that the JIRA API is fairly expansive. Therefore, this component could be easily expanded to provide additional interactions.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-jira</artifactId>
    <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
jira://endpoint[?options]
```

MANDATORY OPTIONS:

Note that these can be configured directly through the endpoint.

Option	Description
serverUrl	JIRA host server URL
username	JIRA username
password	JIRA password

CONSUMER ENDPOINTS:

Endpoint	Context	Body Type

newIssue	polling	com.atlassian.jira.rest.client.domain.BasicIssue
newComment	polling	com.atlassian.jira.rest.client.domain.Comment

PRODUCER ENDPOINTS:

Endpoint	Body	Required Message Headers
pullRequestComment	String (issue description)	• ProjectKey (String): The project key • IssueTypeId (long): The issue type id (ex: "Bug" is typically 1 in most default configs) • IssueSummary (String): The issue summary (title)

URI OPTIONS:

Name	Default Value	Description
delay	**60**	in seconds
jql		Used by the consumer endpoints. More info below.

JQL:

The JQL URI option is used by both consumer endpoints. Theoretically, items like project key, etc. could be URI options themselves. However, by requiring the use of JQL, the consumers become much more flexible and powerful.

At the bare minimum, the consumers will require the following:

```
jira://[endpoint]?[required options]&jql=project=[project key]
```

One important thing to note is that the newIssue consumer will automatically append "ORDER BY key desc" to your JQL. This is in order to optimize startup processing, rather than having to index every single issue in the project.

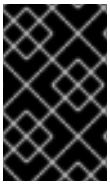
Another note is that, similarly, the newComment consumer will have to index every single issue **and** comment in the project. Therefore, for large projects, it's **vital** to optimize the JQL expression as much as possible. For example, the JIRA Toolkit Plugin includes a "Number of comments" custom field -- use

'"Number of comments" > 0' in your query. Also try to minimize based on state (status=Open), increase the polling delay, etc. Example:

> jira://[endpoint]?[required options]&jql=RAW(project=[project key] AND status in (Open, \"Coding In Progress\") AND \"Number of comments\">0)"

CHAPTER 74. JMS

JMS COMPONENT



USING ACTIVEMQ

If you are using Apache ActiveMQ, you should prefer the ActiveMQ component as it has been optimized for ActiveMQ. All of the options and samples on this page are also valid for the ActiveMQ component.

TRANSACTED AND CACHING

See section *Transactions and Cache Levels* below if you are using transactions with JMS as it can impact performance.

REQUEST/REPLY OVER JMS

Make sure to read the section *Request-reply over JMS* further below on this page for important notes about request/reply, as Camel offers a number of options to configure for performance, and clustered environments.

The JMS component allows messages to be sent to (or consumed from) a JMS Queue or Topic. The implementation of the JMS Component uses Spring's JMS support for declarative transactions, using Spring's **JmsTemplate** for sending and a **MessageListenerContainer** for consuming.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-jms</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
jms:[queue:|topic:]destinationName[?options]
```

Where **destinationName** is a JMS queue or topic name. By default, the **destinationName** is interpreted as a queue name. For example, to connect to the queue, **FOO.BAR** use:

```
jms:FOO.BAR
```

You can include the optional **queue:** prefix, if you prefer:

```
jms:queue:FOO.BAR
```

To connect to a topic, you *must* include the **topic:** prefix. For example, to connect to the topic, **Stocks.Prices**, use:

```
jms:topic:Stocks.Prices
```

You append query options to the URI using the following format, **?option=value&option=value&...**

USING ACTIVEMQ

The JMS component reuses Spring 2's **JmsTemplate** for sending messages. This is not ideal for use in a non-J2EE container and typically requires some caching in the JMS provider to avoid poor performance.

If you intend to use Apache ActiveMQ as your Message Broker - which is a good choice as ActiveMQ rocks :-) , then we recommend that you either:

- Use the ActiveMQ component, which is already optimized to use ActiveMQ efficiently
- Use the **PoolingConnectionFactory** in ActiveMQ.

TRANSACTIONS AND CACHE LEVELS

If you are consuming messages and using transactions (**transacted=true**) then the default settings for cache level can impact performance. If you are using XA transactions then you cannot cache as it can cause the XA transaction to not work properly.

If you are **not** using XA, then you should consider caching as it speeds up performance, such as setting **cacheLevelName=CACHE_CONSUMER**.

Through Camel 2.7.x, the default setting for **cacheLevelName** is **CACHE_CONSUMER**. You will need to explicitly set **cacheLevelName=CACHE_NONE**. In Camel 2.8 onwards, the default setting for **cacheLevelName** is **CACHE_AUTO**. This default auto detects the mode and sets the cache level accordingly to:

- CACHE_CONSUMER = if transacted=false
- CACHE_NONE = if transacted=true

So you can say the default setting is conservative. Consider using **cacheLevelName=CACHE_CONSUMER** if you are using non-XA transactions.

DURABLE SUBSCRIPTIONS

If you wish to use durable topic subscriptions, you need to specify both **clientId** and **durableSubscriptionName**. The value of the **clientId** must be unique and can only be used by a single JMS connection instance in your entire network. You may prefer to use Virtual Topics instead to avoid this limitation. More background on durable messaging here.

MESSAGE HEADER MAPPING

When using message headers, the JMS specification states that header names must be valid Java identifiers. So try to name your headers to be valid Java identifiers. One benefit of doing this is that you can then use your headers inside a JMS Selector (whose SQL92 syntax mandates Java identifier syntax for headers).

A simple strategy for mapping header names is used by default. The strategy is to replace any dots and hyphens in the header name as shown below and to reverse the replacement when the header name is restored from a JMS message sent over the wire. What does this mean? No more losing method names

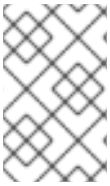
to invoke on a bean component, no more losing the filename header for the File Component, and so on.

The current header name strategy for accepting header names in Camel is as follows:

- Dots are replaced by _**DOT**_ and the replacement is reversed when Camel consume the message
- Hyphen is replaced by _**HYPHEN**_ and the replacement is reversed when Camel consumes the message

OPTIONS

You can configure many different properties on the JMS endpoint which map to properties on the JMSConfiguration POJO.



MAPPING TO SPRING JMS

Many of these properties map to properties on Spring JMS, which Camel uses for sending and receiving messages. So you can get more information about these properties by consulting the relevant Spring documentation.

The options are divided into two tables, the first one with the most common options used. The latter contains the rest.

MOST COMMONLY USED OPTIONS

Option	Default Value	Description
clientId	**null**	Sets the JMS client ID to use. Note that this value, if specified, must be unique and can only be used by a single JMS connection instance. It is typically only required for durable topic subscriptions. You may prefer to use Virtual Topics instead.
concurrentConsumers	**1**	Specifies the default number of concurrent consumers. From **Camel 2.10.3** onwards this option can also be used when doing request/reply over JMS. See also the **maxMessagesPerTask** option to control dynamic scaling up/down of threads.

disableReplyTo	**false**	If **true**, a producer will behave like a InOnly exchange with the exception that **JMSReplyTo** header is sent out and not be suppressed like in the case of **InOnly**. Like **InOnly** the producer will not wait for a reply. A consumer with this flag will behave like **InOnly**. This feature can be used to bridge **InOut** requests to another queue so that a route on the other queue will send its response directly back to the original **JMSReplyTo**.
durableSubscriptionName	**null**	The durable subscriber name for specifying durable topic subscriptions. The **clientId** option **must** be configured as well.
maxConcurrentConsumers	**1**	Specifies the maximum number of concurrent consumers. From **Camel 2.10.3** onwards this option can also be used when doing request/reply over JMS. See also the **maxMessagesPerTask** option to control dynamic scaling up/down of threads.
maxMessagesPerTask	**-1**	The number of messages per task. \-1 is unlimited. If you use a range for concurrent consumers (eg min < max), then this option can be used to set a value to eg **100** to control how fast the consumers will shrink when less work is required.

preserveMessageQos	**false**	Set to **true**, if you want to send message using the QoS settings specified on the message, instead of the QoS settings on the JMS endpoint. The following three headers are considered **JMSPriority**, **JMSDeliveryMode**, and **JMSExpiration**. You can provide all or only some of them. If not provided, Camel will fall back to use the values from the endpoint instead. So, when using this option, the headers override the values from the endpoint. The **explicitQosEnabled** option, by contrast, will only use options set on the endpoint, and not values from the message header.
replyTo	**null**	Provides an explicit ReplyTo destination, which overrides any incoming value of **Message.getJMSReplyTo()**. If you do Request Reply over JMS then **make sure** to read the section *Request-reply over JMS* further below for more details, and the **replyToType** option as well.
replyToOverride	**null**	**Camel 2.15:** Provides an explicit ReplyTo destination in the JMS message, which overrides the setting of replyTo. It is useful if you want to forward the message to a remote Queue and receive the reply message from the ReplyTo destination.

replyToType	**null**	**Camel 2.9:** Allows for explicitly specifying which kind of strategy to use for replyTo queues when doing request/reply over JMS. Possible values are: **Temporary**, **Shared**, or **Exclusive**. By default Camel will use temporary queues. However if **replyTo** has been configured, then **Shared** is used by default. This option allows you to use exclusive queues instead of shared ones. See further below for more details, and especially the notes about the implications if running in a clustered environment, and the fact that **Shared** reply queues has lower performance than its alternatives **Temporary** and **Exclusive**.
requestTimeout	**20000**	**Producer only:** The timeout for waiting for a reply when using the InOut Exchange Pattern (in milliseconds). The default is 20 seconds. From **Camel 2.13/2.12.3** onwards you can include the header **CamelJmsRequestTimeout** to override this endpoint configured timeout value, and thus have per message individual timeout values. See below in section *About time to live* for more details. See also the *requestTimeoutCheckerInterval* option.
selector	**null**	Sets the JMS Selector, which is an SQL 92 predicate that is used to filter messages within the broker. You may have to encode special characters such as = as %3D **Before Camel 2.3.0**, we don't support this option in CamelConsumerTemplate
timeToLive	**null**	When sending messages, specifies the time-to-live of the message (in milliseconds). See below in section *About time to live* for more details.

transacted	**false**	Specifies whether to use transacted mode for sending/receiving messages using the InOnly Exchange Pattern.
testConnectionOnStartup	**false**	**Camel 2.1:** Specifies whether to test the connection on startup. This ensures that when Camel starts that all the JMS consumers have a valid connection to the JMS broker. If a connection cannot be granted then Camel throws an exception on startup. This ensures that Camel is not started with failed connections. From **Camel 2.8** onwards also the JMS producers is tested as well.

ALL THE OTHER OPTIONS

Option	Default Value	Description
acceptMessagesWhileStopping	**false**	Specifies whether the consumer accept messages while it is stopping. You may consider enabling this option, if you start and stop JMS routes at runtime, while there are still messages enqued on the queue. If this option is **false**, and you stop the JMS route, then messages may be rejected, and the JMS broker would have to attempt redeliveries, which yet again may be rejected, and eventually the message may be moved at a dead letter queue on the JMS broker. To avoid this its recommended to enable this option.
acknowledgementModeName	**AUTO_ACKNOWLEDGE**	The JMS acknowledgement name, which is one of: **SESSION_TRANSACTED**, **CLIENT_ACKNOWLEDGE**, **AUTO_ACKNOWLEDGE**, **DUPS_OK_ACKNOWLEDGE**

acknowledgementMode	**\-1**	The JMS acknowledgement mode defined as an Integer. Allows you to set vendor-specific extensions to the acknowledgment mode. For the regular modes, it is preferable to use the **acknowledgementModeName** instead.
allowNullBody	**true**	**Camel 2.9.3/2.10.1:** Whether to allow sending messages with no body. If this option is **false** and the message body is null, then an **JMSException** is thrown.
alwaysCopyMessage	**false**	If **true**, Camel will always make a JMS message copy of the message when it is passed to the producer for sending. Copying the message is needed in some situations, such as when a **replyToDestinationSelectorName** is set (incidentally, Camel will set the **alwaysCopyMessage** option to **true**, if a **replyToDestinationSelectorName** is set)
asyncConsumer	**false**	**Camel 2.9:** Whether the **JmsConsumer** processes the Exchange asynchronously. If enabled then the **JmsConsumer** may pickup the next message from the JMS queue, while the previous message is being processed asynchronously (by the Asynchronous Routing Engine). This means that messages may be processed not 100% strictly in order. If disabled (as default) then the Exchange is fully processed before the **JmsConsumer** will pickup the next message from the JMS queue. Note if **transacted** has been enabled, then **asyncConsumer=true** does not run asynchronously, as transactions must be executed synchronously (Camel 3.0 may support async transactions).

asyncStartListener	**false**	**Camel 2.10:** Whether to startup the **JmsConsumer** message listener asynchronously, when starting a route. For example if a **JmsConsumer** cannot get a connection to a remote JMS broker, then it may block while retrying and/or failover. This will cause Camel to block while starting routes. By setting this option to **true**, you will let routes startup, while the **JmsConsumer** connects to the JMS broker using a dedicated thread in asynchronous mode. If this option is used, then beware that if the connection could not be established, then an exception is logged at **WARN** level, and the consumer will not be able to receive messages; You can then restart the route to retry.
asyncStopListener	**false**	**Camel 2.10:** Whether to stop the **JmsConsumer** message listener asynchronously, when stopping a route.
autoStartup	**true**	Specifies whether the consumer container should auto-startup.
cacheLevelName	CACHE_AUTO (Camel >= 2.8.0) CACHE_CONSUMER (Camel <= 2.7.1)	Sets the cache level by name for the underlying JMS resources. Possible values are: **CACHE_AUTO**, **CACHE_CONNECTION**, **CACHE_CONSUMER**, **CACHE_NONE**, and **CACHE_SESSION**. The default setting for **Camel 2.8** and newer is **CACHE_AUTO**. For **Camel 2.7.1** and older the default is **CACHE_CONSUMER**. See the Spring documentation and Transactions Cache Levels for more information.
cacheLevel		Sets the cache level by ID for the underlying JMS resources. See **cacheLevelName** option for more details.

consumerType	**Default**	The consumer type to use, which can be one of: **Simple**, **Default**, or **Custom**. The consumer type determines which Spring JMS listener to use. **Default** will use **org.springframework.jms.listener.DefaultMessageListenerContainer**, **Simple** will use **org.springframework.jms.listener.SimpleMessageListenerContainer**. When **Custom** is specified, the **MessageListenerContainerFactory** defined by the **messageListenerContainerFactoryRef** option will determine what **org.springframework.jms.listener.AbstractMessageListenerContainer** to use (**new option in Camel 2.11 and 2.10.2**). This option was temporary removed in Camel 2.7 and 2.8. But has been added back from Camel 2.9 onwards.
connectionFactory	**null**	The default JMS connection factory to use for the **listenerConnectionFactory** and **templateConnectionFactory**, if neither is specified.

defaultTaskExecutorType	(see description)	**Camel 2.10.4:** Specifies what default TaskExecutor type to use in the DefaultMessageListenerContainer, for both consumer endpoints and the ReplyTo consumer of producer endpoints. Possible values: **SimpleAsync** (uses Spring's SimpleAsyncTaskExecutor) or **ThreadPool** (uses Spring's ThreadPoolTaskExecutor with optimal values - cached threadpool-like). If not set, it defaults to the previous behaviour, which uses a cached thread pool for consumer endpoints and SimpleAsync for reply consumers. The use of **ThreadPool** is recommended to reduce "thread trash" in elastic configurations with dynamically increasing and decreasing concurrent consumers.
deliveryMode	null	*Camel 2.12.2/2.13:* Specifies the delivery mode to be used. Possibles values are those defined by **javax.jms.DeliveryMode**.
deliveryPersistent	**true**	Specifies whether persistent delivery is used by default.
destination	**null**	Specifies the JMS Destination object to use on this endpoint.
destinationName	**null**	Specifies the JMS destination name to use on this endpoint.
destinationResolver	**null**	A pluggable **org.springframework.jms.support.destination.DestinationResolver** that allows you to use your own resolver (for example, to lookup the real destination in a JNDI registry).

disableTimeToLive	**false**	**Camel 2.8:** Use this option to force disabling time to live. For example when you do request/reply over JMS, then Camel will by default use the **requestTimeout** value as time to live on the message being sent. The problem is that the sender and receiver systems have to have their clocks synchronized, so they are in sync. This is not always so easy to archive. So you can use **disableTimeToLive=true** to **not** set a time to live value on the sent message. Then the message will not expire on the receiver system. See below in section *About time to live* for more details.
eagerLoadingOfProperties	**false**	Enables eager loading of JMS properties as soon as a message is received, which is generally inefficient, because the JMS properties might not be required. But this feature can sometimes catch early any issues with the underlying JMS provider and the use of JMS properties. This feature can also be used for testing purposes, to ensure JMS properties can be understood and handled correctly.
exceptionListener	**null**	Specifies the JMS Exception Listener that is to be notified of any underlying JMS exceptions.
errorHandler	**null**	>**Camel 2.8.2, 2.9:** Specifies a **org.springframework.util.ErrorHandler** to be invoked in case of any uncaught exceptions thrown while processing a **Message**. By default these exceptions will be logged at the WARN level, if no **errorHandler** has been configured. From **Camel 2.9.1:** onwards you can configure logging level and whether stack traces should be logged using the below two options. This makes it much easier to configure, than having to code a custom **errorHandler**.

errorHandlerLoggingLevel	**WARN**	**Camel 2.9.1:** Allows to configure the default **errorHandler** logging level for logging uncaught exceptions.
errorHandlerLogStackTrace	**true**	**Camel 2.9.1:** Allows to control whether stacktraces should be logged or not, by the default **errorHandler**.
explicitQosEnabled	**false**	Set if the **deliveryMode**, **priority** or **timeToLive** qualities of service should be used when sending messages. This option is based on Spring's **JmsTemplate**. The **deliveryMode**, **priority** and **timeToLive** options are applied to the current endpoint. This contrasts with the **preserveMessageQos** option, which operates at message granularity, reading QoS properties exclusively from the Camel In message headers.
exposeListenerSession	**true**	Specifies whether the listener session should be exposed when consuming messages.
forceSendOriginalMessage	**false**	>**Camel 2.7:** When using **mapJmsMessage=false** Camel will create a new JMS message to send to a new JMS destination if you touch the headers (get or set) during the route. Set this option to **true** to force Camel to send the original JMS message that was received.
idleTaskExecutionLimit	**1**	Specifies the limit for idle executions of a receive task, not having received any message within its execution. If this limit is reached, the task will shut down and leave receiving to other executing tasks (in the case of dynamic scheduling; see the **maxConcurrentConsumers** setting).

idleConsumerLimit	**1**	**Camel 2.8.2, 2.9:** Specify the limit for the number of consumers that are allowed to be idle at any given time.
includeSentJMSMessageID	**false**	**Camel 2.10.3:** Only applicable when sending to JMS destination using InOnly (eg fire and forget). Enabling this option will enrich the Camel Exchange with the actual JMSMessageID that was used by the JMS client when the message was sent to the JMS destination.
includeAllJMSXProperties	**false**	**Camel 2.11.2/2.12:** Whether to include all JMSXxxx properties when mapping from JMS to Camel Message. Setting this to **true** will include properties such as **JMSXAppID**, and **JMSXUserID** etc. **Note:** If you are using a custom **headerFilterStrategy** then this option does not apply.
jmsMessageType	**null**	Allows you to force the use of a specific **javax.jms.Message** implementation for sending JMS messages. Possible values are: **Bytes**, **Map**, **Object**, **Stream**, **Text**. By default, Camel would determine which JMS message type to use from the In body type. This option allows you to specify it.

jmsKeyFormatStrategy	**default**	Pluggable strategy for encoding and decoding JMS keys so they can be compliant with the JMS specification. Camel provides two implementations out of the box: **default** and **passthrough**. The **default** strategy will safely marshal dots and hyphens (**.** and **\-**). The **passthrough** strategy leaves the key as is. Can be used for JMS brokers which do not care whether JMS header keys contain illegal characters. You can provide your own implementation of the **org.apache.camel.component.jms.JmsKeyFormatStrategy** and refer to it using the **\#** notation.
jmsOperations	**null**	Allows you to use your own implementation of the **org.springframework.jms.core.JmsOperations** interface. Camel uses **JmsTemplate** as default. Can be used for testing purpose, but not used much as stated in the spring API docs.
lazyCreateTransactionManager	**true**	If **true**, Camel will create a **JmsTransactionManager**, if there is no **transactionManager** injected when option **transacted=true**.
listenerConnectionFactory	**null**	The JMS connection factory used for consuming messages.
mapJmsMessage	**true**	Specifies whether Camel should auto map the received JMS message to an appropiate payload type, such as **javax.jms.TextMessage** to a **String** etc. See section about how mapping works below for more details.
maximumBrowseSize	**\-1**	Limits the number of messages fetched at most, when browsing endpoints using Browse or JMX API.

messageConverter	**null**	To use a custom Spring **org.springframework.jms.support.converter.MessageConverter** so you can be 100% in control how to map to/from a **javax.jms.Message**.
messageIdEnabled	**true**	When sending, specifies whether message IDs should be added.
messageListenerContainerFactoryRef	**null**	**Camel 2.10.2:** Registry ID of the **MessageListenerContainerFactory** used to determine what **org.springframework.jms.listener.AbstractMessageListenerContainer** to use to consume messages. Setting this will automatically set **consumerType** to **Custom**.
messageTimestampEnabled	**true**	Specifies whether timestamps should be enabled by default on sending messages.
password	**null**	The password for the connector factory.
priority	**4**	Values greater than 1 specify the message priority when sending (where 0 is the lowest priority and 9 is the highest). The **explicitQosEnabled** option **must** also be enabled in order for this option to have any effect.
pubSubNoLocal	**false**	Specifies whether to inhibit the delivery of messages published by its own connection.
receiveTimeout	**1000**	The timeout for receiving messages (in milliseconds).
recoveryInterval	**5000**	Specifies the interval between recovery attempts, i.e. when a connection is being refreshed, in milliseconds. The default is 5000 ms, that is, 5 seconds.

replyToCacheLevelName	CACHE_CONSUMER	**Camel 2.9.1:** Sets the cache level by name for the reply consumer when doing request/reply over JMS. This option only applies when using fixed reply queues (not temporary). Camel will by default use: **CACHE_CONSUMER** for exclusive or shared w/ **replyToSelectorName**. And **CACHE_SESSION** for shared without **replyToSelectorName**. Some JMS brokers such as IBM WebSphere may require to set the **replyToCacheLevelName=CACHE_NONE** to work.
replyToDestinationSelectorName	**null**	Sets the JMS Selector using the fixed name to be used so you can filter out your own replies from the others when using a shared queue (that is, if you are not using a temporary reply queue).
replyToDeliveryPersistent	**true**	Specifies whether to use persistent delivery by default for replies.
requestTimeoutCheckerInterval	**1000**	**Camel 2.9.2:** Configures how often Camel should check for timed out Exchanges when doing request/reply over JMS.By default Camel checks once per second. But if you must react faster when a timeout occurs, then you can lower this interval, to check more frequently. The timeout is determined by the option *requestTimeout*.
subscriptionDurable	**false**	**@deprecated:** Enabled by default, if you specify a **durableSubscriptionName** and a **clientId**.
taskExecutor	**null**	Allows you to specify a custom task executor for consuming messages.

taskExecutorSpring2	**null**	**Camel 2.6:** To use when using Spring 2.x with Camel. Allows you to specify a custom task executor for consuming messages.
templateConnectionFactory	**null**	The JMS connection factory used for sending messages.
transactedInOut	**false**	**@deprecated:** Specifies whether to use transacted mode for sending messages using the InOut Exchange Pattern. Applies only to producer endpoints. See section Enabling Transacted Consumption for more details.
transactionManager	**null**	The Spring transaction manager to use.
transactionName	**"JmsConsumer[destinationName]"**	The name of the transaction to use.
transactionTimeout	**null**	The timeout value of the transaction (in seconds), if using transacted mode.
transferException	**false**	If enabled and you are using Request Reply messaging (InOut) and an Exchange failed on the consumer side, then the caused **Exception** will be send back in response as a **javax.jms.ObjectMessage**. If the client is Camel, the returned **Exception** is rethrown. This allows you to use Camel JMS as a bridge in your routing - for example, using persistent queues to enable robust routing. Notice that if you also have **transferExchange** enabled, this option takes precedence. The caught exception is required to be serializable. The original **Exception** on the consumer side can be wrapped in an outer exception such as **org.apache.camel.RuntimeCamelException** when returned to the producer.

transferExchange	**false**	You can transfer the exchange over the wire instead of just the body and headers. The following fields are transferred: In body, Out body, Fault body, In headers, Out headers, Fault headers, exchange properties, exchange exception. This requires that the objects are serializable. Camel will exclude any non-serializable objects and log it at **WARN** level. You **must** enable this option on both the producer and consumer side, so Camel knows the payloads is an Exchange and not a regular payload.
username	**null**	The username for the connector factory.
useMessageIDAsCorrelationID	**false**	Specifies whether **JMSMessageID** should always be used as **JMSCorrelationID** for **InOut** messages.
useVersion102	**false**	**@deprecated (removed from Camel 2.5 onwards):** Specifies whether the old JMS API should be used.

MESSAGE MAPPING BETWEEN JMS AND CAMEL

Camel automatically maps messages between **javax.jms.Message** and **org.apache.camel.Message**.

When sending a JMS message, Camel converts the message body to the following JMS message types:

Body Type	JMS Message	Comment
String	**javax.jms.TextMessage**	
org.w3c.dom.Node	**javax.jms.TextMessage**	The DOM will be converted to **String**.
Map	**javax.jms.MapMessage**	
java.io.Serializable	**javax.jms.ObjectMessage**	
byte[]	**javax.jms.BytesMessage**	

java.io.File	**javax.jms.BytesMessage**	
java.io.Reader	**javax.jms.BytesMessage**	
java.io.InputStream	**javax.jms.BytesMessage**	
java.nio.ByteBuffer	**javax.jms.BytesMessage**	

When receiving a JMS message, Camel converts the JMS message to the following body type:

JMS Message	Body Type
javax.jms.TextMessage	**String**
javax.jms.BytesMessage	**byte[]**
javax.jms.MapMessage	**Map<String, Object>**
javax.jms.ObjectMessage	**Object**

DISABLING AUTO-MAPPING OF JMS MESSAGES

You can use the **mapJmsMessage** option to disable the auto-mapping above. If disabled, Camel will not try to map the received JMS message, but instead uses it directly as the payload. This allows you to avoid the overhead of mapping and let Camel just pass through the JMS message. For instance, it even allows you to route **javax.jms.ObjectMessage** JMS messages with classes you do **not** have on the classpath.

USING A CUSTOM MESSAGECONVERTER

You can use the **messageConverter** option to do the mapping yourself in a Spring **org.springframework.jms.support.converter.MessageConverter** class.

For example, in the route below we use a custom message converter when sending a message to the JMS order queue:

```
from("file://inbox/order").to("jms:queue:order?messageConverter=#myMessageConverter");
```

You can also use a custom message converter when consuming from a JMS destination.

CONTROLLING THE MAPPING STRATEGY SELECTED

You can use the **jmsMessageType** option on the endpoint URL to force a specific message type for all messages. In the route below, we poll files from a folder and send them as **javax.jms.TextMessage** as we have forced the JMS producer endpoint to use text messages:

```
from("file://inbox/order").to("jms:queue:order?jmsMessageType=Text");
```

You can also specify the message type to use for each messabe by setting the header with the key **CamelJmsMessageType**. For example:

```
  from("file://inbox/order").setHeader("CamelJmsMessageType",
JmsMessageType.Text).to("jms:queue:order");
```

The possible values are defined in the **enum** class, **org.apache.camel.jms.JmsMessageType**.

MESSAGE FORMAT WHEN SENDING

The exchange that is sent over the JMS wire must conform to the JMS Message spec.

For the **exchange.in.header** the following rules apply for the header **keys**:

- Keys starting with **JMS** or **JMSX** are reserved.
- **exchange.in.headers** keys must be literals and all be valid Java identifiers (do not use dots in the key name).
- Camel replaces dots & hyphens and the reverse when when consuming JMS messages: **.** is replaced by _**DOT**_ and the reverse replacement when Camel consumes the message. **-** is replaced by _**HYPHEN**_ and the reverse replacement when Camel consumes the message.
- See also the option **jmsKeyFormatStrategy**, which allows use of your own custom strategy for formatting keys.

For the **exchange.in.header**, the following rules apply for the header **values**:

- The values must be primitives or their counter objects (such as **Integer**, **Long**, **Character**). The types, **String**, **CharSequence**, **Date**, **BigDecimal** and **BigInteger** are all converted to their **toString()** representation. All other types are dropped.

Camel will log with category **org.apache.camel.component.jms.JmsBinding** at **DEBUG** level if it drops a given header value. For example:

```
2008-07-09 06:43:04,046 [main           ] DEBUG JmsBinding
  - Ignoring non primitive header: order of class:
org.apache.camel.component.jms.issues.DummyOrder with value: DummyOrder{orderId=333,
itemId=4444, quantity=2}
```

MESSAGE FORMAT WHEN RECEIVING

Camel adds the following properties to the **Exchange** when it receives a message:

Property	Type	Description
org.apache.camel.jms.replyDestination	**javax.jms.Destination**	The reply destination.

Camel adds the following JMS properties to the In message headers when it receives a JMS message:

Header	Type	Description
JMSCorrelationID	**String**	The JMS correlation ID.
JMSDeliveryMode	**int**	The JMS delivery mode.
JMSDestination	**javax.jms.Destination**	The JMS destination.
JMSExpiration	**long**	The JMS expiration.
JMSMessageID	**String**	The JMS unique message ID.
JMSPriority	**int**	The JMS priority (with 0 as the lowest priority and 9 as the highest).
JMSRedelivered	**boolean**	Is the JMS message redelivered.
JMSReplyTo	**javax.jms.Destination**	The JMS reply-to destination.
JMSTimestamp	**long**	The JMS timestamp.
JMSType	**String**	The JMS type.
JMSXGroupID	**String**	The JMS group ID.

ABOUT USING CAMEL TO SEND AND RECEIVE MESSAGES AND JMSREPLYTO

The JMS component is complex and you have to pay close attention to how it works in some cases. So this is a short summary of some of the areas/pitfalls to look for.

When Camel sends a message using its **JMSProducer**, it checks the following conditions:

- The message exchange pattern,
- Whether a **JMSReplyTo** was set in the endpoint or in the message headers,
- Whether any of the following options have been set on the JMS endpoint: **disableReplyTo**, **preserveMessageQos**, **explicitQosEnabled**.

All this can be a tad complex to understand and configure to support your use case.

JMSPRODUCER

The **JmsProducer** behaves as follows, depending on configuration:

Exchange Pattern	Other options	Description

InOut	\-	Camel will expect a reply, set a temporary **JMSReplyTo**, and after sending the message, it will start to listen for the reply message on the temporary queue.
InOut	**JMSReplyTo** is set	Camel will expect a reply and, after sending the message, it will start to listen for the reply message on the specified **JMSReplyTo** queue.
InOnly	\-	Camel will send the message and **not** expect a reply.
InOnly	**JMSReplyTo** is set	By default, Camel discards the **JMSReplyTo** destination and clears the **JMSReplyTo** header before sending the message. Camel then sends the message and does **not** expect a reply. Camel logs this in the log at **WARN** level (changed to **DEBUG** level from **Camel 2.6** onwards. You can use **preserveMessageQuo=true** to instruct Camel to keep the **JMSReplyTo**. In all situations the **JmsProducer** does **not** expect any reply and thus continue after sending the message.

JMSCONSUMER

The **JmsConsumer** behaves as follows, depending on configuration:

Exchange Pattern	Other options	Description
InOut	\-	Camel will send the reply back to the **JMSReplyTo** queue.
InOnly	\-	Camel will not send a reply back, as the pattern is *InOnly*.
\-	**disableReplyTo=true**	This option suppresses replies.

So pay attention to the message exchange pattern set on your exchanges.

If you send a message to a JMS destination in the middle of your route you can specify the exchange pattern to use, see more at Request Reply. This is useful if you want to send an **InOnly** message to a JMS topic:

```
from("activemq:queue:in")
  .to("bean:validateOrder")
  .to(ExchangePattern.InOnly, "activemq:topic:order")
  .to("bean:handleOrder");
```

REUSE ENDPOINT AND SEND TO DIFFERENT DESTINATIONS COMPUTED AT RUNTIME

If you need to send messages to a lot of different JMS destinations, it makes sense to reuse a JMS endpoint and specify the real destination in a message header. This allows Camel to reuse the same endpoint, but send to different destinations. This greatly reduces the number of endpoints created and economizes on memory and thread resources.

You can specify the destination in the following headers:

Header	Type	Description
CamelJmsDestination	**javax.jms.Destination**	A destination object.
CamelJmsDestinationName	**String**	The destination name.

For example, the following route shows how you can compute a destination at run time and use it to override the destination appearing in the JMS URL:

```
from("file://inbox")
  .to("bean:computeDestination")
  .to("activemq:queue:dummy");
```

The queue name, **dummy**, is just a placeholder. It must be provided as part of the JMS endpoint URL, but it will be ignored in this example.

In the **computeDestination** bean, specify the real destination by setting the **CamelJmsDestinationName** header as follows:

```
public void setJmsHeader(Exchange exchange) {
  String id = ....
  exchange.getIn().setHeader("CamelJmsDestinationName", "order:" + id");
}
```

Then Camel will read this header and use it as the destination instead of the one configured on the endpoint. So, in this example Camel sends the message to **activemq:queue:order:2**, assuming the **id** value was 2.

If both the **CamelJmsDestination** and the **CamelJmsDestinationName** headers are set, **CamelJmsDestination** takes priority. Keep in mind that the JMS producer removes both **CamelJmsDestination** and **CamelJmsDestinationName** headers from the exchange and do not propagate them to the created JMS message in order to avoid the accidental loops in the routes (in scenarios when the message will be forwarded to the another JMS endpoint).

CONFIGURING DIFFERENT JMS PROVIDERS

You can configure your JMS provider in Spring XML as follows:

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
    <jmxAgent id="agent" disabled="true"/>
</camelContext>

<bean id="activemq" class="org.apache.activemq.camel.component.ActiveMQComponent">
  <property name="connectionFactory">
    <bean class="org.apache.activemq.ActiveMQConnectionFactory">
      <property name="brokerURL" value="vm://localhost?
broker.persistent=false&roker.useJmx=false"/>
    </bean>
  </property>
</bean>
```

Basically, you can configure as many JMS component instances as you wish and give them **a unique name using theid** attribute. The preceding example configures an **activemq** component. You could do the same to configure MQSeries, TibCo, BEA, Sonic and so on.

Once you have a named JMS component, you can then refer to endpoints within that component using URIs. For example for the component name, **activemq**, you can then refer to destinations using the URI format, **activemq:[queue:|topic:]destinationName**. You can use the same approach for all other JMS providers.

This works by the SpringCamelContext lazily fetching components from the spring context for the scheme name you use for Endpoint URIs and having the Component resolve the endpoint URIs.

USING JNDI TO FIND THE CONNECTIONFACTORY

If you are using a J2EE container, you might need to look up JNDI to find the JMS **ConnectionFactory** rather than use the usual **<bean>** mechanism in Spring. You can do this using Spring's factory bean or the new Spring XML namespace. For example:

```
<bean id="weblogic" class="org.apache.camel.component.jms.JmsComponent">
  <property name="connectionFactory" ref="myConnectionFactory"/>
</bean>

<jee:jndi-lookup id="myConnectionFactory" jndi-name="jms/connectionFactory"/>
```

See The jee schema in the Spring reference documentation for more details about JNDI lookup.

CONCURRENT CONSUMING

A common requirement with JMS is to consume messages concurrently in multiple threads in order to make an application more responsive. You can set the **concurrentConsumers** option to specify the number of threads servicing the JMS endpoint, as follows:

```
from("jms:SomeQueue?concurrentConsumers=20").
  bean(MyClass.class);
```

You can configure this option in one of the following ways:

- On the **JmsComponent**,
- On the endpoint URI or,
- By invoking **setConcurrentConsumers()** directly on the **JmsEndpoint**.

CONCURRENT CONSUMING WITH ASYNC CONSUMER

Notice that each concurrent consumer will only pickup the next available message from the JMS broker, when the current message has been fully processed. You can set the option **asyncConsumer=true** to let the consumer pickup the next message from the JMS queue, while the previous message is being processed asynchronously (by the Asynchronous Routing Engine). See more details in the table on top of the page about the **asyncConsumer** option.

```
from("jms:SomeQueue?concurrentConsumers=20&asyncConsumer=true").
  bean(MyClass.class);
```

REQUEST-REPLY OVER JMS

Camel supports Request Reply over JMS. In essence the MEP of the Exchange should be **InOut** when you send a message to a JMS queue.

Camel offers a number of options to configure request/reply over JMS that influence performance and clustered environments. The table below summaries the options.

Option	Performance	Cluster	Description
Temporary	Fast	Yes	A temporary queue is used as reply queue, and automatic created by Camel. To use this do **not** specify a replyTo queue name. And you can optionally configure **replyToType=Temporary** to make it stand out that temporary queues are in use.

Shared	Slow	Yes	A shared persistent queue is used as reply queue. The queue must be created beforehand, although some brokers can create them on the fly such as Apache ActiveMQ. To use this you must specify the replyTo queue name. And you can optionally configure **replyToType=Shared** to make it stand out that shared queues are in use. A shared queue can be used in a clustered environment with multiple nodes running this Camel application at the same time. All using the same shared reply queue. This is possible because JMS Message selectors are used to correlate expected reply messages; this impacts performance though. JMS Message selectors is slower, and therefore not as fast as **Temporary** or **Exclusive** queues. See further below how to tweak this for better performance.

Exclusive	Fast	No	An exclusive persistent queue is used as reply queue. The queue must be created beforehand, although some brokers can create them on the fly such as Apache ActiveMQ. To use this you must specify the replyTo queue name. And you **must** configure **replyToType=Exclusive** to instruct Camel to use exclusive queues, as **Shared** is used by default, if a **replyTo** queue name was configured. When using exclusive reply queues, then JMS Message selectors are **not** in use, and therefore other applications must not use this queue as well. An exclusive queue **cannot** be used in a clustered environment with multiple nodes running this Camel application at the same time; as we do not have control if the reply queue comes back to the same node that sent the request message; that is why shared queues use JMS Message selectors to make sure of this. **Though** if you configure each Exclusive reply queue with an unique name per node, then you can run this in a clustered environment. As then the reply message will be sent back to that queue for the given node, that awaits the reply message.

concurrentConsumers	Fast	Yes	**Camel 2.10.3:** Allows to process reply messages concurrently using concurrent message listeners in use. You can specify a range using the **concurrentConsumers** and **maxConcurrentConsumers** options. **Notice:** That using **Shared** reply queues may not work as well with concurrent listeners, so use this option with care.
maxConcurrentConsumers	Fast	Yes	**Camel 2.10.3:** Allows to process reply messages concurrently using concurrent message listeners in use. You can specify a range using the **concurrentConsumers** and **maxConcurrentConsumers** options. **Notice:** That using **Shared** reply queues may not work as well with concurrent listeners, so use this option with care.

The **JmsProducer** detects the **InOut** and provides a **JMSReplyTo** header with the reply destination to be used. By default Camel uses a temporary queue, but you can use the **replyTo** option on the endpoint to specify a fixed reply queue (see more below about fixed reply queue).

Camel will automatic setup a consumer which listen on the reply queue, so you should **not** do anything. This consumer is a Spring **DefaultMessageListenerContainer** which listen for replies. However it's fixed to 1 concurrent consumer. That means replies will be processed in sequence as there are only 1 thread to process the replies. If you want to process replies faster, then we need to use concurrency. But **not** using the **concurrentConsumer** option. We should use the **threads** from the Camel DSL instead, as shown in the route below:

```
from(xxx)
.inOut().to("activemq:queue:foo")
.threads(5)
.to(yyy)
.to(zzz);
```

In this route we instruct Camel to route replies asynchronously using a thread pool with 5 threads.

TIP

Instead of using threads, then use **concurrentConsumers** option if using Camel 2.10.3 or better. See further below.

From Camel 2.10.3 onwards you can now configure the listener to use concurrent threads using the **concurrentConsumers** and **maxConcurrentConsumers** options. This allows you to easier configure this in Camel as shown below:

```
from(xxx)
.inOut().to("activemq:queue:foo?concurrentConsumers=5")
.to(yyy)
.to(zzz);
```

REQUEST-REPLY OVER JMS AND USING A SHARED FIXED REPLY QUEUE

If you use a fixed reply queue when doing Request Reply over JMS as shown in the example below, then pay attention.

```
from(xxx)
.inOut().to("activemq:queue:foo?replyTo=bar")
.to(yyy)
```

In this example the fixed reply queue named "bar" is used. By default Camel assumes the queue is shared when using fixed reply queues, and therefore it uses a **JMSSelector** to only pickup the expected reply messages (eg based on the **JMSCorrelationID**). See next section for exclusive fixed reply queues. That means its not as fast as temporary queues. You can speedup how often Camel will pull for reply messages using the **receiveTimeout** option. By default its 1000 millis. So to make it faster you can set it to 250 millis to pull 4 times per second as shown:

```
from(xxx)
.inOut().to("activemq:queue:foo?replyTo=bar&receiveTimeout=250")
.to(yyy)
```

Notice this will cause the Camel to send pull requests to the message broker more frequent, and thus require more network traffic. It is generally recommended to use temporary queues if possible.

REQUEST-REPLY OVER JMS AND USING AN EXCLUSIVE FIXED REPLY QUEUE

Available as of Camel 2.9

In the previous example, Camel would anticipate the fixed reply queue named "bar" was shared, and thus it uses a **JMSSelector** to only consume reply messages which it expects. However there is a drawback doing this as JMS selectos is slower. Also the consumer on the reply queue is slower to update with new JMS selector ids. In fact it only updates when the **receiveTimeout** option times out, which by default is 1 second. So in theory the reply messages could take up till about 1 sec to be detected. On the other hand if the fixed reply queue is exclusive to the Camel reply consumer, then we can avoid using the JMS selectors, and thus be more performant. In fact as fast as using temporary queues. So in **Camel 2.9** onwards we introduced the **ReplyToType** option which you can configure to **Exclusive** to tell Camel that the reply queue is exclusive as shown in the example below:

```
from(xxx)
.inOut().to("activemq:queue:foo?replyTo=bar&replyToType=Exclusive")
.to(yyy)
```

Mind that the queue must be exclusive to each and every endpoint. So if you have two routes, then they each need an unique reply queue as shown in the next example:

```
from(xxx)
.inOut().to("activemq:queue:foo?replyTo=bar&replyToType=Exclusive")
.to(yyy)

from(aaa)
.inOut().to("activemq:queue:order?replyTo=order.reply&replyToType=Exclusive")
.to(bbb)
```

The same applies if you run in a clustered environment. Then each node in the cluster must use an unique reply queue name. As otherwise each node in the cluster may pickup messages which was intended as a reply on another node. For clustered environments its recommended to use shared reply queues instead.

SYNCHRONIZING CLOCKS BETWEEN SENDERS AND RECEIVERS

When doing messaging between systems, its desirable that the systems have synchronized clocks. For example when sending a JMS message, then you can set a time to live value on the message. Then the receiver can inspect this value, and determine if the message is already expired, and thus drop the message instead of consume and process it. However this requires that both sender and receiver have synchronized clocks. If you are using ActiveMQ then you can use the timestamp plugin to synchronize clocks.

ABOUT TIME TO LIVE

Read first above about synchronized clocks.

When you do request/reply (InOut) over JMS with Camel then Camel uses a timeout on the sender side, which is default 20 seconds from the **requestTimeout** option. You can control this by setting a higher/lower value. However the time to live value is still set on the JMS message being send. So that requires the clocks to be synchronized between the systems. If they are not, then you may want to disable the time to live value being set. This is now possible using the **disableTimeToLive** option from **Camel 2.8** onwards. So if you set this option to **disableTimeToLive=true**, then Camel does **not** set any time to live value when sending JMS messages. **But** the request timeout is still active. So for example if you do request/reply over JMS and have disabled time to live, then Camel will still use a timeout by 20 seconds (the **requestTimeout** option). That option can of course also be configured. So the two options **requestTimeout** and **disableTimeToLive** gives you fine grained control when doing request/reply.

From **Camel 2.13/2.12.3** onwards you can provide a header in the message to override and use as the request timeout value instead of the endpoint configured value. For example:

```
from("direct:someWhere")
  .to("jms:queue:foo?replyTo=bar&requestTimeout=30s")
  .to("bean:processReply");
```

In the route above we have a endpoint configured **requestTimeout** of 30 seconds. So Camel will wait up till 30 seconds for that reply message to come back on the bar queue. If no reply message is received then a **org.apache.camel.ExchangeTimedOutException** is set on the Exchange and Camel continues

routing the message, which would then fail due the exception, and Camel's error handler reacts.

If you want to use a per message timeout value, you can set the header with key **org.apache.camel.component.jms.JmsConstants#JMS_REQUEST_TIMEOUT** which has constant value **"CamelJmsRequestTimeout"** with a timeout value as long type.

For example we can use a bean to compute the timeout value per individual message, such as calling the **whatIsTheTimeout** method on the service bean as shown below:

```
from("direct:someWhere")
  .setHeader("CamelJmsRequestTimeout", method(ServiceBean.class, "whatIsTheTimeout"))
  .to("jms:queue:foo?replyTo=bar&requestTimeout=30s")
  .to("bean:processReply");
```

When you do fire and forget (InOut) over JMS with Camel then Camel by default does **not** set any time to live value on the message. You can configure a value by using the **timeToLive** option. For example to indicate a 5 sec., you set **timeToLive=5000**. The option **disableTimeToLive** can be used to force disabling the time to live, also for InOnly messaging. The **requestTimeout** option is not being used for InOnly messaging.

ENABLING TRANSACTED CONSUMPTION

A common requirement is to consume from a queue in a transaction and then process the message using the Camel route. To do this, just ensure that you set the following properties on the component/endpoint:

- **transacted** = true
- **transactionManager** = a *Transsaction Manager* \- typically the **JmsTransactionManager**

See the Transactional Client EIP pattern for further details.

TRANSACTIONS AND [REQUEST REPLY] OVER JMS

When using Request Reply over JMS you cannot use a single transaction; JMS will not send any messages until a commit is performed, so the server side won't receive anything at all until the transaction commits. Therefore to use Request Reply you must commit a transaction after sending the request and then use a separate transaction for receiving the response.

To address this issue the JMS component uses different properties to specify transaction use for oneway messaging and request reply messaging:

The **transacted** property applies **only** to the InOnly message Exchange Pattern (MEP).

The **transactedInOut** property applies to the InOut(Request Reply) message Exchange Pattern (MEP).

If you want to use transactions for Request Reply(InOut MEP), you **must** set **transactedInOut=true**.

Available as of Camel 2.10

You can leverage the DMLC transacted session API using the following properties on component/endpoint:

- **transacted** = true
- **lazyCreateTransactionManager** = false

The benefit of doing so is that the cacheLevel setting will be honored when using local transactions without a configured TransactionManager. When a TransactionManager is configured, no caching happens at DMLC level and its necessary to rely on a pooled connection factory. For more details about this kind of setup see here and here.

USING JMSREPLYTO FOR LATE REPLIES

When using Camel as a JMS listener, it sets an Exchange property with the value of the ReplyTo **javax.jms.Destination** object, having the key **ReplyTo**. You can obtain this **Destination** as follows:

```
Destination replyDestination =
exchange.getIn().getHeader(JmsConstants.JMS_REPLY_DESTINATION, Destination.class);
```

And then later use it to send a reply using regular JMS or Camel.

```
// we need to pass in the JMS component, and in this sample we use ActiveMQ
JmsEndpoint endpoint = JmsEndpoint.newInstance(replyDestination, activeMQComponent);
// now we have the endpoint we can use regular Camel API to send a message to it
template.sendBody(endpoint, "Here is the late reply.");
```

A different solution to sending a reply is to provide the **replyDestination** object in the same Exchange property when sending. Camel will then pick up this property and use it for the real destination. The endpoint URI must include a dummy destination, however. For example:

```
// we pretend to send it to some non existing dummy queue
template.send("activemq:queue:dummy, new Processor() {
    public void process(Exchange exchange) throws Exception {
        // and here we override the destination with the ReplyTo destination object so the message is
sent to there instead of dummy
        exchange.getIn().setHeader(JmsConstants.JMS_DESTINATION, replyDestination);
        exchange.getIn().setBody("Here is the late reply.");
    }
}
```

USING A REQUEST TIMEOUT

In the sample below we send a Request Reply style message Exchange (we use the **requestBody** method = **InOut**) to the slow queue for further processing in Camel and we wait for a return reply:

```
// send a in-out with a timeout for 5 sec
Object out = template.requestBody("activemq:queue:slow?requestTimeout=5000", "Hello World");
```

SAMPLES

JMS is used in many examples for other components as well. But we provide a few samples below to get started.

RECEIVING FROM JMS

In the following sample we configure a route that receives JMS messages and routes the message to a POJO:

```
    from("jms:queue:foo").
      to("bean:myBusinessLogic");
```

You can of course use any of the EIP patterns so the route can be context based. For example, here's how to filter an order topic for the big spenders:

```
from("jms:topic:OrdersTopic").
  filter().method("myBean", "isGoldCustomer").
    to("jms:queue:BigSpendersQueue");
```

SENDING TO A JMS

In the sample below we poll a file folder and send the file content to a JMS topic. As we want the content of the file as a **TextMessage** instead of a **BytesMessage**, we need to convert the body to a **String**:

```
from("file://orders").
  convertBodyTo(String.class).
  to("jms:topic:OrdersTopic");
```

USING ANNOTATIONS

Camel also has annotations so you can use POJO Consuming and POJO Producing.

SPRING DSL SAMPLE

The preceding examples use the Java DSL. Camel also supports Spring XML DSL. Here is the big spender sample using Spring DSL:

```
<route>
  <from uri="jms:topic:OrdersTopic"/>
  <filter>
    <method bean="myBean" method="isGoldCustomer"/>
    <to uri="jms:queue:BigSpendersQueue"/>
  </filter>
</route>
```

OTHER SAMPLES

JMS appears in many of the examples for other components and EIP patterns, as well in this Camel documentation. So feel free to browse the documentation. If you have time, check out the this tutorial that uses JMS but focuses on how well Spring Remoting and Camel works together Tutorial-JmsRemoting.

USING JMS AS A DEAD LETTER QUEUE STORING EXCHANGE

Normally, when using JMS as the transport, it only transfers the body and headers as the payload. If you want to use JMS with a Dead Letter Channel, using a JMS queue as the Dead Letter Queue, then normally the caused Exception is not stored in the JMS message. You can, however, use the **transferExchange** option on the JMS dead letter queue to instruct Camel to store the entireExchange in

the queue as a **javax.jms.ObjectMessage** that holds a **org.apache.camel.impl.DefaultExchangeHolder**. This allows you to consume from the Dead Letter Queue and retrieve the caused exception from the Exchange property with the key **Exchange.EXCEPTION_CAUGHT**. The demo below illustrates this:

```
// setup error handler to use JMS as queue and store the entire Exchange
errorHandler(deadLetterChannel("jms:queue:dead?transferExchange=true"));
```

Then you can consume from the JMS queue and analyze the problem:

```
from("jms:queue:dead").to("bean:myErrorAnalyzer");

// and in our bean
String body = exchange.getIn().getBody();
Exception cause = exchange.getProperty(Exchange.EXCEPTION_CAUGHT, Exception.class);
// the cause message is
String problem = cause.getMessage();
```

USING JMS AS A DEAD LETTER CHANNEL STORING ERROR ONLY

You can use JMS to store the cause error message or to store a custom body, which you can initialize yourself. The following example uses the Message Translator EIP to do a transformation on the failed exchange before it is moved to the JMS dead letter queue:

```
// we sent it to a seda dead queue first
errorHandler(deadLetterChannel("seda:dead"));

// and on the seda dead queue we can do the custom transformation before its sent to the JMS queue
from("seda:dead").transform(exceptionMessage()).to("jms:queue:dead");
```

Here we only store the original cause error message in the transform. You can, however, use any Expression to send whatever you like. For example, you can invoke a method on a Bean or use a custom processor.

SENDING AN INONLY MESSAGE AND KEEPING THE JMSREPLYTO HEADER

When sending to a JMS destination using **camel-jms** the producer will use the MEP to detect if its InOnly or InOut messaging. However there can be times where you want to send an InOnly message but keeping the JMSReplyTo header. To do so you have to instruct Camel to keep it, otherwise the JMSReplyTo header will be dropped.

For example to send an InOnly message to the foo queue, but with a JMSReplyTo with bar queue you can do as follows:

```
template.send("activemq:queue:foo?preserveMessageQos=true", new Processor() {
    public void process(Exchange exchange) throws Exception {
        exchange.getIn().setBody("World");
        exchange.getIn().setHeader("JMSReplyTo", "bar");
    }
});
```

Notice we use **preserveMessageQos=true** to instruct Camel to keep the JMSReplyTo header.

SETTING JMS PROVIDER OPTIONS ON THE DESTINATION

Some JMS providers, like IBM's WebSphere MQ need options to be set on the JMS destination. For example, you may need to specify the targetClient option. Since targetClient is a WebSphere MQ option and not a Camel URI option, you need to set that on the JMS destination name like so:

```
...
.setHeader("CamelJmsDestinationName", constant("queue:///MY_QUEUE?targetClient=1"))
.to("wmq:queue:MY_QUEUE?useMessageIDAsCorrelationID=true");
```

Some versions of WMQ won't accept this option on the destination name and you will get an exception like:

```
com.ibm.msg.client.jms.DetailedJMSException: JMSCC0005: The specified value
'MY_QUEUE?targetClient=1' is not allowed for 'XMSC_DESTINATION_NAME'
```

A workaround is to use a custom DestinationResolver:

```
JmsComponent wmq = new JmsComponent(connectionFactory);

wmq.setDestinationResolver(new DestinationResolver(){
    public Destination resolveDestinationName(Session session, String destinationName, boolean
pubSubDomain) throws JMSException {
        MQQueueSession wmqSession = (MQQueueSession) session;
        return wmqSession.createQueue("queue:///" + destinationName + "?targetClient=1");
    }
});
```

- Transactional Client
- Bean Integration
- Tutorial-JmsRemoting
- JMSTemplate gotchas

CHAPTER 75. JMX

JMX COMPONENT

The JMX component enables consumers to subscribe to an MBean's notifications. The component supports passing the **Notification** object directly through the exchange or serializing it to XML according to the schema provided within this project. This is a consumer-only component. Exceptions are thrown if you attempt to create a producer for it.

URI FORMAT

The component can connect to the local platform MBean server with the following URI:

```
jmx://platform?options
```

A remote MBean server URL can be specified after the **jmx:** scheme prefix, as follows:

```
jmx:service:jmx:rmi:///jndi/rmi://localhost:1099/jmxrmi?options
```

You can append query options to the URI in the following format, **?option=value&option=value&...**.

URI OPTIONS

Property	Required	Default	Description
format		**xml**	Format for the message body. Either **xml** or **raw**. If **xml**, the notification is serialized to XML. If **raw**, the raw java object is set as the body.
password			Credentials for making a remote connection.
objectDomain	*Yes*		The domain of the MBean you are connecting to.
objectName			The name key for the MBean you are connecting to. Either this property of a list of keys must be provided (but not both). For more details, see the section called “ObjectName Construction”.

notificationFilter			Reference to a bean that implements the **NotificationFilter** interface. The ***#beanID*** syntax should be used to reference the bean in the registry.
handback			Value to hand back to the listener when a notification is received. This value will be put into the **jmx.handback** message header.
testConnectionOnStartup		**true**	*Camel 2.11* If true, the consumer will throw an exception when unable to establish the JMX connection upon startup. If false, the consumer will attempt to establish the JMX connection every 'x' seconds until the connection is made - where 'x' is the configured *reconnectDelay*.
reconnectOnConnectionFailure		**false**	*Camel 2.11* If true, the consumer will attempt to reconnect to the JMX server when any connection failure occurs. The consumer will attempt to re-establish the JMX connection every 'x' seconds until the connection is made--where 'x' is the configured *reconnectDelay*.
reconnectDelay		**10**	*Camel 2.11* The number of seconds to wait before retrying creation of the initial connection or before reconnecting a lost connection.

OBJECTNAME CONSTRUCTION

The URI must always have the **objectDomain** property. In addition, the URI must contain either **objectName** or one or more properties that start with **key**.

DOMAIN WITH NAME PROPERTY

When the **objectName** property is provided, the following constructor is used to build the **ObjectName** instance for the MBean:

```
ObjectName(String domain, String key, String value)
```

The **key** value in the preceding constructor must be **name** and the value is the value of the **objectName** property.

DOMAIN WITH HASHTABLE

```
ObjectName(String domain, Hashtable<String,String> table)
```

The **Hashtable** is constructed by extracting properties that start with **key**. The properties will have the **key** prefix stripped prior to building the **Hashtable**. This allows the URI to contain a variable number of properties to identify the MBean.

EXAMPLE

```
from("jmx:platform?objectDomain=jmxExample&key.name=simpleBean").
        to("log:jmxEvent");
```

FULL EXAMPLE

A complete example using the JMX component is available under the **examples/camel-example-jmx** directory.

MONITOR TYPE CONSUMER

Available as of Camel 2.8 One popular use case for JMX is creating a monitor bean to monitor an attribute on a deployed bean. This requires writing a few lines of Java code to create the JMX monitor and deploy it. As shown below:

```
CounterMonitor monitor = new CounterMonitor();
monitor.addObservedObject(makeObjectName("simpleBean"));
monitor.setObservedAttribute("MonitorNumber");
monitor.setNotify(true);
monitor.setInitThreshold(1);
monitor.setGranularityPeriod(500);
registerBean(monitor, makeObjectName("counter"));
monitor.start();
```

The 2.8 version introduces a new type of consumer that automatically creates and registers a monitor bean for the specified objectName and attribute. Additional endpoint attributes allow the user to specify the attribute to monitor, type of monitor to create, and any other required properties. The code snippet

above is condensed into a set of endpoint properties. The consumer uses these properties to create the CounterMonitor, register it, and then subscribe to its changes. All of the JMX monitor types are supported.

EXAMPLE

```
from("jmx:platform?objectDomain=myDomain&objectName=simpleBean&" +
    "monitorType=counter&observedAttribute=MonitorNumber&initThreshold=1&" +
    "granularityPeriod=500").to("mock:sink");
```

The example above will cause a new Monitor Bean to be created and depoyed to the local mbean server that monitors the **MonitorNumber** attribute on the **simpleBean**. Additional types of monitor beans and options are detailed below. The newly deployed monitor bean is automatically undeployed when the consumer is stopped.

URI OPTIONS FOR MONITOR TYPE

property	type	applies to	description
monitorType	**enum**	all	one of the counters, guage, string
observedAttribute	**string**	all	the attribute being observed
granularityPeriod	**long**	all	granularity period (in millis) for the attribute being observed. As per JMX, default is 10 seconds
initThreshold	**number**	counter	initial threshold value
offset	**number**	counter	offset value
modulus	**number**	counter	modulus value
differenceMode	**boolean**	counter, gauge	true if difference should be reported, false for actual value
notifyHigh	**boolean**	gauge	high notification on/off switch
notifyLow	**boolean**	gauge	low notification on/off switch
highThreshold	**number**	gauge	threshold for reporting high notification

lowThreshold	**number**	gauge	threshold for reporting low notificaton
notifyDiffer	**boolean**	string	true to fire notification when string differs
notifyMatch	**boolean**	string	true to fire notification when string matches
stringToCompare	**string**	string	string to compare against the attribute value

The monitor style consumer is only supported for the local mbean server. JMX does not currently support remote deployment of mbeans without either having the classes already remotely deployed or an adapter library on both the client and server to facilitate a proxy deployment.

CHAPTER 76. JPA

JPA COMPONENT

The **jpa** component enables you to store and retrieve Java objects from persistent storage using EJB 3's Java Persistence Architecture (JPA), which is a standard interface layer that wraps Object/Relational Mapping (ORM) products such as OpenJPA, Hibernate, TopLink, and so on.

SENDING TO THE ENDPOINT

You can store a Java entity bean in a database by sending it to a JPA producer endpoint. The body of the *In* message is assumed to be an entity bean (that is, a POJO with an @Entity annotation on it) or a collection or an array of entity beans.

If the body does not contain one of the preceding types, put a Message TranslatorMessage Translator in front of the endpoint to perform the necessary conversion first.

CONSUMING FROM THE ENDPOINT

Consuming messages from a JPA consumer endpoint removes (or updates) entity beans in the database. This allows you to use a database table as a logical queue: consumers take messages from the queue and then delete/update them to logically remove them from the queue.

If you do not wish to delete the entity bean when it has been processed (and when routing is done), you can specify **consumeDelete=false** on the URI. This will result in the entity being processed each poll.

If you would rather perform some update on the entity to mark it as processed (such as to exclude it from a future query) then you can annotate a method with @Consumed which will be invoked on your entity bean when the entity bean when it has been processed (and when routing is done).

From **Camel 2.13** onwards you can use **@PreConsumed** which will be invoked on your entity bean before it has been processed (before routing).

URI FORMAT

```
jpa:entityClassName[?options]
```

For sending to the endpoint, the *entityClassName* is optional. If specified, it helps the Type Converter to ensure the body is of the correct type.

For consuming, the *entityClassName* is mandatory.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
entityType	*entityClassName*	Overrides the *entityClassName* from the URI.

persistenceUnit	**camel**	The JPA persistence unit used by default.
consumeDelete	**true**	**JPA consumer only:** If **true**, the entity is deleted after it is consumed; if **false**, the entity is not deleted.
consumeLockEntity	**true**	**JPA consumer only:** Specifies whether or not to set an exclusive lock on each entity bean while processing the results from polling.
flushOnSend	**true**	**JPA producer only:** Flushes the EntityManager after the entity bean has been persisted.
maximumResults	**-1**	**JPA consumer only:** Set the maximum number of results to retrieve on the Query.
transactionManager	**null**	This option is Registry based, which requires the **#** notation so that the given **transactionManager** being specified can be looked up properly, e.g. **transactionManager=#myTransactionManager**. It specifies the transaction manager to use. If none provided, Apache Camel will use a **JpaTransactionManager** by default. Can be used to set a JTA transaction manager (for integration with an EJB container).
consumer.delay	**500**	**JPA consumer only:** Delay in milliseconds between each poll.
consumer.initialDelay	**1000**	**JPA consumer only:** Milliseconds before polling starts.
consumer.useFixedDelay	**false**	**JPA consumer only:** Set to **true** to use fixed delay between polls, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.

maxMessagesPerPoll	**0**	**Apache Camel 2.0:JPA consumer only:** An integer value to define the maximum number of messages to gather per poll. By default, no maximum is set. Can be used to avoid polling many thousands of messages when starting up the server. Set a value of 0 or negative to disable.
consumer.query		**JPA consumer only:** To use a custom query when consuming data.
consumer.namedQuery		**JPA consumer only:** To use a named query when consuming data.
consumer.nativeQuery		**JPA consumer only:** To use a custom native query when consuming data.
consumer.parameters		**Camel 2.12: JPA consumer only:** the parameters map which will be used for building the query. The parameters is an instance of Map which key is String and value is Object. It's is expected to be of the generic type **java.util.Map<String, Object>**, where the keys are the named parameters of a given JPA query and the values are their corresponding effective values you want to select for.
consumer.resultClass		**Camel 2.7: JPA consumer only:** Defines the type of the returned payload (we will call **entityManager.createNativeQuery(nativeQuery, resultClass)** instead of **entityManager.createNativeQuery(nativeQuery)**). Without this option, we will return an object array. Only has an affect when using in conjunction with native query when consuming data.

consumer.transacted	**false**	*Camel 2.7.5/2.8.3/2.9: JPA consumer only:* Whether to run the consumer in transacted mode, by which all messages will either commit or rollback, when the entire batch has been processed. The default behavior (false) is to commit all the previously successfully processed messages, and only rollback the last failed message.
consumer.lockModeType	**WRITE**	**Camel 2.11.2/2.12:** To configure the lock mode on the consumer. The possible values is defined in the enum **javax.persistence.LockModeType**. The default value is changed to **PESSIMISTIC_WRITE** since **Camel 2.13**.
consumer.SkipLockedEntity	**false**	**Camel 2.13:** To configure whether to use NOWAIT on lock and silently skip the entity.
usePersist	**false**	**Camel 2.5: JPA producer only:** Indicates to use **entityManager.persist(entity)** instead of **entityManager.merge(entity)**. Note: **entityManager.persist(entity)** doesn't work for detached entities (where the EntityManager has to execute an UPDATE instead of an INSERT query)!
consumer.SkipLockedEntity	**false**	**Camel 2.13:** To configure whether to use NOWAIT on lock and silently skip the entity.

MESSAGE HEADERS

Apache Camel adds the following message headers to the exchange:

Header	Type	Description

CamelEntityManager	**EntityManager**	**Camel 2.12: JPA consumer / Camel 2.12.2: JPA producer:** The JPA EntityManager object being used by JpaConsumer or JpaProducer.

CONFIGURING ENTITYMANAGERFACTORY

You are strongly advised to configure the JPA component to use a specific **EntityManagerFactory** instance. If you do not do so, each **JpaEndpoint** will auto-create its own **EntityManagerFactory** instance.For example, you can instantiate a JPA component that references the **myEMFactory** entity manager factory, as follows:

```
<bean id="jpa" class="org.apache.camel.component.jpa.JpaComponent">
  <property name="entityManagerFactory" ref="myEMFactory"/>
</bean>
```

In **Camel 2.3** the **JpaComponent** will auto lookup the **EntityManagerFactory** from the Registry which means you do not need to configure this on the **JpaComponent** as shown above. You only need to do so if there is ambiguity, in which case Camel will log a WARN.

CONFIGURING TRANSACTIONMANAGER

Since Camel 2.3 the **JpaComponent** will auto lookup the **TransactionManager** from the Registry. If Camel does not find any **TransactionManager** instance registered, it will also look up for the **TransactionTemplate** and try to extract **TransactionManager** from it. If no **TransactionTemplate** is available in the registry, **JpaEndpoint** will auto-create its own instance of **TransactionManager**.

If more than a single instance of the **TransactionManager** is found, Camel logs a **WARN** message. In such cases, you might want to instantiate and explicitly configure a JPA component that references the **myTransactionManager** transaction manager, as follows:

```
<bean id="jpa" class="org.apache.camel.component.jpa.JpaComponent">
  <property name="entityManagerFactory" ref="myEMFactory"/>
  <property name="transactionManager" ref="myTransactionManager"/>
</bean>
```

USING A CONSUMER WITH A NAMED QUERY

For consuming only selected entities, you can use the **consumer.namedQuery** URI query option. First, you have to define the named query in the JPA Entity class:

```
@Entity
@NamedQuery(name = "step1", query = "select x from MultiSteps x where x.step = 1")
public class MultiSteps {
  ...
}
```

After that you can define a consumer uri like this one:

```
from("jpa://org.apache.camel.examples.MultiSteps?consumer.namedQuery=step1")
.to("bean:myBusinessLogic");
```

USING A CONSUMER WITH A QUERY

For consuming only selected entities, you can use the **consumer.query** URI query option. You only have to define the query option:

```
from("jpa://org.apache.camel.examples.MultiSteps?consumer.query=select o from
org.apache.camel.examples.MultiSteps o where o.step = 1")
.to("bean:myBusinessLogic");
```

USING A CONSUMER WITH A NATIVE QUERY

For consuming only selected entities, you can use the **consumer.nativeQuery** URI query option. You only have to define the native query option:

```
from("jpa://org.apache.camel.examples.MultiSteps?consumer.nativeQuery=select * from MultiSteps
where step = 1")
.to("bean:myBusinessLogic");
```

If you use the native query option, you will receive an object array in the message body.

EXAMPLE

See the Tracer Example for an example using JPA to store traced messages into a database.

USING THE JPA BASED IDEMPOTENT REPOSITORY

In this section we will use the JPA based idempotent repository.

First we need to setup a **persistence-unit** in the persistence.xml file:

```
<persistence-unit name="idempotentDb" transaction-type="RESOURCE_LOCAL">
  <class>org.apache.camel.processor.idempotent.jpa.MessageProcessed</class>

  <properties>
    <property name="openjpa.ConnectionURL"
value="jdbc:derby:target/idempotentTest;create=true"/>
    <property name="openjpa.ConnectionDriverName"
value="org.apache.derby.jdbc.EmbeddedDriver"/>
    <property name="openjpa.jdbc.SynchronizeMappings" value="buildSchema"/>
    <property name="openjpa.Log" value="DefaultLevel=WARN, Tool=INFO"/>
  </properties>
 </persistence-unit>
```

Second we have to setup a **org.springframework.orm.jpa.JpaTemplate** which is used by the **org.apache.camel.processor.idempotent.jpa.JpaMessageIdRepository**:

```
<!-- this is standard spring JPA configuration -->
 <bean id="jpaTemplate" class="org.springframework.orm.jpa.JpaTemplate">
```

```
    <property name="entityManagerFactory" ref="entityManagerFactory"/>
 </bean>

 <bean id="entityManagerFactory"
class="org.springframework.orm.jpa.LocalEntityManagerFactoryBean">
    <!-- we use idempotentDB as the persitence unit name defined in the persistence.xml file -->
    <property name="persistenceUnitName" value="idempotentDb"/>
 </bean>
```

Afterwards we can configure our **org.apache.camel.processor.idempotent.jpa.JpaMessageIdRepository**:

```
<!-- we define our jpa based idempotent repository we want to use in the file consumer -->
 <bean id="jpaStore" class="org.apache.camel.processor.idempotent.jpa.JpaMessageIdRepository">
    <!-- Here we refer to the spring jpaTemplate -->
    <constructor-arg index="0" ref="jpaTemplate"/>
    <!-- This 2nd parameter is the name  (= a cateogry name).
        You can have different repositories with different names -->
    <constructor-arg index="1" value="FileConsumer"/>
 </bean>
```

And finally we can create our JPA idempotent repository in the spring XML file as well:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
   <route id="JpaMessageIdRepositoryTest">
      <from uri="direct:start" />
      <idempotentConsumer messageIdRepositoryRef="jpaStore">
         <header>messageId</header>
         <to uri="mock:result" />
      </idempotentConsumer>
   </route>
</camelContext>
```

CHAPTER 77. JSCH

JSCH

The **camel-jsch** component supports the SCP protocol using the Client API of the Jsch project. Jsch is already used in camel by the FTP component for the **sftp:** protocol.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-jsch</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
scp://host[:port]/destination[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

The file name can be specified either in the <path> part of the URI or as a "CamelFileName" header on the message (**Exchange.FILE_NAME** if used in code).

OPTIONS

Name	Description	Example	Default Value
username	Specifies the username to use to log in to the remote file system.		**null**
password	Specifies the password to use to log in to the remote file system.		**null**
knownHostsFile	Sets the **known_hosts** file, so that the scp endpoint can do host key verification.		**null**
strictHostKeyChecking	Sets whether to use strict host key checking. Possible values are: **no**, **yes**		**no**

chmod	Allows you to set chmod on the stored file. For example **chmod=664**.		**null**
useUserKnownHostsFile	**Camel 2.15:** If **knownHostFile** has not been explicitly configured, use the host file from **System.getProperty("user.home") + "/.ssh/known_hosts"** .		**true**

COMPONENT OPTIONS

The JschComponent supports the following options:

Name	Description	Default Value
verboseLogging	**Camel 2.15:** JSCH is verbose logging out of the box. Therefore, we turn the logging down to **DEBUG** logging by default.	**true**

LIMITATIONS

Currently **camel-jsch** supports only a Producer (i.e. copy files to another host).

CHAPTER 78. JT400

JT/400 COMPONENT

The **jt400** component allows you to exchanges messages with an AS/400 system using data queues.

URI FORMAT

```
jt400://user:password@system/QSYS.LIB/LIBRARY.LIB/QUEUE.DTAQ[?options]
```

To call a remote program (**Camel 2.7**)

```
jt400://user:password@system/QSYS.LIB/LIBRARY.LIB/program.PGM[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

URI OPTIONS

For the data queue message exchange:

Name	Default value	Description
ccsid	default system CCSID	Specifies the CCSID to use for the connection with the AS/400 system.
format	**text**	Specifies the data format for sending messages valid options are: **text** (represented by **String**) and **binary** (represented by **byte[]**)
consumer.delay	**500**	Delay in milliseconds between each poll.
consumer.initialDelay	**1000**	Milliseconds before polling starts.
consumer.userFixedDelay	**false**	**true** to use fixed delay between polls, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.
guiAvailable	**false**	**Camel 2.8:** Specifies whether AS/400 prompting is enabled in the environment running Camel.
keyed	**false**	*Camel 2.10:* Whether to use keyed or non-keyed data queues.

searchKey	**null**	*Camel 2.10:* Search key for keyed data queues.
searchType	**EQ**	*Camel 2.10:* Search type which can be a value of **EQ**, **NE**, **LT**, **LE**, **GT**, or **GE**.
connectionPool	**AS400ConnectionPool** instance	*Camel 2.10:* Reference to an com.ibm.as400.access.AS400ConnectionPool instance in the Registry. This is used for obtaining connections to the AS/400 system. The look up notation ('#' character) should be used.

For the remote program call (**Camel 2.7**):

Name	Default value	Description
outputFieldsIdx		Specifies which fields (program parameters) are output parameters.
fieldsLength		Specifies the fields (program parameters) length as in the AS/400 program definition.
format	**text**	*Camel 2.10:* Specifies the data format for sending messages valid options are: **text** (represented by **String**) and **binary** (represented by **byte[]**)
guiAvailable	**false**	*Camel 2.8:* Specifies whether AS/400 prompting is enabled in the environment running Camel.
connectionPool	**AS400ConnectionPool** instance	*Camel 2.10:* Reference to an com.ibm.as400.access.AS400ConnectionPool instance in the Registry. This is used for obtaining connections to the AS/400 system. The look up notation ('#' character) should be used.

USAGE

When configured as a consumer endpoint, the endpoint will poll a data queue on a remote system. For every entry on the data queue, a new **Exchange** is sent with the entry's data in the *In* message's body, formatted either as a **String** or a **byte[]**, depending on the format. For a provider endpoint, the *In*

message body contents will be put on the data queue as either raw bytes or text.

CONNECTION POOL

Available as of Camel 2.10

Connection pooling is in use from Camel 2.10 onwards. You can explicit configure a connection pool on the Jt400Component, or as an uri option on the endpoint.

REMOTE PROGRAM CALL (CAMEL 2.7)

This endpoint expects the input to be either a String array or byte[] array (depending on format) and handles all the CCSID handling through the native jt400 library mechanisms. A parameter can be *omitted* by passing null as the value in its position (the remote program has to support it). After the program execution the endpoint returns either a **String** array or **byte[]** array with the values as they were returned by the program (the input only parameters will contain the same data as the beginning of the invocation) This endpoint does not implement a provider endpoint!

EXAMPLE

In the snippet below, the data for an exchange sent to the **direct:george** endpoint will be put in the data queue **PENNYLANE** in library **BEATLES** on a system named **LIVERPOOL**. Another user connects to the same data queue to receive the information from the data queue and forward it to the **mock:ringo** endpoint.

```
public class Jt400RouteBuilder extends RouteBuilder {

    @Override
    public void configure() throws Exception {

from("direct:george").to("jt400://GEORGE:EGROEG@LIVERPOOL/QSYS.LIB/BEATLES.LIB/PENNY
LANE.DTAQ");

from("jt400://RINGO:OGNIR@LIVERPOOL/QSYS.LIB/BEATLES.LIB/PENNYLANE.DTAQ").to("mock:
ringo");
    }
}
```

REMOTE PROGRAM CALL EXAMPLE (CAMEL 2.7)

In the snippet below, the data Exchange sent to the direct:work endpoint will contain three string that will be used as the arguments for the program "compute" in the library "assets". This program will write the output values in the 2nd and 3rd parameters. All the parameters will be sent to the direct:play endpoint.

```
public class Jt400RouteBuilder extends RouteBuilder {
    @Override
    public void configure() throws Exception {
       from("direct:work").to("jt400://GRUPO:ATWORK@server/QSYS.LIB/assets.LIB/compute.PGM?
fieldsLength=10,10,512&ouputFieldsIdx=2,3").to("direct:play");
    }
}
```

WRITING TO KEYED DATA QUEUES

```
from("jms:queue:input")
.to("jt400://username:password@system/lib.lib/MSGINDQ.DTAQ?keyed=true");
```

READING FROM KEYED DATA QUEUES

```
from("jt400://username:password@system/lib.lib/MSGOUTDQ.DTAQ?
keyed=true&searchKey=MYKEY&searchType=GE")
.to("jms:queue:output");
```

CHAPTER 79. KAFKA

KAFKA COMPONENT

Available as of Camel 2.13

The **kafka:** component is used for communicating with Apache Kafka message broker.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-kafka</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
kafka:server:port[?options]
```

OPTIONS

Property	Default	Description
zookeeperHost		The zookeeper host to use
zookeeperPort	2181	The zookeeper port to use
zookeeperConnect		*Camel 2.13.3/2.14.1:* If in use, then zookeeperHost/zookeeperPort is not used.
topic		The topic to use
groupId		
partitioner		
consumerStreams	10	
clientId		
zookeeperSessionTimeoutMs		
zookeeperConnectionTimeoutMs		

zookeeperSyncTimeMs		
consumersCount	**1**	**Camel 2.15.0:** The number of consumers that connect to Kafka server.
batchSize	**100**	**Camel 2.15.0:** The **batchSize** that the **BatchingConsumerTask** processes once.
barrierAwaitTimeoutMs	**10000**	**Camel 2.15.0:** If the **BatchingConsumerTask** processes exchange exceed the **batchSize**, it will wait for **barrierAwaitTimeoutMs**.

You can append query options to the URI in the following format, **?option=value&option=value&...**

PRODUCER OPTIONS

Property	Default	Description
producerType		
compressionCodec		
compressedTopics		
messageSendMaxRetries		
retryBackoffMs		
topicMetadataRefreshIntervalMs		
sendBufferBytes		
requestRequiredAcks		
requestTimeoutMs		
queueBufferingMaxMs		
queueBufferingMaxMessages		
queueEnqueueTimeoutMs		

batchNumMessages		
serializerClass		
keySerializerClass		

CONSUMER OPTIONS

Property	Default	Description
consumerId		
socketTimeoutMs		
socketReceiveBufferBytes		
fetchMessageMaxBytes		
autoCommitEnable		
autoCommitIntervalMs		
queuedMaxMessages		
rebalanceMaxRetries		
fetchMinBytes		
fetchWaitMaxMs		
rebalanceBackoffMs		
refreshLeaderBackoffMs		
autoOffsetReset		
consumerTimeoutMs		

SAMPLES

Consuming messages:

```
from("kafka:localhost:9092?
topic=test&zookeeperHost=localhost&zookeeperPort=2181&groupId=group1").to("log:input");
```

Producing messages:

See unit tests of camel-kafka for more examples

ENDPOINTS

Camel supports the Message Endpoint pattern using the Endpoint interface. Endpoints are usually created by a Component and Endpoints are usually referred to in the DSL via their URIs.

From an Endpoint you can use the following methods

- createProducer() will create a Producer for sending message exchanges to the endpoint
- createConsumer() implements the Event Driven Consumer pattern for consuming message exchanges from the endpoint via a Processor when creating a Consumer
- createPollingConsumer() implements the Polling Consumer pattern for consuming message exchanges from the endpoint via a PollingConsumer

SEE ALSO

- Configuring Camel
- Message Endpoint pattern
- URIs
- Writing Components

CHAPTER 80. KESTREL

KESTREL COMPONENT

The Kestrel component allows messages to be sent to a Kestrel queue, or messages to be consumed from a Kestrel queue. This component uses the spymemcached client for memcached protocol communication with Kestrel servers.

WARNING

The Kestrel project is inactive and this component is therefore **deprecated**.

URI FORMAT

```
kestrel://[addresslist/]queuename[?options]
```

Where **queuename** is the name of the queue on Kestrel. The **addresslist** part of the URI may include one or more **host:port** pairs. For example, to connect to the queue **foo** on **kserver01:22133**, use:

```
kestrel://kserver01:22133/foo
```

If the addresslist is omitted, **localhost:22133** is assumed, i.e.:

```
kestrel://foo
```

Likewise, if a port is omitted from a **host:port** pair in addresslist, the default port 22133 is assumed, i.e.:

```
kestrel://kserver01/foo
```

Here is an example of a Kestrel endpoint URI used for producing to a clustered queue:

```
kestrel://kserver01:22133,kserver02:22133,kserver03:22133/massive
```

Here is an example of a Kestrel endpoint URI used for consuming concurrently from a queue:

```
kestrel://kserver03:22133/massive?concurrentConsumers=25&waitTimeMs=500
```

OPTIONS

You can configure properties on each Kestrel endpoint individually by specifying them in the **?parameters** portion of the endpoint URI. Any **?parameters** that are omitted will default to what is configured on the KestrelComponent's base KestrelConfiguration. The following properties may be set on KestrelConfiguration and/or each individual endpoint:

Option	Default Value	Description

concurrentConsumers	**1**	Specifies the number of concurrent consumer threads.
waitTimeMs	**100**	Specifies the **/t=...** wait time passed to Kestrel on GET requests.

NOTE: If **waitTimeMs** is set to zero (or negative), the **/t=...** specifier does **not** get passed to the server on GET requests. When a queue is empty, the GET call returns immediately with no value. In order to prevent "tight looping" in the polling phase, this component will do a **Thread.sleep(100)** whenever nothing is returned from the GET request (only when nothing is returned). You are **highly encouraged** to configure a positive non-zero value for waitTimeMs.

CONFIGURING THE KESTREL COMPONENT USING SPRING XML

The simplest form of explicit configuration is as follows:

```
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="
      http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
      http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

  <bean id="kestrel" class="org.apache.camel.component.kestrel.KestrelComponent"/>

  <camelContext xmlns="http://camel.apache.org/schema/spring">
  </camelContext>

</beans>
```

That will enable the Kestrel component with all default settings, i.e. it will use **localhost:22133**, 100ms wait time, and a single non-concurrent consumer by default.

To use specific options in the base configuration (which supplies configuration to endpoints whose **?** **properties** are not specified), you can set up a KestrelConfiguration POJO as follows:

```
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="
      http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
      http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

  <bean id="kestrelConfiguration" class="org.apache.camel.component.kestrel.KestrelConfiguration">
    <property name="addresses" value="kestrel01:22133"/>
    <property name="waitTimeMs" value="100"/>
    <property name="concurrentConsumers" value="1"/>
  </bean>

  <bean id="kestrel" class="org.apache.camel.component.kestrel.KestrelComponent">
```

```
    <property name="configuration" ref="kestrelConfiguration"/>
  </bean>

  <camelContext xmlns="http://camel.apache.org/schema/spring">
  </camelContext>

</beans>
```

USAGE EXAMPLES

EXAMPLE 1: CONSUMING

```
from("kestrel://kserver02:22133/massive?concurrentConsumers=10&waitTimeMs=500")
  .bean("myConsumer", "onMessage");
```

```
public class MyConsumer {
    public void onMessage(String message) {
        ...
    }
}
```

EXAMPLE 2: PRODUCING

```
public class MyProducer {
    @EndpointInject(uri = "kestrel://kserver01:22133,kserver02:22133/myqueue")
    ProducerTemplate producerTemplate;

    public void produceSomething() {
        producerTemplate.sendBody("Hello, world.");
    }
}
```

EXAMPLE 3: SPRING XML CONFIGURATION

```
  <camelContext xmlns="http://camel.apache.org/schema/spring">
    <route>
      <from uri="kestrel://ks01:22133/sequential?concurrentConsumers=1&waitTimeMs=500"/>
      <bean ref="myBean" method="onMessage"/>
    </route>
    <route>
      <from uri="direct:start"/>
      <to uri="kestrel://ks02:22133/stuff"/>
    </route>
  </camelContext>
```

```
public class MyBean {
    public void onMessage(String message) {
        ...
    }
}
```

DEPENDENCIES

The Kestrel component has the following dependencies:

- **spymemcached** 2.5 (or greater)

SPYMEMCACHED

You **must** have the **spymemcached** jar on your classpath. Here is a snippet you can use in your pom.xml:

```
<dependency>
  <groupId>spy</groupId>
  <artifactId>memcached</artifactId>
  <version>2.5</version>
</dependency>
```

Alternatively, you can download the jar directly.

LIMITATIONS

NOTE: The spymemcached client library does **not** work properly with kestrel when JVM assertions are enabled. There is a known issue with spymemcached when assertions are enabled and a requested key contains the **/t=...** extension (i.e. if you're using the **waitTimeMs** option on an endpoint URI, which is highly encouraged).

Fortunately, JVM assertions are **disabled by default**, unless you explicitly enable them, so this should not present a problem under normal circumstances.

Something to note is that Maven's Surefire test plugin **enables** assertions. If you're using this component in a Maven test environment, you may need to set **enableAssertions** to **false**. Please refer to the surefire:test reference for details.

CHAPTER 81. KRATI

KRATI COMPONENT

Available as of Camel 2.9

This component allows the use krati datastores and datasets inside Camel. Krati is a simple persistent data store with very low latency and high throughput. It is designed for easy integration with read-write-intensive applications with little effort in tuning configuration, performance and JVM garbage collection.

Camel provides a producer and consumer for krati datastore_(key/value engine)_. It also provides an idempotent repository for filtering out duplicate messages.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-krati</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
krati:[the path of the datastore][?options]
```

The **path of the datastore** is the relative path of the folder that krati will use for its datastore.

You can append query options to the URI in the following format, **?option=value&option=value&...**

KRATI URI OPTIONS

Name	Default Value	Description
operation	CamelKratiPut	**Producer Only**. Specifies the type of operation that will be performed to the datastore. Allowed values are CamelKratiPut, CamelKratiGet, CamelKratiDelete & CamelKratiDeleteAll.
initialCapacity	100	The inital capcity of the store.
keySerializer	KratiDefaultSerializer	The serializer serializer that will be used to serialize the key.
valueSerializer	KratiDefaultSerializer	The serializer serializer that will be used to serialize the value.

segmentFactory	ChannelSegmentFactory	The segment factory to use. Allowed instance classes: ChannelSegmentFactory,MemorySegmentFactory, MappedSegmentFactory & WriteBufferSegmentFactory.
hashFunction	FnvHashFunction	The hash function to use. Allowed instance classes: FnvHashFunction,Fnv1Hash32,FnvHash64,Fnv1aHash32,Fnv1aHash64, JenkisHashFunction, MurmurHashFunctiom
maxMessagesPerPoll		**Camel 2.10.5/2.11.1:** The maximum number of messages which can be received in one poll. This can be used to avoid reading in too much data and taking up too much memory.

For producer endpoint you can override all of the above URI options by passing the appropriate headers to the message.

MESSAGE HEADERS FOR DATASTORE

Header	Description
CamelKratiOperation	The operation to be performed on the datastore. The valid options are • **CamelKratiAdd** • **CamelKratiGet** • **CamelKratiDelete** • **CamelKratiDeleteAll**
CamelKratiKey	The key.
CamelKratiValue	The value.

USAGE SAMPLES

EXAMPLE 1: PUTTING TO THE DATASTORE.

This example will show you how you can store any message inside a datastore.

```
from("direct:put").to("krati:target/test/producertest");
```

In the above example you can override any of the URI parameters with headers on the message. Here is how the above example would look like using xml to define our route.

```
<route>
    <from uri="direct:put"/>
    <to uri="krati:target/test/producerspringtest"/>
</route>
```

EXAMPLE 2: GETTING/READING FROM A DATASTORE

This example will show you how you can read the contnet of a datastore.

```
from("direct:get")
    .setHeader(KratiConstants.KRATI_OPERATION,
constant(KratiConstants.KRATI_OPERATION_GET))
    .to("krati:target/test/producertest");
```

In the above example you can override any of the URI parameters with headers on the message. Here is how the above example would look like using xml to define our route.

```
<route>
     <from uri="direct:get"/>
     <to uri="krati:target/test/producerspringtest?operation=CamelKratiGet"/>
</route>
```

EXAMPLE 3: CONSUMING FROM A DATASTORE

This example will consume all items that are under the specified datastore.

```
    from("krati:target/test/consumertest")
        .to("direct:next");
```

You can achieve the same goal by using xml, as you can see below.

```
<route>
    <from uri="krati:target/test/consumerspringtest"/>
    <to uri="mock:results"/>
</route>
```

IDEMPOTENT REPOSITORY

As already mentioned this component also offers and idemptonet repository which can be used for filtering out duplicate messages.

```
from("direct://in").idempotentConsumer(header("messageId"), new
KratiIdempotentRepositroy("/tmp/idempotent").to("log://out");
```

SEE ALSO

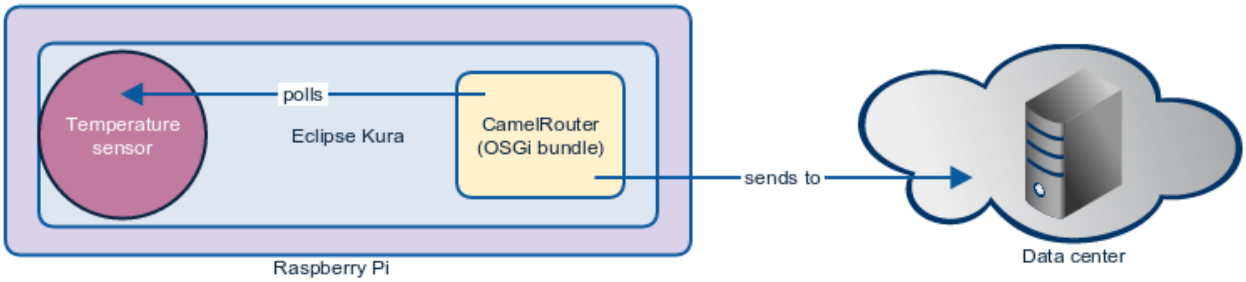
Krati

CHAPTER 82. KURA

KURA COMPONENT

Kura component is available starting from Camel **2.15**.

This documentation page covers the integration options of Camel with the Eclipse Kura M2M gateway. The common reason to deploy Camel routes into the Eclipse Kura is to provide enterprise integration patterns and Camel components to the messaging M2M gateway. For example you might want to install Kura on Raspberry PI, then read temperature from the sensor attached to that Raspberry PI using Kura services and finally forward the current temperature value to your data center service using Camel EIP and components.



KURAROUTER ACTIVATOR

Bundles deployed to the Eclipse Kura are usually developed as bundle activators. So the easiest way to deploy Apache Camel routes into the Kura is to create an OSGi bundle containing the class extending **org.apache.camel.kura.KuraRouter** class:

```
public class MyKuraRouter extends KuraRouter {

  @Override
  public void configure() throws Exception {
    from("timer:trigger").
      to("netty-http:http://app.mydatacenter.com/api");
  }

}
```

Keep in mind that **KuraRouter** implements the **org.osgi.framework.BundleActivator** interface, so you need to register its **start** and **stop** lifecycle methods while creating Kura bundle component class.

Kura router starts its own OSGi-aware **CamelContext**. It means that for every class extending **KuraRouter**, there will be a dedicated **CamelContext** instance. Ideally we recommend to deploy one **KuraRouter** per OSGi bundle.

DEPLOYING KURAROUTER

Bundle containing your Kura router class should import the following packages in the OSGi manifest:

```
Import-Package: org.osgi.framework;version="1.3.0",
  org.slf4j;version="1.6.4",
```

```
org.apache.camel,org.apache.camel.impl,org.apache.camel.core.osgi,org.apache.camel.builder,org.apa
che.camel.model,
  org.apache.camel.component.kura
```

Keep in mind that you don't have to import every Camel component bundle you plan to use in your routes, as Camel components are resolved as the services on the runtime level.

Before you deploy your router bundle, be sure that you have deployed (and started) the following Camel core bundles (using Kura GoGo shell)...

```
install file:///home/user/.m2/repository/org/apache/camel/camel-core/2.15.0/camel-core-2.15.0.jar
start <camel-core-bundle-id>
install file:///home/user/.m2/repository/org/apache/camel/camel-core-osgi/2.15.0/camel-core-osgi-
2.15.0.jar
start <camel-core-osgi-bundle-id>
install file:///home/user/.m2/repository/org/apache/camel/camel-kura/2.15.0/camel-kura-2.15.0.jar
start <camel-kura-bundle-id>
```

...and all the components you plan to use in your routes:

```
install file:///home/user/.m2/repository/org/apache/camel/camel-stream/2.15.0/camel-stream-
2.15.0.jar
start <camel-stream-bundle-id>
```

Then finally deploy your router bundle:

```
install file:///home/user/.m2/repository/com/example/myrouter/1.0/myrouter-1.0.jar
start <your-bundle-id>
```

KURAROUTER UTILITIES

Kura router base class provides many useful utilities. This section explores each of them.

SLF4J LOGGER

Kura uses SLF4J facade for logging purposes. Protected member **log** returns SLF4J logger instance associated with the given Kura router.

```
public class MyKuraRouter extends KuraRouter {

    @Override
    public void configure() throws Exception {
  log.info("Configuring Camel routes!");
        ...
    }

}
```

BUNDLECONTEXT

Protected member **bundleContext** returns bundle context associated with the given Kura router.

```
public class MyKuraRouter extends KuraRouter {

    @Override
    public void configure() throws Exception {
  ServiceReference<MyService> serviceRef =
bundleContext.getServiceReference(LogService.class.getName());
  MyService myService = content.getService(serviceRef);
        ...
    }

}
```

CAMELCONTEXT

Protected member **camelContext** is the **CamelContext** associated with the given Kura router.

```
public class MyKuraRouter extends KuraRouter {

    @Override
    public void configure() throws Exception {
  camelContext.getStatus();
        ...
    }

}
```

OSGI SERVICE RESOLVER

OSGi service resolver (**service(Class<T> serviceType)**) can be used to easily retrieve service by type from the OSGi bundle context.

```
public class MyKuraRouter extends KuraRouter {

    @Override
    public void configure() throws Exception {
  MyService myService = service(MyService.class);
        ...
    }

}
```

KURAROUTER ACTIVATOR CALLBACKS

Kura router comes with the lifecycle callbacks that can be used to customize the way the Camel router works. For example to configure the **CamelContext** instance associated with the router just before the former is started, override **beforeStart** method of the **KuraRouter** class:

```
public class MyKuraRouter extends KuraRouter {

  ...

  protected void beforeStart(CamelContext camelContext) {
```

```
    OsgiDefaultCamelContext osgiContext = (OsgiCamelContext) camelContext;
    osgiContext.setName("NameOfTheRouter");
  }

}
```

CHAPTER 83. LANGUAGE

LANGUAGE

Available as of Camel 2.5

The language component allows you to send Exchange to an endpoint which executes a script by any of the supported Languages in Camel. By having a component to execute language scripts, it allows more dynamic routing capabilities. For example by using the Routing SlipRouting Slip or Dynamic RouterDynamic Router EIPs you can send messages to **language** endpoints where the script is dynamic defined as well.

This component is provided out of the box in **camel-core** and hence no additional JARs is needed. You only have to include additional Camel components if the language of choice mandates it, such as using Groovy or JavaScript languages.

And from Camel 2.11 onwards you can refer to an external resource for the script using same notation as supported by the other Languages in Camel

```
language://languageName:resource:scheme:location][?options]
```

URI FORMAT

```
language://languageName[:script][?options]
```

URI OPTIONS

The component supports the following options.

Name	Default Value	Type	Description
languageName	**null**	**String**	The name of the Language to use, such as **simple**, **groovy**, **javascript** etc. This option is mandatory.
script	**null**	**String**	The script to execute.
transform	**true**	**boolean**	Whether or not the result of the script should be used as the new message body. By setting to **false** the script is executed but the result of the script is discarded.

contentCache	**true**	**boolean**	**Camel 2.9:** Whether to cache the script if loaded from a resource. Note: from **Camel 2.10.3** a cached script can be forced to reload at runtime via JMX using the clearContentCache operation.
cacheScript	**false**	**boolean**	*Camel 2.13/2.12.2/2.11.3:* Whether to cache the compiled script. Turning this option on can gain performance as the script is only compiled/created once, and reuse when processing Camel messages. But this may cause side-effects with data left from previous evaluation spills into the next, and concurrency issues as well. If the script being evaluated is idempotent then this option can be turned on.
binary	**false**	**boolean**	*Camel 2.14.1:* Whether the script is binary content. This is intended to be used for loading resources using the Constant language, such as loading binary files.

MESSAGE HEADERS

The following message headers can be used to affect the behavior of the component

Header	Description
CamelLanguageScript	The script to execute provided in the header. Takes precedence over script configured on the endpoint.

EXAMPLES

For example you can use the Simple language to Message TranslatorMessage Translator a message:

```
String script = URLEncoder.encode("Hello ${body}", "UTF-8");
from("direct:start").to("language:simple:" + script).to("mock:result");
```

In case you want to convert the message body type you can do this as well:

```
String script = URLEncoder.encode("${mandatoryBodyAs(String)}", "UTF-8");
from("direct:start").to("language:simple:" + script).to("mock:result");
```

You can also use the Groovy language, such as this example where the input message will by multiplied with 2:

```
from("direct:start").to("language:groovy:request.body * 2").to("mock:result");
```

You can also provide the script as a header as shown below. Here we use XPath language to extract the text from the **<foo>** tag.

```
Object out = producer.requestBodyAndHeader("language:xpath", "<foo>Hello World</foo>",
Exchange.LANGUAGE_SCRIPT, "/foo/text()");
assertEquals("Hello World", out);
```

LOADING SCRIPTS FROM RESOURCES

Available as of Camel 2.9

You can specify a resource uri for a script to load in either the endpoint uri, or in the **Exchange.LANGUAGE_SCRIPT** header. The uri must start with one of the following schemes: file:, classpath:, or http:

For example to load a script from the classpath:

```
from("direct:start")
    // load the script from the classpath
    .to("language:simple:classpath:org/apache/camel/component/language/mysimplescript.txt")
    .to("mock:result");
```

By default the script is loaded once and cached. However you can disable the **contentCache** option and have the script loaded on each evaluation. For example if the file myscript.txt is changed on disk, then the updated script is used:

```
from("direct:start")
    // the script will be loaded on each message, as we disabled cache
    .to("language:simple:file:target/script/myscript.txt?contentCache=false")
    .to("mock:result");
```

From **Camel 2.11** onwards you can refer to the resource similar to the other Languages in Camel by prefixing with **"resource:"** as shown below:

```
from("direct:start")
    // load the script from the classpath

.to("language:simple:resource:classpath:org/apache/camel/component/language/mysimplescript.txt")
    .to("mock:result");
```

- Languages
- Routing SlipRouting Slip

- Dynamic RouterDynamic Router

CHAPTER 84. LDAP

LDAP COMPONENT

The **ldap** component allows you to perform searches in LDAP servers using filters as the message payload. This component uses standard JNDI (**javax.naming** package) to access the server.

URI FORMAT

```
ldap:ldapServerBean[?options]
```

The *ldapServerBean* portion of the URI refers to a DirContext bean in the registry. The LDAP component only supports producer endpoints, which means that an **ldap** URI cannot appear in the **from** at the start of a route.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
base	**ou=system**	The base DN for searches.
scope	**subtree**	Specifies how deeply to search the tree of entries, starting at the base DN. Value can be **object**, **onelevel**, or **subtree**.
pageSize	No paging used.	When specified the LDAP module uses paging to retrieve all results (most LDAP Servers throw an exception when trying to retrieve more than 1000 entries in one query). To be able to use this, an **LdapContext** (subclass of **DirContext**) has to be passed in as **ldapServerBean** (otherwise an exception is thrown)
returnedAttributes	Depends on LDAP Server (could be all or none) .	Comma-separated list of attributes that should be set in each entry of the result

RESULT

The result is returned in the Out body as a **ArrayList<javax.naming.directory.SearchResult>** object.

DIRCONTEXT

The URI, **ldap:ldapserver**, references a Spring bean with the ID, **ldapserver**. The **ldapserver** bean may be defined as follows:

```
<bean id="ldapserver" class="javax.naming.directory.InitialDirContext" scope="prototype">
  <constructor-arg>
    <props>
      <prop key="java.naming.factory.initial">com.sun.jndi.ldap.LdapCtxFactory</prop>
      <prop key="java.naming.provider.url">ldap://localhost:10389</prop>
      <prop key="java.naming.security.authentication">none</prop>
    </props>
  </constructor-arg>
</bean>
```

The preceding example declares a regular Sun based LDAP **DirContext** that connects anonymously to a locally hosted LDAP server.

NOTE

DirContext objects are **not** required to support concurrency by contract. It is therefore important that the directory context is declared with the setting, **scope="prototype"**, in the **bean** definition or that the context supports concurrency. In the Spring framework, **prototype** scoped objects are instantiated each time they are looked up.

SAMPLES

Following on from the Spring configuration above, the code sample below sends an LDAP request to filter search a group for a member. The Common Name is then extracted from the response.

```
ProducerTemplate<Exchange> template = exchange
  .getContext().createProducerTemplate();

Collection<?> results = (Collection<?>) (template
  .sendBody(
    "ldap:ldapserver?base=ou=mygroup,ou=groups,ou=system",
    "(member=uid=huntc,ou=users,ou=system)"));

if (results.size() > 0) {
  // Extract what we need from the device's profile

  Iterator<?> resultIter = results.iterator();
  SearchResult searchResult = (SearchResult) resultIter
      .next();
  Attributes attributes = searchResult
      .getAttributes();
  Attribute deviceCNAttr = attributes.get("cn");
  String deviceCN = (String) deviceCNAttr.get();

  ...
```

If no specific filter is required - for example, you just need to look up a single entry - specify a wildcard filter expression. For example, if the LDAP entry has a Common Name, use a filter expression like:

```
(cn=*)
```

BINDING USING CREDENTIALS

A Camel end user donated this sample code he used to bind to the ldap server using credentials.

```
Properties props = new Properties();
props.setProperty(Context.INITIAL_CONTEXT_FACTORY, "com.sun.jndi.ldap.LdapCtxFactory");
props.setProperty(Context.PROVIDER_URL, "ldap://localhost:389");
props.setProperty(Context.URL_PKG_PREFIXES, "com.sun.jndi.url");
props.setProperty(Context.REFERRAL, "ignore");
props.setProperty(Context.SECURITY_AUTHENTICATION, "simple");
props.setProperty(Context.SECURITY_PRINCIPAL, "cn=Manager");
props.setProperty(Context.SECURITY_CREDENTIALS, "secret");

SimpleRegistry reg = new SimpleRegistry();
reg.put("myldap", new InitialLdapContext(props, null));

CamelContext context = new DefaultCamelContext(reg);
context.addRoutes(
   new RouteBuilder() {
      public void configure() throws Exception {
         from("direct:start").to("ldap:myldap?base=ou=test");
      }
   }
);
context.start();

ProducerTemplate template = context.createProducerTemplate();

Endpoint endpoint = context.getEndpoint("direct:start");
Exchange exchange = endpoint.createExchange();
exchange.getIn().setBody("(uid=test)");
Exchange out = template.send(endpoint, exchange);

Collection<SearchResult> data = out.getOut().getBody(Collection.class);
assert data != null;
assert !data.isEmpty();

System.out.println(out.getOut().getBody());

context.stop();
```

CONFIGURING SSL

All that is required is to create a custom socket factory and reference it in the **InitialDirContext** bean, as shown in the following example:

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xsi:schemaLocation="http://www.osgi.org/xmlns/blueprint/v1.0.0
http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd
              http://camel.apache.org/schema/blueprint http://camel.apache.org/schema/blueprint/camel-
blueprint.xsd">
```

```
    <sslContextParameters xmlns="http://camel.apache.org/schema/blueprint"
                          id="sslContextParameters">
      <keyManagers
            keyPassword="{{keystore.pwd}}">
        <keyStore
              resource="{{keystore.url}}"
              password="{{keystore.pwd}}"/>
      </keyManagers>
    </sslContextParameters>

    <bean id="customSocketFactory" class="zotix.co.util.CustomSocketFactory">
      <argument ref="sslContextParameters" />
    </bean>
    <bean id="ldapserver" class="javax.naming.directory.InitialDirContext" scope="prototype">
      <argument>
        <props>
          <prop key="java.naming.factory.initial" value="com.sun.jndi.ldap.LdapCtxFactory"/>
          <prop key="java.naming.provider.url" value="ldaps://lab.zotix.co:636"/>
          <prop key="java.naming.security.protocol" value="ssl"/>
          <prop key="java.naming.security.authentication" value="simple" />
          <prop key="java.naming.security.principal" value="cn=Manager,dc=example,dc=com"/>
          <prop key="java.naming.security.credentials" value="passw0rd"/>
          <prop key="java.naming.ldap.factory.socket"
              value="zotix.co.util.CustomSocketFactory"/>
        </props>
      </argument>
    </bean>
</blueprint>
```

The **CustomSocketFactory** class is implemented as follows:

```
import org.apache.camel.util.jsse.SSLContextParameters;

import javax.net.SocketFactory;
import javax.net.ssl.SSLContext;
import javax.net.ssl.SSLSocketFactory;
import javax.net.ssl.TrustManagerFactory;
import java.io.IOException;
import java.net.InetAddress;
import java.net.Socket;
import java.security.KeyStore;

/**
 * The CustomSocketFactory. Loads the KeyStore and creates an instance of SSLSocketFactory
 */
public class CustomSocketFactory extends SSLSocketFactory {

    private static SSLSocketFactory socketFactory;

    /**
     * Called by the getDefault() method.
     */
    public CustomSocketFactory() {

    }
```

```
    /**
     * Called by Blueprint DI to initialise an instance of SocketFactory
     *
     * @param sslContextParameters
     */
    public CustomSocketFactory(SSLContextParameters sslContextParameters) {
        try {
            KeyStore keyStore =
sslContextParameters.getKeyManagers().getKeyStore().createKeyStore();
            TrustManagerFactory tmf = TrustManagerFactory.getInstance("SunX509");
            tmf.init(keyStore);
            SSLContext ctx = SSLContext.getInstance("TLS");
            ctx.init(null, tmf.getTrustManagers(), null);
            socketFactory = ctx.getSocketFactory();
        } catch (Exception ex) {
            ex.printStackTrace(System.err);  /* handle exception */
        }
    }

    /**
     * Getter for the SocketFactory
     *
     * @return
     */
    public static SocketFactory getDefault() {
        return new CustomSocketFactory();
    }

    @Override
    public String[] getDefaultCipherSuites() {
        return socketFactory.getDefaultCipherSuites();
    }

    @Override
    public String[] getSupportedCipherSuites() {
        return socketFactory.getSupportedCipherSuites();
    }

    @Override
    public Socket createSocket(Socket socket, String string, int i, boolean bln) throws IOException {
        return socketFactory.createSocket(socket, string, i, bln);
    }

    @Override
    public Socket createSocket(String string, int i) throws IOException {
        return socketFactory.createSocket(string, i);
    }

    @Override
    public Socket createSocket(String string, int i, InetAddress ia, int i1) throws IOException {
        return socketFactory.createSocket(string, i, ia, i1);
    }

    @Override
    public Socket createSocket(InetAddress ia, int i) throws IOException {
        return socketFactory.createSocket(ia, i);
```

```
    }

    @Override
    public Socket createSocket(InetAddress ia, int i, InetAddress ia1, int i1) throws IOException {
        return socketFactory.createSocket(ia, i, ia1, i1);
    }
}
```

CHAPTER 85. LEVELDB

LEVELDB

Available as of Camel 2.10

Leveldb is a very lightweight and embedable key value database. It allows together with Camel to provide persistent support for various Camel features such as Aggregator.

Current features it provides:

- LevelDBAggregationRepository

USING LEVELDBAGGREGATIONREPOSITORY

LevelDBAggregationRepository is an **AggregationRepository** which on the fly persists the aggregated messages. This ensures that you will not loose messages, as the default aggregator will use an in memory only **AggregationRepository**.

It has the following options:

Option	Type	Description
repositoryName	String	A mandatory repository name. Allows you to use a shared **LevelDBFile** for multiple repositories.
persistentFileName	String	Filename for the persistent storage. If no file exists on startup a new file is created.
levelDBFile	LevelDBFile	Use an existing configured **org.apache.camel.component.leveldb.LevelDBFile** instance.
sync	boolean	**Camel 2.12:** Whether or not the LevelDBFile should sync on write or not. Default is false. By sync on write ensures that its always waiting for all writes to be spooled to disk and thus will not loose updates. See LevelDB docs for more details about async vs sync writes.

returnOldExchange	boolean	Whether the get operation should return the old existing Exchange if any existed. By default this option is **false** to optimize as we do not need the old exchange when aggregating.
useRecovery	boolean	Whether or not recovery is enabled. This option is by default **true**. When enabled the Camel Aggregator automatic recover failed aggregated exchange and have them resubmitted.
recoveryInterval	long	If recovery is enabled then a background task is run every x'th time to scan for failed exchanges to recover and resubmit. By default this interval is 5000 millis.
maximumRedeliveries	int	Allows you to limit the maximum number of redelivery attempts for a recovered exchange. If enabled then the Exchange will be moved to the dead letter channel if all redelivery attempts failed. By default this option is disabled. If this option is used then the **deadLetterUri** option must also be provided.
deadLetterUri	String	An endpoint uri for a Dead Letter Channel where exhausted recovered Exchanges will be moved. If this option is used then the **maximumRedeliveries** option must also be provided.

The **repositoryName** option must be provided. Then either the **persistentFileName** or the **levelDBFile** must be provided.

WHAT IS PRESERVED WHEN PERSISTING

LevelDBAggregationRepository will only preserve any **Serializable** compatible data types. If a data type is not such a type its dropped and a **WARN** is logged. And it only persists the **Message** body and the **Message** headers. The **Exchange** properties are **not** persisted.

RECOVERY

The **LevelDBAggregationRepository** will by default recover any failed Exchange. It does this by having a background tasks that scans for failed Exchanges in the persistent store. You can use the

checkInterval option to set how often this task runs. The recovery works as transactional which ensures that Camel will try to recover and redeliver the failed Exchange. Any Exchange which was found to be recovered will be restored from the persistent store and resubmitted and send out again.

The following headers is set when an Exchange is being recovered/redelivered:

Header	Type	Description
Exchange.REDELIVERED	Boolean	Is set to true to indicate the Exchange is being redelivered.
Exchange.REDELIVERY_COUNTER	Integer	The redelivery attempt, starting from 1.

Only when an Exchange has been successfully processed it will be marked as complete which happens when the **confirm** method is invoked on the **AggregationRepository**. This means if the same Exchange fails again it will be kept retried until it success.

You can use option **maximumRedeliveries** to limit the maximum number of redelivery attempts for a given recovered Exchange. You must also set the **deadLetterUri** option so Camel knows where to send the Exchange when the **maximumRedeliveries** was hit.

You can see some examples in the unit tests of camel-leveldb, for example this test.

USING LEVELDBAGGREGATIONREPOSITORY IN JAVA DSL

In this example we want to persist aggregated messages in the **target/data/leveldb.dat** file.

```
public void configure() throws Exception {
    // create the leveldb repo
    LevelDBAggregationRepository repo = new LevelDBAggregationRepository("repo1",
"target/data/leveldb.dat");

    // here is the Camel route where we aggregate
    from("direct:start")
        .aggregate(header("id"), new MyAggregationStrategy())
            // use our created leveldb repo as aggregation repository
            .completionSize(5).aggregationRepository(repo)
            .to("mock:aggregated");
}
```

USING LEVELDBAGGREGATIONREPOSITORY IN SPRING XML

The same example but using Spring XML instead:

```
<!-- a persistent aggregation repository using camel-leveldb -->
<bean id="repo" class="org.apache.camel.component.leveldb.LevelDBAggregationRepository">
    <!-- store the repo in the leveldb.dat file -->
    <property name="persistentFileName" value="target/data/leveldb.dat"/>
    <!-- and use repo2 as the repository name -->
    <property name="repositoryName" value="repo2"/>
</bean>
```

```
<!-- aggregate the messages using this strategy -->
<bean id="myAggregatorStrategy"
class="org.apache.camel.component.leveldb.LevelDBSpringAggregateTest$MyAggregationStrategy"/>


<!-- this is the camel routes -->
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">

    <route>
        <from uri="direct:start"/>
        <!-- aggregate using our strategy and leveldb repo, and complete when we have 5 messages
aggregated -->
        <aggregate strategyRef="myAggregatorStrategy" aggregationRepositoryRef="repo"
completionSize="5">
            <!-- correlate by header with the key id -->
            <correlationExpression><header>id</header></correlationExpression>
            <!-- send aggregated messages to the mock endpoint -->
            <to uri="mock:aggregated"/>
        </aggregate>
    </route>

</camelContext>
```

DEPENDENCIES

To use LevelDB in your camel routes you need to add the a dependency on **camel-leveldb**.

If you use maven you could just add the following to your pom.xml, substituting the version number for the latest & greatest release (see the download page for the latest versions).

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-leveldb</artifactId>
  <version>2.10.0</version>
</dependency>
```

- Aggregator
- HawtDB
- Components

CHAPTER 86. LINKEDIN

LINKEDIN COMPONENT

Available as of Camel 2.14

The LinkedIn component provides access to all of LinkedIn REST APIs documented at https://developer.linkedin.com/rest.

LinkedIn uses OAuth2.0 for all client application authentication. In order to use camel-linkedin with your account, you'll need to create a new application for LinkedIn at https://www.linkedin.com/secure/developer. The LinkedIn application's client id and secret will allow access to LinkedIn REST APIs which require a current user. A user access token is generated and managed by component for an end user. Alternatively the Camel application can register an implementation of org.apache.camel.component.linkedin.api.OAuthSecureStorage to provide an org.apache.camel.component.linkedin.apiOAuthToken OAuth token.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-linkedin</artifactId>
  <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
linkedin://endpoint-prefix/endpoint?[options]
```

Where **endpoint-prefix** can be one of:

- **comments**
- **companies**
- **groups**
- **jobs**
- **people**
- **posts**
- **search**

LINKEDINCOMPONENT

The LinkedIn Component can be configured with the options below. These options can be provided using the component's bean property **configuration** of type **org.apache.camel.component.linkedin.LinkedInConfiguration**.

Option	Type	Description

clientId	**String**	LinkedIn application client ID
clientSecret	**String**	LinkedIn application client secret
httpParams	**java.util.Map**	Custom HTTP params, for example proxy host and port, use constants from AllClientPNames
lazyAuth	**boolean**	Flag to enable/disable lazy OAuth, default is true. when enabled, OAuth token retrieval or generation is not done until the first REST call
redirectUri	**String**	Application redirect URI, although the component never redirects to this page to avoid having to have a functioning redirect server. So for testing one could use https://localhost
scopes	**org.apache.camel.component.linkedin.api.OAuthScope[]**	List of LinkedIn scopes as specified at https://developer.linkedin.com/documents/authentication#granting
secureStorage	**org.apache.camel.component.linkedin.api.OAuthSecureStorage**	Callback interface for providing an OAuth token or to store the token generated by the component. The callback should return **null** on the first call and then save the created token in the saveToken() callback. If the callback returns null the first time, a **userPassword** MUST be provided
userName	**String**	LinkedIn user account name, MUST be provided
userPassword	**String**	LinkedIn account password

PRODUCER ENDPOINTS:

Producer endpoints can use endpoint prefixes followed by endpoint names and associated options described next. A shorthand alias can be used for some endpoints. The endpoint URI MUST contain a prefix.

Endpoint options that are not mandatory are denoted by []. When there are no mandatory options for an endpoint, one of the set of [] options MUST be provided. Producer endpoints can also use a special option **inBody** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message.

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelLinkedIn.<option>**. Note that the **inBody** option overrides message header, i.e. the endpoint option **inBody=option** would override a **CamelLinkedIn.option** header.

For more information on the endpoints and options see LinkedIn REST API documentation at https://developer.linkedin.com/rest.

ENDPOINT PREFIX COMMENTS

The following endpoints can be invoked with the prefix **comments** as follows:

```
linkedin://comments/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
getComment	**comment**	**comment_id**, **fields**	**org.apache.camel.component.linkedin.api.model.Comment**
removeComment	**comment**	**comment_id**	

URI OPTIONS FOR COMMENTS

Name	Type
comment_id	**String**
fields	**String**

ENDPOINT PREFIX COMPANIES

The following endpoints can be invoked with the prefix **companies** as follows:

```
linkedin://companies/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addCompanyUpdateComment	**companyUpdateComment**	**company_id**, **update_key**, **updatecomment**	
addCompanyUpdateCommentAsCompany	**companyUpdateCommentAsCompany**	**company_id**, **update_key**, **updatecomment**	

addShare	share	company_id, share	
getCompanies	companies	email_domain, fields, is_company_admin	org.apache.camel.component.linkedin.api.model.Companies
getCompanyById	companyById	company_id, fields	org.apache.camel.component.linkedin.api.model.Company
getCompanyByName	companyByName	fields, universal_name	org.apache.camel.component.linkedin.api.model.Company
getCompanyUpdateComments	companyUpdateComments	company_id, fields, secure_urls, update_key	org.apache.camel.component.linkedin.api.model.Comments
getCompanyUpdateLikes	companyUpdateLikes	company_id, fields, secure_urls, update_key	org.apache.camel.component.linkedin.api.model.Likes
getCompanyUpdates	companyUpdates	company_id, count, event_type, fields, start	org.apache.camel.component.linkedin.api.model.Updates
getHistoricalFollowStatistics	historicalFollowStatistics	company_id, end_timestamp, start_timestamp, time_granularity	org.apache.camel.component.linkedin.api.model.HistoricalFollowStatistics
getHistoricalStatusUpdateStatistics	historicalStatusUpdateStatistics	company_id, end_timestamp, start_timestamp, time_granularity, update_key	org.apache.camel.component.linkedin.api.model.HistoricalStatusUpdateStatistics
getNumberOfFollowers	numberOfFollowers	companySizes, company_id, geos, industries, jobFunc, seniorities	org.apache.camel.component.linkedin.api.model.NumFollowers
getStatistics	statistics	company_id	org.apache.camel.component.linkedin.api.model.CompanyStatistics

isShareEnabled		**company_id**	**org.apache.camel.component.linkedin.api.model.IsCompanyShareEnabled**
isViewerShareEnabled		**company_id**	**org.apache.camel.component.linkedin.api.model.IsCompanyShareEnabled**
likeCompanyUpdate		**company_id**, **isliked**, **update_key**	

URI OPTIONS FOR COMPANIES

If a value is not provided for one of the option(s) **[companySizes, count, email_domain, end_timestamp, event_type, geos, industries, is_company_admin, jobFunc, secure_urls, seniorities, start, start_timestamp, time_granularity]** either in the endpoint URI or in a message header, it will be assumed to be **null**. Note that the **null** value(s) will only be used if other options do not satisfy matching endpoints.

Name	Type
companySizes	**java.util.List**
company_id	**Long**
count	**Long**
email_domain	**String**
end_timestamp	**Long**
event_type	**org.apache.camel.component.linkedin.api.Eventtype**
fields	**String**
geos	**java.util.List**
industries	**java.util.List**
is_company_admin	**Boolean**
isliked	**org.apache.camel.component.linkedin.api.model.IsLiked**

jobFunc	**java.util.List**
secure_urls	**Boolean**
seniorities	**java.util.List**
share	**org.apache.camel.component.linkedin.api.model.Share**
start	**Long**
start_timestamp	**Long**
time_granularity	**org.apache.camel.component.linkedin.api.Timegranularity**
universal_name	**String**
update_key	**String**
updatecomment	**org.apache.camel.component.linkedin.api.model.UpdateComment**

ENDPOINT PREFIX GROUPS

The following endpoints can be invoked with the prefix **groups** as follows:

```
linkedin://groups/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addPost	**post**	**group_id**, **post**	
getGroup	**group**	**group_id**	**org.apache.camel.component.linkedin.api.model.Group**

URI OPTIONS FOR GROUPS

Name	Type
group_id	**Long**

post	**org.apache.camel.component.linkedin.api.model.Post**

ENDPOINT PREFIX JOBS

The following endpoints can be invoked with the prefix **jobs** as follows:

```
linkedin://jobs/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addJob	**job**	**job**	
editJob		**job**, **partner_job_id**	
getJob	**job**	**fields**, **job_id**	**org.apache.camel.component.linkedin.api.model.Job**
removeJob	**job**	**partner_job_id**	

URI OPTIONS FOR JOBS

Name	Type
fields	**String**
job	**org.apache.camel.component.linkedin.api.model.Job**
job_id	**Long**
partner_job_id	**Long**

ENDPOINT PREFIX PEOPLE

The following endpoints can be invoked with the prefix **people** as follows:

```
linkedin://people/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addActivity	**activity**	**activity**	

addGroupMembership	groupMembership	groupmembership	
addInvite	invite	mailboxitem	
addJobBookmark	jobBookmark	jobbookmark	
addUpdateComment	updateComment	update_key, updatecomment	
followCompany		company	
getConnections	connections	fields, secure_urls	org.apache.camel.component.linkedin.api.model.Connections
getConnectionsById	connectionsById	fields, person_id, secure_urls	org.apache.camel.component.linkedin.api.model.Connections
getConnectionsByUrl	connectionsByUrl	fields, public_profile_url, secure_urls	org.apache.camel.component.linkedin.api.model.Connections
getFollowedCompanies	followedCompanies	fields	org.apache.camel.component.linkedin.api.model.Companies
getGroupMembershipSettings	groupMembershipSettings	count, fields, group_id, start	org.apache.camel.component.linkedin.api.model.GroupMemberships
getGroupMemberships	groupMemberships	count, fields, membership_state, start	org.apache.camel.component.linkedin.api.model.GroupMemberships
getJobBookmarks	jobBookmarks		org.apache.camel.component.linkedin.api.model.JobBookmarks
getNetworkStats	networkStats		org.apache.camel.component.linkedin.api.model.NetworkStats

getNetworkUpdates	**networkUpdates**	**after**, **before**, **count**, **fields**, **scope**, **secure_urls**, **show_hidden_members**, **start**, **type**	**org.apache.camel.component.linkedin.api.model.Updates**
getNetworkUpdatesById	**networkUpdatesById**	**after**, **before**, **count**, **fields**, **person_id**, **scope**, **secure_urls**, **show_hidden_members**, **start**, **type**	**org.apache.camel.component.linkedin.api.model.Updates**
getPerson	**person**	**fields**, **secure_urls**	**org.apache.camel.component.linkedin.api.model.Person**
getPersonById	**personById**	**fields**, **person_id**, **secure_urls**	**org.apache.camel.component.linkedin.api.model.Person**
getPersonByUrl	**personByUrl**	**fields**, **public_profile_url**, **secure_urls**	**org.apache.camel.component.linkedin.api.model.Person**
getPosts	**posts**	**category**, **count**, **fields**, **group_id**, **modified_since**, **order**, **role**, **start**	**org.apache.camel.component.linkedin.api.model.Posts**
getSuggestedCompanies	**suggestedCompanies**	**fields**	**org.apache.camel.component.linkedin.api.model.Companies**
getSuggestedGroupPosts	**suggestedGroupPosts**	**category**, **count**, **fields**, **group_id**, **modified_since**, **order**, **role**, **start**	**org.apache.camel.component.linkedin.api.model.Posts**
getSuggestedGroups	**suggestedGroups**	**fields**	**org.apache.camel.component.linkedin.api.model.Groups**
getSuggestedJobs	**suggestedJobs**	**fields**	**org.apache.camel.component.linkedin.api.model.JobSuggestions**

getUpdateComments	**updateComments**	**fields**, **secure_urls**, **update_key**	**org.apache.camel.component.linkedin.api.model.Comments**
getUpdateLikes	**updateLikes**	**fields**, **secure_urls**, **update_key**	**org.apache.camel.component.linkedin.api.model.Likes**
likeUpdate		**isliked**, **update_key**	
removeGroupMembership	**groupMembership**	**group_id**	
removeGroupSuggestion	**groupSuggestion**	**group_id**	
removeJobBookmark	**jobBookmark**	**job_id**	
share		**share**	**org.apache.camel.component.linkedin.api.model.Update**
stopFollowingCompany		**company_id**	
updateGroupMembership		**group_id**, **groupmembership**	

URI OPTIONS FOR PEOPLE

If a value is not provided for one of the option(s) **[after, before, category, count, membership_state, modified_since, order, public_profile_url, role, scope, secure_urls, show_hidden_members, start, type]** either in the endpoint URI or in a message header, it will be assumed to be **null**. Note that the **null** value(s) will only be used if other options do not satisfy matching endpoints.

Name	Type
activity	**org.apache.camel.component.linkedin.api.model.Activity**
after	**Long**
before	**Long**
category	**org.apache.camel.component.linkedin.api.Category**

company	org.apache.camel.component.linkedin.api.model.Company
company_id	Long
count	Long
fields	String
group_id	Long
groupmembership	org.apache.camel.component.linkedin.api.model.GroupMembership
isliked	org.apache.camel.component.linkedin.api.model.IsLiked
job_id	Long
jobbookmark	org.apache.camel.component.linkedin.api.model.JobBookmark
mailboxitem	org.apache.camel.component.linkedin.api.model.MailboxItem
membership_state	org.apache.camel.component.linkedin.api.model.MembershipState
modified_since	Long
order	org.apache.camel.component.linkedin.api.Order
person_id	String
public_profile_url	String
role	org.apache.camel.component.linkedin.api.Role
scope	String
secure_urls	Boolean
share	org.apache.camel.component.linkedin.api.model.Share

show_hidden_members	**Boolean**
start	**Long**
type	**org.apache.camel.component.linkedin.api.Type**
update_key	**String**
updatecomment	**org.apache.camel.component.linkedin.api.model.UpdateComment**

ENDPOINT PREFIX POSTS

The following endpoints can be invoked with the prefix **posts** as follows:

```
linkedin://posts/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
addComment	**comment**	**comment**, **post_id**	
flagCategory		**post_id**, **postcategorycode**	
followPost		**isfollowing**, **post_id**	
getPost	**post**	**count**, **fields**, **post_id**, **start**	**org.apache.camel.component.linkedin.api.model.Post**
getPostComments	**postComments**	**count**, **fields**, **post_id**, **start**	**org.apache.camel.component.linkedin.api.model.Comments**
likePost		**isliked**, **post_id**	
removePost	**post**	**post_id**	

URI OPTIONS FOR POSTS

If a value is not provided for one of the option(s) **[count, start]** either in the endpoint URI or in a message header, it will be assumed to be **null**. Note that the **null** value(s) will only be used if other options do not satisfy matching endpoints.

Name	Type
comment	org.apache.camel.component.linkedin.api.model.Comment
count	Long
fields	String
isfollowing	org.apache.camel.component.linkedin.api.model.IsFollowing
isliked	org.apache.camel.component.linkedin.api.model.IsLiked
post_id	String
postcategorycode	org.apache.camel.component.linkedin.api.model.PostCategoryCode
start	Long

ENDPOINT PREFIX SEARCH

The following endpoints can be invoked with the prefix **search** as follows:

```
linkedin://search/endpoint?[options]
```

Endpoint	Shorthand Alias	Options	Result Body Type
searchCompanies	companies	count, facet, facets, fields, hq_only, keywords, sort, start	org.apache.camel.component.linkedin.api.model.CompanySearch
searchJobs	jobs	company_name, count, country_code, distance, facet, facets, fields, job_title, keywords, postal_code, sort, start	org.apache.camel.component.linkedin.api.model.JobSearch

searchPeople	**people**	**company_name**, **count**, **country_code**, **current_company**, **current_school**, **current_title**, **distance**, **facet**, **facets**, **fields**, **first_name**, **keywords**, **last_name**, **postal_code**, **school_name**, **sort**, **start**, **title**	**org.apache.camel.component.linkedin.api.model.PeopleSearch**

URI OPTIONS FOR SEARCH

If a value is not provided for one of the option(s) **[company_name, count, country_code, current_company, current_school, current_title, distance, facet, facets, first_name, hq_only, job_title, keywords, last_name, postal_code, school_name, sort, start, title]** either in the endpoint URI or in a message header, it will be assumed to be **null**. Note that the **null** value(s) will only be used if other options do not satisfy matching endpoints.

Name	Type
company_name	**String**
count	**Long**
country_code	**String**
current_company	**String**
current_school	**String**
current_title	**String**
distance	**org.apache.camel.component.linkedin.api.model.Distance**
facet	**String**
facets	**String**
fields	**String**
first_name	**String**

hq_only	**String**
job_title	**String**
keywords	**String**
last_name	**String**
postal_code	**String**
school_name	**String**
sort	**String**
start	**Long**
title	**String**

CONSUMER ENDPOINTS

Any of the producer endpoints can be used as a consumer endpoint. Consumer endpoints can use Scheduled Poll Consumer Options with a **consumer.** prefix to schedule endpoint invocation. By default Consumer endpoints that return an array or collection will generate one exchange per element, and their routes will be executed once for each exchange. To change this behavior use the property **consumer.splitResults=true** to return a single exchange for the entire list or array.

MESSAGE HEADERS

Any URI option can be provided in a message header for producer endpoints with a **CamelLinkedIn.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the Camel LinkedIn API SDK, which is built using Apache CXF JAX-RS. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint parameter.

USE CASES

The following route gets user's profile:

```
from("direct:foo")
 .to("linkedin://people/person");
```

The following route polls user's connections every 30 seconds:

```
from("linkedin://people/connections?consumer.timeUnit=SECONDS&consumer.delay=30")
 .to("bean:foo");
```

The following route uses a producer with dynamic header options. The *personId* header has the LinkedIn person ID, so its assigned to the *CamelLinkedIn.person_id* header as follows:

```
from("direct:foo")
 .setHeader("CamelLinkedIn.person_id", header("personId"))
 .to("linkedin://people/connectionsById")
 .to("bean://bar");
```

CHAPTER 87. LIST

LIST COMPONENT

deprecated: is renamed to the Browse component in Apache Camel 2.0

The List component provides a simple BrowsableEndpoint which can be useful for testing, visualisation tools or debugging. The exchanges sent to the endpoint are all available to be browsed.

URI FORMAT

```
list:someName
```

Where **someName** can be any string to uniquely identify the endpoint.

SAMPLE

In the route below we have the list component to be able to browse the Exchanges that is passed through:

```
from("activemq:order.in").to("list:orderReceived").to("bean:processOrder");
```

Then we will be able to inspect the received exchanges from java code:

```
private CamelContext context;

public void inspectRecievedOrders() {
    BrowsableEndpoint browse = context.getEndpoint("list:orderReceived",
BrowsableEndpoint.class);
    List<Exchange> exchanges = browse.getExchanges();
    ...
    // then we can inspect the list of received exchanges from Java
    for (Exchange exchange : exchanges) {
        String payload = exchange.getIn().getBody();
        ...
    }
}
```

See also:

- Browse

CHAPTER 88. LOG

LOG COMPONENT

The **log:** component logs message exchanges to the underlying logging mechanism.

URI FORMAT

```
log:loggingCategory[?options]
```

Where **loggingCategory** is the name of the logging category to use. You can append query options to the URI in the following format, **?option=value&option=value&...**

USING LOGGER INSTANCE FROM THE THE REGISTRY

As of **Camel 2.12.4/2.13.1**, if there's single instance of **org.slf4j.Logger** found in the Registry, the **loggingCategory** is no longer used to create logger instance. The registered instance is used instead. Also it is possible to reference particular **Logger** instance using **?logger=#myLogger** URI parameter. Eventually, if there's no registered and URI **logger** parameter, the logger instance is created using **loggingCategory**.

For example, a log endpoint typically specifies the logging level using the **level** option, as follows:

```
log:org.apache.camel.example?level=DEBUG
```

The default logger logs every exchange (*regular logging*). But Apache Camel also ships with the **Throughput** logger, which is used whenever the **groupSize** option is specified.

ALSO A LOG IN THE DSL

There is also a **log** directly in the DSL, but it has a different purpose. Its meant for lightweight and human logs. See more details at LogEIP.

OPTIONS

Option	Default	Type	Description
level	**INFO**	**String**	Logging level to use. Possible values: **ERROR**, **WARN**, **INFO**, **DEBUG**, **TRACE**, **OFF**
marker	**null**	**String**	**Camel 2.9:** An optional Marker name to use.
groupSize	**null**	**Integer**	An integer that specifies a group size for throughput logging.

groupInterval	**null**	**Integer**	If specified will group message stats by this time interval (in millis)
groupDelay	**0**	**Integer**	Set the initial delay for stats (in millis)
groupActiveOnly	**true**	**boolean**	If true, will hide stats when no new messages have been received for a time interval, if false, show stats regardless of message traffic
logger		**Logger**	**Camel 2.12.4/2.13.1:** An optional reference to **org.slf4j.Logger** from Registry to use.

FORMATTING

The log formats the execution of exchanges to log lines. By default, the log uses **LogFormatter** to format the log output, where **LogFormatter** has the following options:

Option	Default	Description
showAll	**false**	Quick option for turning all options on (multiline, maxChars has to be manually set if to be used).
showExchangeId	**false**	Show the unique exchange ID.
showExchangePattern	**true**	Shows the Message Exchange Pattern (or MEP for short).
showProperties	**false**	Show the exchange properties.
showHeaders	**false**	Show the In message headers.
skipBodyLineSeparator	**true**	*Camel 2.12.2:* Whether to skip line separators when logging the message body. This allows to log the message body in one line, setting this option to **false** will preserve any line separators from the body, which then will log the body *as is*.
showBodyType	**true**	Show the In body Java type.

showBody	**true**	Show the In body.
showOut	**false**	If the exchange has an Out message, show the Out message.
showException	**false**	**Apache Camel 2.0:** If the exchange has an exception, show the exception message (no stack trace).
showCaughtException	**false**	**Apache Camel 2.0:** If the exchange has a caught exception, show the exception message (no stack trace). A caught exception is stored as a property on the exchange and for instance a **doCatch** can catch exceptions. See Try Catch Finally.
showStackTrace	**false**	**Apache Camel 2.0:** Show the stack trace, if an exchange has an exception. Only effective if one of **showAll**, **showException** or **showCaughtException** are enabled.
showFiles	**false**	**Camel 2.9:** Whether Camel should show file bodies or not (eg such as java.io.File).
showFuture	**false**	Whether Camel should show **java.util.concurrent.Future** bodies or not. If enabled Camel could potentially wait until the **Future** task is done. Will by default not wait.
showStreams	**false**	**Camel 2.8:** Whether Camel should show stream bodies or not (eg such as java.io.InputStream). Beware if you enable this option then you may not be able later to access the message body as the stream have already been read by this logger. To remedy this you will have to use Stream Caching.
multiline	**false**	If **true**, each piece of information is logged on a new line.

maxChars		Limits the number of characters logged per line. The default value is **10000** from **Camel 2.9** onwards.

LOGGING STREAM BODIES

For older versions of Camel that do not support the showFiles or showStreams properties above, you can set the following property instead on the CamelContext to log both stream and file bodies:

```
camelContext.getProperties().put(Exchange.LOG_DEBUG_BODY_STREAMS, true);
```

REGULAR LOGGER SAMPLE

In the route below we log the incoming orders at **DEBUG** level before the order is processed:

```
from("activemq:orders").to("log:com.mycompany.order?level=DEBUG").to("bean:processOrder");
```

Or using Spring XML to define the route:

```
<route>
  <from uri="activemq:orders"/>
  <to uri="log:com.mycompany.order?level=DEBUG"/>
  <to uri="bean:processOrder"/>
</route>
```

REGULAR LOGGER WITH FORMATTER SAMPLE

In the route below we log the incoming orders at **INFO** level before the order is processed.

```
from("activemq:orders").
    to("log:com.mycompany.order?showAll=true&multiline=true").to("bean:processOrder");
```

THROUGHPUT LOGGER WITH GROUPSIZE SAMPLE

In the route below we log the throughput of the incoming orders at **DEBUG** level grouped by 10 messages.

```
from("activemq:orders").
    to("log:com.mycompany.order?level=DEBUG&groupSize=10").to("bean:processOrder");
```

THROUGHPUT LOGGER WITH GROUPINTERVAL SAMPLE

This route will result in message stats logged every 10s, with an initial 60s delay and stats should be displayed even if there isn't any message traffic.

```
from("activemq:orders")
    .to("log:com.mycompany.order?
```

```
level=DEBUG&groupInterval=10000&groupDelay=60000&groupActiveOnly=false")
    .to("bean:processOrder");
```

The following will be logged:

```
"Received: 1000 new messages, with total 2000 so far. Last group took: 10000 millis which is: 100
messages per second. average: 100"
```

FULL CUSTOMIZATION OF THE LOGGING OUTPUT

Available as of Camel 2.11

With the options outlined in the Formatting section, you can control much of the output of the logger. However, log lines will always follow this structure:

```
Exchange[Id:ID-machine-local-50656-1234567901234-1-2, ExchangePattern:InOut,
Properties:{CamelToEndpoint=log://org.apache.camel.component.log.TEST?showAll=true,
CamelCreatedTimestamp=Thu Mar 28 00:00:00 WET 2013},
Headers:{breadcrumbId=ID-machine-local-50656-1234567901234-1-1}, BodyType:String, Body:Hello
World, Out: null]
```

This format is unsuitable in some cases, perhaps because you need to...

- ... filter the headers and properties that are printed, to strike a balance between insight and verbosity.
- ... adjust the log message to whatever you deem most readable.
- ... tailor log messages for digestion by log mining systems, e.g. Splunk.
- ... print specific body types differently.
- ... etc.

Whenever you require absolute customization, you can create a class that implements the **ExchangeFormatter** interface. Within the **format(Exchange)** method you have access to the full Exchange, so you can select and extract the precise information you need, format it in a custom manner and return it. The return value will become the final log message.

You can have the Log component pick up your custom **ExchangeFormatter** in either of two ways:

Explicitly instantiating the LogComponent in your Registry:

```
<bean name="log" class="org.apache.camel.component.log.LogComponent">
  <property name="exchangeFormatter" ref="myCustomFormatter" />
</bean>
```

Convention over configuration:

Simply by registering a bean with the name **logFormatter**; the Log Component is intelligent enough to pick it up automatically.

```
<bean name="logFormatter" class="com.xyz.MyCustomExchangeFormatter" />
```

NOTE: the **ExchangeFormatter** gets applied to **all Log endpoints within that Camel Context**. If you need different ExchangeFormatters for different endpoints, just instantiate the LogComponent as many times as needed, and use the relevant bean name as the endpoint prefix.

From **Camel 2.11.2/2.12** onwards when using a custom log formatter, you can specify parameters in the log uri, which gets configured on the custom log formatter. Though when you do that you should define the "logFormatter" as prototype scoped so its not shared if you have different parameters, eg:

```
<bean name="logFormatter" class="com.xyz.MyCustomExchangeFormatter" scope="prototype"/>
```

And then we can have Camel routes using the log uri with different options:

```
<to uri="log:foo?param1=foo&aram2=100"/>
...
<to uri="log:bar?param1=bar&aram2=200"/>
```

USING LOG COMPONENT IN OSGI

Improvement as of Camel 2.12.4/2.13.1

When using Log component inside OSGi (e.g., in Karaf), the underlying logging mechanisms are provided by PAX logging. It searches for a bundle which invokes **org.slf4j.LoggerFactory.getLogger()** method and associates the bundle with the logger instance. Without specifying custom **org.sfl4j.Logger** instance, the logger created by Log component is associated with **camel-core** bundle.

In some scenarios it is required that the bundle associated with logger should be the bundle which contains route definition. To do this, either register single instance of **org.slf4j.Logger** in the Registry or reference it using **logger** URI parameter.

CHAPTER 89. LUCENE

LUCENE (INDEXER AND SEARCH) COMPONENT

Available as of Apache Camel 2.2

The **lucene** component is based on the Apache Lucene project. Apache Lucene is a powerful high-performance, full-featured text search engine library written entirely in Java. For more details about Lucene, please see the following links:

- http://lucene.apache.org/java/docs/
- http://lucene.apache.org/java/docs/features.html

The lucene component in camel facilitates integration and utilization of Lucene endpoints in enterprise integration patterns and scenarios. The lucene component does the following

- builds a searchable index of documents when payloads are sent to the Lucene Endpoint
- facilitates performing of indexed searches in Apache Camel

This component only supports producer endpoints.

URI FORMAT

```
lucene:searcherName:insert[?options]
lucene:searcherName:query[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

INSERT OPTIONS

Name	Default Value	Description
analyzer	**StandardAnalyzer**	An Analyzer builds TokenStreams, which analyze text. It thus represents a policy for extracting index terms from text. The value for analyzer can be any class that extends the abstract class org.apache.lucene.analysis.Analyzer. Lucene also offers a rich set of analyzers out of the box
indexDir	**./indexDirectory**	A file system directory in which index files are created upon analysis of the document by the specified analyzer

srcDir	**null**	An optional directory containing files to be used to be analyzed and added to the index at producer startup.

QUERY OPTIONS

Name	Default Value	Description
analyzer	**StandardAnalyzer**	An Analyzer builds TokenStreams, which analyze text. It thus represents a policy for extracting index terms from text. The value for analyzer can be any class that extends the abstract class org.apache.lucene.analysis.Analyzer. Lucene also offers a rich set of analyzers out of the box
indexDir	**./indexDirectory**	A file system directory in which index files are created upon analysis of the document by the specified analyzer
maxHits	**10**	An integer value that limits the result set of the search operation

MESSAGE HEADERS

Header	Description
QUERY	The Lucene Query to performed on the index. The query may include wildcards and phrases.
RETURN_LUCENE_DOCS	**Camel 2.15:** Set this header to true to include the actual Lucene documentation when returning hit information.

LUCENE PRODUCERS

This component supports 2 producer endpoints.

- **insert** - The insert producer builds a searchable index by analyzing the body in incoming exchanges and associating it with a token ("content").
- **query** - The query producer performs searches on a pre-created index. The query uses the searchable index to perform score & relevance based searches. Queries are sent via the incoming exchange contains a header property name called 'QUERY'. The value of the header

property 'QUERY' is a Lucene Query. For more details on how to create Lucene Queries check out http://lucene.apache.org/java/3_0_0/queryparsersyntax.html

LUCENE PROCESSOR

There is a processor called LuceneQueryProcessor available to perform queries against lucene without the need to create a producer.

EXAMPLE 1: CREATING A LUCENE INDEX

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
      from("direct:start").
          to("lucene:whitespaceQuotesIndex:insert?
analyzer=#whitespaceAnalyzer&indexDir=#whitespace&srcDir=#load_dir").
          to("mock:result");
    }
};
```

EXAMPLE 2: LOADING PROPERTIES INTO THE JNDI REGISTRY IN THE CAMEL CONTEXT

```
@Override
protected JndiRegistry createRegistry() throws Exception {
  JndiRegistry registry =
        new JndiRegistry(createJndiContext());
  registry.bind("whitespace", new File("./whitespaceIndexDir"));
  registry.bind("load_dir",
        new File("src/test/resources/sources"));
  registry.bind("whitespaceAnalyzer",
        new WhitespaceAnalyzer());
  return registry;
}
...
CamelContext context = new DefaultCamelContext(createRegistry());
```

EXAMPLE 2: PERFORMING SEARCHES USING A QUERY PRODUCER

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
      from("direct:start").
          setHeader("QUERY", constant("Seinfeld")).
          to("lucene:searchIndex:query?
analyzer=#whitespaceAnalyzer&indexDir=#whitespace&maxHits=20").
          to("direct:next");

      from("direct:next").process(new Processor() {
          public void process(Exchange exchange) throws Exception {
            Hits hits = exchange.getIn().getBody(Hits.class);
            printResults(hits);
          }
```

```
        private void printResults(Hits hits) {
            LOG.debug("Number of hits: " + hits.getNumberOfHits());
            for (int i = 0; i < hits.getNumberOfHits(); i++) {
                LOG.debug("Hit " + i + " Index Location:" + hits.getHit().get(i).getHitLocation());
                LOG.debug("Hit " + i + " Score:" + hits.getHit().get(i).getScore());
                LOG.debug("Hit " + i + " Data:" + hits.getHit().get(i).getData());
            }
        }
    }).to("mock:searchResult");
  }
};
```

EXAMPLE 3: PERFORMING SEARCHES USING A QUERY PROCESSOR

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
        try {
            from("direct:start").
                setHeader("QUERY", constant("Rodney Dangerfield")).
                process(new LuceneQueryProcessor("target/stdindexDir", analyzer, null, 20)).
                to("direct:next");
        } catch (Exception e) {
            e.printStackTrace();
        }

        from("direct:next").process(new Processor() {
            public void process(Exchange exchange) throws Exception {
                Hits hits = exchange.getIn().getBody(Hits.class);
                printResults(hits);
            }

            private void printResults(Hits hits) {
                LOG.debug("Number of hits: " + hits.getNumberOfHits());
                for (int i = 0; i < hits.getNumberOfHits(); i++) {
                    LOG.debug("Hit " + i + " Index Location:" + hits.getHit().get(i).getHitLocation());
                    LOG.debug("Hit " + i + " Score:" + hits.getHit().get(i).getScore());
                    LOG.debug("Hit " + i + " Data:" + hits.getHit().get(i).getData());
                }
            }
        }).to("mock:searchResult");
    }
};
```

CHAPTER 90. MAIL

MAIL COMPONENT

The mail component provides access to Email via Spring's Mail support and the underlying JavaMail system.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-mail</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

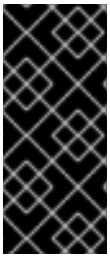
GERONIMO MAIL .JAR

We have discovered that the geronimo mail **.jar** (v1.6) has a bug when polling mails with attachments. It cannot correctly identify the **Content-Type**. So, if you attach a **.jpeg** file to a mail and you poll it, the **Content-Type** is resolved as **text/plain** and not as **image/jpeg**. For that reason, we have added an **org.apache.camel.component.ContentTypeResolver** SPI interface which enables you to provide your own implementation and fix this bug by returning the correct Mime type based on the file name. So if the file name ends with **jpeg/jpg**, you can return **image/jpeg**.

You can set your custom resolver on the **MailComponent** instance or on the **MailEndpoint** instance.

POP3 OR IMAP

POP3 has some limitations and end users are encouraged to use IMAP if possible.



USING MOCK-MAIL FOR TESTING

You can use a mock framework for unit testing, which allows you to test without the need for a real mail server. However you should remember to not include the mock-mail when you go into production or other environments where you need to send mails to a real mail server. Just the presence of the mock-javamail.jar on the classpath means that it will kick in and avoid sending the mails.

URI FORMAT

Mail endpoints can have one of the following URI formats (for the protocols, SMTP, POP3, or IMAP, respectively):

```
smtp://[username@]host[:port][?options]
pop3://[username@]host[:port][?options]
imap://[username@]host[:port][?options]
```

The mail component also supports secure variants of these protocols (layered over SSL). You can enable the secure protocols by adding **s** to the scheme:

```
smtps://[username@]host[:port][?options]
pop3s://[username@]host[:port][?options]
imaps://[username@]host[:port][?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

SAMPLE ENDPOINTS

Typically, you specify a URI with login credentials as follows (taking SMTP as an example):

```
smtp://[username@]host[:port][?password=somepwd]
```

Alternatively, it is possible to specify both the user name and the password as query options:

```
smtp://host[:port]?password=somepwd&username=someuser
```

For example:

```
smtp://mycompany.mailserver:30?password=tiger&username=scott
```

DEFAULT PORTS

Default port numbers are supported. If the port number is omitted, Camel determines the port number to use based on the protocol.

Protocol	Default Port Number
SMTP	**25**
SMTPS	**465**
POP3	**110**
POP3S	**995**
IMAP	**143**
IMAPS	**993**

OPTIONS

Property	Default	Description
host		The host name or IP address to connect to.
port	See DefaultPorts	The TCP port number to connect on.
username		The user name on the email server.
password	**null**	The password on the email server.
ignoreUriScheme	**false**	If **false**, Camel uses the scheme to determine the transport protocol (POP, IMAP, SMTP etc.)
contentType	**text/plain**	The mail message content type. Use **text/html** for HTML mails.
folderName	**INBOX**	The folder to poll.
destination	**username@host**	**@deprecated** Use the **to** option instead. The **TO** recipients (receivers of the email).
to	**username@host**	The TO recipients (the receivers of the mail). Separate multiple email addresses with a comma.
replyTo	**alias@host**	As of **Camel 2.8.4, 2.9.1\+**, the Reply-To recipients (the receivers of the response mail). Separate multiple email addresses with a comma.
CC	**null**	The CC recipients (the receivers of the mail). Separate multiple email addresses with a comma.
BCC	**null**	The BCC recipients (the receivers of the mail). Separate multiple email addresses with a comma.
from	**camel@localhost**	The FROM email address.

subject		As of **Camel 2.3**, the Subject of the message being sent. Note: Setting the subject in the header takes precedence over this option.
peek	**true**	*Camel 2.11.3/2.12.2:* Consumer only. Will mark the **javax.mail.Message** as peeked before processing the mail message. This applies to **IMAPMessage** messages types only. By using peek the mail will not be eager marked as **SEEN** on the mail server, which allows us to roll back the mail message if there is an error processing in Camel.
delete	**false**	Deletes the messages after they have been processed. This is done by setting the **DELETED** flag on the mail message. If **false**, the **SEEN** flag is set instead. As of **Camel 2.10** you can override this configuration option by setting a header with the key **delete** to determine if the mail should be deleted or not.
unseen	**true**	It is possible to configure a consumer endpoint so that it processes only unseen messages (that is, new messages) or all messages. Note that Camel always skips deleted messages. The default option of **true** will filter to only unseen messages. POP3 does not support the **SEEN** flag, so this option is not supported in POP3; use IMAP instead. **Important:** This option is **not** in use if you also use **searchTerm** options. Instead if you want to disable unseen when using **searchTerm**'s then add **searchTerm.unseen=false** as a term.

copyTo	**null**	**Camel 2.10:** Consumer only. After processing a mail message, it can be copied to a mail folder with the given name. You can override this configuration value, with a header with the key **copyTo**, allowing you to copy messages to folder names configured at runtime.
fetchSize	**\-1**	Sets the maximum number of messages to consume during a poll. This can be used to avoid overloading a mail server, if a mailbox folder contains a lot of messages. Default value of **\-1** means no fetch size and all messages will be consumed. Setting the value to 0 is a special corner case, where Camel will not consume any messages at all.
alternativeBodyHeader	**CamelMailAlternativeBody**	Specifies the key to an IN message header that contains an alternative email body. For example, if you send emails in **text/html** format and want to provide an alternative mail body for non-HTML email clients, set the alternative mail body with this key as a header.
debugMode	**false**	Enable debug mode on the underlying mail framework. The SUN Mail framework logs the debug messages to **System.out** by default.
connectionTimeout	**30000**	The connection timeout in milliseconds. Default is 30 seconds.
consumer.initialDelay	**1000**	Milliseconds before the polling starts.
consumer.delay	**60000**	Camel will poll the mailbox only once a minute by default to avoid overloading the mail server.

consumer.useFixedDelay	**false**	Set to **true** to use a fixed delay between polls, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.
disconnect	**false**	**Camel 2.8.3/2.9:** Whether the consumer should disconnect after polling. If enabled this forces Camel to connect on each poll.
closeFolder	**true**	**Camel 2.10.4:** Whether the consumer should close the folder after polling. Setting this option to **false** and having **disconnect=false** as well, then the consumer keep the folder open between polls.
mail.XXX	**null**	Set any additional java mail properties. For instance if you want to set a special property when using POP3 you can now provide the option directly in the URI such as: **mail.pop3.forgettopheaders=true**. You can set multiple such options, for example: **mail.pop3.forgettopheaders=true&mail.mime.encodefilename=true**.
mapMailMessage	**true**	**Camel 2.8:** Specifies whether Camel should map the received mail message to Camel body/headers. If set to true, the body of the mail message is mapped to the body of the Camel IN message and the mail headers are mapped to IN headers. If this option is set to false then the IN message contains a raw **javax.mail.Message**. You can retrieve this raw message by calling **exchange.getIn().getBody(javax.mail.Message.class)**.

maxMessagesPerPoll	**0**	Specifies the maximum number of messages to gather per poll. By default, no maximum is set. Can be used to set a limit of e.g. 1000 to avoid downloading thousands of files when the server starts up. Set a value of 0 or negative to disable this option.
javaMailSender	**null**	Specifies a pluggable **org.apache.camel.component.mail.JavaMailSender** instance in order to use a custom email implementation.
ignoreUnsupportedCharset	**false**	Option to let Camel ignore unsupported charset in the local JVM when sending mails. If the charset is unsupported then **charset=XXX** (where **XXX** represents the unsupported charset) is removed from the **content-type** and it relies on the platform default instead.
sslContextParameters	**null**	**Camel 2.10:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility.
searchTerm	**null**	**Camel 2.11:** Refers to a **javax.mail.search.SearchTerm** which allows to filter mails based on search criteria such as subject, body, from, sent after a certain date etc. See further below for examples.
searchTerm.xxx	**null**	**Camel 2.11:** To configure search terms directly from the endpoint uri, which supports a limited number of terms defined by the **org.apache.camel.component.mail.SimpleSearchTerm** class. See further below for examples.

sortTerm	**null**	*Camel 2.15:* To configure the sortTerms that IMAP supports to sort the searched mails. You may need to define an array of**com.sun.mail.imap.sortTerm** in the registry first and #name to reference it in this URI option.
postProcessAction	**null**	*Camel 2.15:* Refers to a**org.apache.camel.component.mail.MailBoxPostProcessAction** for doing post processing tasks on the mailbox once the normal processing ended.
skipFailedMessage	**false**	*Camel 2.15:* If the mail consumer cannot retrieve a given mail message, then this option allows to skip the message and move on to retrieve the next mail message. The default behavior would be the consumer throws an exception and no mails from the batch would be able to be routed by Camel.
handleFailedMessage	**false**	*Camel 2.15:* If the mail consumer cannot retrieve a given mail message, then this option allows to handle the caused exception by the consumer's error handler. By enable the bridge error handler on the consumer, then the Camel routing error handler can handle the exception instead. The default behavior would be the consumer throws an exception and no mails from the batch would be able to be routed by Camel.

SSL SUPPORT

The underlying mail framework is responsible for providing SSL support. ou may either configure SSL/TLS support by completely specifying the necessary Java Mail API configuration options, or you may provide a configured SSLContextParameters through the component or endpoint configuration.

USING THE JSSE CONFIGURATION UTILITY

As of **Camel 2.10**, the mail component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the mail component.

PROGRAMMATIC CONFIGURATION OF THE ENDPOINT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/truststore.jks");
ksp.setPassword("keystorePassword");
TrustManagersParameters tmp = new TrustManagersParameters();
tmp.setKeyStore(ksp);
SSLContextParameters scp = new SSLContextParameters();
scp.setTrustManagers(tmp);
Registry registry = ...
registry.bind("sslContextParameters", scp);
...
from(...)
  .to("smtps://smtp.google.com?
username=user@gmail.com&password=password&sslContextParameters=#sslContextParameters");
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
<camel:sslContextParameters id="sslContextParameters">
  <camel:trustManagers>
    <camel:keyStore resource="/users/home/server/truststore.jks" password="keystorePassword"/>
  </camel:trustManagers>
</camel:sslContextParameters>...
...
<to uri="smtps://smtp.google.com?
username=user@gmail.com&password=password&sslContextParameters=#sslContextParameters"/>...
```

CONFIGURING JAVAMAIL DIRECTLY

Camel uses SUN JavaMail, which only trusts certificates issued by well known Certificate Authorities (the default JVM trust configuration). If you issue your own certificates, you have to import the CA certificates into the JVM's Java trust/key store files, override the default JVM trust/key store files (see **SSLNOTES.txt** in JavaMail for details).

MAIL MESSAGE CONTENT

Camel uses the message exchange's IN body as the MimeMessage text content. The body is converted to **String.class**.

Camel copies all of the exchange's IN headers to the MimeMessage headers.

The subject of the MimeMessage can be configured using a header property on the IN message. The code below demonstrates this:

```
from("direct:a").setHeader("subject", constant(subject)).to("smtp://james2@localhost");
```

The same applies for other MimeMessage headers such as recipients, so you can use a header property as **To**:

```
Map<String, Object> map = new HashMap<String, Object>();
```

```
map.put("To", "davsclaus@apache.org");
map.put("From", "jstrachan@apache.org");
map.put("Subject", "Camel rocks");

String body = "Hello Claus.\nYes it does.\n\nRegards James.";
template.sendBodyAndHeaders("smtp://davsclaus@apache.org", body, map);
```

Since Camel 2.11 When using the MailProducer the send the mail to server, you should be able to get the message id of the MimeMessage with the key **CamelMailMessageId** from the Camel message header.

HEADERS TAKE PRECEDENCE OVER PRE-CONFIGURED RECIPIENTS

The recipients specified in the message headers always take precedence over recipients pre-configured in the endpoint URI. The idea is that if you provide any recipients in the message headers, that is what you get. The recipients pre-configured in the endpoint URI are treated as a fallback.

In the sample code below, the email message is sent to **davsclaus@apache.org**, because it takes precedence over the pre-configured recipient, **info@mycompany.com**. Any **CC** and **BCC** settings in the endpoint URI are also ignored and those recipients will not receive any mail. The choice between headers and pre-configured settings is all or nothing: the mail component *either* takes the recipients exclusively from the headers or exclusively from the pre-configured settings. It is not possible to mix and match headers and pre-configured settings.

```
    Map<String, Object> headers = new HashMap<String, Object>();
    headers.put("to", "davsclaus@apache.org");

    template.sendBodyAndHeaders("smtp://admin@localhost?to=info@mycompany.com", "Hello
World", headers);
```

MULTIPLE RECIPIENTS FOR EASIER CONFIGURATION

It is possible to set multiple recipients using a comma-separated or a semicolon-separated list. This applies both to header settings and to settings in an endpoint URI. For example:

```
    Map<String, Object> headers = new HashMap<String, Object>();
    headers.put("to", "davsclaus@apache.org ; jstrachan@apache.org ; ningjiang@apache.org");
```

The preceding example uses a semicolon, **;**, as the separator character.

SETTING SENDER NAME AND EMAIL

You can specify recipients in the format, **name <email>**, to include both the name and the email address of the recipient.

For example, you define the following headers on the a Message:

```
Map headers = new HashMap();
map.put("To", "Claus Ibsen <davsclaus@apache.org>");
map.put("From", "James Strachan <jstrachan@apache.org>");
map.put("Subject", "Camel is cool");
```

SUN JAVAMAIL

SUN JavaMail is used under the hood for consuming and producing mails. We encourage end-users to consult these references when using either POP3 or IMAP protocol. Note particularly that POP3 has a much more limited set of features than IMAP.

- SUN POP3 API
- SUN IMAP API
- And generally about the MAIL Flags

SAMPLES

We start with a simple route that sends the messages received from a JMS queue as emails. The email account is the **admin** account on **mymailserver.com**.

```
from("jms://queue:subscription").to("smtp://admin@mymailserver.com?password=secret");
```

In the next sample, we poll a mailbox for new emails once every minute. Notice that we use the special **consumer** option for setting the poll interval, **consumer.delay**, as 60000 milliseconds = 60 seconds.

```
from("imap://admin@mymailserver.com
    password=secret&unseen=true&consumer.delay=60000")
   .to("seda://mails");
```

In this sample we want to send a mail to multiple recipients:

```
// all the recipients of this mail are:
// To: camel@riders.org , easy@riders.org
// CC: me@you.org
// BCC: someone@somewhere.org
String recipients =
"&To=camel@riders.org,easy@riders.org&CC=me@you.org&BCC=someone@somewhere.org";

from("direct:a").to("smtp://you@mymailserver.com?password=secret&From=you@apache.org" +
recipients);
```

SENDING MAIL WITH ATTACHMENT SAMPLE

ATTACHMENTS ARE NOT SUPPORT BY ALL CAMEL COMPONENTS

The *Attachments API* is based on the Java Activation Framework and is generally only used by the Mail API. Since many of the other Camel components do not support attachments, the attachments could potentially be lost as they propagate along the route. The rule of thumb, therefore, is to add attachments just before sending a message to the mail endpoint.

The mail component supports attachments. In the sample below, we send a mail message containing a plain text message with a logo file attachment.

```
// create an exchange with a normal body and attachment to be produced as email
Endpoint endpoint = context.getEndpoint("smtp://james@mymailserver.com?password=secret");

// create the exchange with the mail message that is multipart with a file and a Hello World text/plain
message.
Exchange exchange = endpoint.createExchange();
Message in = exchange.getIn();
in.setBody("Hello World");
in.addAttachment("logo.jpeg", new DataHandler(new FileDataSource("src/test/data/logo.jpeg")));

// create a producer that can produce the exchange (= send the mail)
Producer producer = endpoint.createProducer();
// start the producer
producer.start();
// and let it go (processes the exchange by sending the email)
producer.process(exchange);
```

SSL SAMPLE

In this sample, we want to poll our Google mail inbox for mails. To download mail onto a local mail client, Google mail requires you to enable and configure SSL. This is done by logging into your Google mail account and changing your settings to allow IMAP access. Google have extensive documentation on how to do this.

```
from("imaps://imap.gmail.com?
username=YOUR_USERNAME@gmail.com&password=YOUR_PASSWORD"
    + "&delete=false&unseen=true&consumer.delay=60000").to("log:newmail");
```

The preceding route polls the Google mail inbox for new mails once every minute and logs the received messages to the **newmail** logger category. Running the sample with **DEBUG** logging enabled, we can monitor the progress in the logs:

```
2008-05-08 06:32:09,640 DEBUG MailConsumer - Connecting to MailStore
imaps//imap.gmail.com:993 (SSL enabled), folder=INBOX
2008-05-08 06:32:11,203 DEBUG MailConsumer - Polling mailfolder: imaps//imap.gmail.com:993
(SSL enabled), folder=INBOX
2008-05-08 06:32:11,640 DEBUG MailConsumer - Fetching 1 messages. Total 1 messages.
2008-05-08 06:32:12,171 DEBUG MailConsumer - Processing message: messageNumber=[332],
from=[James Bond <007@mi5.co.uk>], to=YOUR_USERNAME@gmail.com], subject=[...
2008-05-08 06:32:12,187 INFO  newmail - Exchange[MailMessage: messageNumber=[332], from=
[James Bond <007@mi5.co.uk>], to=YOUR_USERNAME@gmail.com], subject=[...
```

CONSUMING MAILS WITH ATTACHMENT SAMPLE

In this sample we poll a mailbox and store all attachments from the mails as files. First, we define a route to poll the mailbox. As this sample is based on google mail, it uses the same route as shown in the SSL sample:

```
from("imaps://imap.gmail.com?
username=YOUR_USERNAME@gmail.com&password=YOUR_PASSWORD"
    + "&delete=false&unseen=true&consumer.delay=60000").process(new MyMailProcessor());
```

Instead of logging the mail we use a processor where we can process the mail from java code:

```
    public void process(Exchange exchange) throws Exception {
        // the API is a bit clunky so we need to loop
        Map<String, DataHandler> attachments = exchange.getIn().getAttachments();
        if (attachments.size() > 0) {
            for (String name : attachments.keySet()) {
                DataHandler dh = attachments.get(name);
                // get the file name
                String filename = dh.getName();

                // get the content and convert it to byte[]
                byte[] data = exchange.getContext().getTypeConverter()
                                .convertTo(byte[].class, dh.getInputStream());

                // write the data to a file
                FileOutputStream out = new FileOutputStream(filename);
                out.write(data);
                out.flush();
                out.close();
            }
        }
    }
```

As you can see the API to handle attachments is a bit clunky but it's there so you can get the **javax.activation.DataHandler** so you can handle the attachments using standard API.

HOW TO SPLIT A MAIL MESSAGE WITH ATTACHMENTS

In this example we consume mail messages which may have a number of attachments. What we want to do is to use the Splitter EIP per individual attachment, to process the attachments separately. For example if the mail message has 5 attachments, we want the Splitter to process five messages, each having a single attachment. To do this we need to provide a custom Expression to the Splitter where we provide a List<Message> that contains the five messages with the single attachment.

The code is provided out of the box in Camel 2.10 onwards in the **camel-mail** component. The code is in the class: **org.apache.camel.component.mail.SplitAttachmentsExpression**, which you can find the source code here

In the Camel route you then need to use this Expression in the route as shown below:

```
from("pop3://james@mymailserver.com?password=secret&consumer.delay=1000")
    .to("log:email")
    // use the SplitAttachmentsExpression which will split the message per attachment
    .split(new SplitAttachmentsExpression())
        // each message going to this mock has a single attachment
        .to("mock:split")
    .end();
```

If you use XML DSL then you need to declare a method call expression in the Splitter as shown below

```
<split>
  <method beanType="org.apache.camel.component.mail.SplitAttachmentsExpression"/>
  <to uri="mock:split"/>
</split>
```

USING CUSTOM SEARCHTERM

Available as of Camel 2.11

You can configure a **searchTerm** on the **MailEndpoint** which allows you to filter out unwanted mails.

For example to filter mails to contain Camel in either Subject or Text you can do as follows:

```
<route>
  <from uri="imaps://mymailseerver?
username=foo&password=secret&searchTerm.subjectOrBody=Camel"/>
  <to uri="bean:myBean"/>
</route>
```

Notice we use the **"searchTerm.subjectOrBody"** as parameter key to indicate that we want to search on mail subject or body, to contain the word "Camel". The class **org.apache.camel.component.mail.SimpleSearchTerm** has a number of options you can configure:

Or to get the new unseen emails going 24 hours back in time you can do. Notice the "now-24h" syntax. See the table below for more details.

```
<route>
  <from uri="imaps://mymailseerver?
username=foo&password=secret&searchTerm.fromSentDate=now-24h"/>
  <to uri="bean:myBean"/>
</route>
```

You can have multiple searchTerm in the endpoint uri configuration. They would then be combined together using AND operator, eg so both conditions must match. For example to get the last unseen emails going back 24 hours which has Camel in the mail subject you can do:

```
<route>
  <from uri="imaps://mymailseerver?
username=foo&password=secret&searchTerm.subject=Camel&searchTerm.fromSentDate=now-
24h"/>
  <to uri="bean:myBean"/>
</route>
```

Option	Default	Description
unseen	**true**	Whether to limit by unseen mails only.
subjectOrBody	**null**	To limit by subject or body to contain the word.

subject	**null**	The subject must contain the word.
body	**null**	The body must contain the word.
from	**null**	The mail must be from a given email pattern.
to	**null**	The mail must be to a given email pattern.
fromSentDate	**null**	The mail must be sent after or equals (GE) a given date. The date pattern is **yyyy-MM-dd HH:mm:SS**, eg use **"2012-01-01 00:00:00"** to be from the year 2012 onwards. You can use **"now"** for current timestamp. The "now" syntax supports an optional offset, that can be specified as either + or - with a numeric value. For example for last 24 hours, you can use **"now - 24h"** or without spaces **"now-24h"**. Notice that Camel supports shorthands for hours, minutes, and seconds.
toSentDate	**null**	The mail must be sent before or equals (BE) a given date. The date pattern is **yyyy-MM-dd HH:mm:SS**, eg use **"2012-01-01 00:00:00"** to be before the year 2012. You can use **"now"** for current timestamp. The "now" syntax supports an optional offset, that can be specified as either + or - with a numeric value. For example for last 24 hours, you can use **"now - 24h"** or without spaces **"now-24h"**. Notice that Camel supports shorthands for hours, minutes, and seconds.

The **SimpleSearchTerm** is designed to be easily configurable from a POJO, so you can also configure it using a <bean> style in XML

```
<bean id="mySearchTerm" class="org.apache.camel.component.mail.SimpleSearchTerm">
  <property name="subject" value="Order"/>
  <property name="to" value="acme-order@acme.com"/>
  <property name="fromSentDate" value="now"/>
 </bean>
```

You can then refer to this bean, using #beanId in your Camel route as shown:

```
<route>
  <from uri="imaps://mymailseerver?
username=foo&password=secret&searchTerm=#mySearchTerm"/>
  <to uri="bean:myBean"/>
</route>
```

In Java there is a builder class to build compound **SearchTerm**s using the **org.apache.camel.component.mail.SearchTermBuilder** class. This allows you to build complex terms such as:

```
// we just want the unseen mails which is not spam
SearchTermBuilder builder = new SearchTermBuilder();

builder.unseen().body(Op.not, "Spam").subject(Op.not, "Spam")
  // which was sent from either foo or bar
  .from("foo@somewhere.com").from(Op.or, "bar@somewhere.com");
  // .. and we could continue building the terms

SearchTerm term = builder.build();
```

CHAPTER 91. MASTER COMPONENT

Abstract

The Master component provides a way to ensure that only a single consumer in a cluster consumes from a given endpoint; with automatic failover if that JVM dies. This feature can be useful if you need to consume from a legacy back-end that doesn't support concurrent consumption or, due to commercial or stability reasons, you can have only a single connection to the back-end at any point in time.

DEPENDENCIES

The Master component can only be used in the context of a fabric-enabled Red Hat JBoss Fuse container. You must ensure that the **fabric-camel** feature is installed.

In the context of Fabric, you install a feature by adding it to the relevant profile. For example, if you are using a profile called **my-master-profile**, you would add the **fabric-camel** feature by entering the following console command:

```
karaf@root> fabric:profile-edit --features fabric-camel my-master-profile
```

URI FORMAT

A Master endpoint can only be used as a *consumer endpoint*. It has the following URI format:

```
master:ClusterID:EndpointURI[?Options]
```

Where the URI, ***EndpointURI***, is published in the fabric registry and associated with the ***ClusterId*** cluster.

URI OPTIONS

The Master component itself does *not* support any URI options. Any options on the URI are, therefore, applied to the specified consumer endpoint, ***EndpointURI***.

HOW TO USE THE MASTER COMPONENT

The Master component is useful in cases where you need to poll messages from an endpoint, but you are only allowed to make *one connection* to that endpoint. In this case, you can use the Master component to define a failover cluster of consumer endpoints. Each Master endpoint in the cluster is capable of consuming messages from the given endpoint, but only *one* of the Master endpoints is active at any time (the master), while the other Master endpoints are waiting (the slaves).

For example, to set up a cluster of Master endpoints that can consume from the **seda:bar** endpoint, you would proceed as follows:

1. Define the Master endpoints with the following URI (where each endpoint in the cluster uses *exactly* the same URI):

   ```
   master:mysedalock:seda:bar
   ```

   Each of the Master endpoints in the cluster tries to get the **mysedalock** lock (implemented as a

key in the Zookeeper registry). The Master endpoint that succeeds in getting the lock becomes active (the master) and starts consuming messages from the **seda:bar** endpoint. The other Master endpoints enter a waiting state and continue to try the lock (the slaves).

2. You must remember to include the **fabric-camel** feature in the profile that deploys a Master endpoint.

3. In Blueprint XML, you can define a Master endpoint at the start of a Camel route, as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  ...
  <camelContext id="camel" xmlns="http://camel.apache.org/schema/blueprint">
    <route>
      <from uri="master:mysedalock:seda:bar"/>
      ...
    </route>
  </camelContext>
  ...
</blueprint>
```

EXAMPLE OF A MASTER-SLAVE CLUSTER POLLING A JMS ACTIVEMQ BROKER

For example, a typical way to use the Master component is to create a cluster of exclusive consumers for consuming messages from a JMS queue. Only one of the Master endpoints consumes from the queue at any time, and if that Master endpoint goes down, one of the other Master endpoints takes over (becomes the new master). In this example, we create a cluster of two Camel routes, where each route starts with a Master endpoint that is capable of consuming from the specified queue, **FABRIC.DEMO**.

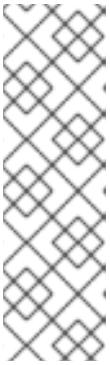
STEPS TO CREATE A CLUSTER THAT POLLS MESSAGES FROM AN ACTIVEMQ BROKER

To create a master-slave cluster that polls messages from an ActiveMQ broker, based on the Master component, perform the following steps:

1. If you do not already have a fabric, enter the following console command to create one:

```
JBossFuse:karaf@root> fabric:create --new-user AdminUser --new-user-password
AdminPass
  --zookeeper-password ZooPass --wait-for-provisioning
```

The **--new-user** and **--new-user-password** options specify the credentials for a new administrator user. The Zookeeper password is used to protect sensitive data in the Fabric registry service (all of the nodes under /**fabric**).



NOTE

If you use a VPN (virtual private network) on your local machine, it is advisable to log off VPN *before* you create the fabric and to stay logged off while you are using the local container. A local Fabric Server is permanently associated with a fixed IP address or hostname. If VPN is enabled when you create the fabric, the underlying Java runtime is liable to detect and use the VPN hostname instead of your permanent local hostname. This can also be an issue with multi-homed machines. To be absolutely sure about the hostname, you could specify the IP address explicitly—see chapter "Creating a New Fabric" in "Fabric Guide".

2. For this example, you must have access to a running instance of an Apache ActiveMQ broker and you must know the IP port of the broker's OpenWire connector. For example, you might get access to an ActiveMQ broker in one of the following ways:

   - You just created the fabric on a clean installation of JBoss Fuse (after a cold restart). In this case, the **root** container ought to include the **jboss-fuse-full** profile by default. You can check whether this is the case by entering the **fabric:container-list** console command, as follows:

     ```
     JBossFuse:karaf@root> fabric:container-list
     [id]   [version] [connected] [profiles]                                  [provision status]
     root*  1.0       true        fabric, fabric-ensemble-0000-1, jboss-fuse-full    success
     ```

     By default, the **jboss-fuse-full** profile instantiates an ActiveMQ broker that listens on port **61616**. You can use this broker for the current example.

   - If no broker is running in the root container (or any other container), you can quickly install a broker into a new fabric child container, **broker1**, by entering the following fabric command at the console prompt:

     ```
     JBossFuse:karaf@root> fabric:container-create-child --profile mq-default root broker1
     ```

     In this case, you can use the browser-based Fuse Management Console to discover the IP port of the OpenWire connector on the broker.

3. Create the **master-example** profile, which will be used to deploy a simple Apache Camel route that uses the Master component. Enter the following console command to create the profile:

   ```
   JBossFuse:karaf@root> fabric:profile-create --parents default master-example
   ```

4. Add the requisite Karaf features to the **master-example** profile. Enter the following console commands:

   ```
   fabric:profile-edit --features fabric-camel master-example
   fabric:profile-edit --features activemq-camel master-example
   ```

5. Define the simple Camel route as a resource in the **master-example** profile. Invoke the built-in text editor to create a new **camel.xml** resource, as follows:

   ```
   fabric:profile-edit --resource camel.xml master-example
   ```

   Copy and paste the following content into the built-in text editor:

   ■

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

   <camelContext id="camel" xmlns="http://camel.apache.org/schema/blueprint">
      <route id="fabric-server">
         <from uri="master:lockhandle:activemq:queue:FABRIC.DEMO"/>
         <log message="Message received : ${body}"/>
      </route>
   </camelContext>

   <bean id="activemq"
        class="org.apache.activemq.camel.component.ActiveMQComponent">
      <property name="brokerURL" value="tcp://localhost:OpenWirePort"/>
      <property name="userName" value="UserName"/>
      <property name="password" value="Password"/>
   </bean>

</blueprint>
```

Remember to customize the route configuration by replacing *OpenWirePort* with the port number of the OpenWire connector on the broker, and by replacing *UserName* and *Password* by any valid JAAS credentials on the container (for example, you could substitute the *AdminUser* and *AdminPass* credentials created in Step 1 of these instructions).

To save and exit from the text editor, type Ctrl-S, Ctrl-X.

6. Configure the **master-example** profile to deploy the **camel.xml** resource as an OSGi bundle. Enter the following console command to create a new entry in the **master-example** agent properties:

```
fabric:profile-edit --bundles blueprint:profile:camel.xml master-example
```

NOTE

The **blueprint:** prefix tells Fabric to deploy the specified resource as a Blueprint XML file, and the **profile:** prefix tells Fabric where to find the resource (that is, in the current version of the current profile).

7. Create two new child containers, so that you can deploy the **master-example** profile as a cluster (one master and one slave). Enter the following console command:

```
fabric:container-create-child root child 2
```

8. Now deploy both the **master-example** profile and the **mq-client** profile to each of the child containers, as follows:

```
fabric:container-change-profile child1 master-example mq-client
fabric:container-change-profile child2 master-example mq-client
```

9. If you now send some messages to the **FABRIC.DEMO** queue on the broker, the messages are consumed by one (and only one) of the deployed master endpoints. For example, you can easily create and send messages to the broker using the browser-based Fuse Management console.

10. If you stop the container that hosts the current master (initially, the **child1** container), the slave will be promoted to be the new master (in the **child2** container) and will start consuming messages from the **FABRIC.DEMO** queue. For example, assuming that **child2** contains the current master, you can stop it by entering the following console command:

```
fabric:container-stop child2
```

OSGI BUNDLE PLUG-IN CONFIGURATION

When defining an OSGi bundle that uses Master endpoints, the **Import-Package** bundle header must be configured to import the following Java packages:

```
io.fabric8.zookeeper
```

For example, assuming that you use Maven to build your application, Example 91.1, “Maven Bundle Plug-In Configuration” shows how you can configure the Maven bundle plug-in to import the required packages.

Example 91.1. Maven Bundle Plug-In Configuration

```
<project ... >
  ...
  <build>
    <defaultGoal>install</defaultGoal>
    <plugins>
      ...
      <plugin>
        <groupId>org.apache.felix</groupId>
        <artifactId>maven-bundle-plugin</artifactId>
        <extensions>true</extensions>
        <configuration>
          <instructions>
            <Bundle-SymbolicName>${project.groupId}.${project.artifactId}</Bundle-SymbolicName>
            <Import-Package>
              io.fabric8.zookeeper,
              *
            </Import-Package>
          </instructions>
        </configuration>
      </plugin>
    </plugins>
  </build>
  ...
</project>
```

CHAPTER 92. METRICS

METRICS COMPONENT

Available as of Camel 2.14

The **metrics:** component allows to collect various metrics directly from Camel routes. Supported metric types are counter, histogram, meter and timer. Metrics provides simple way to measure behaviour of application. Configurable reporting backend is enabling different integration options for collecting and visualizing statistics. The component also provides a **MetricsRoutePolicyFactory** which allows to expose route statistics using codehale metrics, see bottom of page for details.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-metrics</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
metrics:[ meter | counter | histogram | timer ]:metricname[?options]
```

METRIC REGISTRY

Camel Metrics Component uses by default **MetricRegistry** with **Slf4jReporter** and 60 second reporting interval. Default registry can be replaced with custom one by providing bean with name **metricRegistry** in Camel registry. For example using Spring Java Configuration.

```
@Configuration
public static class MyConfig extends SingleRouteCamelConfiguration {

  @Bean
  @Override
  public RouteBuilder route() {
    return new RouteBuilder() {
      @Override
      public void configure() throws Exception {
        // define Camel routes here
      }
    };
  }

  @Bean(name = MetricsComponent.METRIC_REGISTRY_NAME)
  public MetricRegistry getMetricRegistry() {
    MetricRegistry registry = ...;
    return registry;
  }
}
```

WARNING

MetricRegistry uses internal thread(s) for reporting. There is no public API in version 3.0.1 for users to clean up on exit. Thus using Camel Metrics Component leads to Java classloader leak and my cause **OutOfMemoryErrors** in some cases.

USAGE

Each metric has type and name. Supported types are counter, histogram, meter and timer. Metric name is simple string. If metric type is not provided then type meter is used by default.

HEADERS

Metric name defined in URI can be overridden by using header with name **CamelMetricsName**.

For example

```
from("direct:in")
    .setHeader(MetricsConstants.HEADER_METRIC_NAME, constant("new.name"))
    .to("metrics:counter:name.not.used")
    .to("direct:out");
```

will update counter with name **new.name** instead of **name.not.used**.

All Metrics specific headers are removed from the message once Metrics endpoint finishes processing of exchange. While processing exchange Metrics endpoint will catch all exceptions and write log entry using level **warn**.

METRICS TYPE COUNTER

```
metrics:counter:metricname[?options]
```

OPTIONS

Name	Default	Description
increment	-	Long value to add to the counter
decrement	-	Long value to subtract from the counter

If neither **increment** or **decrement** is defined then counter value will be incremented by one. If **increment** and **decrement** are both defined only increment operation is called.

```
// update counter simple.counter by 7
from("direct:in")
```

```
    .to("metric:counter:simple.counter?increment=7")
    .to("direct:out");
```

```
// increment counter simple.counter by 1
from("direct:in")
    .to("metric:counter:simple.counter")
    .to("direct:out");
```

```
// decrement counter simple.counter by 3
from("direct:in")
    .to("metric:counter:simple.counter?decrement=3")
    .to("direct:out");
```

HEADERS

Message headers can be used to override **increment** and **decrement** values specified in Metrics component URI.

Name	Description	Expected type
CamelMetricsCounterIncrement	Override increment value in URI	Long
CamelMetricsCounterDecrement	Override decrement value in URI	Long

```
// update counter simple.counter by 417
from("direct:in")
    .setHeader(MetricsConstants.HEADER_COUNTER_INCREMENT, constant(417L))
    .to("metric:counter:simple.counter?increment=7")
    .to("direct:out");
```

```
// updates counter using simple language to evaluate body.length
from("direct:in")
    .setHeader(MetricsConstants.HEADER_COUNTER_INCREMENT, simple("${body.length}"))
    .to("metrics:counter:body.length")
    .to("mock:out");
```

METRIC TYPE HISTOGRAM

```
metrics:histogram:metricname[?options]
```

OPTIONS

Name	Default	Description
value	-	Value to use in histogram

If no **value** is not set nothing is added to histogram and warning is logged.

```
// adds value 9923 to simple.histogram
from("direct:in")
    .to("metric:histogram:simple.histogram?value=9923")
    .to("direct:out");
```

```
// nothing is added to simple.histogram; warning is logged
from("direct:in")
    .to("metric:histogram:simple.histogram")
    .to("direct:out");
```

HEADERS

Message header can be used to override value specified in Metrics component URI.

Name	Description	Expected type
CamelMetricsHistogramValue	Override histogram value in URI	Long

```
// adds value 992 to simple.histogram
from("direct:in")
    .setHeader(MetricsConstants.HEADER_HISTOGRAM_VALUE, constant(992L))
    .to("metric:histogram:simple.histogram?value=700")
    .to("direct:out")
```

METRIC TYPE METER

```
metrics:meter:metricname[?options]
```

OPTIONS

Name	Default	Description
mark	-	Long value to use as mark

If **mark** is not set then **meter.mark()** is called without argument.

```
// marks simple.meter without value
from("direct:in")
    .to("metric:simple.meter")
    .to("direct:out");
```

```
// marks simple.meter with value 81
from("direct:in")
    .to("metric:meter:simple.meter?mark=81")
    .to("direct:out");
```

HEADERS

Message header can be used to override **mark** value specified in Metrics component URI.

Name	Description	Expected type
CamelMetricsMeterMark	Override mark value in URI	Long

```
// updates meter simple.meter with value 345
from("direct:in")
    .setHeader(MetricsConstants.HEADER_METER_MARK, constant(345L))
    .to("metric:meter:simple.meter?mark=123")
    .to("direct:out");
```

METRICS TYPE TIMER

```
metrics:timer:metricname[?options]
```

OPTIONS

Name	Default	Description
action	-	start or stop

If no **action** or invalid value is provided then warning is logged without any timer update. If action **start** is called on already running timer or **stop** is called on not running timer then nothing is updated and warning is logged.

```
// measure time taken by route "calculate"
from("direct:in")
    .to("metrics:timer:simple.timer?action=start")
    .to("direct:calculate")
    .to("metrics:timer:simple.timer?action=stop");
```

TimerContext objects are stored as Exchange properties between different Metrics component calls.

HEADERS

Message header can be used to override action value specified in Metrics component URI.

Name	Description	Expected type
CamelMetricsTimerAction	Override timer action in URI	**org.apache.camel.component.metrics.timer.TimerEndpoint.TimerAction**

```
// sets timer action using header
```

```
from("direct:in")
    .setHeader(MetricsConstants.HEADER_TIMER_ACTION, TimerAction.start)
    .to("metric:timer:simple.timer")
    .to("direct:out");
```

METRICSROUTEPOLICYFACTORY

This factory allows to add a RoutePolicy for each route which exposes route utilization statistics using codehale metrics. This factory can be used in Java and XML as the examples below demonstrates.

TIP

Instead of using the MetricsRoutePolicyFactory you can define a MetricsRoutePolicy per route you want to instrument, in case you only want to instrument a few selected routes.

From Java you just add the factory to the **CamelContext** as shown below:

```
context.addRoutePolicyFactory(new MetricsRoutePolicyFactory());
```

And from XML DSL you define a <bean> as follows:

```
  <!-- use camel-metrics route policy to gather metrics for all routes -->
  <bean id="metricsRoutePolicyFactory"
class="org.apache.camel.component.metrics.routepolicy.MetricsRoutePolicyFactory"/>
```

The **MetricsRoutePolicyFactory** and **MetricsRoutePolicy** supports the following options:

Name	Default	Description
useJmx	false	Whether to report fine grained statistics to JMX by using the **com.codahale.metrics.JmxReporter**. Notice that if JMX is enabled on CamelContext then a **MetricsRegistryService** mbean is enlisted under the services type in the JMX tree. That mbean has a single operation to output the statistics using json. Setting **useJmx** to true is only needed if you want fine grained mbeans per statistics type.
jmxDomain	org.apache.camel.metrics	The JMX domain name
prettyPrint	false	Whether to use pretty print when outputting statistics in json format
metricsRegistry		Allow to use a shared **com.codahale.metrics.MetricRegistry**. If none is provided then Camel will create a shared instance used by the this CamelContext.

Name	Default	Description
rateUnit	TimeUnit.SECONDS	The unit to use for rate in the metrics reporter or when dumping the statistics as json.
durationUnit	TimeUnit.MILLISECONDS	The unit to use for duration in the metrics reporter or when dumping the statistics as json.

From Java code tou can get hold of the **com.codahale.metrics.MetricRegistry** from the **org.apache.camel.component.metrics.routepolicy.MetricsRegistryService** as shown below:

```
MetricRegistryService registryService = context.hasService(MetricsRegistryService.class);
if (registryService != null) {
  MetricsRegistry registry = registryService.getMetricsRegistry();
  ...
}
```

CHAPTER 93. MINA2 - DEPRECATED

MINA 2 COMPONENT

DEPRECATED

The MINA2 component is deprecated. Use Netty instead.

NOTE

Be careful with **sync=false** on consumer endpoints. Since camel-mina2, all consumer exchanges are *InOut*. This is different to camel-mina.

Available as of Camel 2.10

The **mina2:** component is a transport for working with Apache MINA 2.x

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-mina2</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
mina2:tcp://hostname[:port][?options]
mina2:udp://hostname[:port][?options]
mina2:vm://hostname[:port][?options]
```

You can specify a codec in the Registry using the **codec** option. If you are using TCP and no codec is specified then the **textline** flag is used to determine if text line based codec or object serialization should be used instead. By default the object serialization is used.

For UDP if no codec is specified the default uses a basic **ByteBuffer** based codec.

The VM protocol is used as a direct forwarding mechanism in the same JVM.

A Mina producer has a default timeout value of 30 seconds, while it waits for a response from the remote server.

In normal use, **camel-mina** only supports marshalling the body content—essage headers and exchange properties are not sent. However, the option, **transferExchange**, does allow you to transfer the exchange itself over the wire. See options below.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default Value	Description
codec	**null**	You can refer to a named **ProtocolCodecFactory** instance in your Registry such as your Spring **ApplicationContext**, which is then used for the marshalling.
disconnect	**false**	Whether or not to disconnect(close) from Mina session right after use. Can be used for both consumer and producer.
textline	**false**	Only used for TCP. If no codec is specified, you can use this flag to indicate a text line based codec; if not specified or the value is **false**, then Object Serialization is assumed over TCP.
textlineDelimiter	**DEFAULT**	Only used for TCP and if **textline=true**. Sets the text line delimiter to use. Possible values are: **DEFAULT**, **AUTO**, **WINDOWS**, **UNIX** or **MAC**. If none provided, Camel will use **DEFAULT**. This delimiter is used to mark the end of text.
sync	**true**	Setting to set endpoint as one-way or request-response.
lazySessionCreation	**true**	Sessions can be lazily created to avoid exceptions, if the remote server is not up and running when the Camel producer is started.
timeout	**30000**	You can configure the timeout that specifies how long to wait for a response from a remote server. The timeout unit is in milliseconds, so 60000 is 60 seconds. The timeout is only used for Mina producer.

encoding	*JVM Default*	You can configure the encoding (a charset name) to use for the TCP textline codec and the UDP protocol. If not provided, Camel will use the JVM default Charset.
transferExchange	**false**	Only used for TCP. You can transfer the exchange over the wire instead of just the body. The following fields are transferred: In body, Out body, fault body, In headers, Out headers, fault headers, exchange properties, exchange exception. This requires that the objects are *serializable*. Camel will exclude any non-serializable objects and log it at **WARN** level.
minaLogger	**false**	You can enable the Apache MINA logging filter. Apache MINA uses **slf4j** logging at **INFO** level to log all input and output.
filters	**null**	You can set a list of Mina IoFilters to register. The **filters** can be specified as a comma-separate list of bean references (e.g. **#filterBean1,#filterBean2**) where each bean must be of type **org.apache.mina.common.IoFilter**.
encoderMaxLineLength	**\-1**	Set the textline protocol encoder max line length. By default the default value of Mina itself is used which are **Integer.MAX_VALUE**.
decoderMaxLineLength	**\-1**	Set the textline protocol decoder max line length. By default the default value of Mina itself is used which are 1024.

maximumPoolSize	16	The TCP producer is thread safe and supports concurrency much better. This option allows you to configure the number of threads in its thread pool for concurrent producers. **Note:** Camel has a pooled service which ensured it was already thread safe and supported concurrency already.
allowDefaultCodec	**true**	The mina component installs a default codec if both, **codec** is **null** and **textline** is **false**. Setting **allowDefaultCodec** to **false** prevents the mina component from installing a default codec as the first element in the filter chain. This is useful in scenarios where another filter must be the first in the filter chain, like the SSL filter.
disconnectOnNoReply	**true**	If sync is enabled then this option dictates MinaConsumer if it should disconnect where there is no reply to send back.
noReplyLogLevel	**WARN**	If sync is enabled this option dictates MinaConsumer which logging level to use when logging a there is no reply to send back. Values are: **FATAL, ERROR, INFO, DEBUG, OFF**.
orderedThreadPoolExecutor	**true**	Whether to use ordered thread pool, to ensure events are processed orderly on the same channel.
sslContextParameters	**null**	SSL configuration using an **org.apache.camel.util.jsse.SSLContextParameters** instance. See Using the JSSE Configuration Utility.
autoStartTls	**true**	Whether to auto start SSL handshake.

cachedAddress	**true**	**Camel 2.14:** Whether to create the InetAddress once and reuse. Setting this to false allows to pickup DNS changes in the network.
clientMode	**false**	**Camel 2.15:** Consumer only. If the clientMode is true, mina consumer will connect the address as a TCP client.

USING A CUSTOM CODEC

See the Mina how to write your own codec. To use your custom codec with **camel-mina**, you should register your codec in the Registry; for example, by creating a bean in the Spring XML file. Then use the **codec** option to specify the bean ID of your codec. See HL7 that has a custom codec.

SAMPLE WITH SYNC=FALSE

In this sample, Camel exposes a service that listens for TCP connections on port 6200. We use the **textline** codec. In our route, we create a Mina consumer endpoint that listens on port 6200:

```
from("mina2:tcp://localhost:" + port1 + "?textline=true&sync=false").to("mock:result");
```

As the sample is part of a unit test, we test it by sending some data to it on port 6200.

```
MockEndpoint mock = getMockEndpoint("mock:result");
mock.expectedBodiesReceived("Hello World");

template.sendBody("mina2:tcp://localhost:" + port1 + "?textline=true&sync=false", "Hello World");

assertMockEndpointsSatisfied();
```

SAMPLE WITH SYNC=TRUE

In the next sample, we have a more common use case where we expose a TCP service on port 6201 also use the textline codec. However, this time we want to return a response, so we set the **sync** option to **true** on the consumer.

```
from("mina2:tcp://localhost:" + port2 + "?textline=true&sync=true").process(new Processor() {
    public void process(Exchange exchange) throws Exception {
        String body = exchange.getIn().getBody(String.class);
        exchange.getOut().setBody("Bye " + body);
    }
});
```

Then we test the sample by sending some data and retrieving the response using the **template.requestBody()** method. As we know the response is a **String**, we cast it to **String** and can assert that the response is, in fact, something we have dynamically set in our processor code logic.

```
String response = (String)template.requestBody("mina2:tcp://localhost:" + port2 + "?
textline=true&sync=true", "World");
assertEquals("Bye World", response);
```

SAMPLE WITH SPRING DSL

Spring DSL can, of course, also be used for MINA. In the sample below we expose a TCP server on port 5555:

```
<route>
  <from uri="mina2:tcp://localhost:5555?textline=true"/>
  <to uri="bean:myTCPOrderHandler"/>
</route>
```

In the route above, we expose a TCP server on port 5555 using the textline codec. We let the Spring bean with ID, **myTCPOrderHandler**, handle the request and return a reply. For instance, the handler bean could be implemented as follows:

```
public String handleOrder(String payload) {
    ...
    return "Order: OK"
}
```

CLOSING SESSION WHEN COMPLETE

When acting as a server you sometimes want to close the session when, for example, a client conversion is finished. To instruct Camel to close the session, you should add a header with the key **CamelMinaCloseSessionWhenComplete** set to a boolean **true** value.

For instance, the example below will close the session after it has written the **bye** message back to the client:

```
    from("mina2:tcp://localhost:8080?sync=true&textline=true").process(new Processor() {
        public void process(Exchange exchange) throws Exception {
            String body = exchange.getIn().getBody(String.class);
            exchange.getOut().setBody("Bye " + body);

exchange.getOut().setHeader(Mina2Constants.MINA_CLOSE_SESSION_WHEN_COMPLETE,
true);
        }
    });
```

GET THE IOSESSION FOR MESSAGE

You can get the IoSession from the message header with this key **Mina2Constants.MINA_IOSESSION**, and also get the local host address with the key **Mina2Constants.MINA_LOCAL_ADDRESS** and remote host address with the key **Mina2Constants.MINA_REMOTE_ADDRESS**.

CONFIGURING MINA FILTERS

Filters permit you to use some Mina Filters, such as **SslFilter**. You can also implement some

customized filters. Please note that **codec** and **logger** are also implemented as Mina filters of type, **ioFilter**. Any filters you may define are appended to the end of the filter chain; that is, after **codec** and **logger**.

- See also:

  Netty

CHAPTER 94. MOCK

MOCK COMPONENT

The Mock component provides a powerful declarative testing mechanism, which is similar to jMock in that it allows declarative expectations to be created on any Mock endpoint before a test begins. Then the test is run, which typically fires messages to one or more endpoints, and finally the expectations can be asserted in a test case to ensure the system worked as expected.

This allows you to test various things like:

- The correct number of messages are received on each endpoint,
- The correct payloads are received, in the right order,
- Messages arrive on an endpoint in order, using some Expression to create an order testing function,
- Messages arrive match some kind of Predicate such as that specific headers have certain values, or that parts of the messages match some predicate, such as by evaluating an XPath or XQuery Expression.

Note that there is also the Test endpoint which is a Mock endpoint, but which uses a second endpoint to provide the list of expected message bodies and automatically sets up the Mock endpoint assertions. In other words, it's a Mock endpoint that automatically sets up its assertions from some sample messages in a File or database, for example.

MOCK ENDPOINTS KEEP RECEIVED EXCHANGES IN MEMORY INDEFINITELY

Remember that Mock is designed for testing. When you add Mock endpoints to a route, each Exchange sent to the endpoint will be stored (to allow for later validation) in memory until explicitly reset or the JVM is restarted. If you are sending high volume and/or large messages, this may cause excessive memory use. If your goal is to test deployable routes inline, consider using NotifyBuilder or AdviceWith in your tests instead of adding Mock endpoints to routes directly.

From Camel 2.10 onwards there are two new options **retainFirst**, and **retainLast** that can be used to limit the number of messages the Mock endpoints keep in memory.

URI FORMAT

```
mock:someName[?options]
```

Where **someName** can be any string that uniquely identifies the endpoint.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
reportGroup	**null**	A size to use a throughput logger for reporting
retainFirst		**Camel 2.10:** To only keep first X number of messages in memory.
retainLast		**Camel 2.10:** To only keep last X number of messages in memory.

SIMPLE EXAMPLE

Here's a simple example of Mock endpoint in use. First, the endpoint is resolved on the context. Then we set an expectation, and then, after the test has run, we assert that our expectations have been met.

```
MockEndpoint resultEndpoint = context.resolveEndpoint("mock:foo", MockEndpoint.class);

resultEndpoint.expectedMessageCount(2);

// send some messages
...

// now lets assert that the mock:foo endpoint received 2 messages
resultEndpoint.assertIsSatisfied();
```

You typically always call the assertIsSatisfied() method to test that the expectations were met after running a test.

Apache Camel will by default wait 10 seconds when the **assertIsSatisfied()** is invoked. This can be configured by setting the **setResultWaitTime(millis)** method.

USING ASSERTPERIOD

Available as of Camel 2.7 When the assertion is satisfied then Camel will stop waiting and continue from the **assertIsSatisfied** method. That means if a new message arrives on the mock endpoint, just a bit later, that arrival will not affect the outcome of the assertion. Suppose you do want to test that no new messages arrives after a period thereafter, then you can do that by setting the **setAssertPeriod** method, for example:

```
MockEndpoint resultEndpoint = context.resolveEndpoint("mock:foo", MockEndpoint.class);
resultEndpoint.setAssertPeriod(5000);
resultEndpoint.expectedMessageCount(2);

// send some messages
...

// now lets assert that the mock:foo endpoint received 2 messages
resultEndpoint.assertIsSatisfied();
```

SETTING EXPECTATIONS

You can see from the javadoc of MockEndpoint the various helper methods you can use to set expectations. The main methods are as follows:

Method	Description
expectedMessageCount(int)	To define the expected message count on the endpoint.
expectedMinimumMessageCount(int)	To define the minimum number of expected messages on the endpoint.
expectedBodiesReceived(...)	To define the expected bodies that should be received (in order).
expectedHeaderReceived(...)	To define the expected header that should be received
expectsAscending(Expression)	To add an expectation that messages are received in order, using the given Expression to compare messages.
expectsDescending(Expression)	To add an expectation that messages are received in order, using the given Expression to compare messages.
expectsNoDuplicates(Expression)	To add an expectation that no duplicate messages are received; using an Expression to calculate a unique identifier for each message. This could be something like the **JMSMessageID** if using JMS, or some unique reference number within the message.

Here's another example:

```
resultEndpoint.expectedBodiesReceived("firstMessageBody", "secondMessageBody",
"thirdMessageBody");
```

ADDING EXPECTATIONS TO SPECIFIC MESSAGES

In addition, you can use the message(int messageIndex) method to add assertions about a specific message that is received.

For example, to add expectations of the headers or body of the first message (using zero-based indexing like **java.util.List**), you can use the following code:

```
resultEndpoint.message(0).header("foo").isEqualTo("bar");
```

There are some examples of the Mock endpoint in use in the camel-core processor tests.

MOCKING EXISTING ENDPOINTS

Available as of Camel 2.7

Camel now allows you to automatic mock existing endpoints in your Camel routes.

HOW IT WORKS

Important: The endpoints are still in action, what happens is that a Mock endpoint is injected and receives the message first, it then delegate the message to the target endpoint. You can view this as a kind of intercept and delegate or endpoint listener.

Suppose you have the given route below:

```
@Override
protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        @Override
        public void configure() throws Exception {
            from("direct:start").to("direct:foo").to("log:foo").to("mock:result");

            from("direct:foo").transform(constant("Bye World"));
        }
    };
}
```

You can then use the **adviceWith** feature in Camel to mock all the endpoints in a given route from your unit test, as shown below:

```
public void testAdvisedMockEndpoints() throws Exception {
    // advice the first route using the inlined AdviceWith route builder
    // which has extended capabilities than the regular route builder
    context.getRouteDefinitions().get(0).adviceWith(context, new AdviceWithRouteBuilder() {
        @Override
        public void configure() throws Exception {
            // mock all endpoints
            mockEndpoints();
        }
    });

    getMockEndpoint("mock:direct:start").expectedBodiesReceived("Hello World");
    getMockEndpoint("mock:direct:foo").expectedBodiesReceived("Hello World");
    getMockEndpoint("mock:log:foo").expectedBodiesReceived("Bye World");
    getMockEndpoint("mock:result").expectedBodiesReceived("Bye World");

    template.sendBody("direct:start", "Hello World");

    assertMockEndpointsSatisfied();

    // additional test to ensure correct endpoints in registry
    assertNotNull(context.hasEndpoint("direct:start"));
    assertNotNull(context.hasEndpoint("direct:foo"));
    assertNotNull(context.hasEndpoint("log:foo"));
    assertNotNull(context.hasEndpoint("mock:result"));
    // all the endpoints was mocked
```

```
    assertNotNull(context.hasEndpoint("mock:direct:start"));
    assertNotNull(context.hasEndpoint("mock:direct:foo"));
    assertNotNull(context.hasEndpoint("mock:log:foo"));
}
```

Notice that the mock endpoints is given the uri **mock:<endpoint>**, for example **mock:direct:foo**. Camel logs at **INFO** level the endpoints being mocked:

```
INFO  Adviced endpoint [direct://foo] with mock endpoint [mock:direct:foo]
```

MOCKED ENDPOINTS ARE WITHOUT PARAMETERS

Endpoints which are mocked will have their parameters stripped off. For example the endpoint "log:foo?showAll=true" will be mocked to the following endpoint "mock:log:foo". Notice the parameters has been removed.

Its also possible to only mock certain endpoints using a pattern. For example to mock all **log** endpoints you do as shown:

```
public void testAdvisedMockEndpointsWithPattern() throws Exception {
    // advice the first route using the inlined AdviceWith route builder
    // which has extended capabilities than the regular route builder
    context.getRouteDefinitions().get(0).adviceWith(context, new AdviceWithRouteBuilder() {
        @Override
        public void configure() throws Exception {
            // mock only log endpoints
            mockEndpoints("log*");
        }
    });

    // now we can refer to log:foo as a mock and set our expectations
    getMockEndpoint("mock:log:foo").expectedBodiesReceived("Bye World");

    getMockEndpoint("mock:result").expectedBodiesReceived("Bye World");

    template.sendBody("direct:start", "Hello World");

    assertMockEndpointsSatisfied();

    // additional test to ensure correct endpoints in registry
    assertNotNull(context.hasEndpoint("direct:start"));
    assertNotNull(context.hasEndpoint("direct:foo"));
    assertNotNull(context.hasEndpoint("log:foo"));
    assertNotNull(context.hasEndpoint("mock:result"));
    // only the log:foo endpoint was mocked
    assertNotNull(context.hasEndpoint("mock:log:foo"));
    assertNull(context.hasEndpoint("mock:direct:start"));
    assertNull(context.hasEndpoint("mock:direct:foo"));
}
```

The pattern supported can be a wildcard or a regular expression. See more details about this at Intercept as its the same matching function used by Camel.

IMPORTANT

Mind that mocking endpoints causes the messages to be copied when they arrive on the mock. That means Camel will use more memory. This may not be suitable when you send in a lot of messages.

MOCKING EXISTING ENDPOINTS USING THE CAMEL-TEST COMPONENT

Instead of using the **adviceWith** to instruct Camel to mock endpoints, you can easily enable this behavior when using the **camel-test** Test Kit. The same route can be tested as follows. Notice that we return **"*"** from the **isMockEndpoints** method, which tells Camel to mock all endpoints. If you only want to mock all **log** endpoints you can return **"log*"** instead.

```
public class IsMockEndpointsJUnit4Test extends CamelTestSupport {

    @Override
    public String isMockEndpoints() {
        // override this method and return the pattern for which endpoints to mock.
        // use * to indicate all
        return "*";
    }

    @Test
    public void testMockAllEndpoints() throws Exception {
        // notice we have automatic mocked all endpoints and the name of the endpoints is "mock:uri"
        getMockEndpoint("mock:direct:start").expectedBodiesReceived("Hello World");
        getMockEndpoint("mock:direct:foo").expectedBodiesReceived("Hello World");
        getMockEndpoint("mock:log:foo").expectedBodiesReceived("Bye World");
        getMockEndpoint("mock:result").expectedBodiesReceived("Bye World");

        template.sendBody("direct:start", "Hello World");

        assertMockEndpointsSatisfied();

        // additional test to ensure correct endpoints in registry
        assertNotNull(context.hasEndpoint("direct:start"));
        assertNotNull(context.hasEndpoint("direct:foo"));
        assertNotNull(context.hasEndpoint("log:foo"));
        assertNotNull(context.hasEndpoint("mock:result"));
        // all the endpoints was mocked
        assertNotNull(context.hasEndpoint("mock:direct:start"));
        assertNotNull(context.hasEndpoint("mock:direct:foo"));
        assertNotNull(context.hasEndpoint("mock:log:foo"));
    }

    @Override
    protected RouteBuilder createRouteBuilder() throws Exception {
        return new RouteBuilder() {
            @Override
            public void configure() throws Exception {
                from("direct:start").to("direct:foo").to("log:foo").to("mock:result");

                from("direct:foo").transform(constant("Bye World"));
            }
```

```
        };
    }
}
```

MOCKING EXISTING ENDPOINTS WITH XML DSL

If you do not use the **camel-test** component for unit testing (as shown above) you can use a different approach when using XML files for routes. The solution is to create a new XML file used by the unit test and then include the intended XML file which has the route you want to test.

Suppose we have the route in the **camel-route.xml** file:

```
<!-- this camel route is in the camel-route.xml file -->
<camelContext xmlns="http://camel.apache.org/schema/spring">

    <route>
        <from uri="direct:start"/>
        <to uri="direct:foo"/>
        <to uri="log:foo"/>
        <to uri="mock:result"/>
    </route>

    <route>
        <from uri="direct:foo"/>
        <transform>
            <constant>Bye World</constant>
        </transform>
    </route>

</camelContext>
```

Then we create a new XML file as follows, where we include the **camel-route.xml** file and define a spring bean with the class **org.apache.camel.impl.InterceptSendToMockEndpointStrategy** which tells Camel to mock all endpoints:

```
<!-- the Camel route is defined in another XML file -->
<import resource="camel-route.xml"/>

<!-- bean which enables mocking all endpoints -->
<bean id="mockAllEndpoints"
class="org.apache.camel.impl.InterceptSendToMockEndpointStrategy"/>
```

Then in your unit test you load the new XML file (**test-camel-route.xml**) instead of **camel-route.xml**.

To only mock all log endpoints you can define the pattern in the constructor for the bean:

```
<bean id="mockAllEndpoints"
class="org.apache.camel.impl.InterceptSendToMockEndpointStrategy">
    <constructor-arg index="0" value="log*"/>
</bean>
```

MOCKING ENDPOINTS AND SKIP SENDING TO ORIGINAL ENDPOINT

Available as of Camel 2.10

Sometimes you want to easily mock and skip sending to a certain endpoints. So the message is detoured and send to the mock endpoint only. From Camel 2.10 onwards you can now use the **mockEndpointsAndSkip** method using AdviceWith or the Test Kit. The example below will skip sending to the two endpoints **"direct:foo"**, and **"direct:bar"**.

```
public void testAdvisedMockEndpointsWithSkip() throws Exception {
    // advice the first route using the inlined AdviceWith route builder
    // which has extended capabilities than the regular route builder
    context.getRouteDefinitions().get(0).adviceWith(context, new AdviceWithRouteBuilder() {
        @Override
        public void configure() throws Exception {
            // mock sending to direct:foo and direct:bar and skip send to it
            mockEndpointsAndSkip("direct:foo", "direct:bar");
        }
    });

    getMockEndpoint("mock:result").expectedBodiesReceived("Hello World");
    getMockEndpoint("mock:direct:foo").expectedMessageCount(1);
    getMockEndpoint("mock:direct:bar").expectedMessageCount(1);

    template.sendBody("direct:start", "Hello World");

    assertMockEndpointsSatisfied();

    // the message was not send to the direct:foo route and thus not sent to the seda endpoint
    SedaEndpoint seda = context.getEndpoint("seda:foo", SedaEndpoint.class);
    assertEquals(0, seda.getCurrentQueueSize());
}
```

The same example using the Test Kit

```
public class IsMockEndpointsAndSkipJUnit4Test extends CamelTestSupport {

    @Override
    public String isMockEndpointsAndSkip() {
        // override this method and return the pattern for which endpoints to mock,
        // and skip sending to the original endpoint.
        return "direct:foo";
    }

    @Test
    public void testMockEndpointAndSkip() throws Exception {
        // notice we have automatic mocked the direct:foo endpoints and the name of the endpoints is
"mock:uri"
        getMockEndpoint("mock:result").expectedBodiesReceived("Hello World");
        getMockEndpoint("mock:direct:foo").expectedMessageCount(1);

        template.sendBody("direct:start", "Hello World");

        assertMockEndpointsSatisfied();

        // the message was not send to the direct:foo route and thus not sent to the seda endpoint
        SedaEndpoint seda = context.getEndpoint("seda:foo", SedaEndpoint.class);
        assertEquals(0, seda.getCurrentQueueSize());
```

```
    }

    @Override
    protected RouteBuilder createRouteBuilder() throws Exception {
        return new RouteBuilder() {
            @Override
            public void configure() throws Exception {
                from("direct:start").to("direct:foo").to("mock:result");

                from("direct:foo").transform(constant("Bye World")).to("seda:foo");
            }
        };
    }
}
```

LIMITING THE NUMBER OF MESSAGES TO KEEP

Available as of Camel 2.10

The Mock endpoints will by default keep a copy of every Exchange that it received. So if you test with a lot of messages, then it will consume memory. From Camel 2.10 onwards we have introduced two options **retainFirst** and **retainLast** that can be used to specify to only keep N'th of the first and/or last Exchanges.

For example in the code below, we only want to retain a copy of the first 5 and last 5 Exchanges the mock receives.

```
MockEndpoint mock = getMockEndpoint("mock:data");
mock.setRetainFirst(5);
mock.setRetainLast(5);
mock.expectedMessageCount(2000);

...

mock.assertIsSatisfied();
```

Using this has some limitations. The **getExchanges()** and **getReceivedExchanges()** methods on the **MockEndpoint** will return only the retained copies of the Exchanges. So in the example above, the list will contain 10 Exchanges; the first five, and the last five. The **retainFirst** and **retainLast** options also have limitations on which expectation methods you can use. For example the expectedXXX methods that work on message bodies, headers, etc. will only operate on the retained messages. In the example above they can test only the expectations on the 10 retained messages.

TESTING WITH ARRIVAL TIMES

Available as of Camel 2.7

The Mock endpoint stores the arrival time of the message as a property on the Exchange.

```
Date time = exchange.getProperty(Exchange.RECEIVED_TIMESTAMP, Date.class);
```

You can use this information to know when the message arrived on the mock. But it also provides foundation to know the time interval between the previous and next message arrived on the mock. You can use this to set expectations using the **arrives** DSL on the Mock endpoint.

For example to say that the first message should arrive between 0-2 seconds before the next you can do:

```
mock.message(0).arrives().noLaterThan(2).seconds().beforeNext();
```

You can also define this as that 2nd message (0 index based) should arrive no later than 0-2 seconds after the previous:

```
mock.message(1).arrives().noLaterThan(2).seconds().afterPrevious();
```

You can also use between to set a lower bound. For example suppose that it should be between 1-4 seconds:

```
mock.message(1).arrives().between(1, 4).seconds().afterPrevious();
```

You can also set the expectation on all messages, for example to say that the gap between them should be at most 1 second:

```
mock.allMessages().arrives().noLaterThan(1).seconds().beforeNext();
```

TIME UNITS

In the example above we use **seconds** as the time unit, but Camel offers **milliseconds**, and **minutes** as well.

CHAPTER 95. MONGODB

CAMEL MONGODB COMPONENT

Available as of Camel 2.10

According to Wikipedia: "NoSQL is a movement promoting a loosely defined class of non-relational data stores that break with a long history of relational databases and ACID guarantees." NoSQL solutions have grown in popularity in the last few years, and major extremely-used sites and services such as Facebook, LinkedIn, Twitter, etc. are known to use them extensively to achieve scalability and agility.

Basically, NoSQL solutions differ from traditional RDBMS (Relational Database Management Systems) in that they don't use SQL as their query language and generally don't offer ACID-like transactional behaviour nor relational data. Instead, they are designed around the concept of flexible data structures and schemas (meaning that the traditional concept of a database table with a fixed schema is dropped), extreme scalability on commodity hardware and blazing-fast processing.

MongoDB is a very popular NoSQL solution and the camel-mongodb component integrates Camel with MongoDB allowing you to interact with MongoDB collections both as a producer (performing operations on the collection) and as a consumer (consuming documents from a MongoDB collection).

MongoDB revolves around the concepts of documents (not as is office documents, but rather hierarchical data defined in JSON/BSON) and collections. This component page will assume you are familiar with them. Otherwise, visit http://www.mongodb.org/.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-mongodb</artifactId>
  <version>x.y.z</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
mongodb:connectionBean?
database=databaseName&collection=collectionName&operation=operationName[&moreOptions...]
```

ENDPOINT OPTIONS

MongoDB endpoints support the following options, depending on whether they are acting like a Producer or as a Consumer (options vary based on the consumer type too).

Name	Default Value	Description	Producer	Tailable Cursor Consumer

database	none	**Required.** The name of the database to which this endpoint will be bound. All operations will be executed against this database unless dynamicity is enabled and the **CamelMongoDbDatabase** header is set.	(/)	(/)
collection	none	**Required (Except for getDbStats and command operations).** The name of the collection (within the specified database) to which this endpoint will be bound. ll operations will be executed against this database unless dynamicity is enabled and the **CamelMongoDbDatabase** header is set.	(/)	(/)
collectionIndex	none	**Camel 2.12:** An optional single field index or compound index to create when inserting new collections.	(/)	

operation	none	**Required for producers.** The id of the operation this endpoint will execute. Pick from the following: • Query operations: **findById**, **findOneByQuery**, **findAll**, **count** • Write operations: **insert**, **save**, **update** • Delete operations: **remove** • Other operations: **getDbStats**, **getColStats**, **command**	(/)	
createCollection	true	Determines whether the collection will be automatically created in the MongoDB database during endpoint initialisation if it doesn't exist already. If this option is **false** and the collection doesn't exist, an initialisation exception will be thrown.	(/)	

invokeGetLastError	false (behaviour may be inherited from connections WriteConcern)	Instructs the MongoDB Java driver to invoke **getLastError()** after every call. Default behaviour in version 2.7.2 of the MongoDB Java driver is that only network errors will cause the operation to fail, because the actual operation is executed asynchronously in the MongoDB server without holding up the client - to increase performance. The client can obtain the real result of the operation by explicitly invoking **getLastError()** on the **WriteResult** object returned or by setting the appropriate **WriteConcern**. If the backend operation has not finished yet, the client will block until the result is available. Setting this option to **true** will make the endpoint behave synchronously and return an Exception if the underlying operation failed.	(/)	

writeConcern	none (driver's default)	Set a **WriteConcern** on the operation out of MongoDB's parameterised values. See WriteConcern.valueOf(String).	(/)	
writeConcernRef	none	Sets a custom **WriteConcern** that exists in the Registry. Specify the bean name.	(/)	
readPreference	none	**Available as of Camel 2.12.4, 2.13.1 and 2.14.0:** Sets a ReadPreference on the connection. Accepted values are those supported by the ReadPreference#valueOf() public API. Currently as of MongoDB-Java-Driver version 2.12.0 the supported values are: **primary**, **primaryPreferred**, **secondary**, **secondaryPreferred** and **nearest**. See also the documentation for more details about this option.	(/)	

dynamicity	false	If set to true, the endpoint will inspect the **CamelMongoDbDatabase** and **CamelMongoDbCollection** headers of the incoming message, and if any of them exists, the target collection and/or database will be overridden for that particular operation. Set to false by default to avoid triggering the lookup on every Exchange if the feature is not desired.	(/)	
writeResultAsHeader	false	**Available as of Camel 2.10.3 and 2.11:** In write operations (save, update, insert, etc.), instead of replacing the body with the WriteResult object returned by MongoDB, keep the input body untouched and place the WriteResult in the **CamelMongoWriteResult** header (constant **MongoDbConstants.WRITERESULT**).	(/)	
persistentTailTracking	false	Enables or disables persistent tail tracking for Tailable Cursor consumers. See below for more information.		(/)

persistentId	none	**Required if persistent tail tracking is enabled.** The id of this persistent tail tracker, to separate its records from the rest on the tail-tracking collection.		(/)
tailTrackingIncreasingField	none	**Required if persistent tail tracking is enabled.** Correlation field in the incoming record which is of increasing nature and will be used to position the tailing cursor every time it is generated. The cursor will be (re)created with a query of type: tailTrackIncreasingField > lastValue (where lastValue is possibly recovered from persistent tail tracking). Can be of type Integer, Date, String, etc. NOTE: No support for dot notation at the current time, so the field should be at the top level of the document.		(/)
cursorRegenerationDelay	1000ms	Establishes how long the endpoint will wait to regenerate the cursor after it has been killed by the MongoDB server (normal behaviour).		(/)

tailTrackDb	same as endpoint's	Database on which the persistent tail tracker will store its runtime information.		(/)
tailTrackCollection	camelTailTracking	Collection on which the persistent tail tracker will store its runtime information.		(/)
tailTrackField	lastTrackingValue	Field in which the persistent tail tracker will store the last tracked value.		(/)

CONFIGURATION OF DATABASE IN SPRING XML

The following Spring XML creates a bean defining the connection to a MongoDB instance.

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd">
    <bean id="mongoBean" class="com.mongodb.Mongo">
        <constructor-arg name="host" value="${mongodb.host}" />
        <constructor-arg name="port" value="${mongodb.port}" />
    </bean>
</beans>
```

SAMPLE ROUTE

The following route defined in Spring XML executes the operation dbStats on a collection.

```
<route>
  <from uri="direct:start" />
  <!-- using bean 'mongoBean' defined above -->
  <to uri="mongodb:mongoBean?
database=${mongodb.database}&amp;collection=${mongodb.collection}&amp;operation=getDbStats"
/>
  <to uri="direct:result" />
</route>
```

MONGODB OPERATIONS - PRODUCER ENDPOINTS

QUERY OPERATIONS

FINDBYID

This operation retrieves only one element from the collection whose _id field matches the content of the IN message body. The incoming object can be anything that has an equivalent to a BSON type. See http://bsonspec.org/#/specification and http://www.mongodb.org/display/DOCS/Java+Types.

```
from("direct:findById")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=findById")
    .to("mock:resultFindById");
```

SUPPORTS FIELDS FILTER

This operation supports specifying a fields filter. See Specifying a fields filter.

FINDONEBYQUERY

Use this operation to retrieve just one element from the collection that matches a MongoDB query. **The query object is extracted from the IN message body**, i.e. it should be of type **DBObject** or convertible to **DBObject**. It can be a JSON String or a Hashmap. See Type conversions for more info.

Example with no query (returns any object of the collection):

```
from("direct:findOneByQuery")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=findOneByQuery")
    .to("mock:resultFindOneByQuery");
```

Example with a query (returns one matching result):

```
from("direct:findOneByQuery")
    .setBody().constant("{ \"name\": \"Raul Kripalani\" }")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=findOneByQuery")
    .to("mock:resultFindOneByQuery");
```

SUPPORTS FIELDS FILTER

This operation supports specifying a fields filter. See Specifying a fields filter.

FINDALL

The **findAll** operation returns all documents matching a query, or none at all, in which case all documents contained in the collection are returned. **The query object is extracted from the IN message body**, i.e. it should be of type **DBObject** or convertible to **DBObject**. It can be a JSON String or a Hashmap. See Type conversions for more info.

Example with no query (returns all object in the collection):

```
from("direct:findAll")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=findAll")
    .to("mock:resultFindAll");
```

Example with a query (returns all matching results):

```
from("direct:findAll")
    .setBody().constant("{ \"name\": \"Raul Kripalani\" }")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=findAll")
    .to("mock:resultFindAll");
```

Paging and efficient retrieval is supported via the following headers:

Header key	Quick constant	Description (extracted from MongoDB API doc)	Expected type
CamelMongoDbNumToSkip	**MongoDbConstants.NUM_TO_SKIP**	Discards a given number of elements at the beginning of the cursor.	int/Integer
CamelMongoDbLimit	**MongoDbConstants.LIMIT**	Limits the number of elements returned.	int/Integer

CamelMongoDbBatchSize	**MongoDbConstants.BATCH_SIZE**	Limits the number of elements returned in one batch. A cursor typically fetches a batch of result objects and store them locally. If batchSize is positive, it represents the size of each batch of objects retrieved. It can be adjusted to optimize performance and limit data transfer. If batchSize is negative, it will limit of number objects returned, that fit within the max batch size limit (usually 4MB), and cursor will be closed. For example if batchSize is -10, then the server will return a maximum of 10 documents and as many as can fit in 4MB, then close the cursor. Note that this feature is different from limit() in that documents must fit within a maximum size, and it removes the need to send a request to close the cursor server-side. The batch size can be changed even after a cursor is iterated, in which case the setting will apply on the next batch retrieval.	int/Integer

Additionally, you can set a sortBy criteria by putting the relevant **DBObject** describing your sorting in the **CamelMongoDbSortBy** header, quick constant: **MongoDbConstants.SORT_BY**.

The **findAll** operation will also return the following OUT headers to enable you to iterate through result pages if you are using paging:

Header key	Quick constant	Description (extracted from MongoDB API doc)	Data type

CamelMongoDbResultTotalSize	**MongoDbConstants.RESULT_TOTAL_SIZE**	Number of objects matching the query. This does not take limit/skip into consideration.	int/Integer
CamelMongoDbResultPageSize	**MongoDbConstants.RESULT_PAGE_SIZE**	Number of objects matching the query. This does not take limit/skip into consideration.	int/Integer

SUPPORTS FIELDS FILTER

This operation supports specifying a fields filter. See Specifying a fields filter.

COUNT

Returns the total number of objects in a collection, returning a **Long** as the *Out* message body. The following example will count the number of records in the **dynamicCollectionName** collection. Notice how dynamicity is enabled, and as a result, the operation will not run against the **notableScientists** collection, but against the **dynamicCollectionName** collection.

```
// from("direct:count").to("mongodb:myDb?
database=tickets&collection=flights&operation=count&dynamicity=true");
Long result = template.requestBodyAndHeader("direct:count", "irrelevantBody",
MongoDbConstants.COLLECTION, "dynamicCollectionName");
assertTrue("Result is not of type Long", result instanceof Long);
```

From Camel 2.14 onwards you can provide a **com.mongodb.DBObject** object in the message body as a query, and operation will return the amount of documents matching this criteria.

```
DBObject query = ...
Long count = template.requestBodyAndHeader("direct:count", query,
MongoDbConstants.COLLECTION, "dynamicCollectionName");
```

SPECIFYING A FIELDS FILTER

Query operations will, by default, return the matching objects in their entirety (with all their fields). If your documents are large and you only require retrieving a subset of their fields, you can specify a field filter in all query operations, simply by setting the relevant **DBObject** (or type convertible to **DBObject**, such as a JSON String, Map, etc.) on the **CamelMongoDbFieldsFilter** header, constant shortcut: **MongoDbConstants.FIELDS_FILTER**.

Here is an example that uses MongoDB's BasicDBObjectBuilder to simplify the creation of DBObjects. It retrieves all fields except **_id** and **boringField**:

```
// route: from("direct:findAll").to("mongodb:myDb?
database=flights&collection=tickets&operation=findAll")
DBObject fieldFilter = BasicDBObjectBuilder.start().add("_id", 0).add("boringField", 0).get();
Object result = template.requestBodyAndHeader("direct:findAll", (Object) null,
MongoDbConstants.FIELDS_FILTER, fieldFilter);
```

CREATE/UPDATE OPERATIONS

INSERT

Inserts an new object into the MongoDB collection, taken from the IN message body. Type conversion is attempted to turn it into **DBObject** or a **List**. Two modes are supported: single insert and multiple insert. For multiple insert, the endpoint will expect a List, Array or Collections of objects of any type, as long as they are - or can be converted to - **DBObject**. All objects are inserted at once. The endpoint will intelligently decide which backend operation to invoke (single or multiple insert) depending on the input.

Example:

```
from("direct:insert")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=insert");
```

The operation will return a WriteResult, and depending on the **WriteConcern** or the value of the **invokeGetLastError** option, **getLastError()** would have been called already or not. If you want to access the ultimate result of the write operation, you need to retrieve the **CommandResult** by calling **getLastError()** or **getCachedLastError()** on the **WriteResult**. Then you can verify the result by calling **CommandResult.ok()**, **CommandResult.getErrorMessage()** and/or **CommandResult.getException()**.

Note that the new object's **_id** must be unique in the collection. If you don't specify the value, MongoDB will automatically generate one for you. But if you do specify it and it is not unique, the insert operation will fail (and for Camel to notice, you will need to enable invokeGetLastError or set a WriteConcern that waits for the write result).

This is not a limitation of the component, but it is how things work in MongoDB for higher throughput. If you are using a custom **_id**, you are expected to ensure at the application level that is unique (and this is a good practice too).

Since Camel 2.15: OID(s) of the inserted record(s) is stored in the message header under **CamelMongoOid** key (**MongoDbConstants.OID** constant). The value stored is **org.bson.types.ObjectId** for single insert or **java.util.List<org.bson.types.ObjectId>** if multiple records have been inserted.

SAVE

The save operation is equivalent to an *upsert* (UPdate, inSERT) operation, where the record will be updated, and if it doesn't exist, it will be inserted, all in one atomic operation. MongoDB will perform the matching based on the _id field.

Beware that in case of an update, the object is replaced entirely and the usage of MongoDB's $modifiers is not permitted. Therefore, if you want to manipulate the object if it already exists, you have two options:

1. perform a query to retrieve the entire object first along with all its fields (may not be efficient), alter it inside Camel and then save it.

2. use the update operation with $modifiers, which will execute the update at the server-side instead. You can enable the upsert flag, in which case if an insert is required, MongoDB will apply the $modifiers to the filter query object and insert the result.

For example:

```
from("direct:insert")
    .to("mongodb:myDb?database=flights&collection=tickets&operation=save");
```

UPDATE

Update one or multiple records on the collection. Requires a List<DBObject> as the IN message body containing exactly 2 elements:

- Element 1 (index 0) => filter query => determines what objects will be affected, same as a typical query object
- Element 2 (index 1) => update rules => how matched objects will be updated. All modifier operations from MongoDB are supported.

MULTIUPDATES

By default, MongoDB will only update 1 object even if multiple objects match the filter query. To instruct MongoDB to update **all** matching records, set the **CamelMongoDbMultiUpdate** IN message header to **true**.

A header with key **CamelMongoDbRecordsAffected** will be returned (**MongoDbConstants.RECORDS_AFFECTED** constant) with the number of records updated (copied from **WriteResult.getN()**).

Supports the following IN message headers:

Header key	Quick constant	Description (extracted from MongoDB API doc)	Expected type
CamelMongoDbMultiUpdate	**MongoDbConstants.MULTIUPDATE**	If the update should be applied to all objects matching. See http://www.mongodb.org/display/DOCS/Atomic+Operations	boolean/Boolean
CamelMongoDbUpsert	**MongoDbConstants.UPSERT**	If the database should create the element if it does not exist	boolean/Boolean

For example, the following will update **all** records whose filterField field equals true by setting the value of the "scientist" field to "Darwin":

```
// route: from("direct:update").to("mongodb:myDb?
database=science&collection=notableScientists&operation=update");
DBObject filterField = new BasicDBObject("filterField", true);
DBObject updateObj = new BasicDBObject("$set", new BasicDBObject("scientist", "Darwin"));
Object result = template.requestBodyAndHeader("direct:update", new Object[] {filterField, updateObj},
MongoDbConstants.MULTIUPDATE, true);
```

DELETE OPERATIONS

REMOVE

Remove matching records from the collection. The IN message body will act as the removal filter query, and is expected to be of type **DBObject** or a type convertible to it. The following example will remove all objects whose field 'conditionField' equals true, in the science database, notableScientists collection:

```
// route: from("direct:remove").to("mongodb:myDb?
database=science&collection=notableScientists&operation=remove");
DBObject conditionField = new BasicDBObject("conditionField", true);
Object result = template.requestBody("direct:remove", conditionField);
```

A header with key **CamelMongoDbRecordsAffected** is returned (**MongoDbConstants.RECORDS_AFFECTED** constant) with type **int**, containing the number of records deleted (copied from **WriteResult.getN()**).

OTHER OPERATIONS

AGGREGATE

Camel 2.14: Perform a aggregation with the given pipeline contained in the body. Aggregations could be long and heavy operations. Use with care.

```
// route: from("direct:aggregate").to("mongodb:myDb?
database=science&collection=notableScientists&operation=aggregate");
from("direct:aggregate")
    .setBody().constant("[{ $match : {$or : [{\"scientist\" : \"Darwin\"},{\"scientist\" : \"Einstein\"}]}},{
$group: { _id: \"$scientist\", count: { $sum: 1 }} } ]")
    .to("mongodb:myDb?database=science&collection=notableScientists&operation=aggregate")
    .to("mock:resultAggregate");
```

GETDBSTATS

Equivalent of running the **db.stats()** command in the MongoDB shell, which displays useful statistic figures about the database. For example:

```
> db.stats();
{
 "db" : "test",
 "collections" : 7,
 "objects" : 719,
 "avgObjSize" : 59.73296244784423,
 "dataSize" : 42948,
 "storageSize" : 1000058880,
 "numExtents" : 9,
 "indexes" : 4,
 "indexSize" : 32704,
 "fileSize" : 1275068416,
 "nsSizeMB" : 16,
 "ok" : 1
}
```

Usage example:

```
// from("direct:getDbStats").to("mongodb:myDb?
database=flights&collection=tickets&operation=getDbStats");
Object result = template.requestBody("direct:getDbStats", "irrelevantBody");
assertTrue("Result is not of type DBObject", result instanceof DBObject);
```

The operation will return a data structure similar to the one displayed in the shell, in the form of a **DBObject** in the OUT message body.

GETCOLSTATS

Equivalent of running the **db.collection.stats()** command in the MongoDB shell, which displays useful statistic figures about the collection. For example:

```
> db.camelTest.stats();
{
 "ns" : "test.camelTest",
 "count" : 100,
 "size" : 5792,
 "avgObjSize" : 57.92,
 "storageSize" : 20480,
 "numExtents" : 2,
 "nindexes" : 1,
 "lastExtentSize" : 16384,
 "paddingFactor" : 1,
 "flags" : 1,
 "totalIndexSize" : 8176,
 "indexSizes" : {
  "_id_" : 8176
 },
 "ok" : 1
}
```

Usage example:

```
// from("direct:getColStats").to("mongodb:myDb?
database=flights&collection=tickets&operation=getColStats");
Object result = template.requestBody("direct:getColStats", "irrelevantBody");
assertTrue("Result is not of type DBObject", result instanceof DBObject);
```

The operation will return a data structure similar to the one displayed in the shell, in the form of a **DBObject** in the OUT message body.

COMMAND

Camel 2.15: Run the body as a command on database. Useful for admin operation as getting host informations, replication or sharding status. Collection parameter is not use for this operation.

```
// route: from("command").to("mongodb:myDb?database=science&operation=command");
DBObject commandBody = new BasicDBObject("hostInfo", "1");
Object result = template.requestBody("direct:command", commandBody);
```

DYNAMIC OPERATIONS

An Exchange can override the endpoint's fixed operation by setting the **CamelMongoDbOperation** header, defined by the **MongoDbConstants.OPERATION_HEADER** constant. The values supported are determined by the MongoDbOperation enumeration and match the accepted values for the **operation** parameter on the endpoint URI.

For example:

```
// from("direct:insert").to("mongodb:myDb?database=flights&collection=tickets&operation=insert");
Object result = template.requestBodyAndHeader("direct:insert", "irrelevantBody",
MongoDbConstants.OPERATION_HEADER, "count");
assertTrue("Result is not of type Long", result instanceof Long);
```

TAILABLE CURSOR CONSUMER

MongoDB offers a mechanism to instantaneously consume ongoing data from a collection, by keeping the cursor open just like the **tail -f** command of *nix systems. This mechanism is significantly more efficient than a scheduled poll, due to the fact that the server pushes new data to the client as it becomes available, rather than making the client ping back at scheduled intervals to fetch new data. It also reduces otherwise redundant network traffic.

There is only one requisite to use tailable cursors: the collection must be a "capped collection", meaning that it will only hold N objects, and when the limit is reached, MongoDB flushes old objects in the same order they were originally inserted. For more information, please refer to: http://www.mongodb.org/display/DOCS/Tailable+Cursors.

The Camel MongoDB component implements a tailable cursor consumer, making this feature available for you to use in your Camel routes. As new objects are inserted, MongoDB will push them as DBObjects in natural order to your tailable cursor consumer, who will transform them to an Exchange and will trigger your route logic.

HOW THE TAILABLE CURSOR CONSUMER WORKS

To turn a cursor into a tailable cursor, a few special flags are to be signalled to MongoDB when first generating the cursor. Once created, the cursor will then stay open and will block upon calling the **DBCursor.next()** method until new data arrives. However, the MongoDB server reserves itself the right to kill your cursor if new data doesn't appear after an indeterminate period. If you are interested to continue consuming new data, you have to regenerate the cursor. And to do so, you will have to remember the position where you left off or else you will start consuming from the top again.

The Camel MongoDB tailable cursor consumer takes care of all these tasks for you. You will just need to provide the key to some field in your data of increasing nature, which will act as a marker to position your cursor every time it is regenerated, e.g. a timestamp, a sequential ID, etc. It can be of any datatype supported by MongoDB. Date, Strings and Integers are found to work well. We call this mechanism "tail tracking" in the context of this component.

The consumer will remember the last value of this field and whenever the cursor is to be regenerated, it will run the query with a filter like: **increasingField > lastValue**, so that only unread data is consumed.

Setting the increasing field: Set the key of the increasing field on the endpoint URI **tailTrackingIncreasingField** option. In Camel 2.10, it must be a top-level field in your data, as nested navigation for this field is not yet supported. That is, the "timestamp" field is okay, but "nested.timestamp" will not work. Please open a ticket in the Camel JIRA if you do require support for nested increasing fields.

Cursor regeneration delay: One thing to note is that if new data is not already available upon initialisation, MongoDB will kill the cursor instantly. Since we don't want to overwhelm the server in this case, a **cursorRegenerationDelay** option has been introduced (with a default value of 1000ms.), which you can modify to suit your needs.

An example:

```
from("mongodb:myDb?
database=flights&collection=cancellations&tailTrackIncreasingField=departureTime")
    .id("tailableCursorConsumer1")
    .autoStartup(false)
    .to("mock:test");
```

The above route will consume from the "flights.cancellations" capped collection, using "departureTime" as the increasing field, with a default regeneration cursor delay of 1000ms.

PERSISTENT TAIL TRACKING

Standard tail tracking is volatile and the last value is only kept in memory. However, in practice you will need to restart your Camel container every now and then, but your last value would then be lost and your tailable cursor consumer would start consuming from the top again, very likely sending duplicate records into your route.

To overcome this situation, you can enable the **persistent tail tracking** feature to keep track of the last consumed increasing value in a special collection inside your MongoDB database too. When the consumer initialises again, it will restore the last tracked value and continue as if nothing happened.

The last read value is persisted on two occasions: every time the cursor is regenerated and when the consumer shuts down. We may consider persisting at regular intervals too in the future (flush every 5 seconds) for added robustness if the demand is there. To request this feature, please open a ticket in the Camel JIRA.

ENABLING PERSISTENT TAIL TRACKING

To enable this function, set at least the following options on the endpoint URI:

- **persistentTailTracking** option to **true**
- **persistentId** option to a unique identifier for this consumer, so that the same collection can be reused across many consumers

Additionally, you can set the **tailTrackDb**, **tailTrackCollection** and **tailTrackField** options to customise where the runtime information will be stored. Refer to the endpoint options table at the top of this page for descriptions of each option.

For example, the following route will consume from the "flights.cancellations" capped collection, using "departureTime" as the increasing field, with a default regeneration cursor delay of 1000ms, with persistent tail tracking turned on, and persisting under the "cancellationsTracker" id on the "flights.camelTailTracking", storing the last processed value under the "lastTrackingValue" field (**camelTailTracking** and **lastTrackingValue** are defaults).

```
from("mongodb:myDb?
database=flights&collection=cancellations&tailTrackIncreasingField=departureTime&persistentTailTrack
ng=true" +
    "&persistentId=cancellationsTracker")
```

```
.id("tailableCursorConsumer2")
.autoStartup(false)
.to("mock:test");
```

Below is another example identical to the one above, but where the persistent tail tracking runtime information will be stored under the "trackers.camelTrackers" collection, in the "lastProcessedDepartureTime" field:

```
from("mongodb:myDb?
database=flights&collection=cancellations&tailTrackIncreasingField=departureTime&persistentTailTrack
ng=true" +
    "&persistentId=cancellationsTracker"&tailTrackDb=trackers&tailTrackCollection=camelTrackers" +
    "&tailTrackField=lastProcessedDepartureTime")
.id("tailableCursorConsumer3")
.autoStartup(false)
.to("mock:test");
```

TYPE CONVERSIONS

The **MongoDbBasicConverters** type converter included with the camel-mongodb component provides the following conversions:

Name	From type	To type	How?
fromMapToDBObject	**Map**	**DBObject**	constructs a new **BasicDBObject** via the **new BasicDBObject(Map m)** constructor
fromBasicDBObjectToMap	**BasicDBObject**	**Map**	**BasicDBObject** already implements **Map**
fromStringToDBObject	**String**	**DBObject**	uses **com.mongodb.util.JSON.parse(String s)**
fromAnyObjectToDBObject	**Object**	**DBObject**	uses the Jackson library to convert the object to a **Map**, which is in turn used to initialise a new **BasicDBObject**

This type converter is auto-discovered, so you don't need to configure anything manually.

SEE ALSO

- MongoDB website

- NoSQL Wikipedia article
- MongoDB Java driver API docs - current version
- Unit tests for more examples of usage

CHAPTER 96. MQTT

MQTT COMPONENT

Available as of Camel 2.10

The **mqtt:** component is used for communicating with MQTT compliant message brokers, like Apache ActiveMQ or Mosquitto

Camel will poll the feed every 60 seconds by default. **Note:** The component currently only supports polling (consuming) feeds.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-mqtt</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
mqtt://name[?options]
```

Where **name** is the name you want to assign the component.

OPTIONS

Property	Default
host	**tcp://127.0.0.1:1883**
localAddress	
username	
password	
connectAttemptsMax	**-1**
reconnectAttemptsMax	**-1**
reconnectDelay	**10**

reconnectBackOffMultiplier	**2.0**
reconnectDelayMax	**30000**
qualityOfService	**AtLeastOnce**
subscribeTopicName	
subscribeTopicNames	
publishTopicName	**camel/mqtt/test**
byDefaultRetain	**false**
mqttTopicPropertyName	**_MQTTTopicPropertyName+**
mqttRetainPropertyName	**MQTTRetain**
mqttQosPropertyName	**MQTTQos**
connectWaitInSeconds	**10**

disconnectWaitInSeconds	**5**
sendWaitInSeconds	**5**
clientId	
cleanSession	**true**

You can append query options to the URI in the following format, **?option=value&option=value&...**

SAMPLES

Sending messages:

```
from("direct:foo")
    .to("mqtt:cheese?publishTopicName=test.mqtt.topic");
```

Consuming messages:

```
from("mqtt:bar?subscribeTopicName=test.mqtt.topic")
    .transform(body().convertToString())
    .to("mock:result")
```

CHAPTER 97. MSV

MSV COMPONENT

The MSV component performs XML validation of the message body using the MSV Library and any of the supported XML schema languages, such as XML Schema or RelaxNG XML Syntax.

Note that the Jing component also supports RelaxNG Compact Syntax

URI FORMAT

```
msv:someLocalOrRemoteResource[?options]
```

Where **someLocalOrRemoteResource** is some URL to a local resource on the classpath or a full URL to a remote resource or resource on the file system. For example

```
msv:org/foo/bar.rng
msv:file:../foo/bar.rng
msv:http://acme.com/cheese.rng
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
useDom	**true**	Whether DOMSource/DOMResult or SaxSource/SaxResult should be used by the validator. **Note:** DOM must be used by the MSV component.

EXAMPLE

The following example shows how to configure a route from endpoint **direct:start** which then goes to one of two endpoints, either **mock:valid** or **mock:invalid** based on whether or not the XML matches the given RelaxNG XML Schema (which is supplied on the classpath).

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <from uri="direct:start"/>
    <doTry>
      <to uri="msv:org/apache/camel/component/validator/msv/schema.rng"/>
      <to uri="mock:valid"/>

      <doCatch>
        <exception>org.apache.camel.ValidationException</exception>
        <to uri="mock:invalid"/>
      </doCatch>
      <doFinally>
```

```
            <to uri="mock:finally"/>
          </doFinally>
        </doTry>
    </route>
</camelContext>
```

CHAPTER 98. MUSTACHE

MUSTACHE

Available as of Camel 2.12

The **mustache:** component allows for processing a message using a Mustache template. This can be ideal when using Templating to generate responses for requests.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
<groupId>org.apache.camel</groupId>
<artifactId>camel-mustache</artifactId>
<version>x.x.x</version> <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
mustache:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template (eg: file://folder/myfile.mustache).

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
encoding	**null**	Character encoding of the resource content.
startDelimiter	{{	Characters used to mark template code beginning.
endDelimiter	}}	Characters used to mark template code end.

MUSTACHE CONTEXT

Camel will provide exchange information in the Mustache context (just a **Map**). The **Exchange** is transferred as:

key	value
exchange	The **Exchange** itself.

exchange.properties	The **Exchange** properties.
headers	The headers of the In message.
camelContext	The Camel Context.
request	The In message.
body	The In message body.
response	The Out message (only for InOut message exchange pattern).

DYNAMIC TEMPLATES

Camel provides two headers by which you can define a different resource location for a template or the template content itself. If any of these headers is set then Camel uses this over the endpoint configured resource. This allows you to provide a dynamic template at runtime.

Header	Type	Description	Support Version
MustacheConstants.MUSTACHE_RESOURCE_URI	String	A URI for the template resource to use instead of the endpoint configured.	
MustacheConstants.MUSTACHE_TEMPLATE	String	The template to use instead of the endpoint configured.	

SAMPLES

For example you could use something like:

```
from("activemq:My.Queue").
to("mustache:com/acme/MyResponse.mustache");
```

To use a Mustache template to formulate a response for a message for InOut message exchanges (where there is a **JMSReplyTo** header).

If you want to use InOnly and consume the message and send it to another destination you could use:

```
from("activemq:My.Queue").
to("mustache:com/acme/MyResponse.mustache").
to("activemq:Another.Queue");
```

It's possible to specify what template the component should use dynamically via a header, so for example:

```
from("direct:in").
setHeader(MustacheConstants.MUSTACHE_RESOURCE_URI).constant("path/to/my/template.mustac
he").
to("mustache:dummy");
```

THE EMAIL SAMPLE

In this sample we want to use Mustache templating for an order confirmation email. The email template is laid out in Mustache as:

```
Dear {{headers.lastName}}}, {{headers.firstName}}

Thanks for the order of {{headers.item}}.

Regards Camel Riders Bookstore
{{body}}
```

CHAPTER 99. MVEL COMPONENT

MVEL COMPONENT

Available as of Camel 2.12

The **mvel:** component allows you to process a message using an MVEL template. This can be ideal when using Templating to generate responses for requests.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-mvel</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
mvel:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template (eg: file://folder/myfile.mvel).

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
contentCache	**true**	Cache for the resource content when it is loaded. The cached resource content can be cleared via JMX using the endpoint's **clearContentCache** operation.
encoding	**null**	Character encoding of the resource content.

MESSAGE HEADERS

The mvel component sets a couple headers on the message.

Header	Description
CamelMvelResourceUri	The **templateName** as a **String** object.

MVEL CONTEXT

Camel will provide exchange information in the MVEL context (just a **Map**). The **Exchange** is transfered as:

key	value
exchange	The **Exchange** itself.
exchange.properties	The **Exchange** properties.
headers	The headers of the In message.
camelContext	The Camel Context intance.
request	The In message.
in	The In message.
body	The In message body.
out	The Out message (only for InOut message exchange pattern).
response	The Out message (only for InOut message exchange pattern).

HOT RELOADING

The mvel template resource is, by default, hot reloadable for both file and classpath resources (expanded jar). If you set **contentCache=true**, Camel will only load the resource once, and thus hot reloading is not possible. This scenario can be used in production, when the resource never changes.

DYNAMIC TEMPLATES

Camel provides two headers by which you can define a different resource location for a template or the template content itself. If any of these headers is set then Camel uses this over the endpoint configured resource. This allows you to provide a dynamic template at runtime.

Header	Type	Description
CamelMvelResourceUri	String	A URI for the template resource to use instead of the endpoint configured.
CamelMvelTemplate	String	The template to use instead of the endpoint configured.

SAMPLES

For example you could use something like

```
from("activemq:My.Queue").
  to("mvel:com/acme/MyResponse.mvel");
```

To use a MVEL template to formulate a response to a message for InOut message exchanges (where there is a **JMSReplyTo** header).

To specify what template the component should use dynamically via a header, so for example:

```
from("direct:in").
  setHeader("CamelMvelResourceUri").constant("path/to/my/template.mvel").
  to("mvel:dummy");
```

To specify a template directly as a header the component should use dynamically via a header, so for example:

```
from("direct:in").
  setHeader("CamelMvelTemplate").constant("@{\"The result is \" + request.body * 3}\" }").
  to("velocity:dummy");
```

CHAPTER 100. MYBATIS

MYBATIS

Available as of Camel 2.7

The **mybatis:** component allows you to query, poll, insert, update and delete data in a relational database using MyBatis.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-mybatis</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
mybatis:statementName[?options]
```

Where **statementName** is the statement name in the MyBatis XML mapping file which maps to the query, insert, update or delete operation you wish to evaluate.

You can append query options to the URI in the following format, **?option=value&option=value&...**

This component will by default load the MyBatis SqlMapConfig file from the root of the classpath with the expected name of **SqlMapConfig.xml**. If the file is located in another location, you will need to configure the **configurationUri** option on the **MyBatisComponent** component.

OPTIONS

Option	Type	Default	Description
consumer.onConsume	**String**	**null**	Statements to run after consuming. Can be used, for example, to update rows after they have been consumed and processed in Camel. See sample later. Multiple statements can be separated with commas.

consumer.useIterator	**boolean**	**true**	If **true** each row returned when polling will be processed individually. If **false** the entire **List** of data is set as the IN body.
consumer.routeEmptyResultSet	**boolean**	**false**	Sets whether empty result sets should be routed.
statementType	**StatementType**	**null**	Mandatory to specify for the producer to control which kind of operation to invoke. The enum values are: **SelectOne**, **SelectList**, **Insert**, **InsertList**, **Update**, **UpdateList**, **Delete**, and **DeleteList**. **Notice:InsertList** is available as of Camel 2.10, and **UpdateList**, **DeleteList** is available as of Camel 2.11.
maxMessagesPerPoll	**int**	**0**	This option is intended to split results returned by the database pool into the batches and deliver them in multiple exchanges. This integer defines the maximum messages to deliver in single exchange. By default, no maximum is set. Can be used to set a limit of e.g. 1000 to avoid when starting up the server that there are thousands of files. Set a value of 0 or negative to disable it.

executorType	**String**	**null**	**Camel 2.11:** The executor type to be used while executing statements. The supported values are: simple, reuse, batch. By default, the value is not specified and is equal to what MyBatis uses, i.e. **simple**. **simple** executor does nothing special. **reuse** executor reuses prepared statements. **batch** executor reuses statements and batches updates.
outputHeader	**String**	**null**	**Camel 2.15:** To store the result as a header instead of the message body. This allows to preserve the existing message body as-is.
inputHeader	**String**	**null**	**Camel 2.15:** To use a header value as input to the component instead of the body.

MESSAGE HEADERS

Camel will populate the result message, either IN or OUT with a header with the statement used:

Header	Type	Description
CamelMyBatisStatementName	**String**	The **statementName** used (for example: insertAccount).
CamelMyBatisResult	**Object**	The **response** returned from MtBatis in any of the operations. For instance an **INSERT** could return the auto-generated key, or number of rows etc.

MESSAGE BODY

The response from MyBatis will only be set as the body if it's a **SELECT** statement. That means, for example, for **INSERT** statements Camel will not replace the body. This allows you to continue routing and keep the original body. The response from MyBatis is always stored in the header with the key **CamelMyBatisResult**.

SAMPLES

For example if you wish to consume beans from a JMS queue and insert them into a database you could do the following:

```
from("activemq:queue:newAccount").
  to("mybatis:insertAccount?statementType=Insert");
```

Notice we have to specify the **statementType**, as we need to instruct Camel which kind of operation to invoke.

Where **insertAccount** is the MyBatis ID in the SQL mapping file:

```
<!-- Insert example, using the Account parameter class -->
<insert id="insertAccount" parameterType="Account">
  insert into ACCOUNT (
    ACC_ID,
    ACC_FIRST_NAME,
    ACC_LAST_NAME,
    ACC_EMAIL
  )
  values (
    #{id}, #{firstName}, #{lastName}, #{emailAddress}
  )
</insert>
```

USING STATEMENTTYPE FOR BETTER CONTROL OF MYBATIS

When routing to an MyBatis endpoint you will want more fine grained control so you can control whether the SQL statement to be executed is a **SELECT**, **UPDATE**, **DELETE** or **INSERT** etc. So for instance if we want to route to an MyBatis endpoint in which the IN body contains parameters to a **SELECT** statement we can do:

```
from("direct:start")
    .to("mybatis:selectAccountById?statementType=SelectOne")
    .to("mock:result");
```

In the code above we can invoke the MyBatis statement **selectAccountById** and the IN body should contain the account id we want to retrieve, such as an **Integer** type.

We can do the same for some of the other operations, such as **SelectList**:

```
from("direct:start")
    .to("mybatis:selectAllAccounts?statementType=SelectList")
    .to("mock:result");
```

And the same for **UPDATE**, where we can send an **Account** object as the IN body to MyBatis:

```
from("direct:start")
    .to("mybatis:updateAccount?statementType=Update")
    .to("mock:result");
```

USING INSERTLIST STATEMENTTYPE

Available as of Camel 2.10

MyBatis allows you to insert multiple rows using its for-each batch driver. To use this, you need to use the <foreach> in the mapper XML file. For example as shown below:

```
<!-- Batch Insert example, using the Account parameter class -->
<insert id="batchInsertAccount" parameterType="java.util.List">
    insert into ACCOUNT (
    ACC_ID,
    ACC_FIRST_NAME,
    ACC_LAST_NAME,
    ACC_EMAIL
    )
    values (
    <foreach item="Account" collection="list" open="" close="" separator="),(">
        #{Account.id}, #{Account.firstName}, #{Account.lastName}, #{Account.emailAddress}
    </foreach>
    )
</insert>
```

Then you can insert multiple rows, by sending a Camel message to the **mybatis** endpoint which uses the **InsertList** statement type, as shown below:

```
from("direct:start")
    .to("mybatis:batchInsertAccount?statementType=InsertList")
    .to("mock:result");
```

USING UPDATELIST STATEMENTTYPE

Available as of Camel 2.11

MyBatis allows you to update multiple rows using its for-each batch driver. To use this, you need to use the <foreach> in the mapper XML file. For example as shown below:

```
<update id="batchUpdateAccount" parameterType="java.util.Map">
    update ACCOUNT set
    ACC_EMAIL = #{emailAddress}
    where
    ACC_ID in
    <foreach item="Account" collection="list" open="(" close=")" separator=",">
        #{Account.id}
    </foreach>
</update>
```

Then you can update multiple rows, by sending a Camel message to the mybatis endpoint which uses the UpdateList statement type, as shown below:

```
from("direct:start")
    .to("mybatis:batchUpdateAccount?statementType=UpdateList")
    .to("mock:result");
```

USING DELETELIST STATEMENTTYPE

Available as of Camel 2.11

MyBatis allows you to delete multiple rows using its for-each batch driver. To use this, you need to use the <foreach> in the mapper XML file. For example as shown below:

```
<delete id="batchDeleteAccountById" parameterType="java.util.List">
    delete from ACCOUNT
    where
    ACC_ID in
    <foreach item="AccountID" collection="list" open="(" close=")" separator=",">
        #{AccountID}
    </foreach>
</delete>
```

Then you can delete multiple rows, by sending a Camel message to the mybatis endpoint which uses the DeleteList statement type, as shown below:

```
from("direct:start")
    .to("mybatis:batchDeleteAccount?statementType=DeleteList")
    .to("mock:result");
```

NOTICE ON INSERTLIST, UPDATELIST AND DELETELIST STATEMENTTYPES

Parameter of any type (List, Map, etc.) can be passed to mybatis and an end user is responsible for handling it as required with the help of mybatis dynamic queries capabilities.

SCHEDULED POLLING EXAMPLE

This component supports scheduled polling and can therefore be used as a Polling Consumer. For example to poll the database every minute:

```
from("mybatis:selectAllAccounts?delay=60000").to("activemq:queue:allAccounts");
```

See "ScheduledPollConsumer Options" on Polling Consumer for more options.

Alternatively you can use another mechanism for triggering the scheduled polls, such as the Timer or Quartz components.

In the sample below we poll the database, every 30 seconds using the Timer component and send the data to the JMS queue:

```
from("timer://pollTheDatabase?
delay=30000").to("mybatis:selectAllAccounts").to("activemq:queue:allAccounts");
```

And the MyBatis SQL mapping file used:

```
  <!-- Select with no parameters using the result map for Account class. -->
  <select id="selectAllAccounts" resultMap="AccountResult">
    select * from ACCOUNT
```

```
</select>
```

USING ONCONSUME

This component supports executing statements **after** data have been consumed and processed by Camel. This allows you to do post updates in the database. Notice all statements must be **UPDATE** statements. Camel supports executing multiple statements whose names should be separated by commas.

The route below illustrates we execute the **consumeAccount** statement data is processed. This allows us to change the status of the row in the database to processed, so we avoid consuming it twice or more.

```
from("mybatis:selectUnprocessedAccounts?
consumer.onConsume=consumeAccount").to("mock:results");
```

And the statements in the sqlmap file:

```
<select id="selectUnprocessedAccounts" resultMap="AccountResult">
   select * from ACCOUNT where PROCESSED = false
</select>
```

```
<update id="consumeAccount" parameterType="Account">
   update ACCOUNT set PROCESSED = true where ACC_ID = #{id}
</update>
```

PARTICIPATING IN TRANSACTIONS

Setting up a transaction manager under camel-mybatis can be a little bit fiddly, as it involves externalising the database configuration outside the standard MyBatis **SqlMapConfig.xml** file.

The first part requires the setup of a **DataSource**. This is typically a pool (either DBCP, or c3p0), which needs to be wrapped in a Spring proxy. This proxy enables non-Spring use of the **DataSource** to participate in Spring transactions (the MyBatis **SqlSessionFactory** does just this).

```
   <bean id="dataSource"
class="org.springframework.jdbc.datasource.TransactionAwareDataSourceProxy">
      <constructor-arg>
         <bean class="com.mchange.v2.c3p0.ComboPooledDataSource">
            <property name="driverClass" value="org.postgresql.Driver"/>
            <property name="jdbcUrl" value="jdbc:postgresql://localhost:5432/myDatabase"/>
            <property name="user" value="myUser"/>
            <property name="password" value="myPassword"/>
         </bean>
      </constructor-arg>
   </bean>
```

This has the additional benefit of enabling the database configuration to be externalised using property placeholders.

A transaction manager is then configured to manage the outermost **DataSource**:

```
   <bean id="txManager"
class="org.springframework.jdbc.datasource.DataSourceTransactionManager">
```

```
        <property name="dataSource" ref="dataSource"/>
    </bean>
```

A mybatis-spring **SqlSessionFactoryBean** then wraps that same **DataSource**:

```
    <bean id="sqlSessionFactory" class="org.mybatis.spring.SqlSessionFactoryBean">
        <property name="dataSource" ref="dataSource"/>
        <!-- standard mybatis config file -->
 <property name="configLocation" value="/META-INF/SqlMapConfig.xml"/>
        <!-- externalised mappers -->
 <property name="mapperLocations" value="classpath*:META-INF/mappers/**/*.xml"/>
    </bean>
```

The camel-mybatis component is then configured with that factory:

```
    <bean id="mybatis" class="org.apache.camel.component.mybatis.MyBatisComponent">
        <property name="sqlSessionFactory" ref="sqlSessionFactory"/>
    </bean>
```

Finally, a transaction policy is defined over the top of the transaction manager, which can then be used as usual:

```
    <bean id="PROPAGATION_REQUIRED"
 class="org.apache.camel.spring.spi.SpringTransactionPolicy">
        <property name="transactionManager" ref="txManager"/>
        <property name="propagationBehaviorName" value="PROPAGATION_REQUIRED"/>
    </bean>

    <camelContext id="my-model-context" xmlns="http://camel.apache.org/schema/spring">
        <route id="insertModel">
            <from uri="direct:insert"/>
            <transacted ref="PROPAGATION_REQUIRED"/>
            <to uri="mybatis:myModel.insert?statementType=Insert"/>
        </route>
    </camelContext>
```

CHAPTER 101. NAGIOS

NAGIOS

Available as of Apache Camel 2.3

The Nagios component allows you to send passive checks to Nagios.

URI FORMAT

```
nagios://host[:port][?Options]
```

Apache Camel provides two abilities with the Nagios component. You can send passive check messages by sending a message to its endpoint. Apache Camel also provides a EventNotifer which allows you to send notifications to Nagios.

OPTIONS

Name	Default Value	Description
host	none	This is the address of the Nagios host where checks should be send.
port		The port number of the host.
password		Password to be authenticated when sending checks to Nagios.
connectionTimeout	5000	Connection timeout in millis.
timeout	5000	Sending timeout in millis.
nagiosSettings		To use an already configured **com.googlecode.jsendnsca.core.NagiosSettings** object. Then any of the other options are not in use, if using this.
sendSync	**true**	Whether or not to use synchronous when sending a passive check. Setting it to **false** will allow Apache Camel to continue routing the message and the passive check message will be send asynchronously.

encryptionMethod	**No**	*Camel 2.9:* To specify an encryption method. Possible values: **No**, **Xor**, or **TripleDes**.

HEADERS

Name	Description
CamelNagiosHostName	This is the address of the Nagios host where checks should be send. This header will override any existing hostname configured on the endpoint.
CamelNagiosLevel	This is the severity level. You can use values **CRITICAL, WARNING, OK**. Apache Camel will by default use **OK**.
CamelNagiosServiceName	The servie name. Will default use the CamelContext name.

SENDING MESSAGE EXAMPLES

You can send a message to Nagios where the message payload contains the message. By default it will be **OK** level and use the CamelContext name as the service name. You can overrule these values using headers as shown above.

For example we send the **Hello Nagios** message to Nagios as follows:

```
template.sendBody("direct:start", "Hello Nagios");

from("direct:start").to("nagios:127.0.0.1:5667?password=secret").to("mock:result");
```

To send a **CRITICAL** message you can send the headers such as:

```
Map headers = new HashMap();
headers.put(NagiosConstants.LEVEL, "CRITICAL");
headers.put(NagiosConstants.HOST_NAME, "myHost");
headers.put(NagiosConstants.SERVICE_NAME, "myService");
template.sendBodyAndHeaders("direct:start", "Hello Nagios", headers);
```

USING NAGIOSEVENTNOTIFER

The Nagios component also provides an EventNotifer which you can use to send events to Nagios. For example we can enable this from Java as follows:

```
NagiosEventNotifier notifier = new NagiosEventNotifier();
notifier.getConfiguration().setHost("localhost");
notifier.getConfiguration().setPort(5667);
notifier.getConfiguration().setPassword("password");
```

```
CamelContext context = ...
context.getManagementStrategy().addEventNotifier(notifier);
return context;
```

In Spring XML its just a matter of defining a Spring bean with the type **EventNotifier** and Apache Camel will pick it up as documented here: Advanced configuration of CamelContext using Spring.

CHAPTER 102. NETTY

NETTY COMPONENT

Available as of Camel 2.3

The **Netty** component in Camel is a socket communication component, based on the Netty project. Netty is a NIO client server framework which enables quick and easy development of network applications such as protocol servers and clients. Netty greatly simplifies and streamlines network programming such as TCP and UDP socket server.

TIP

There is a Netty4 component that is using the newer Netty 4 which is recommend to use as this component is using the older Netty 3 library.

This camel component supports both producer and consumer endpoints.

The Netty component has several options and allows fine-grained control of a number of TCP/UDP communication parameters (buffer sizes, keepAlives, tcpNoDelay etc) and facilitates both In-Only and In-Out communication on a Camel route.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-netty</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a netty component is as follows

```
netty:tcp://localhost:99999[?options]
netty:udp://remotehost:99999/[?options]
```

This component supports producer and consumer endpoints for both TCP and UDP.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
keepAlive	**true**	Setting to ensure socket is not closed due to inactivity

tcpNoDelay	**true**	Setting to improve TCP protocol performance
backlog		**Camel 2.9.6/2.10.4/2.11:** Allows to configure a backlog for netty consumer (server). Note the backlog is just a best effort depending on the OS. Setting this option to a value such as **200**, **500** or **1000**, tells the TCP stack how long the "accept" queue can be. If this option is not configured, then the backlog depends on OS setting.
broadcast	**false**	Setting to choose Multicast over UDP
connectTimeout	**10000**	Time to wait for a socket connection to be available. Value is in millis.
reuseAddress	**true**	Setting to facilitate socket multiplexing
sync	**true**	Setting to set endpoint as one-way or request-response
synchronous	**false**	**Camel 2.10:** Whether Asynchronous Routing Engine is not in use. **false** then the Asynchronous Routing Engine is used, **true** to force processing synchronous.
ssl	**false**	Setting to specify whether SSL encryption is applied to this endpoint
sslClientCertHeaders	**false**	**Camel 2.12:** When enabled and in SSL mode, then the Netty consumer will enrich the Camel Message with headers having information about the client certificate such as subject name, issuer name, serial number, and the valid date range.
sendBufferSize	**65536 bytes**	The TCP/UDP buffer sizes to be used during outbound communication. Size is bytes.

receiveBufferSize	**65536 bytes**	The TCP/UDP buffer sizes to be used during inbound communication. Size is bytes.
option.XXX	**null**	**Camel 2.11/2.10.4:** Allows to configure additional netty options using "option." as prefix. For example "option.child.keepAlive=false" to set the netty option "child.keepAlive=false". See the Netty documentation for possible options that can be used.
corePoolSize	**10**	The number of allocated threads at component startup. Defaults to 10. **Note:** This option is removed from Camel 2.9.2 onwards. As we rely on Nettys default settings.
maxPoolSize	**100**	The maximum number of threads that may be allocated to this endpoint. Defaults to 100. **Note:** This option is removed from Camel 2.9.2 onwards. As we rely on Nettys default settings.
disconnect	**false**	Whether or not to disconnect(close) from Netty Channel right after use. Can be used for both consumer and producer.
lazyChannelCreation	**true**	Channels can be lazily created to avoid exceptions, if the remote server is not up and running when the Camel producer is started.
transferExchange	**false**	Only used for TCP. You can transfer the exchange over the wire instead of just the body. The following fields are transferred: In body, Out body, fault body, In headers, Out headers, fault headers, exchange properties, exchange exception. This requires that the objects are serializable. Camel will exclude any non-serializable objects and log it at WARN level.

disconnectOnNoReply	**true**	If sync is enabled then this option dictates NettyConsumer if it should disconnect where there is no reply to send back.
noReplyLogLevel	**WARN**	If sync is enabled this option dictates NettyConsumer which logging level to use when logging a there is no reply to send back. Values are: **FATAL, ERROR, INFO, DEBUG, OFF**.
serverExceptionCaughtLogLevel	**WARN**	**Camel 2.11.1:** If the server (NettyConsumer) catches an exception then its logged using this logging level.
serverClosedChannelExceptionCaughtLogLevel	**DEBUG**	**Camel 2.11.1:** If the server (NettyConsumer) catches an **java.nio.channels.ClosedChannelException** then its logged using this logging level. This is used to avoid logging the closed channel exceptions, as clients can disconnect abruptly and then cause a flod of closed exceptions in the Netty server.
allowDefaultCodec	**true**	**Camel 2.4:** The netty component installs a default codec if both, encoder/deocder is null and textline is false. Setting allowDefaultCodec to false prevents the netty component from installing a default codec as the first element in the filter chain.
textline	**false**	**Camel 2.4:** Only used for TCP. If no codec is specified, you can use this flag to indicate a text line based codec; if not specified or the value is false, then Object Serialization is assumed over TCP.
delimiter	**LINE**	**Camel 2.4:** The delimiter to use for the textline codec. Possible values are **LINE** and **NULL**.
decoderMaxLineLength	**1024**	**Camel 2.4:** The max line length to use for the textline codec.

autoAppendDelimiter	**true**	**Camel 2.4:** Whether or not to auto append missing end delimiter when sending using the textline codec.
encoding	**null**	**Camel 2.4:** The encoding (a charset name) to use for the textline codec. If not provided, Camel will use the JVM default Charset.
workerCount	**null**	**Camel 2.9:** When netty works on nio mode, it uses default workerCount parameter from Netty, which is cpu_core_threads*2. User can use this operation to override the default workerCount from Netty
sslContextParameters	**null**	**Camel 2.9:** SSL configuration using an **org.apache.camel.util.jsse.SSLContextParameters** instance. See Using the JSSE Configuration Utility.
receiveBufferSizePredictor	**null**	**Camel 2.9:** Configures the buffer size predictor. See details at Jetty documentation and this mail thread.
requestTimeout	**0**	**Camel 2.11.1:** Allows to use a timeout for the Netty producer when calling a remote server. By default no timeout is in use. The value is in milliseconds. The **requestTimeout** option uses Netty's **ReadTimeoutHandler** to trigger the timeout.
needClientAuth	**false**	**Camel 2.11:** Configures whether the server needs client authentication when using SSL.

orderedThreadPoolExecutor	**true**	**Camel 2.10.2:** Whether to use ordered thread pool, to ensure events are processed orderly on the same channel. See details at the netty javadoc of **org.jboss.netty.handler.execution.OrderedMemoryAwareThreadPoolExecutor** for more details.
maximumPoolSize	**16**	**Camel 2.10.2:** The core pool size for the ordered thread pool, if its in use.
producerPoolEnabled	**true**	**Camel 2.10.4/Camel 2.11:** Producer only. Whether producer pool is enabled or not. **Important:** Do not turn this off, as the pooling is needed for handling concurrency and reliable request/reply.
producerPoolMaxActive	**-1**	**Camel 2.10.3:** Producer only. Sets the cap on the number of objects that can be allocated by the pool (checked out to clients, or idle awaiting checkout) at a given time. Use a negative value for no limit.
producerPoolMinIdle	**0**	**Camel 2.10.3:** Producer only. Sets the minimum number of instances allowed in the producer pool before the evictor thread (if active) spawns new objects.
producerPoolMaxIdle	**100**	**Camel 2.10.3:** Producer only. Sets the cap on the number of "idle" instances in the pool.
producerPoolMinEvictableIdle	**30000**	**Camel 2.10.3:** Producer only. Sets the minimum amount of time (value in millis) an object may sit idle in the pool before it is eligible for eviction by the idle object evictor.

bootstrapConfiguration	**null**	**Camel 2.12:** Consumer only. Allows to configure the Netty ServerBootstrap options using a **org.apache.camel.component.netty.NettyServerBootstrapConfiguration** instance. This can be used to reuse the same configuration for multiple consumers, to align their configuration more easily.
bossPoll	**null**	**Camel 2.12:** To use a explicit **org.jboss.netty.channel.socket.nio.BossPool** as the boss thread pool. For example to share a thread pool with multiple consumers. By default each consumer has their own boss pool with 1 core thread.
workerPool	**null**	**Camel 2.12:** To use a explicit **org.jboss.netty.channel.socket.nio.WorkerPool** as the worker thread pool. For example to share a thread pool with multiple consumers. By default each consumer has their own worker pool with 2 x cpu count core threads.
networkInterface	**null**	**Camel 2.12:** Consumer only. When using UDP then this option can be used to specify a network interface by its name, such as **eth0** to join a multicast group.
udpConnectionlessSending	**false**	**Camel 2.15:** Producer only. This option supports connectionless UDP sending, which is genuine fire-and-forget. A UDP send attempt receives the **PortUnreachableException** exception, if no one is listening on the receiving port.
clientMode	**false**	**Camel 2.15:** Consumer only. If **clientMode** is **true**, the Netty consumer connects to the address as a TCP client.

REGISTRY BASED OPTIONS

Codec Handlers and SSL Keystores can be enlisted in the Registry, such as in the Spring XML file. The values that could be passed in, are the following:

Name	Description
passphrase	password setting to use in order to encrypt/decrypt payloads sent using SSH
keyStoreFormat	keystore format to be used for payload encryption. Defaults to "JKS" if not set
securityProvider	Security provider to be used for payload encryption. Defaults to "SunX509" if not set.
keyStoreFile	**deprecated:** Client side certificate keystore to be used for encryption
trustStoreFile	**deprecated:** Server side certificate keystore to be used for encryption
keyStoreResource	**Camel 2.11.1:** Client side certificate keystore to be used for encryption. Is loaded by default from classpath, but you can prefix with **"classpath:"**, **"file:"**, or **"http:"** to load the resource from different systems.
trustStoreResource	**Camel 2.11.1:** Server side certificate keystore to be used for encryption. Is loaded by default from classpath, but you can prefix with **"classpath:"**, **"file:"**, or **"http:"** to load the resource from different systems.
sslHandler	Reference to a class that could be used to return an SSL Handler
encoder	A custom **ChannelHandler** class that can be used to perform special marshalling of outbound payloads. Must override **org.jboss.netty.channel.ChannelDownStreamHandler**.
encorders	A list of encoders to be used. You can use a String which have values separated by comma, and have the values be looked up in the Registry. Just remember to prefix the value with # so Camel knows it should lookup.

decoder	A custom **ChannelHandler** class that can be used to perform special marshalling of inbound payloads. Must override **org.jboss.netty.channel.ChannelUpStreamHandler**. With no decoder defined Netty will default to serialized Java objects via the ObjectDecoder class; if a different format is expected then a decoder must be specified.
decoders	A list of decoders to be used. You can use a String which have values separated by comma, and have the values be looked up in the Registry. Just remember to prefix the value with # so Camel knows it should lookup.

Important: Read below about using non shareable encoders/decoders.

USING NON SHAREABLE ENCODERS OR DECODERS

If your encoders or decoders is not shareable (eg they have the @Shareable class annotation), then your encoder/decoder must implement the **org.apache.camel.component.netty.ChannelHandlerFactory** interface, and return a new instance in the **newChannelHandler** method. This is to ensure the encoder/decoder can safely be used. If this is not the case, then the Netty component will log a WARN when an endpoint is created.

The Netty component offers a **org.apache.camel.component.netty.ChannelHandlerFactories** factory class, that has a number of commonly used methods.

SENDING MESSAGES TO/FROM A NETTY ENDPOINT

NETTY PRODUCER

In Producer mode, the component provides the ability to send payloads to a socket endpoint using either TCP or UDP protocols (with optional SSL support).

The producer mode supports both one-way and request-response based operations.

NETTY CONSUMER

In Consumer mode, the component provides the ability to:

- listen on a specified socket using either TCP or UDP protocols (with optional SSL support),
- receive requests on the socket using text/xml, binary and serialized object based payloads and
- send them along on a route as message exchanges.

The consumer mode supports both one-way and request-response based operations.

HEADERS

The following headers are filled for the exchanges created by the Netty consumer:

Header Key	Class	Description
NettyConstants.NETTY_CHANNEL_HANDLER_CONTEXT / CamelNettyChannelHandlerContext	**org.jboss.netty.channel.ChannelHandlerContext**	**ChannelHandlerContext** instance associated with the connection received by Netty.
NettyConstants.NETTY_MESSAGE_EVENT / CamelNettyMessageEvent	**org.jboss.netty.channel.MessageEvent**	**MessageEvent** instance associated with the connection received by Netty.
NettyConstants.NETTY_REMOTE_ADDRESS / CamelNettyRemoteAddress	**java.net.SocketAddress**	Remote address of the incoming socket connection.
NettyConstants.NETTY_LOCAL_ADDRESS / CamelNettyLocalAddress	**java.net.SocketAddress**	Local address of the incoming socket connection.

A UDP NETTY ENDPOINT USING REQUEST-REPLY AND SERIALIZED OBJECT PAYLOAD

```
RouteBuilder builder = new RouteBuilder() {
  public void configure() {
    from("netty:udp://localhost:5155?sync=true")
      .process(new Processor() {
        public void process(Exchange exchange) throws Exception {
          Poetry poetry = (Poetry) exchange.getIn().getBody();
          poetry.setPoet("Dr. Sarojini Naidu");
          exchange.getOut().setBody(poetry);
        }
      }
    }
};
```

A TCP BASED NETTY CONSUMER ENDPOINT USING ONE-WAY COMMUNICATION

```
RouteBuilder builder = new RouteBuilder() {
  public void configure() {
      from("netty:tcp://localhost:5150")
          .to("mock:result");
  }
};
```

AN SSL/TCP BASED NETTY CONSUMER ENDPOINT USING REQUEST-REPLY COMMUNICATION

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.9, the Netty component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the Netty component.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);

NettyComponent nettyComponent = getContext().getComponent("netty", NettyComponent.class);
nettyComponent.setSslContextParameters(scp);
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
      id="sslContextParameters">
    <camel:keyManagers
        keyPassword="keyPassword">
      <camel:keyStore
          resource="/users/home/server/keystore.jks"
          password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>...
...
  <to uri="netty:tcp://localhost:5150?
sync=true&ssl=true&sslContextParameters=#sslContextParameters"/>
...
```

USING BASIC SSL/TLS CONFIGURATION ON THE JETTY COMPONENT

```
JndiRegistry registry = new JndiRegistry(createJndiContext());
registry.bind("password", "changeit");
registry.bind("ksf", new File("src/test/resources/keystore.jks"));
registry.bind("tsf", new File("src/test/resources/keystore.jks"));

context.createRegistry(registry);
```

```
context.addRoutes(new RouteBuilder() {
  public void configure() {
      String netty_ssl_endpoint =
        "netty:tcp://localhost:5150?sync=true&ssl=true&passphrase=#password"
        + "&keyStoreFile=#ksf&trustStoreFile=#tsf";
      String return_string =
        "When You Go Home, Tell Them Of Us And Say,"
        + "For Your Tomorrow, We Gave Our Today.";

      from(netty_ssl_endpoint)
       .process(new Processor() {
          public void process(Exchange exchange) throws Exception {
            exchange.getOut().setBody(return_string);
          }
       }
  }
});
```

GETTING ACCESS TO SSLSESSION AND THE CLIENT CERTIFICATE

Available as of Camel 2.12

You can get access to the **javax.net.ssl.SSLSession** if you eg need to get details about the client certificate. When **ssl=true** then the Netty component will store the **SSLSession** as a header on the Camel Message as shown below:

```
SSLSession session = exchange.getIn().getHeader(NettyConstants.NETTY_SSL_SESSION,
SSLSession.class);
// get the first certificate which is client certificate
javax.security.cert.X509Certificate cert = session.getPeerCertificateChain()[0];
Principal principal = cert.getSubjectDN();
```

Remember to set **needClientAuth=true** to authenticate the client, otherwise **SSLSession** cannot access information about the client certificate, and you may get an exception **javax.net.ssl.SSLPeerUnverifiedException: peer not authenticated**. You may also get this exception if the client certificate is expired or not valid etc.

TIP

The option **sslClientCertHeaders** can be set to **true** which then enriches the Camel Message with headers having details about the client certificate. For example the subject name is readily available in the header **CamelNettySSLClientCertSubjectName**.

USING MULTIPLE CODECS

In certain cases it may be necessary to add chains of encoders and decoders to the netty pipeline. To add multpile codecs to a camel netty endpoint the 'encoders' and 'decoders' uri parameters should be used. Like the 'encoder' and 'decoder' parameters they are used to supply references (to lists of ChannelUpstreamHandlers and ChannelDownstreamHandlers) that should be added to the pipeline. Note that if encoders is specified then the encoder param will be ignored, similarly for decoders and the decoder param.

IMPORTANT

Read further above about using non shareable encoders/decoders.

The lists of codecs need to be added to the Camel's registry so they can be resolved when the endpoint is created.

```
ChannelHandlerFactory lengthDecoder =
ChannelHandlerFactories.newLengthFieldBasedFrameDecoder(1048576, 0, 4, 0, 4);

StringDecoder stringDecoder = new StringDecoder();
registry.bind("length-decoder", lengthDecoder);
registry.bind("string-decoder", stringDecoder);

LengthFieldPrepender lengthEncoder = new LengthFieldPrepender(4);
StringEncoder stringEncoder = new StringEncoder();
registry.bind("length-encoder", lengthEncoder);
registry.bind("string-encoder", stringEncoder);

List<ChannelHandler> decoders = new ArrayList<ChannelHandler>();
decoders.add(lengthDecoder);
decoders.add(stringDecoder);

List<ChannelHandler> encoders = new ArrayList<ChannelHandler>();
encoders.add(lengthEncoder);
encoders.add(stringEncoder);

registry.bind("encoders", encoders);
registry.bind("decoders", decoders);
```

Spring's native collections support can be used to specify the codec lists in an application context

```
    <util:list id="decoders" list-class="java.util.LinkedList">
        <bean class="org.apache.camel.component.netty.ChannelHandlerFactories" factory-
method="newLengthFieldBasedFrameDecoder">
            <constructor-arg value="1048576"/>
            <constructor-arg value="0"/>
            <constructor-arg value="4"/>
            <constructor-arg value="0"/>
            <constructor-arg value="4"/>
        </bean>
        <bean class="org.jboss.netty.handler.codec.string.StringDecoder"/>
    </util:list>

    <util:list id="encoders" list-class="java.util.LinkedList">
        <bean class="org.jboss.netty.handler.codec.frame.LengthFieldPrepender">
            <constructor-arg value="4"/>
        </bean>
        <bean class="org.jboss.netty.handler.codec.string.StringEncoder"/>
    </util:list>

    <bean id="length-encoder" class="org.jboss.netty.handler.codec.frame.LengthFieldPrepender">
        <constructor-arg value="4"/>
    </bean>
    <bean id="string-encoder" class="org.jboss.netty.handler.codec.string.StringEncoder"/>
```

```
    <bean id="length-decoder" class="org.apache.camel.component.netty.ChannelHandlerFactories"
factory-method="newLengthFieldBasedFrameDecoder">
        <constructor-arg value="1048576"/>
        <constructor-arg value="0"/>
        <constructor-arg value="4"/>
        <constructor-arg value="0"/>
        <constructor-arg value="4"/>
    </bean>
    <bean id="string-decoder" class="org.jboss.netty.handler.codec.string.StringDecoder"/>

</beans>
```

The bean names can then be used in netty endpoint definitions either as a comma separated list or contained in a List e.g.

```
                from("direct:multiple-codec").to("netty:tcp://localhost:{{port}}?
encoders=#encoders&sync=false");

                from("netty:tcp://localhost:{{port}}?decoders=#length-decoder,#string-
decoder&sync=false").to("mock:multiple-codec");
            }
        };
    }
}
```

or via spring.

```
<camelContext id="multiple-netty-codecs-context" xmlns="http://camel.apache.org/schema/spring">
    <route>
        <from uri="direct:multiple-codec"/>
        <to uri="netty:tcp://localhost:5150?encoders=#encoders&ync=false"/>
    </route>
    <route>
        <from uri="netty:tcp://localhost:5150?decoders=#length-decoder,#string-decoder&ync=false"/>
        <to uri="mock:multiple-codec"/>
    </route>
</camelContext>
```

CLOSING CHANNEL WHEN COMPLETE

When acting as a server you sometimes want to close the channel when, for example, a client conversion is finished. You can do this by simply setting the endpoint option **disconnect=true**.

However you can also instruct Camel on a per message basis as follows. To instruct Camel to close the channel, you should add a header with the key **CamelNettyCloseChannelWhenComplete** set to a boolean **true** value. For instance, the example below will close the channel after it has written the bye message back to the client:

```
        from("netty:tcp://localhost:8080").process(new Processor() {
            public void process(Exchange exchange) throws Exception {
                String body = exchange.getIn().getBody(String.class);
                exchange.getOut().setBody("Bye " + body);
                // some condition which determines if we should close
```

```
            if (close) {

exchange.getOut().setHeader(NettyConstants.NETTY_CLOSE_CHANNEL_WHEN_COMPLETE,
true);
            }
        }
    });
```

ADDING CUSTOM CHANNEL PIPELINE FACTORIES TO GAIN COMPLETE CONTROL OVER A CREATED PIPELINE

Available as of Camel 2.5

Custom channel pipelines provide complete control to the user over the handler/interceptor chain by inserting custom handler(s), encoder(s) & decoders without having to specify them in the Netty Endpoint URL in a very simple way.

In order to add a custom pipeline, a custom channel pipeline factory must be created and registered with the context via the context registry (JNDIRegistry,or the camel-spring ApplicationContextRegistry etc).

A custom pipeline factory must be constructed as follows

- A Producer linked channel pipeline factory must extend the abstract class **ClientPipelineFactory**.
- A Consumer linked channel pipeline factory must extend the abstract class **ServerPipelineFactory**.
- The classes should override the getPipeline() method in order to insert custom handler(s), encoder(s) and decoder(s). Not overriding the getPipeline() method creates a pipeline with no handlers, encoders or decoders wired to the pipeline.

The example below shows how ServerChannel Pipeline factory may be created

USING CUSTOM PIPELINE FACTORY

```
public class SampleServerChannelPipelineFactory extends ServerPipelineFactory {
    private int maxLineSize = 1024;

    public ChannelPipeline getPipeline() throws Exception {
        ChannelPipeline channelPipeline = Channels.pipeline();

        channelPipeline.addLast("encoder-SD", new StringEncoder(CharsetUtil.UTF_8));
        channelPipeline.addLast("decoder-DELIM", new
DelimiterBasedFrameDecoder(maxLineSize, true, Delimiters.lineDelimiter()));
        channelPipeline.addLast("decoder-SD", new StringDecoder(CharsetUtil.UTF_8));
        // here we add the default Camel ServerChannelHandler for the consumer, to
allow Camel to route the message etc.
        channelPipeline.addLast("handler", new ServerChannelHandler(consumer));

        return channelPipeline;
    }
}
```

The custom channel pipeline factory can then be added to the registry and instantiated/utilized on a camel route in the following way

```
Registry registry = camelContext.getRegistry();
serverPipelineFactory = new TestServerChannelPipelineFactory();
registry.bind("spf", serverPipelineFactory);
context.addRoutes(new RouteBuilder() {
  public void configure() {
     String netty_ssl_endpoint =
       "netty:tcp://localhost:5150?serverPipelineFactory=#spf"
     String return_string =
       "When You Go Home, Tell Them Of Us And Say,"
       + "For Your Tomorrow, We Gave Our Today.";

     from(netty_ssl_endpoint)
      .process(new Processor() {
         public void process(Exchange exchange) throws Exception {
           exchange.getOut().setBody(return_string);
         }
      }
  }
});
```

REUSING NETTY BOSS AND WORKER THREAD POOLS

Available as of Camel 2.12

Netty has two kind of thread pools: boss and worker. By default each Netty consumer and producer has their private thread pools. If you want to reuse these thread pools among multiple consumers or producers then the thread pools must be created and enlisted in the Registry.

For example using Spring XML we can create a shared worker thread pool using the **NettyWorkerPoolBuilder** with 2 worker threads as shown below:

```
<!-- use the worker pool builder to create to help create the shared thread pool -->
<bean id="poolBuilder" class="org.apache.camel.component.netty.NettyWorkerPoolBuilder">
  <property name="workerCount" value="2"/>
</bean>

<!-- the shared worker thread pool -->
<bean id="sharedPool" class="org.jboss.netty.channel.socket.nio.WorkerPool"
      factory-bean="poolBuilder" factory-method="build" destroy-method="shutdown">
</bean>
```

TIP

For boss thread pool there is a **org.apache.camel.component.netty.NettyServerBossPoolBuilder** builder for Netty consumers, and a **org.apache.camel.component.netty.NettyClientBossPoolBuilder** for the Netty produces.

Then in the Camel routes we can refer to this worker pools by configuring the **workerPool** option in the URI as shown below:

```
    <route>
      <from uri="netty:tcp://localhost:5021?
textline=true&ync=true&orkerPool=#sharedPool&rderedThreadPoolExecutor=false"/>
      <to uri="log:result"/>
      ...
    </route>
```

And if we have another route we can refer to the shared worker pool:

```
    <route>
      <from uri="netty:tcp://localhost:5022?
textline=true&ync=true&orkerPool=#sharedPool&rderedThreadPoolExecutor=false"/>
      <to uri="log:result"/>
      ...
    </route>
```

... and so forth.

SEE ALSO

- Netty HTTP
- Mina

CHAPTER 103. NETTY4

NETTY4 COMPONENT

Available as of Camel 2.14

The **Netty4** component in Camel is a socket communication component, based on the Netty project version 4. Netty is a NIO client server framework which enables quick and easy development of **netwServerInitializerFactoryork** applications such as protocol servers and clients. Netty4 greatly simplifies and streamlines network programming such as TCP and UDP socket server.

This camel component supports both producer and consumer endpoints.

The Netty component has several options and allows fine-grained control of a number of TCP/UDP communication parameters (buffer sizes, keepAlives, tcpNoDelay etc) and facilitates both In-Only and In-Out communication on a Camel route.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-netty4</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a netty component is as follows

```
netty4:tcp://localhost:99999[?options]
netty4:udp://remotehost:99999/[?options]
```

This component supports producer and consumer endpoints for both TCP and UDP.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
keepAlive	**true**	Setting to ensure socket is not closed due to inactivity
tcpNoDelay	**true**	Setting to improve TCP protocol performance

backlog		Allows to configure a backlog for netty consumer (server). Note the backlog is just a best effort depending on the OS. Setting this option to a value such as **200**, **500** or **1000**, tells the TCP stack how long the "accept" queue can be. If this option is not configured, then the backlog depends on OS setting.
broadcast	**false**	Setting to choose Multicast over UDP
connectTimeout	**10000**	Time to wait for a socket connection to be available. Value is in millis.
reuseAddress	**true**	Setting to facilitate socket multiplexing
sync	**true**	Setting to set endpoint as one-way or request-response
synchronous	**false**	Whether Asynchronous Routing Engine is not in use. **false** then the Asynchronous Routing Engine is used, **true** to force processing synchronous.
ssl	**false**	Setting to specify whether SSL encryption is applied to this endpoint
sslClientCertHeaders	**false**	When enabled and in SSL mode, then the Netty consumer will enrich the Camel Message with headers having information about the client certificate such as subject name, issuer name, serial number, and the valid date range.
sendBufferSize	**65536 bytes**	The TCP/UDP buffer sizes to be used during outbound communication. Size is bytes.
receiveBufferSize	**65536 bytes**	The TCP/UDP buffer sizes to be used during inbound communication. Size is bytes.

option.XXX	**null**	Allows to configure additional netty options using "option." as prefix. For example "option.child.keepAlive=false" to set the netty option "child.keepAlive=false". See the Netty documentation for possible options that can be used.
corePoolSize	**10**	The number of allocated threads at component startup. Defaults to 10. *Note:* This option is removed from Camel 2.9.2 onwards. As we rely on Nettys default settings.
maxPoolSize	**100**	The maximum number of threads that may be allocated to this endpoint. Defaults to 100. *Note:* This option is removed from Camel 2.9.2 onwards. As we rely on Nettys default settings.
disconnect	**false**	Whether or not to disconnect(close) from Netty Channel right after use. Can be used for both consumer and producer.
lazyChannelCreation	**true**	Channels can be lazily created to avoid exceptions, if the remote server is not up and running when the Camel producer is started.
transferExchange	**false**	Only used for TCP. You can transfer the exchange over the wire instead of just the body. The following fields are transferred: In body, Out body, fault body, In headers, Out headers, fault headers, exchange properties, exchange exception. This requires that the objects are serializable. Camel will exclude any non-serializable objects and log it at WARN level.
disconnectOnNoReply	**true**	If sync is enabled then this option dictates NettyConsumer if it should disconnect where there is no reply to send back.
noReplyLogLevel	**WARN**	If sync is enabled this option dictates NettyConsumer which logging level to use when logging a there is no reply to send back. Values are: **FATAL, ERROR, INFO, DEBUG, OFF**.

serverExceptionCaughtLogLevel	**WARN**	If the server (NettyConsumer) catches an exception then its logged using this logging level.
serverClosedChannelExceptionCaughtLogLevel	**DEBUG**	If the server (NettyConsumer) catches an **java.nio.channels.ClosedChannelException** then its logged using this logging level. This is used to avoid logging the closed channel exceptions, as clients can disconnect abruptly and then cause a flod of closed exceptions in the Netty server.
allowDefaultCodec	**true**	The netty component installs a default codec if both, encoder/deocder is null and textline is false. Setting allowDefaultCodec to false prevents the netty component from installing a default codec as the first element in the filter chain.
textline	**false**	Only used for TCP. If no codec is specified, you can use this flag to indicate a text line based codec; if not specified or the value is false, then Object Serialization is assumed over TCP.
delimiter	**LINE**	The delimiter to use for the textline codec. Possible values are **LINE** and **NULL**.
decoderMaxLineLength	**1024**	The max line length to use for the textline codec.
autoAppendDelimiter	**true**	Whether or not to auto append missing end delimiter when sending using the textline codec.
encoding	**null**	The encoding (a charset name) to use for the textline codec. If not provided, Camel will use the JVM default Charset.
workerCount	**null**	When netty works on nio mode, it uses default workerCount parameter from Netty, which is cpu_core_threads*2. User can use this operation to override the default workerCount from Netty

sslContextParameters	**null**	SSL configuration using an **org.apache.camel.util.jsse.SSLContextParameters** instance. See Using the JSSE Configuration Utility.
receiveBufferSizePredictor	**null**	Configures the buffer size predictor. See details at Jetty documentation and this mail thread.
requestTimeout	**0**	Allows to use a timeout for the Netty producer when calling a remote server. By default no timeout is in use. The value is in milli seconds. The **requestTimeout** uses Netty's **ReadTimeoutHandler** to trigger the timeout.
needClientAuth	**false**	Configures whether the server needs client authentication when using SSL.
usingExecutorService	**true**	Whether to use executorService to handle the message inside the camel route, the executorService can be set from NettyComponent.
maximumPoolSize	**16**	The core pool size for the ordered thread pool, if its in use.
producerPoolEnabled	**true**	Producer only. Whether producer pool is enabled or not. *Important:* Do not turn this off, as the pooling is needed for handling concurrency and reliable request/reply.
producerPoolMaxActive	**-1**	Producer only. Sets the cap on the number of objects that can be allocated by the pool (checked out to clients, or idle awaiting checkout) at a given time. Use a negative value for no limit.
producerPoolMinIdle	**0**	Producer only. Sets the minimum number of instances allowed in the producer pool before the evictor thread (if active) spawns new objects.
producerPoolMaxIdle	**100**	Producer only. Sets the cap on the number of "idle" instances in the pool.

producerPoolMinEvictableIdle	**30000**	Producer only. Sets the minimum amount of time (value in millis) an object may sit idle in the pool before it is eligible for eviction by the idle object evictor.
bootstrapConfiguration	**null**	Consumer only. Allows to configure the Netty ServerBootstrap options using a **org.apache.camel.component.netty4.NettyServerBootstrapConfiguration** instance. This can be used to reuse the same configuration for multiple consumers, to align their configuration more easily.
bossPoll	**null**	To use a explicit **io.netty.channel.EventLoopGroup** as the boss thread pool. For example to share a thread pool with multiple consumers. By default each consumer has their own boss pool with 1 core thread.
workerPool	**null**	To use a explicit **io.netty.channel.EventLoopGroup** as the worker thread pool. For example to share a thread pool with multiple consumers. By default each consumer has their own worker pool with 2 x cpu count core threads.
networkInterface	**null**	Consumer only. When using UDP then this option can be used to specify a network interface by its name, such as **eth0** to join a multicast group.
clientInitializerFactory	**null**	**Camel 2.15:** To use a custom client initializer factory to control the pipelines in the channel. See further below for more details.
serverInitializerFactory	**null**	**Camel 2.15:** To use a custom server initializer factory to control the pipelines in the channel. See further below for more details.
clientPipelineFactory	**null**	*Deprecated*: Use **clientInitializerFactory** instead.
serverPipelineFactory	**null**	*Deprecated*: Use **serverInitializerFactory** instead.

udpConnectionlessSending	**false**	**Camel 2.15:** Producer only. This option supports connectionless UDP sending, which is genuine fire-and-forget. A UDP send attempt receives the **PortUnreachableException** exception, if no one is listening on the receiving port.
clientMode	**false**	**Camel 2.15:** Consumer only. If **clientMode** is **true**, the Netty consumer connects to the address as a TCP client.

REGISTRY BASED OPTIONS

Codec Handlers and SSL Keystores can be enlisted in the Registry, such as in the Spring XML file. The values that could be passed in, are the following:

Name	Description
passphrase	password setting to use in order to encrypt/decrypt payloads sent usin
keyStoreFormat	keystore format to be used for payload encryption. Defaults to "JKS" if
securityProvider	Security provider to be used for payload encryption. Defaults to "SunX
keyStoreFile	*deprecated:* Client side certificate keystore to be used for encryption
trustStoreFile	*deprecated:* Server side certificate keystore to be used for encryption
keyStoreResource	*Camel 2.11.1:* Client side certificate keystore to be used for encryption **"classpath:"**, **"file:"**, or **"http:"** to load the resource from different
trustStoreResource	*Camel 2.11.1:* Server side certificate keystore to be used for encryptio **"classpath:"**, **"file:"**, or **"http:"** to load the resource from different
sslHandler	Reference to a class that could be used to return an SSL Handler
encoder	A custom **ChannelHandler** class that can be used to perform specia **io.netty.channel.ChannelInboundHandlerAdapter**.
encorders	A list of encoders to be used. You can use a String which have values Just remember to prefix the value with # so Camel knows it should loo
decoder	A custom **ChannelHandler** class that can be used to perform specia **io.netty.channel.ChannelOutboundHandlerAdapter**.
decoders	A list of decoders to be used. You can use a String which have values Just remember to prefix the value with # so Camel knows it should loo

Important: Read below about using non shareable encoders/decoders.

USING NON SHAREABLE ENCODERS OR DECODERS

If your encoders or decoders is not shareable (eg they have the @Shareable class annotation), then your encoder/decoder must implement the **org.apache.camel.component.netty.ChannelHandlerFactory** interface, and return a new instance in the **newChannelHandler** method. This is to ensure the encoder/decoder can safely be used. If this is not the case, then the Netty component will log a WARN when an endpoint is created.

The Netty component offers a **org.apache.camel.component.netty.ChannelHandlerFactories** factory class, that has a number of commonly used methods.

SENDING MESSAGES TO/FROM A NETTY ENDPOINT

NETTY PRODUCER

In Producer mode, the component provides the ability to send payloads to a socket endpoint using either TCP or UDP protocols (with optional SSL support).

The producer mode supports both one-way and request-response based operations.

NETTY CONSUMER

In Consumer mode, the component provides the ability to:

- listen on a specified socket using either TCP or UDP protocols (with optional SSL support),
- receive requests on the socket using text/xml, binary and serialized object based payloads and
- send them along on a route as message exchanges.

The consumer mode supports both one-way and request-response based operations.

USAGE SAMPLES

A UDP NETTY ENDPOINT USING REQUEST-REPLY AND SERIALIZED OBJECT PAYLOAD

```
RouteBuilder builder = new RouteBuilder() {
  public void configure() {
    from("netty4:udp://localhost:5155?sync=true")
      .process(new Processor() {
        public void process(Exchange exchange) throws Exception {
          Poetry poetry = (Poetry) exchange.getIn().getBody();
          poetry.setPoet("Dr. Sarojini Naidu");
          exchange.getOut().setBody(poetry);
        }
      }
    }
};
```

A TCP BASED NETTY CONSUMER ENDPOINT USING ONE-WAY COMMUNICATION

```
RouteBuilder builder = new RouteBuilder() {
  public void configure() {
      from("netty4:tcp://localhost:5150")
          .to("mock:result");
  }
};
```

AN SSL/TCP BASED NETTY CONSUMER ENDPOINT USING REQUEST-REPLY COMMUNICATION

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.9, the Netty component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the Netty component.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");

KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);

NettyComponent nettyComponent = getContext().getComponent("netty4", NettyComponent.class);
nettyComponent.setSslContextParameters(scp);
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
     id="sslContextParameters">
    <camel:keyManagers
       keyPassword="keyPassword">
      <camel:keyStore
         resource="/users/home/server/keystore.jks"
         password="keystorePassword"/>
    </camel:keyManagers>
  </camel:sslContextParameters>...
...
```

```
  <to uri="netty4:tcp://localhost:5150?
sync=true&ssl=true&sslContextParameters=#sslContextParameters"/>
...
```

USING BASIC SSL/TLS CONFIGURATION ON THE JETTY COMPONENT

```
JndiRegistry registry = new JndiRegistry(createJndiContext());
registry.bind("password", "changeit");
registry.bind("ksf", new File("src/test/resources/keystore.jks"));
registry.bind("tsf", new File("src/test/resources/keystore.jks"));

context.createRegistry(registry);
context.addRoutes(new RouteBuilder() {
  public void configure() {
      String netty_ssl_endpoint =
        "netty4:tcp://localhost:5150?sync=true&ssl=true&passphrase=#password"
        + "&keyStoreFile=#ksf&trustStoreFile=#tsf";
      String return_string =
        "When You Go Home, Tell Them Of Us And Say,"
        + "For Your Tomorrow, We Gave Our Today.";

      from(netty_ssl_endpoint)
       .process(new Processor() {
          public void process(Exchange exchange) throws Exception {
            exchange.getOut().setBody(return_string);
          }
       }
  }
});
```

GETTING ACCESS TO SSLSESSION AND THE CLIENT CERTIFICATE

Available as of Camel 2.12

You can get access to the **javax.net.ssl.SSLSession** if you eg need to get details about the client certificate. When **ssl=true** then the Netty4 component will store the **SSLSession** as a header on the Camel Message as shown below:

```
SSLSession session = exchange.getIn().getHeader(NettyConstants.NETTY_SSL_SESSION,
SSLSession.class);
// get the first certificate which is client certificate
javax.security.cert.X509Certificate cert = session.getPeerCertificateChain()[0];
Principal principal = cert.getSubjectDN();
```

Remember to set **needClientAuth=true** to authenticate the client, otherwise **SSLSession** cannot access information about the client certificate, and you may get an exception **javax.net.ssl.SSLPeerUnverifiedException: peer not authenticated**. You may also get this exception if the client certificate is expired or not valid etc.

TIP

The option **sslClientCertHeaders** can be set to **true** which then enriches the Camel Message with headers having details about the client certificate. For example the subject name is readily available in the header **CamelNettySSLClientCertSubjectName**.

USING MULTIPLE CODECS

In certain cases it may be necessary to add chains of encoders and decoders to the netty pipeline. To add multpile codecs to a camel netty endpoint the 'encoders' and 'decoders' uri parameters should be used. Like the 'encoder' and 'decoder' parameters they are used to supply references (to lists of ChannelUpstreamHandlers and ChannelDownstreamHandlers) that should be added to the pipeline. Note that if encoders is specified then the encoder param will be ignored, similarly for decoders and the decoder param.

IMPORTANT

Read further above about using non shareable encoders/decoders.

The lists of codecs need to be added to the Camel's registry so they can be resolved when the endpoint is created.

```
ChannelHandlerFactory lengthDecoder =
ChannelHandlerFactories.newLengthFieldBasedFrameDecoder(1048576, 0, 4, 0, 4);

StringDecoder stringDecoder = new StringDecoder();
registry.bind("length-decoder", lengthDecoder);
registry.bind("string-decoder", stringDecoder);

LengthFieldPrepender lengthEncoder = new LengthFieldPrepender(4);
StringEncoder stringEncoder = new StringEncoder();
registry.bind("length-encoder", lengthEncoder);
registry.bind("string-encoder", stringEncoder);

List<ChannelHandler> decoders = new ArrayList<ChannelHandler>();
decoders.add(lengthDecoder);
decoders.add(stringDecoder);

List<ChannelHandler> encoders = new ArrayList<ChannelHandler>();
encoders.add(lengthEncoder);
encoders.add(stringEncoder);

registry.bind("encoders", encoders);
registry.bind("decoders", decoders);
```

Spring's native collections support can be used to specify the codec lists in an application context

```
<util:list id="decoders" list-class="java.util.LinkedList">
        <bean class="org.apache.camel.component.netty4.ChannelHandlerFactories" factory-
method="newLengthFieldBasedFrameDecoder">
            <constructor-arg value="1048576"/>
            <constructor-arg value="0"/>
```

```
            <constructor-arg value="4"/>
            <constructor-arg value="0"/>
            <constructor-arg value="4"/>
        </bean>
        <bean class="io.netty.handler.codec.string.StringDecoder"/>
    </util:list>

    <util:list id="encoders" list-class="java.util.LinkedList">
        <bean class="io.netty.handler.codec.LengthFieldPrepender">
            <constructor-arg value="4"/>
        </bean>
        <bean class="io.netty.handler.codec.string.StringEncoder"/>
    </util:list>

    <bean id="length-encoder" class="io.netty.handler.codec.LengthFieldPrepender">
        <constructor-arg value="4"/>
    </bean>
    <bean id="string-encoder" class="io.netty.handler.codec.string.StringEncoder"/>

    <bean id="length-decoder" class="org.apache.camel.component.netty4.ChannelHandlerFactories"
factory-method="newLengthFieldBasedFrameDecoder">
        <constructor-arg value="1048576"/>
        <constructor-arg value="0"/>
        <constructor-arg value="4"/>
        <constructor-arg value="0"/>
        <constructor-arg value="4"/>
    </bean>
    <bean id="string-decoder" class="io.netty.handler.codec.string.StringDecoder"/>
```

The bean names can then be used in netty endpoint definitions either as a comma separated list or contained in a List e.g.

```
 from("direct:multiple-codec").to("netty4:tcp://localhost:{{port}}?encoders=#encoders&sync=false");

 from("netty4:tcp://localhost:{{port}}?decoders=#length-decoder,#string-
decoder&sync=false").to("mock:multiple-codec");
```

or via spring.

```
  <camelContext id="multiple-netty-codecs-context" xmlns="http://camel.apache.org/schema/spring">
      <route>
          <from uri="direct:multiple-codec"/>
          <to uri="netty4:tcp://localhost:5150?encoders=#encoders&amp;sync=false"/>
      </route>
      <route>
          <from uri="netty4:tcp://localhost:5150?decoders=#length-decoder,#string-
decoder&amp;sync=false"/>
          <to uri="mock:multiple-codec"/>
      </route>
  </camelContext>
```

CLOSING CHANNEL WHEN COMPLETE

When acting as a server you sometimes want to close the channel when, for example, a client conversion is finished. You can do this by simply setting the endpoint option **disconnect=true**.

However you can also instruct Camel on a per message basis as follows. To instruct Camel to close the channel, you should add a header with the key **CamelNettyCloseChannelWhenComplete** set to a boolean **true** value. For instance, the example below will close the channel after it has written the bye message back to the client:

```
        from("netty4:tcp://localhost:8080").process(new Processor() {
            public void process(Exchange exchange) throws Exception {
                String body = exchange.getIn().getBody(String.class);
                exchange.getOut().setBody("Bye " + body);
                // some condition which determines if we should close
                if (close) {

exchange.getOut().setHeader(NettyConstants.NETTY_CLOSE_CHANNEL_WHEN_COMPLETE,
true);
                }
            }
        });
```

ADDING CUSTOM CHANNEL PIPELINE FACTORIES TO GAIN COMPLETE CONTROL OVER A CREATED PIPELINE

Custom channel pipelines provide complete control to the user over the handler/interceptor chain by inserting custom handler(s), encoder(s) & decoders without having to specify them in the Netty Endpoint URL in a very simple way.

In order to add a custom pipeline, a custom channel pipeline factory must be created and registered with the context via the context registry (JNDIRegistry,or the camel-spring ApplicationContextRegistry etc).

A custom pipeline factory must be constructed as follows

- A Producer linked channel pipeline factory must extend the abstract class **ClientInitializerFactory**.
- A Consumer linked channel pipeline factory must extend the abstract class **ServerInitializerFactory**.
- The classes should override the **initChannel()** method in order to insert custom handler(s), encoder(s) and decoder(s). Not overriding the **initChannel()** method creates a pipeline with no handlers, encoders or decoders wired to the pipeline.

The example below shows how **ServerInitializerFactory** factory may be created

Example 103.1. Using server initializer factory

```
public class SampleServerInitializerFactory extends ServerInitializerFactory {
    private int maxLineSize = 1024;

    protected void initChannel(Channel ch) throws Exception {
        ChannelPipeline channelPipeline = ch.pipeline();

        channelPipeline.addLast("encoder-SD", new StringEncoder(CharsetUtil.UTF_8));
        channelPipeline.addLast("decoder-DELIM", new DelimiterBasedFrameDecoder(maxLineSize,
```

```
        true, Delimiters.lineDelimiter()));
            channelPipeline.addLast("decoder-SD", new StringDecoder(CharsetUtil.UTF_8));
            // here we add the default Camel ServerChannelHandler for the consumer, to allow Camel to
        route the message etc.
            channelPipeline.addLast("handler", new ServerChannelHandler(consumer));
        }
    }
```

The custom server initializer factory can then be added to the registry and instantiated/utilized on a camel route in the following way:

```
Registry registry = camelContext.getRegistry();
ServerInitializerFactory factory = new TestServerInitializerFactory();
registry.bind("spf", factory);
context.addRoutes(new RouteBuilder() {
  public void configure() {
      String netty_ssl_endpoint =
        "netty4:tcp://localhost:5150?serverInitializerFactory=#spf"
      String return_string =
        "When You Go Home, Tell Them Of Us And Say,"
        + "For Your Tomorrow, We Gave Our Today.";

      from(netty_ssl_endpoint)
       .process(new Processor() {
          public void process(Exchange exchange) throws Exception {
            exchange.getOut().setBody(return_string);
          }
       }
  }
});
```

REUSING NETTY BOSS AND WORKER THREAD POOLS

Available as of Camel 2.12

Netty has two kind of thread pools: boss and worker. By default each Netty consumer and producer has their private thread pools. If you want to reuse these thread pools among multiple consumers or producers then the thread pools must be created and enlisted in the Registry.

For example using Spring XML we can create a shared worker thread pool using the **NettyWorkerPoolBuilder** with 2 worker threads as shown below:

```
<!-- use the worker pool builder to create to help create the shared thread pool -->
<bean id="poolBuilder" class="org.apache.camel.component.netty.NettyWorkerPoolBuilder">
  <property name="workerCount" value="2"/>
</bean>

<!-- the shared worker thread pool -->
<bean id="sharedPool" class="org.jboss.netty.channel.socket.nio.WorkerPool"
      factory-bean="poolBuilder" factory-method="build" destroy-method="shutdown">
</bean>
```

TIP

For boss thread pool there is a **org.apache.camel.component.netty4.NettyServerBossPoolBuilder** builder for Netty consumers, and a **org.apache.camel.component.netty4.NettyClientBossPoolBuilder** for the Netty produces.

Then in the Camel routes we can refer to this worker pools by configuring the **workerPool** option in the URI as shown below:

```
    <route>
      <from uri="netty4:tcp://localhost:5021?
textline=true&amp;sync=true&amp;workerPool=#sharedPool&amp;usingExecutorService=false"/>
      <to uri="log:result"/>
      ...
    </route>
```

And if we have another route we can refer to the shared worker pool:

```
    <route>
      <from uri="netty4:tcp://localhost:5022?
textline=true&amp;sync=true&amp;workerPool=#sharedPool&amp;usingExecutorService=false"/>
      <to uri="log:result"/>
      ...
    </route>
```

... and so forth.

CHAPTER 104. NETTY HTTP

NETTY HTTP COMPONENT

Available as of Camel 2.12

The **netty-http** component is an extension to Netty component to facilitiate HTTP transport with Netty.

This camel component supports both producer and consumer endpoints.

UPGRADE TO NETTY 4.0 PLANNED

This component is intended to be upgraded to use Netty 4.0 when **camel-netty4** component has finished being upgraded. At the time being this component is still based on Netty 3.x. The upgrade is intended to be as backwards compatible as possible.

STREAM

Netty is stream based, which means the input it receives is submitted to Camel as a stream. That means you will only be able to read the content of the stream **once**. If you find a situation where the message body appears to be empty or you need to access the data multiple times (eg: doing multicasting, or redelivery error handling) you should use Stream Caching or convert the message body to a **String** which is safe to be re-read multiple times.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-netty-http</artifactId>
   <version>x.x.x</version>
   <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a netty component is as follows

```
netty-http:http://localhost:8080[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

QUERY PARAMETERS VS ENDPOINT OPTIONS

You may be wondering how Camel recognizes URI query parameters and endpoint options. For example you might create endpoint URI as follows - **netty-http:http//example.com?myParam=myValue&compression=true** . In this example **myParam** is the HTTP parameter, while **compression** is the Camel endpoint option. The strategy used by Camel in such situations is to resolve available endpoint options and remove them from the URI. It means that for the discussed example, the HTTP request sent by Netty HTTP producer to the endpoint will look as follows - **http//example.com?myParam=myValue** , because **compression** endpoint option will be resolved and removed from the target URL.

Keep also in mind that you cannot specify endpoint options using dynamic headers (like **CamelHttpQuery**). Endpoint options can be specified only at the endpoint URI definition level (like **to** or **from** DSL elements).

HTTP OPTIONS

A LOT MORE OPTIONS

Important: This component inherits all the options from Netty. So make sure to look at the Netty documentation as well. Notice that some options from Netty is not applicable when using this Netty HTTP component, such as options related to UDP transport.

Name	Default Value	Description
chunkedMaxContentLength	**1mb**	Value in bytes the max content length per chunked frame received on the Netty HTTP server.
compression	**false**	Allow using gzip/deflate for compression on the Netty HTTP server if the client supports it from the HTTP headers.
headerFilterStrategy		To use a custom **org.apache.camel.spi.HeaderFilterStrategy** to filter headers.
httpMethodRestrict		To disable HTTP methods on the Netty HTTP consumer. You can specify multiple separated by comma.

mapHeaders	**true**	If this option is enabled, then during binding from Netty to Camel Message then the headers will be mapped as well (eg added as header to the Camel Message as well). You can turn off this option to disable this. The headers can still be accessed from the **org.apache.camel.component.netty.http.NettyHttpMessage** message with the method **getHttpRequest()** that returns the Netty HTTP request **org.jboss.netty.handler.codec.http.HttpRequest** instance.
matchOnUriPrefix	**false**	Whether or not Camel should try to find a target consumer by matching the URI prefix if no exact match is found. See further below for more details.
nettyHttpBinding		To use a custom **org.apache.camel.component.netty.http.NettyHttpBinding** for binding to/from Netty and Camel Message API.
bridgeEndpoint	**false**	If the option is **true**, the producer will ignore the **Exchange.HTTP_URI** header, and use the endpoint's URI for request. You may also set the **throwExceptionOnFailure** to be **false** to let the producer send all the fault response back. The consumer working in the bridge mode will skip the gzip compression and WWW URL form encoding (by adding the **Exchange.SKIP_GZIP_ENCODING** and **Exchange.SKIP_WWW_FORM_URLENCODED** headers to the consumed exchange).
throwExceptionOnFailure	**true**	Option to disable throwing the **HttpOperationFailedException** in case of failed responses from the remote server. This allows you to get all responses regardles of the HTTP status code.

traceEnabled	**false**	Specifies whether to enable HTTP TRACE for this Netty HTTP consumer. By default TRACE is turned off.
transferException	**false**	If enabled and an Exchange failed processing on the consumer side, and if the caused Exception was send back serialized in the response as a **application/x-java-serialized-object** content type. On the producer side the exception will be deserialized and thrown as is, instead of the **HttpOperationFailedException**. The caused exception is required to be serialized.
urlDecodeHeaders	**false**	If this option is enabled, then during binding from Netty to Camel Message then the header values will be URL decoded (eg %20 will be a space character. Notice this option is used by the default **org.apache.camel.component.netty.http.NettyHttpBinding** and therefore if you implement a custom **org.apache.camel.component.netty.http.NettyHttpBinding** then you would need to decode the headers accordingly to this option.
nettySharedHttpServer	**null**	To use a shared Netty HTTP server. See Netty HTTP Server Example for more details.

disableStreamCache	**false**	Determines whether or not the raw input stream from Netty **HttpRequest#getContent()** is cached or not (Camel will read the stream into a in light-weight memory based Stream caching) cache. By default Camel will cache the Netty input stream to support reading it multiple times to ensure it Camel can retrieve all data from the stream. However you can set this option to **true** when you for example need to access the raw stream, such as streaming it directly to a file or other persistent store. Mind that if you enable this option, then you cannot read the Netty stream multiple times out of the box, and you would need manually to reset the reader index on the Netty raw stream.
securityConfiguration	**null**	**Consumer only**. Refers to a **org.apache.camel.component.netty.http.NettyHttpSecurityConfiguration** for configuring secure web resources.
send503whenSuspended	**true**	**Consumer only**. Whether to send back HTTP status code 503 when the consumer has been suspended. If the option is **false** then the Netty Acceptor is unbound when the consumer is suspended, so clients cannot connect anymore.

The **NettyHttpSecurityConfiguration** has the following options:

Name	Default Value	Description
authenticate	**true**	Whether authentication is enabled. Can be used to quickly turn this off.
constraint	**Basic**	The constraint supported. Currently only **Basic** is implemented and supported.

realm	**null**	The name of the JAAS security realm. This option is mandatory.
securityConstraint	**null**	Allows to plugin a security constraint mapper where you can define ACL to web resources.
securityAuthenticator	**null**	Allows to plugin a authenticator that performs the authentication. If none has been configured then the **org.apache.camel.component.netty.http.JAASSecurityAuthenticator** is used by default.
loginDeniedLoggingLevel	**DEBUG**	Logging level used when a login attempt failed, which allows to see more details why the login failed.
roleClassName	**null**	To specify FQN class names of **Principal** implementations that contains user roles. If none has been specified, then the Netty HTTP component will by default assume a **Principal** is role based if its FQN classname has the lower-case word **role** in its classname. You can specify multiple class names separated by comma.

MESSAGE HEADERS

The following headers can be used on the producer to control the HTTP request.

Name	Type	Description
CamelHttpMethod	**String**	Allow to control what HTTP method to use such as GET, POST, TRACE etc. The type can also be a **org.jboss.netty.handler.codec.http.HttpMethod** instance.
CamelHttpQuery	**String**	Allows to provide URI query parameters as a **String** value that overrides the endpoint configuration. Separate multiple parameters using the & sign. For example: **foo=bar&beer=yes**.

CamelHttpPath	**String**	**Camel 2.13.1/2.12.4:** Allows to provide URI context-path and query parameters as a **String** value that overrides the endpoint configuration. This allows to reuse the same producer for calling same remote HTTP server, but using a dynamic context-path and query parameters.
Content-Type	**String**	To set the content-type of the HTTP body. For example: **text/plain; charset="UTF-8"**.
CamelHttpResponseCode	**int**	Allows to set the HTTP Status code to use. By default 200 is used for success, and 500 for failure.

The following headers is provided as meta-data when a route starts from an Netty HTTP endpoint:

The description in the table takes offset in a route having: **from("netty-http:http:0.0.0.0:8080/myapp")...**

Name	Type	Description
CamelHttpMethod	**String**	The HTTP method used, such as GET, POST, TRACE etc.
CamelHttpUrl	**String**	The URL including protocol, host and port, etc: http://0.0.0.0:8080/myapp
CamelHttpUri	**String**	The URI without protocol, host and port, etc: /myapp
CamelHttpQuery	**String**	Any query parameters, such as **foo=bar&beer=yes**
CamelHttpRawQuery	**String**	Camel 2.13.0: Any query parameters, such as **foo=bar&beer=yes**. Stored in the raw form, as they arrived to the consumer (i.e. before URL decoding).

CamelHttpPath	**String**	Additional context-path. This value is empty if the client called the context-path /**myapp**. If the client calls /**myapp**/**mystuff**, then this header value is /**mystuff**. In other words its the value after the context-path configured on the route endpoint.
CamelHttpCharacterEncoding	**String**	The charset from the content-type header.
CamelHttpAuthentication	**String**	If the user was authenticated using HTTP Basic then this header is added with the value **Basic**.
Content-Type	**String**	The content type if provided. For example: **text/plain; charset="UTF-8"**.

ACCESS TO NETTY TYPES

This component uses the **org.apache.camel.component.netty.http.NettyHttpMessage** as the message implementation on the Exchange. This allows end users to get access to the original Netty request/response instances if needed, as shown below. Mind that the original response may not be accessible at all times.

```
org.jboss.netty.handler.codec.http.HttpRequest request =
exchange.getIn(NettyHttpMessage.class).getHttpRequest();
```

EXAMPLES

In the route below we use Netty HTTP as a HTTP server, which returns back a hardcoded "Bye World" message.

```
    from("netty-http:http://0.0.0.0:8080/foo")
      .transform().constant("Bye World");
```

And we can call this HTTP server using Camel also, with the ProducerTemplate as shown below:

```
    String out = template.requestBody("netty-http:http://localhost:8080/foo", "Hello World",
String.class);
    System.out.println(out);
```

And we get back "Bye World" as the output.

HOW DO I LET NETTY MATCH WILDCARDS

By default Netty HTTP will only match on exact uri's. But you can instruct Netty to match prefixes. For example

```
from("netty-http:http://0.0.0.0:8123/foo").to("mock:foo");
```

In the route above Netty HTTP will only match if the uri is an exact match, so it will match if you enter **http://0.0.0.0:8123/foo** but not match if you do **http://0.0.0.0:8123/foo/bar**.

So if you want to enable wildcard matching you do as follows:

```
from("netty-http:http://0.0.0.0:8123/foo?matchOnUriPrefix=true").to("mock:foo");
```

So now Netty matches any endpoints with starts with **foo**.

To match **any** endpoint you can do:

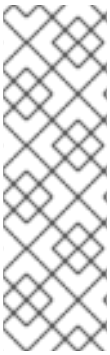
```
from("netty-http:http://0.0.0.0:8123?matchOnUriPrefix=true").to("mock:foo");
```

USING MULTIPLE ROUTES WITH SAME PORT

In the same CamelContext you can have multiple routes from Netty HTTP that shares the same port (eg a **org.jboss.netty.bootstrap.ServerBootstrap** instance). Doing this requires a number of bootstrap options to be identical in the routes, as the routes will share the same **org.jboss.netty.bootstrap.ServerBootstrap** instance. The instance will be configured with the options from the first route created.

The options the routes must be identical configured is all the options defined in the **org.apache.camel.component.netty.NettyServerBootstrapConfiguration** configuration class. If you have configured another route with different options, Camel will throw an exception on startup, indicating the options is not identical. To mitigate this ensure all options is identical.

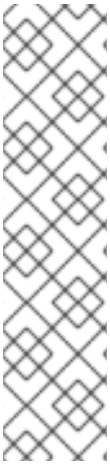
Here is an example with two routes that share the same port.



TWO ROUTES SHARING THE SAME PORT

```
from("netty-http:http://0.0.0.0:{{port}}/foo")
  .to("mock:foo")
  .transform().constant("Bye World");

from("netty-http:http://0.0.0.0:{{port}}/bar")
  .to("mock:bar")
  .transform().constant("Bye Camel");
```

And here is an example of a mis configured 2nd route that do not have identical **org.apache.camel.component.netty.NettyServerBootstrapConfiguration** option as the 1st route. This will cause Camel to fail on startup.



TWO ROUTES SHARING THE SAME PORT, BUT THE 2ND ROUTE IS MISCONFIGURED AND WILL FAIL ON STARTING

```
from("netty-http:http://0.0.0.0:{{port}}/foo")
  .to("mock:foo")
  .transform().constant("Bye World");

// we cannot have a 2nd route on same port with SSL enabled, when the 1st route is
NOT
from("netty-http:http://0.0.0.0:{{port}}/bar?ssl=true")
  .to("mock:bar")
  .transform().constant("Bye Camel");
```

REUSING SAME SERVER BOOTSTRAP CONFIGURATION WITH MULTIPLE ROUTES

By configuring the common server bootstrap option in an single instance of a **org.apache.camel.component.netty.NettyServerBootstrapConfiguration** type, we can use the **bootstrapConfiguration** option on the Netty HTTP consumers to refer and reuse the same options across all consumers.

```
<bean id="nettyHttpBootstrapOptions"
class="org.apache.camel.component.netty.NettyServerBootstrapConfiguration">
  <property name="backlog" value="200"/>
  <property name="connectTimeout" value="20000"/>
  <property name="workerCount" value="16"/>
</bean>
```

And in the routes you refer to this option as shown below

```
<route>
  <from uri="netty-http:http://0.0.0.0:{{port}}/foo?
bootstrapConfiguration=#nettyHttpBootstrapOptions"/>
  ...
</route>

<route>
  <from uri="netty-http:http://0.0.0.0:{{port}}/bar?
bootstrapConfiguration=#nettyHttpBootstrapOptions"/>
  ...
</route>

<route>
  <from uri="netty-http:http://0.0.0.0:{{port}}/beer?
bootstrapConfiguration=#nettyHttpBootstrapOptions"/>
  ...
</route>
```

REUSING SAME SERVER BOOTSTRAP CONFIGURATION WITH MULTIPLE ROUTES ACROSS MULTIPLE BUNDLES IN OSGI CONTAINER

See the Netty HTTP Server Example for more details and example how to do that.

USING HTTP BASIC AUTHENTICATION

The Netty HTTP consumer supports HTTP basic authentication by specifying the security realm name to use, as shown below

```
<route>
  <from uri="netty-http:http://0.0.0.0:{{port}}/foo?securityConfiguration.realm=karaf"/>
  ...
</route>
```

The realm name is mandatory to enable basic authentication. By default the JAAS based authenticator is used, which will use the realm name specified (karaf in the example above) and use the JAAS realm and the JAAS **LoginModule**s of this realm for authentication.

End user of Apache Karaf / ServiceMix has a karaf realm out of the box, and hence why the example above would work out of the box in these containers.

SPECIFYING ACL ON WEB RESOURCES

The **org.apache.camel.component.netty.http.SecurityConstraint** allows to define constrains on web resources. And the **org.apache.camel.component.netty.http.SecurityConstraintMapping** is provided out of the box, allowing to easily define inclusions and exclusions with roles.

For example as shown below in the XML DSL, we define the constraint bean:

```
<bean id="constraint" class="org.apache.camel.component.netty.http.SecurityConstraintMapping">
  <!-- inclusions defines url -> roles restrictions -->
  <!-- a * should be used for any role accepted (or even no roles) -->
  <property name="inclusions">
    <map>
      <entry key="/*" value="*"/>
      <entry key="/admin/*" value="admin"/>
      <entry key="/guest/*" value="admin,guest"/>
    </map>
  </property>
  <!-- exclusions is used to define public urls, which requires no authentication -->
  <property name="exclusions">
    <set>
      <value>/public/*</value>
    </set>
  </property>
</bean>
```

The constraint above is define so that

- access to /* is restricted and any roles is accepted (also if user has no roles)
- access to /admin/* requires the admin role
- access to /guest/* requires the admin or guest role
- access to /public/* is an exclusion which means no authentication is needed, and is therefore public for everyone without logging in

To use this constraint we just need to refer to the bean id as shown below:

```
<route>
  <from uri="netty-http:http://0.0.0.0:{{port}}/foo?
matchOnUriPrefix=true&ecurityConfiguration.realm=karaf&ecurityConfiguration.securityConstraint=#con
straint"/>
  ...
</route>
```

- Netty
- Netty HTTP Server Example
- Jetty

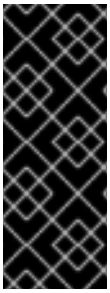
CHAPTER 105. NETTY4-HTTP

NETTY4 HTTP COMPONENT

Available as of Camel 2.14

The **netty4-http** component is an extension to Netty4 component to facilitiate HTTP transport with Netty4.

This camel component supports both producer and consumer endpoints.



STREAM

Netty is stream based, which means the input it receives is submitted to Camel as a stream. That means you will only be able to read the content of the stream **once**. If you find a situation where the message body appears to be empty or you need to access the data multiple times (eg: doing multicasting, or redelivery error handling) you should use Stream caching or convert the message body to a **String** which is safe to be re-read multiple times.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-netty4-http</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a netty component is as follows

```
netty4-http:http://localhost:8080[?options]
```

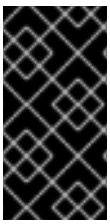
You can append query options to the URI in the following format, **?option=value&option=value&...**

QUERY PARAMETERS VS ENDPOINT OPTIONS

You may be wondering how Camel recognizes URI query parameters and endpoint options. For example you might create endpoint URI as follows - **netty4-http:http//example.com?myParam=myValue&compression=true** . In this example **myParam** is the HTTP parameter, while **compression** is the Camel endpoint option. The strategy used by Camel in such situations is to resolve available endpoint options and remove them from the URI. It means that for the discussed example, the HTTP request sent by Netty HTTP producer to the endpoint will look as follows - **http//example.com?myParam=myValue** , because **compression** endpoint option will be resolved and removed from the target URL.

Keep also in mind that you cannot specify endpoint options using dynamic headers (like **CamelHttpQuery**). Endpoint options can be specified only at the endpoint URI definition level (like **to** or **from** DSL elements).

HTTP OPTIONS



A LOT MORE OPTIONS

Important: This component inherits all the options from Netty4. So make sure to look at the Netty4 documentation as well. Notice that some options from Netty4 are not applicable when using this Netty4 HTTP component, such as options related to UDP transport.

Name	Default Value	Description
chunkedMaxContentLength	**1mb**	Value in bytes the max content length per chunked frame received on the Netty HTTP server.
compression	**false**	Allow using gzip/deflate for compression on the Netty HTTP server if the client supports it from the HTTP headers.
headerFilterStrategy		To use a custom **org.apache.camel.spi.HeaderFilterStrategy** to filter headers.
httpMethodRestrict		To disable HTTP methods on the Netty HTTP consumer. You can specify multiple separated by comma.
mapHeaders	**true**	If this option is enabled, then during binding from Netty to Camel Message then the headers will be mapped as well (eg added as header to the Camel Message as well). You can turn off this option to disable this. The headers can still be accessed from the **org.apache.camel.component.netty4.http.NettyHttpMessage** message with the method **getHttpRequest()** that returns the Netty HTTP request **io.netty.handler.codec.http.HttpRequest** instance.
matchOnUriPrefix	**false**	Whether or not Camel should try to find a target consumer by matching the URI prefix if no exact match is found. See further below for more details.

nettyHttpBinding		To use a custom **org.apache.camel.component.netty4.http.NettyHttpBinding** for binding to/from Netty and Camel Message API.
bridgeEndpoint	**false**	If the option is **true**, the producer will ignore the **Exchange.HTTP_URI** header, and use the endpoint's URI for request. You may also set the **throwExceptionOnFailure** to be **false** to let the producer send all the fault response back.
throwExceptionOnFailure	**true**	Option to disable throwing the **HttpOperationFailedException** in case of failed responses from the remote server. This allows you to get all responses regardles of the HTTP status code.
traceEnabled	**false**	Specifies whether to enable HTTP TRACE for this Netty HTTP consumer. By default TRACE is turned off.
transferException	**false**	If enabled and an Exchange failed processing on the consumer side, and if the caused Exception was send back serialized in the response as a **application/x-java-serialized-object** content type. On the producer side the exception will be deserialized and thrown as is, instead of the **HttpOperationFailedException**. The caused exception is required to be serialized.
urlDecodeHeaders		If this option is enabled, then during binding from Netty to Camel Message then the header values will be URL decoded (eg %20 will be a space character. Notice this option is used by the default **org.apache.camel.component.netty4.http.NettyHttpBinding** and therefore if you implement a custom **org.apache.camel.component.netty4.http.NettyHttpBinding** then you would need to decode the headers accordingly to this option. *Notice:* This option is default **false**.
nettySharedHttpServer	**null**	To use a shared Netty4 HTTP server. See Netty HTTP Server Example for more details.

disableStreamCache	**false**	Determines whether or not the raw input stream from Netty **HttpRequest#getContent()** is cached or not (Camel will read the stream into a in light-weight memory based Stream caching) cache. By default Camel will cache the Netty input stream to support reading it multiple times to ensure it Camel can retrieve all data from the stream. However you can set this option to **true** when you for example need to access the raw stream, such as streaming it directly to a file or other persistent store. Mind that if you enable this option, then you cannot read the Netty stream multiple times out of the box, and you would need manually to reset the reader index on the Netty raw stream.
securityConfiguration	**null**	*Consumer only*. Refers to a **org.apache.camel.component.netty4.http.NettyHttpSecurityConfiguration** for configuring secure web resources.
send503whenSuspended	**true**	*Consumer only*. Whether to send back HTTP status code 503 when the consumer has been suspended. If the option is **false** then the Netty Acceptor is unbound when the consumer is suspended, so clients cannot connect anymore.

The **NettyHttpSecurityConfiguration** has the following options:

Name	Default Value	Description
authenticate	**true**	Whether authentication is enabled. Can be used to quickly turn this off.
constraint	**Basic**	The constraint supported. Currently only **Basic** is implemented and supported.
realm	**null**	The name of the JAAS security realm. This option is mandatory.
securityConstraint	**null**	Allows to plugin a security constraint mapper where you can define ACL to web resources.

securityAuthenticator	**null**	Allows to plugin a authenticator that performs the authentication. If none has been configured then the **org.apache.camel.component.netty4.http.JAASSecurityAuthenticator** is used by default.
loginDeniedLoggingLevel	**DEBUG**	Logging level used when a login attempt failed, which allows to see more details why the login failed.
roleClassName	**null**	To specify FQN class names of **Principal** implementations that contains user roles. If none has been specified, then the Netty4 HTTP component will by default assume a **Principal** is role based if its FQN classname has the lower-case word **role** in its classname. You can specify multiple class names separated by comma.

MESSAGE HEADERS

The following headers can be used on the producer to control the HTTP request.

Name	Type	Description
CamelHttpMethod	**String**	Allow to control what HTTP method to use such as GET, POST, TRACE etc. The type can also be a **io.netty.handler.codec.http.HttpMethod** instance.
CamelHttpQuery	**String**	Allows to provide URI query parameters as a **String** value that overrides the endpoint configuration. Separate multiple parameters using the & sign. For example: **foo=bar&beer=yes**.
CamelHttpPath	**String**	Allows to provide URI context-path and query parameters as a **String** value that overrides the endpoint configuration. This allows to reuse the same producer for calling same remote http server, but using a dynamic context-path and query parameters.

Content-Type	**String**	To set the content-type of the HTTP body. For example: **text/plain; charset="UTF-8"**.
CamelHttpResponseCode	**int**	Allows to set the HTTP Status code to use. By default 200 is used for success, and 500 for failure.

The following headers is provided as meta-data when a route starts from an Netty4 HTTP endpoint:

The description in the table takes offset in a route having: **from("netty4-http:http:0.0.0.0:8080/myapp")...**

Name	Type	Description
CamelHttpMethod	**String**	The HTTP method used, such as GET, POST, TRACE etc.
CamelHttpUrl	**String**	The URL including protocol, host and port, etc: `http://0.0.0.0:8080/myapp`
CamelHttpUri	**String**	The URI without protocol, host and port, etc: `/myapp`
CamelHttpQuery	**String**	Any query parameters, such as **foo=bar&beer=yes**
CamelHttpRawQuery	**String**	Any query parameters, such as **foo=bar&beer=yes**. Stored in the raw form, as they arrived to the consumer (i.e. before URL decoding).
CamelHttpPath	**String**	Additional context-path. This value is empty if the client called the context-path /**myapp**. If the client calls /**myapp**/**mystuff**, then this header value is /**mystuff**. In other words its the value after the context-path configured on the route endpoint.
CamelHttpCharacterEncoding	**String**	The charset from the content-type header.

CamelHttpAuthentication	**String**	If the user was authenticated using HTTP Basic then this header is added with the value **Basic**.
Content-Type	**String**	The content type if provided. For example: **text/plain; charset="UTF-8"**.

ACCESS TO NETTY TYPES

This component uses the **org.apache.camel.component.netty4.http.NettyHttpMessage** as the message implementation on the Exchange. This allows end users to get access to the original Netty request/response instances if needed, as shown below. Mind that the original response may not be accessible at all times.

```
io.netty.handler.codec.http.HttpRequest request =
exchange.getIn(NettyHttpMessage.class).getHttpRequest();
```

EXAMPLES

In the route below we use Netty4 HTTP as a HTTP server, which returns back a hardcoded "Bye World" message.

```
    from("netty4-http:http://0.0.0.0:8080/foo")
      .transform().constant("Bye World");
```

And we can call this HTTP server using Camel also, with the ProducerTemplate as shown below:

```
    String out = template.requestBody("netty4-http:http://localhost:8080/foo", "Hello World",
String.class);
    System.out.println(out);
```

And we get back "Bye World" as the output.

HOW DO I LET NETTY MATCH WILDCARDS

By default Netty4 HTTP will only match on exact uri's. But you can instruct Netty to match prefixes. For example

```
from("netty4-http:http://0.0.0.0:8123/foo").to("mock:foo");
```

In the route above Netty4 HTTP will only match if the uri is an exact match, so it will match if you enter **http://0.0.0.0:8123/foo** but not match if you do **http://0.0.0.0:8123/foo/bar**.

So if you want to enable wildcard matching you do as follows:

```
from("netty4-http:http://0.0.0.0:8123/foo?matchOnUriPrefix=true").to("mock:foo");
```

So now Netty matches any endpoints with starts with **foo**.

To match **any** endpoint you can do:

```
from("netty4-http:http://0.0.0.0:8123?matchOnUriPrefix=true").to("mock:foo");
```

USING MULTIPLE ROUTES WITH SAME PORT

In the same CamelContext you can have multiple routes from Netty4 HTTP that shares the same port (eg a **io.netty.bootstrap.ServerBootstrap** instance). Doing this requires a number of bootstrap options to be identical in the routes, as the routes will share the same **io.netty.bootstrap.ServerBootstrap** instance. The instance will be configured with the options from the first route created.

The options the routes must be identical configured is all the options defined in the **org.apache.camel.component.netty4.NettyServerBootstrapConfiguration** configuration class. If you have configured another route with different options, Camel will throw an exception on startup, indicating the options is not identical. To mitigate this ensure all options is identical.

Here is an example with two routes that share the same port.

Example 105.1. Two routes sharing the same port

```
from("netty4-http:http://0.0.0.0:{{port}}/foo")
  .to("mock:foo")
  .transform().constant("Bye World");

from("netty4-http:http://0.0.0.0:{{port}}/bar")
  .to("mock:bar")
  .transform().constant("Bye Camel");
```

And here is an example of a mis configured 2nd route that do not have identical **org.apache.camel.component.netty4.NettyServerBootstrapConfiguration** option as the 1st route. This will cause Camel to fail on startup.

Example 105.2. Two routes sharing the same port, but the 2nd route is misconfigured and will fail on starting

```
from("netty4-http:http://0.0.0.0:{{port}}/foo")
  .to("mock:foo")
  .transform().constant("Bye World");

// we cannot have a 2nd route on same port with SSL enabled, when the 1st route is NOT
from("netty4-http:http://0.0.0.0:{{port}}/bar?ssl=true")
  .to("mock:bar")
  .transform().constant("Bye Camel");
```

REUSING SAME SERVER BOOTSTRAP CONFIGURATION WITH MULTIPLE ROUTES

By configuring the common server bootstrap option in an single instance of a **org.apache.camel.component.netty4.NettyServerBootstrapConfiguration** type, we can use the **bootstrapConfiguration** option on the Netty4 HTTP consumers to refer and reuse the same options

across all consumers.

```
<bean id="nettyHttpBootstrapOptions"
class="org.apache.camel.component.netty4.NettyServerBootstrapConfiguration">
  <property name="backlog" value="200"/>
  <property name="connectionTimeout" value="20000"/>
  <property name="workerCount" value="16"/>
</bean>
```

And in the routes you refer to this option as shown below

```
<route>
  <from uri="netty4-http:http://0.0.0.0:{{port}}/foo?
bootstrapConfiguration=#nettyHttpBootstrapOptions"/>
  ...
</route>

<route>
  <from uri="netty4-http:http://0.0.0.0:{{port}}/bar?
bootstrapConfiguration=#nettyHttpBootstrapOptions"/>
  ...
</route>

<route>
  <from uri="netty4-http:http://0.0.0.0:{{port}}/beer?
bootstrapConfiguration=#nettyHttpBootstrapOptions"/>
  ...
</route>
```

REUSING SAME SERVER BOOTSTRAP CONFIGURATION WITH MULTIPLE ROUTES ACROSS MULTIPLE BUNDLES IN OSGI CONTAINER

See the Netty HTTP Server Example for more details and example how to do that.

USING HTTP BASIC AUTHENTICATION

The Netty HTTP consumer supports HTTP basic authentication by specifying the security realm name to use, as shown below

```
<route>
  <from uri="netty4-http:http://0.0.0.0:{{port}}/foo?securityConfiguration.realm=karaf"/>
  ...
</route>
```

The realm name is mandatory to enable basic authentication. By default the JAAS based authenticator is used, which will use the realm name specified (karaf in the example above) and use the JAAS realm and the JAAS {{LoginModule}}s of this realm for authentication.

End user of Apache Karaf / ServiceMix has a karaf realm out of the box, and hence why the example above would work out of the box in these containers.

SPECIFYING ACL ON WEB RESOURCES

The **org.apache.camel.component.netty4.http.SecurityConstraint** allows to define constrains on web resources. And the **org.apache.camel.component.netty.http.SecurityConstraintMapping** is provided out of the box, allowing to easily define inclusions and exclusions with roles.

For example as shown below in the XML DSL, we define the constraint bean:

```
<bean id="constraint" class="org.apache.camel.component.netty4.http.SecurityConstraintMapping">
  <!-- inclusions defines url -> roles restrictions -->
  <!-- a * should be used for any role accepted (or even no roles) -->
  <property name="inclusions">
    <map>
      <entry key="/*" value="*"/>
      <entry key="/admin/*" value="admin"/>
      <entry key="/guest/*" value="admin,guest"/>
    </map>
  </property>
  <!-- exclusions is used to define public urls, which requires no authentication -->
  <property name="exclusions">
    <set>
      <value>/public/*</value>
    </set>
  </property>
</bean>
```

The constraint above is define so that

- access to /* is restricted and any roles is accepted (also if user has no roles)
- access to /admin/* requires the admin role
- access to /guest/* requires the admin or guest role
- access to /public/* is an exclusion which means no authentication is needed, and is therefore public for everyone without logging in

To use this constraint we just need to refer to the bean id as shown below:

```
<route>
  <from uri="netty4-http:http://0.0.0.0:{{port}}/foo?
matchOnUriPrefix=true&amp;securityConfiguration.realm=karaf&amp;securityConfiguration.securityCon
straint=#constraint"/>
  ...
</route>
```

CHAPTER 106. OLINGO2

OLINGO2 COMPONENT

Available as of Camel 2.14

The Olingo2 component utilizes Apache Olingo version 2.0 APIs to interact with OData 2.0 and 3.0 compliant services. A number of popular commercial and enterprise vendors and products support the OData protocol. A sample list of supporting products can be found on the OData website.

The Olingo2 component supports reading feeds, delta feeds, entities, simple and complex properties, links, counts, using custom and OData system query parameters. It supports updating entities, properties, and association links. It also supports submitting queries and change requests as a single OData batch operation.

The component supports configuring HTTP connection parameters and headers for OData service connection. This allows configuring use of SSL, OAuth2.0, etc. as required by the target OData service.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-olingo2</artifactId>
    <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
olingo2://endpoint/<resource-path>?[options]
```

OLINGO2COMPONENT

The Olingo2 Component can be configured with the options below. These options can be provided using the component's bean property **configuration** of type **org.apache.camel.component.olingo2.Olingo2Configuration**.

Option	Type	Description
serviceUri	String	Target OData service base URI, e.g. http://services.odata.org/OData/OData.svc
contentType	String	Content-Type header value can be used to specify JSON or XML message format, defaults to **application/json;charset=utf-8**
connectTimeout	int	HTTP connection creation timeout in milliseconds, defaults to 30,000 (30 seconds)

Option	Type	Description
socketTimeout	int	HTTP request timeout in milliseconds, defaults to 30,000 (30 seconds)
httpHeaders	java.util.Map<String, String>	Custom HTTP headers to inject into every request, this could include OAuth tokens, etc.
proxy	org.apache.http.HttpHost	HTTP proxy server configuration
sslContext	javax.net.ssl.SSLContext	HTTP SSL configuration
httpAsyncClientBuilder	org.apache.http.impl.nio.client.HttpAsyncClientBuilder	Custom HTTP async client builder for more complex HTTP client configuration, overrides connectionTimeout, socketTimeout, proxy and sslContext. Note that a socketTimeout **MUST** be specified in the builder, otherwise OData requests could block indefinitely

PRODUCER ENDPOINTS

Producer endpoints can use endpoint names and options listed next. Producer endpoints can also use a special option **inBody** that in turn should contain the name of the endpoint option whose value will be contained in the Camel Exchange In message. The **inBody** option defaults to **data** for endpoints that take that option.

Any of the endpoint options can be provided in either the endpoint URI, or dynamically in a message header. The message header name must be of the format **CamelOlingo2.<option>**. Note that the **inBody** option overrides message header, i.e. the endpoint option **inBody=option** would override a **CamelOlingo2.option** header. In addition, query parameters can be specified

Note that the resourcePath option can either in specified in the URI as a part of the URI path, as an endpoint option ?resourcePath=<resource-path> or as a header value CamelOlingo2.resourcePath. The OData entity key predicate can either be a part of the resource path, e.g. Manufacturers('1'), where '1' is the key predicate, or be specified separately with resource path Manufacturers and keyPredicate option '1'.

Endpoint	Options	HTTP Method	Result Body Type
batch	data	**POST with multipart/mixed batch request**	**java.util.List<org.apache.camel.component.olingo2.api.batch.Olingo2BatchResponse>**

Endpoint	Options	HTTP Method	Result Body Type
create	data, resourcePath	**POST**	**org.apache.olingo.odata2.api.ep.entry.ODataEntry for new entries org.apache.olingo.odata2.api.commons.HttpStatusCodes for other OData resources**
delete	resourcePath	**DELETE**	**org.apache.olingo.odata2.api.commons.HttpStatusCodes**
merge	data, resourcePath	**MERGE**	**org.apache.olingo.odata2.api.commons.HttpStatusCodes**
patch	data, resourcePath	**PATCH**	**org.apache.olingo.odata2.api.commons.HttpStatusCodes**
read	queryParams, resourcePath	**GET**	**Depends on OData resource being queried as described next**
update	data, resourcePath	**PUT**	**org.apache.olingo.odata2.api.commons.HttpStatusCodes**

ODATA RESOURCE TYPE MAPPING

The result of **read** endpoint and data type of **data** option depends on the OData resource being queried, created or modified.

OData Resource Type	Resource URI from resourcePath and keyPredicate	In or Out Body Type
Entity data model	$metadata	**org.apache.olingo.odata2.api.edm.Edm**
Service document	/	**org.apache.olingo.odata2.api.servicedocument.ServiceDocument**

OData Resource Type	Resource URI from resourcePath and keyPredicate	In or Out Body Type
OData feed	<entity-set>	**org.apache.olingo.odata2.api.ep.feed.ODataFeed**
OData entry	<entity-set>(<key-predicate>)	**org.apache.olingo.odata2.api.ep.entry.ODataEntry** for *Out* body (response), **java.util.Map<String, Object>**, for *In* body (request).
Simple property	<entity-set>(<key-predicate>)/<simple-property>	**Appropriate Java data type as described by <link xl:href="http://olingo.apache.org/javadoc/odata2/index.html?org/apache/olingo/odata2/api/edm/class-use/EdmProperty.html" >Olingo EdmProperty</link>**
Simple property value	<entity-set>(<key-predicate>)/<simple-property>/$value	**Appropriate Java data type as described by <link xl:href="http://olingo.apache.org/javadoc/odata2/index.html?org/apache/olingo/odata2/api/edm/class-use/EdmProperty.html" >Olingo EdmProperty</link>**
Complex property	<entity-set>(<key-predicate>)/<complex-property>	**java.util.Map<String, Object>**
Zero or one association link	<entity-set>(<key-predicate>/$link/<one-to-one-entity-set-property>	**String for response java.util.Map<String, Object> with key property names and values for request**
Zero or many association links	<entity-set>(<key-predicate>/$link/<one-to-many-entity-set-property>	**java.util.List<String> for response java.util.List<java.util.Map<String, Object>> containing list of key property names and values for request**
Count	<resource-uri>/$count	**java.lang.Long**

OData Resource Type	Resource URI from resourcePath and keyPredicate	In or Out Body Type

URI OPTIONS

If a value is not provided for **queryParams** either in the endpoint URI or in a message header, it will be assumed to be **null**. Note that the **null** value will only be used if other options do not satisfy matching endpoints.

Name	Type	Description
data	**Object**	Data with appropriate type used to create or modify the OData resource
keyPredicate	**String**	Key predicate to create a parameterized OData resource endpoint. Useful for create/update operations where the key predicate value is dynamically provided in a header
queryParams	**java.util.Map<String, String>**	OData system options and custom query options. For more information see OData 2.0 URI Conventions
resourcePath	**String**	OData resource path, may or may not contain key predicate
*	**String**	Any other URI option is treated as a query parameter and added to query parameter map, overwriting entries in a **queryParams** option, if also specified

CONSUMER ENDPOINTS

Only the **read** endpoint can be used as a consumer endpoint. Consumer endpoints can use Scheduled Poll Consumer Options with a **consumer.** prefix to schedule endpoint invocation. By default consumer endpoints that return an array or collection will generate one exchange per element, and their routes will be executed once for each exchange. This behavior can be disabled by setting the endpoint property **consumer.splitResult=false**.

MESSAGE HEADERS

Any URI option can be provided in a message header for producer endpoints with a **CamelOlingo2.** prefix.

MESSAGE BODY

All result message bodies utilize objects provided by the underlying Apache Olingo 2.0 API used by the Olingo2Component. Producer endpoints can specify the option name for incoming message body in the **inBody** endpoint URI parameter. For endpoints that return an array or collection, a consumer endpoint will map every element to distinct messages, unless **consumer.splitResult** is set to **false**.

USE CASES

The following route reads top 5 entries from the Manufacturer feed ordered by ascending Name property.

```
from("direct:...")
    .setHeader("CamelOlingo2.$top","5")
    .to("olingo2://read/Manufacturers?orderBy=Name%20asc");
```

The following route reads Manufacturer entry using the key property value in incoming **id** header.

```
from("direct:...")
    .setHeader("CamelOlingo2.keyPredicate", header("id"))
    .to("olingo2://read/Manufacturers");
```

The following route creates Manufacturer entry using the **java.util.Map<String, Object>** in body message.

```
from("direct:...")
    .to("olingo2://create/Manufacturers");
```

The following route polls Manufacturer delta feed every 30 seconds. The bean **blah** updates the bean **paramsBean** to add an updated **!deltatoken** property with the value returned in the **ODataDeltaFeed** result. Since the initial delta token is not known, the consumer endpoint will produce an **ODataFeed** value the first time, and **ODataDeltaFeed** on subsequent polls.

```
from("olingo2://read/Manufacturers?
queryParams=#paramsBean&consumer.timeUnit=SECONDS&consumer.delay=30")
    .to("bean:blah");
```

CHAPTER 107. OPENSHIFT

OPENSHIFT COMPONENT

Available as of Camel 2.14

The **openshift** component is a component for managing your OpenShift applications.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-openshift</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
openshift:clientId[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
domain	**null**	Domain name. If not specified then the default domain is used.
username		*Mandatory*: The username to login to openshift server.
password		*Mandatory:* The password for login to openshift server.
server		Url to the openshift server. If not specified then the default value from the local openshift configuration file **~/.openshift/express.conf** is used. And if that fails as well then "openshift.redhat.com" is used.
delay	**10s**	*Consumer only:* How frequent to poll for state changes for the applications. By default we poll every 10 seconds.

operation	**list**	*Producer only*: The operation to perform which can be: **list**, **start**, **stop**, **restart**, and **state**. The **list** operation returns information about all the applications in json format. The **state** operation returns the state such as: started, stopped etc. The other operations does not return any value.
application		*Producer only*: The application name to **start**, **stop**, **restart**, or get the **state**.
mode		*Producer only*: Whether to output the message body as a pojo or json. For pojo the message is a **List<com.openshift.client.IApplication>** type.

EXAMPLES

LISTING ALL APPLICATIONS

```
// sending route
from("direct:apps")
    .to("openshift:myClient?username=foo&password=secret&operation=list");
    .to("log:apps");
```

In this case the information about all the applications is returned as pojo. If you want a json response, then set mode=json.

STOPPING AN APPLICATION

```
// stopping the foobar application
from("direct:control")
    .to("openshift:myClient?username=foo&password=secret&operation=stop&application=foobar");
```

In the example above we stop the application named foobar.

Polling for gear state changes

The consumer is used for polling state changes in gears. Such as when a new gear is added/removed/ or its lifecycle is changed, eg started, or stopped etc.

```
// trigger when state changes on our gears
from("openshift:myClient?username=foo&password=secret&delay=30s")
    .log("Event ${header.CamelOpenShiftEventType} on application ${body.name} changed state to
${header.CamelOpenShiftEventNewState}");
```

When the consumer emits an Exchange then the body contains the **com.openshift.client.IApplication** as the message body. And the following headers is included.

Header	May be null	Description
CamelOpenShiftEventType	No	The type of the event which can be one of: added, removed or changed.
CamelOpenShiftEventOldState	Yes	The old state, when the event type is changed.
CamelOpenShiftEventNewState	No	The new state, for any of the event types

CHAPTER 108. PAX-LOGGING

PAXLOGGING COMPONENT

Available in Camel 2.6

The **paxlogging** component can be used in an OSGi environment to receive PaxLogging events and process them.

DEPENDENCIES

Maven users need to add the following dependency to their **pom.xml**

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-paxlogging</artifactId>
  <version>${camel-version}</version>
</dependency>
```

where **$\{camel-version\}** must be replaced by the actual version of Camel (2.6.0 or higher).

URI FORMAT

```
paxlogging:appender
```

where **appender** is the name of the pax appender that need to be configured in the PaxLogging service configuration.

URI OPTIONS

Name	Default value	Description

MESSAGE HEADERS

Name	Type	Message	Description

MESSAGE BODY

The **in** message body will be set to the received PaxLoggingEvent.

EXAMPLE USAGE

```
<route>
    <from uri="paxlogging:camel"/>
    <to uri="stream:out"/>
```

```
</route>
```

Configuration:

```
log4j.rootLogger=INFO, out, osgi:VmLogAppender, osgi:camel
```

CHAPTER 109. PGEVENT

PGEVENT COMPONENT

This is a component for Apache Camel which allows for Producing/Consuming PostgreSQL events related to the LISTEN/NOTIFY commands added since PostgreSQL 8.3.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-pgevent</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The pgevent component uses the following two styles of endpoint URI notation:

```
pgevent:datasource[?parameters]
pgevent://host:port/database/channel[?parameters]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Type	Default	Description
datasource	String		Name of datasource to lookup from the registry to use
hostname	String	localhost	Instead of using datasource, then connect to the PostgresSQL database using this hostname and port
port	int	5432	Instead of using datasource, then connect to the PostgresSQL database using this hostname and port
database	String		The database name
channel	String		The channel name

user	String	postgres	Username
pass	String		Password

CHAPTER 110. PRINTER

PRINTER COMPONENT

Available as of Apache Camel 2.1

The **printer** component provides a way to direct payloads on a route to a printer. Obviously the payload has to be a formatted piece of payload in order for the component to appropriately print it. The objective is to be able to direct specific payloads as jobs to a line printer in a Apache Camel flow.

This component only supports a producer endpoint.

The functionality allows for the payload to be printed on a default printer, named local, remote or wirelessly linked printer using the javax printing API under the covers.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-printer</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

Since the URI scheme for a printer has not been standardized (the nearest thing to a standard being the IETF print standard) and therefore not uniformly applied by vendors, we have chosen **"lpr"** as the scheme.

```
lpr://localhost/default[?options]
lpr://remotehost:port/path/to/printer[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
mediaSize	**NA_LETTER**	Sets the stationary as defined by enumeration names in the javax.print.attribute.standard.MediaSizeName API API. The default setting is to use North American Letter sized stationary. The value's case is ignored, e.g. values of **iso_a4** and **ISO_A4** may be used.

copies	**1**	Sets number of copies based on the **javax.print.attribute.standard.Copies** API
sides	**Sides.ONE_SIDED**	Sets one sided or two sided printing based on the **javax.print.attribute.standard.Sides** API
flavor	**DocFlavor.BYTE_ARRAY**	Sets **DocFlavor** based on the **javax.print.DocFlavor** API
mimeType	**AUTOSENSE**	Sets **mimeTypes** supported by the **javax.print.DocFlavor** API
mediaTray	**AUTOSENSE**	Since **Camel 2.11.x** sets MediaTray supported by the javax.print.DocFlavor API
printerPrefix	**null**	Since **Camel 2.11.x** sets the prefix name of the printer, it is useful when the printer name is not start with //hostname/printer
sendToPrinter	**true**	Setting this option to **false** prevents sending of the print data to the printer
orientation	**portrait**	Since Camel 2.13.x Sets the page orientation. Possible values: **portrait**, **landscape**, **reverse-portrait** or **reverse-landscape**, based on **javax.print.attribute.standard.OrientationRequested**

PRINTER PRODUCER

Sending data to the printer is very straightforward and involves creating a producer endpoint that can be sent message exchanges on in route.

EXAMPLE 1: PRINTING TEXT BASED PAYLOADS ON A DEFAULT PRINTER USING LETTER STATIONARY AND ONE-SIDED MODE

```
RouteBuilder builder = new RouteBuilder() {
    public void configure() {
      from(file://inputdir/?delete=true)
      .to("lpr://localhost/default?copies=2" +
```

```
        "&flavor=DocFlavor.INPUT_STREAM&" +
        "&mimeType=AUTOSENSE" +
        "&mediaSize=NA_LETTER" +
        "&sides=one-sided")
  }};
```

EXAMPLE 2: PRINTING GIF BASED PAYLOADS ON A REMOTE PRINTER USING A4 STATIONARY AND ONE-SIDED MODE

```
RouteBuilder builder = new RouteBuilder() {
   public void configure() {
      from(file://inputdir/?delete=true)
      .to("lpr://remotehost/sales/salesprinter" +
         "?copies=2&sides=one-sided" +
         "&mimeType=GIF&mediaSize=ISO_A4" +
         "&flavor=DocFlavor.INPUT_STREAM")
  }};
```

EXAMPLE 3: PRINTING JPEG BASED PAYLOADS ON A REMOTE PRINTER USING JAPANESE POSTCARD STATIONARY AND ONE-SIDED MODE

```
RouteBuilder builder = new RouteBuilder() {
   public void configure() {
      from(file://inputdir/?delete=true)
      .to("lpr://remotehost/sales/salesprinter" +
         "?copies=2&sides=one-sided" +
         "&mimeType=JPEG" +
         "&mediaSize=JAPANESE_POSTCARD" +
         "&flavor=DocFlavor.INPUT_STREAM")
   }};
```

CHAPTER 111. PROPERTIES

PROPERTIES COMPONENT

Available as of Apache Camel 2.3

URI FORMAT

```
properties:key[?options]
```

Where **key** is the key for the property to lookup

OPTIONS

Name	Type	Default	Description
cache	**boolean**	**true**	Whether or not to cache loaded properties.
locations	**String**	**null**	A list of locations to load properties. You can use comma to separate multiple locations. This option will override any default locations and **only** use the locations from this option.
encoding	**String**	**null**	**Camel 2.14.3/2.15.1:** To use a specific charset to load the properties, such as UTF-8. By default ISO-8859-1 (latin1) is used.
ignoreMissingLocation	**boolean**	**false**	**Camel 2.10:** Whether to silently ignore if a location cannot be located, such as a properties file not found.
propertyPrefix	**String**	**null**	**Camel 2.9:** Optional prefix prepended to property names before resolution.
propertySuffix	**String**	**null**	**Camel 2.9:** Optional suffix appended to property names before resolution.

fallbackToUnaugmentedProperty	**boolean**	**true**	**Camel 2.9:** If **true**, first attempt resolution of property name augmented with **propertyPrefix** and **propertySuffix** before falling back the plain property name specified. If **false**, only the augmented property name is searched.
prefixToken	**String**	{{	**Camel 2.9:** The token to indicate the beginning of a property token.
suffixToken	**String**	}}	**Camel 2.9:** The token to indicate the end of a property token.

RESOLVING PROPERTY FROM JAVA CODE

You can use the method **resolvePropertyPlaceholders** on the **CamelContext** to resolve a property from any Java code.

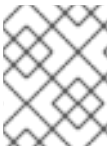
SEE ALSO

- section "Property Placeholders" in "Apache Camel Development Guide"
- Jasypt for using encrypted values (for example, passwords) in the properties

CHAPTER 112. QUARTZ

QUARTZ COMPONENT

The **quartz:** component provides a scheduled delivery of messages using the Quartz Scheduler 1.x. Each endpoint represents a different timer (in Quartz terms, a Trigger and JobDetail).



NOTE

If you are using Quartz 2.x then from Camel 2.12 onwards there is a Quartz2 component you should use

URI FORMAT

```
quartz://timerName?options
quartz://groupName/timerName?options
quartz://groupName/timerName?cron=expression
quartz://timerName?cron=expression
```

The component uses either a **CronTrigger** or a **SimpleTrigger**. If no cron expression is provided, the component uses a simple trigger. If no **groupName** is provided, the quartz component uses the **Camel** group name.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

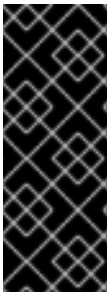
Parameter	Default	Description
cron	*None*	Specifies a **cron** expression (not compatible with the **trigger.*** or **job.*** options).
trigger.repeatCount	**0**	SimpleTrigger: How many times should the timer repeat?
trigger.repeatInterval	**0**	SimpleTrigger: The amount of time in milliseconds between repeated triggers.
job.name	**null**	Sets the job name.
job.*XXX*	**null**	Sets the job option with the ***XXX*** setter name.
trigger.*XXX*	**null**	Sets the trigger option with the ***XXX*** setter name.

stateful	**false**	Uses a Quartz **StatefulJob** instead of the default job.
fireNow	**false**	**Camel 2.2.0:** If **true**, fire the trigger when the route is started when using **SimpleTrigger**.
deleteJob	**true**	**Camel 2.12:** If **true**, the trigger automatically delete when route stops. If **false**, it remains in scheduler and the user may reuse pre-configured trigger with Camel URI. Just ensure the names match. Notice you cannot set both **deleteJob** and to **true**.
pauseJob	**false**	**Camel 2.12:** If **true**, the trigger automatically pauses when route stops. If **false**, it remains in scheduler and the user may reuse pre-configured trigger with Camel URI. Just ensure the names match. Note you cannot set both **deleteJob** and **pauseJob** to **true**.
usingFixedCamelContextName	**false**	**Camel 2.15.0:** If **true**, **JobDataMap** uses the **CamelContext** name directly to reference the camel context; if **false**, **JobDataMap** uses use the **CamelContext** management name which could be changed during the deploy time.

For example, the following routing rule will fire two timer events to the **mock:results** endpoint:

```
from("quartz://myGroup/myTimerName?
trigger.repeatInterval=2&trigger.repeatCount=1").routeId("myRoute").to("mock:result");
```

When using a StatefulJob, the JobDataMap is re-persisted after every execution of the job, thus preserving state for the next execution.



RUNNING IN OSGI AND HAVING MULTIPLE BUNDLES WITH QUARTZ ROUTES

If you run in OSGi such as Apache ServiceMix, or Apache Karaf, and have multiple bundles with Camel routes that start from Quartz endpoints, then make sure if you assign an **id** to the <camelContext> that this id is unique, as this is required by the **QuartzScheduler** in the OSGi container. If you do not set any **id** on <camelContext> then a unique id is auto assigned, and there is no problem.

CONFIGURING QUARTZ.PROPERTIES FILE

By default Quartz will look for a **quartz.properties** file in the **org/quartz** directory of the classpath. If you are using WAR deployments this means just drop the quartz.properties in **WEB-INF/classes/org/quartz**.

However the Camel Quartz component also allows you to configure properties:

Parameter	Default	Type	Description
properties	**null**	**Properties**	**Camel 2.4**: You can configure a **java.util.Propopertie s** instance.
propertiesFile	**null**	**String**	**Camel 2.4**: File name of the properties to load from the classpath

To do this you can configure this in Spring XML as follows

```
<bean id="quartz" class="org.apache.camel.component.quartz.QuartzComponent">
    <property name="propertiesFile" value="com/mycompany/myquartz.properties"/>
</bean>
```

ENABLING QUARTZ SCHEDULER IN JMX

You need to configure the quartz scheduler properties to enable JMX. That is typically setting the option **org.quartz.scheduler.jmx.export** to a **true** value in the configuration file.

From Camel 2.13 onwards Camel will automatic set this option to **true**, unless explicit disabled.

STARTING THE QUARTZ SCHEDULER

Available as of Camel 2.4

The Quartz component offers an option to let the Quartz scheduler be started delayed, or not auto started at all.

Parameter	Default	Type	Description
startDelayedSecond s	**0**	**int**	**Camel 2.4**: Seconds to wait before starting the quartz scheduler.
autoStartScheduler	**true**	**boolean**	**Camel 2.4:** Whether or not the scheduler should be auto started.

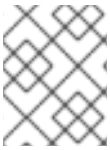
To do this you can configure this in Spring XML as follows

```
<bean id="quartz" class="org.apache.camel.component.quartz.QuartzComponent">
    <property name="startDelayedSeconds" value="5"/>
</bean>
```

CLUSTERING

Available as of Camel 2.4

If you use Quartz in clustered mode, e.g. the **JobStore** is clustered. Then from Camel 2.4 onwards the Quartz component will **not** pause/remove triggers when a node is being stopped/shutdown. This allows the trigger to keep running on the other nodes in the cluster.



NOTE

When running in clustered node, no checking is done to ensure unique job name/group for endpoints.

MESSAGE HEADERS

Apache Camel adds the getters from the Quartz Execution Context as header values. The following headers are added: **calendar**, **fireTime**, **jobDetail**, **jobInstance**, **jobRuntTime**, **mergedJobDataMap**, **nextFireTime**, **previousFireTime**, **refireCount**, **result**, **scheduledFireTime**, **scheduler**, **trigger**, **triggerName**, **triggerGroup**.

The **fireTime** header contains the **java.util.Date** of when the exchange was fired.

USING CRON TRIGGERS

Avaiable as of Apache Camel 2.0 Quartz supports Cron-like expressions for specifying timers in a handy format. You can use these expressions in the **cron** URI parameter; though to preserve valid URI encoding we allow + to be used instead of spaces. Quartz provides a little tutorial on how to use cron expressions.

For example the following will fire a message every five minutes starting at 12pm (noon) to 6pm on weekdays:

```
from("quartz://myGroup/myTimerName?cron=0+0/5+12-18+?+*+MON-
FRI").to("activemq:Totally.Rocks");
```

which is equivalent to using the cron expression

```
0 0/5 12-18 ? * MON-FRI
```

The following table shows the URI character encodings we use to preserve valid URI syntax:

URI Character	Cron character
\+	*Space*

SPECIFYING TIME ZONE

Available as of Camel 2.8.1 The Quartz Scheduler allows you to configure time zone per trigger. For example to use a timezone of your country, then you can do as follows:

```
quartz://groupName/timerName?cron=0+0/5+12-18+?+*+MON-
FRI&trigger.timeZone=Europe/Stockholm
```

The timeZone value is the values accepted by **java.util.TimeZone**.

In Camel 2.8.0 or older versions you would have to provide your custom **String** to **java.util.TimeZone** Type Converter to be able configure this from the endpoint uri. From Camel 2.8.1 onwards we have included such a Type Converter in the camel-core.

- Quartz2
- Timer

CHAPTER 113. QUARTZ2

QUARTZ2 COMPONENT

Available as of Camel 2.12.0

The **quartz2:** component provides a scheduled delivery of messages using the Quartz Scheduler 2.x. Each endpoint represents a different timer (in Quartz terms, a Trigger and JobDetail).

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-quartz2</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

NOTE: Quartz 2.x API is not compatible with Quartz 1.x. If you need to remain on old Quartz 1.x, please use the old Quartz component instead.

URI FORMAT

```
quartz2://timerName?options
quartz2://groupName/timerName?options
quartz2://groupName/timerName?cron=expression
quartz2://timerName?cron=expression
```

The component uses either a **CronTrigger** or a **SimpleTrigger**. If no cron expression is provided, the component uses a simple trigger. If no **groupName** is provided, the quartz component uses the **Camel** group name.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Parameter	Default	Description
cron	*None*	Specifies a **cron** expression (not compatible with the **trigger.*** or **job.*** options).
trigger.repeatCount	**0**	SimpleTrigger: How many times should the timer repeat?
trigger.repeatInterval	**1000**	SimpleTrigger: The amount of time in milliseconds between repeated triggers. Must enable **trigger.repeatCount** to use the simple trigger using this interval.

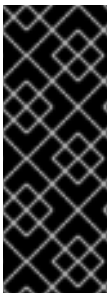
job.name	**null**	Sets the job name.
job.*XXX*	**null**	Sets the job option with the ***XXX*** setter name.
trigger.*XXX*	**null**	Sets the trigger option with the ***XXX*** setter name.
stateful	**false**	Uses a Quartz **@PersistJobDataAfterExecution** and **@DisallowConcurrentExecution** instead of the default job.
fireNow	**false**	If it is true will fire the trigger when the route is start when using SimpleTrigger.
deleteJob	**true**	If set to true, then the trigger automatically delete when route stop. Else if set to false, it will remain in scheduler. When set to false, it will also mean user may reuse pre-configured trigger with camel Uri. Just ensure the names match. Notice you cannot have both deleteJob and pauseJob set to true.
pauseJob	**false**	If set to true, then the trigger automatically pauses when route stop. Else if set to false, it will remain in scheduler. When set to false, it will also mean user may reuse pre-configured trigger with camel Uri. Just ensure the names match. Notice you cannot have both deleteJob and pauseJob set to true.
durableJob	**false**	*Camel 2.12.4/2.13*: Whether or not the job should remain stored after it is orphaned (no triggers point to it).
recoverableJob	**false**	*Camel 2.12.4/2.13*: Instructs the scheduler whether or not the job should be re-executed if a 'recovery' or 'fail-over' situation is encountered.

usingFixedCamelContextName	**false**	**Camel 2.15.0:** If **true**, **JobDataMap** uses the **CamelContext** name directly to reference the camel context; if **false**, **JobDataMap** uses use the **CamelContext** management name which could be changed during the deploy time.

For example, the following routing rule will fire two timer events to the **mock:results** endpoint:

```
from("quartz2://myGroup/myTimerName?trigger.repeatInterval=2&trigger.repeatCount=1")
    .routeId("myRoute")
    .to("mock:result");
```

When using **stateful=true**, the JobDataMap is re-persisted after every execution of the job, thus preserving state for the next execution.



RUNNING IN OSGI AND HAVING MULTIPLE BUNDLES WITH QUARTZ ROUTES

If you run in OSGi such as Apache ServiceMix, or Apache Karaf, and have multiple bundles with Camel routes that start from Quartz2 endpoints, then make sure if you assign an **id** to the <camelContext> that this id is unique, as this is required by the **QuartzScheduler** in the OSGi container. If you do not set any **id** on <camelContext> then a unique id is auto assigned, and there is no problem.

CONFIGURING QUARTZ.PROPERTIES FILE

By default Quartz will look for a **quartz.properties** file in the **org/quartz** directory of the classpath. If you are using WAR deployments this means just drop the quartz.properties in **WEB-INF/classes/org/quartz**.

However the Camel Quartz2 component also allows you to configure properties:

Parameter	Default	Type	Description
properties	**null**	**Properties**	You can configure a **java.util.Properties** instance.
propertiesFile	**null**	**String**	File name of the properties to load from the classpath

To do this you can configure this in Spring XML as follows

```
<bean id="quartz" class="org.apache.camel.component.quartz2.QuartzComponent">
    <property name="propertiesFile" value="com/mycompany/myquartz.properties"/>
</bean>
```

ENABLING QUARTZ SCHEDULER IN JMX

You need to configure the quartz scheduler properties to enable JMX. That is typically setting the option **org.quartz.scheduler.jmx.export** to a **true** value in the configuration file.

From Camel 2.13 onwards Camel will automatic set this option to **true**, unless explicit disabled.

STARTING THE QUARTZ SCHEDULER

The Quartz2 component offers an option to let the Quartz scheduler be started delayed, or not auto started at all.

Parameter	Default	Type	Description
startDelayedSeconds	**0**	**int**	Seconds to wait before starting the quartz scheduler.
autoStartScheduler	**true**	**boolean**	Whether or not the scheduler should be auto started.

To do this you can configure this in Spring XML as follows

```
<bean id="quartz2" class="org.apache.camel.component.quartz2.QuartzComponent">
    <property name="startDelayedSeconds" value="5"/>
</bean>
```

CLUSTERING

If you use Quartz in clustered mode, e.g. the **JobStore** is clustered. Then the Quartz2 component will **not** pause/remove triggers when a node is being stopped/shutdown. This allows the trigger to keep running on the other nodes in the cluster.

Note: When running in clustered node no checking is done to ensure unique job name/group for endpoints.

MESSAGE HEADERS

Camel adds the getters from the Quartz Execution Context as header values. The following headers are added: **calendar**, **fireTime**, **jobDetail**, **jobInstance**, **jobRuntTime**, **mergedJobDataMap**, **nextFireTime**, **previousFireTime**, **refireCount**, **result**, **scheduledFireTime**, **scheduler**, **trigger**, **triggerName**, **triggerGroup**.

The **fireTime** header contains the **java.util.Date** of when the exchange was fired.

USING CRON TRIGGERS

Quartz supports Cron-like expressions for specifying timers in a handy format. You can use these expressions in the **cron** URI parameter; though to preserve valid URI encoding we allow + to be used instead of spaces.

For example, the following will fire a message every five minutes starting at 12pm (noon) to 6pm on weekdays:

```
from("quartz2://myGroup/myTimerName?cron=0+0/5+12-18+?+*+MON-
FRI").to("activemq:Totally.Rocks");
```

which is equivalent to using the cron expression

```
0 0/5 12-18 ? * MON-FRI
```

The following table shows the URI character encodings we use to preserve valid URI syntax:

URI Character	Cron character
\+	*Space*

SPECIFYING TIME ZONE

The Quartz Scheduler allows you to configure time zone per trigger. For example to use a timezone of your country, then you can do as follows:

```
quartz2://groupName/timerName?cron=0+0/5+12-18+?+*+MON-
FRI&trigger.timeZone=Europe/Stockholm
```

The timeZone value is the values accepted by **java.util.TimeZone**.

USING QUARTZSCHEDULEDPOLLCONSUMERSCHEDULER

The Quartz2 component provides a Polling Consumer scheduler which allows to use cron based scheduling for Polling Consumer such as the File and FTP consumers.

For example to use a cron based expression to poll for files every 2nd second, then a Camel route can be define simply as:

```
from("file:inbox?scheduler=quartz2&scheduler.cron=0/2+*+*+*+*+?")
  .to("bean:process");
```

Notice we define the **scheduler=quartz2** to instruct Camel to use the Quartz2 based scheduler. Then we use **scheduler.xxx** options to configure the scheduler. The Quartz2 scheduler requires the cron option to be set.

The following options is supported:

Parameter	Default	Type	Description

quartzScheduler	**null**	**org.quartz.Scheduler**	To use a custom Quartz scheduler. If none configure then the shared scheduler from the Quartz2 component is used.
cron	**null**	**String**	**Mandatory**: To define the cron expression for triggering the polls.
triggerId	**null**	**String**	To specify the trigger id. If none provided then an UUID is generated and used.
triggerGroup	**QuartzScheduledPollConsumerScheduler**	**String**	To specify the trigger group.
timeZone	**Default**	**TimeZone**	The time zone to use for the CRON trigger.

Important: Remember configuring these options from the endpoint URIs must be prefixed with **scheduler.**. For example to configure the trigger id and group:

```
    from("file:inbox?scheduler=quartz2&scheduler.cron=0/2+*+*+*+*+?
&scheduler.triggerId=myId&scheduler.triggerGroup=myGroup")
        .to("bean:process");
```

There is also a CRON scheduler in Spring, so you can use the following as well:

```
    from("file:inbox?scheduler=spring&scheduler.cron=0/2+*+*+*+*+?")
        .to("bean:process");
```

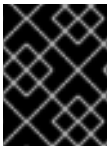
- Quartz
- Timer

CHAPTER 114. QUICKFIX

QUICKFIX/J COMPONENT

Available as of Camel 2.0

The **quickfix** component adapts the QuickFIX/J FIX engine for using in Camel . This component uses the standard Financial Interchange (FIX) protocol for message transport.



PREVIOUS VERSIONS

The **quickfix** component was rewritten for Camel 2.5. For information about using the **quickfix** component prior to 2.5 see the documentation section below.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-quickfix</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
quickfix:configFile[?sessionID=sessionID&lazyCreateEngine=true|false]
```

The **configFile** is the name of the QuickFIX/J configuration to use for the FIX engine (located as a resource found in your classpath). The optional sessionID identifies a specific FIX session. The format of the sessionID is:

```
(BeginString):(SenderCompID)[/(SenderSubID)[/(SenderLocationID)]]->(TargetCompID)
[/(TargetSubID)[/(TargetLocationID)]]
```

The optional **lazyCreateEngine** (Camel 2.12.3+) parameter allows to create QuickFIX/J engine on demand. Value **true** means the engine is started when first message is send or there's consumer configured in route definition. When **false**, the engine is started at the endpoint creation. When this parameter is missing, the value of component's property **lazyCreateEngines** is used.

Example URIs:

```
quickfix:config.cfg

quickfix:config.cfg?sessionID=FIX.4.2:MyTradingCompany->SomeExchange

quickfix:config.cfg?sessionID=FIX.4.2:MyTradingCompany->SomeExchange&lazyCreateEngine=true
```

ENDPOINTS

FIX sessions are endpoints for the **quickfix** component. An endpoint URI may specify a single session or all sessions managed by a specific QuickFIX/J engine. Typical applications will use only one FIX

engine but advanced users may create multiple FIX engines by referencing different configuration files in **quickfix** component endpoint URIs.

When a consumer does not include a session ID in the endpoint URI, it will receive exchanges for all sessions managed by the FIX engine associated with the configuration file specified in the URI. If a producer does not specify a session in the endpoint URI then it must include the session-related fields in the FIX message being sent. If a session is specified in the URI then the component will automatically inject the session-related fields into the FIX message.

EXCHANGE FORMAT

The exchange headers include information to help with exchange filtering, routing and other processing. The following headers are available:

Header Name	Description
EventCategory	One of **AppMessageReceived**, **AppMessageSent**, **AdminMessageReceived**, **AdminMessageSent**, **SessionCreated**, **SessionLogon**, **SessionLogoff**. See the **QuickfixjEventCategory** enum.
SessionID	The FIX message SessionID
MessageType	The FIX MsgType tag value
DataDictionary	Specifies a data dictionary to used for parsing an incoming message. Can be an instance of a data dictionary or a resource path for a QuickFIX/J data dictionary file

The DataDictionary header is useful if string messages are being received and need to be parsed in a route. QuickFIX/J requires a data dictionary to parse certain types of messages (with repeating groups, for example). By injecting a DataDictionary header in the route after receiving a message string, the FIX engine can properly parse the data.

QUICKFIX/J CONFIGURATION EXTENSIONS

When using QuickFIX/J directly, one typically writes code to create instances of logging adapters, message stores and communication connectors. The **quickfix** component will automatically create instances of these classes based on information in the configuration file. It also provides defaults for many of the common required settings and adds additional capabilities (like the ability to activate JMX support).

The following sections describe how the **quickfix** component processes the QuickFIX/J configuration. For comprehensive information about QuickFIX/J configuration, see the QFJ user manual.

COMMUNICATION CONNECTORS

When the component detects an initiator or acceptor session setting in the QuickFIX/J configuration file it will automatically create the corresponding initiator and/or acceptor connector. These settings can be in the default or in a specific session section of the configuration file.

Session Setting	Component Action
ConnectionType=initiator	Create an initiator connector
ConnectionType=acceptor	Create an acceptor connector

The threading model for the QuickFIX/J session connectors can also be specified. These settings affect all sessions in the configuration file and must be placed in the settings default section.

Default/Global Setting	Component Action
ThreadModel=ThreadPerConnector	Use **SocketInitiator** or **SocketAcceptor** (default)
ThreadModel=ThreadPerSession	Use **ThreadedSocketInitiator** or **ThreadedSocketAcceptor**

LOGGING

The QuickFIX/J logger implementation can be specified by including the following settings in the default section of the configuration file. The **ScreenLog** is the default if none of the following settings are present in the configuration. It's an error to include settings that imply more than one log implementation.

Default/Global Setting	Component Action
ScreenLogShowEvents	Use a **ScreenLog**
ScreenLogShowIncoming	Use a **ScreenLog**
ScreenLogShowOutgoing	Use a **ScreenLog**
SLF4J*	**Camel 2.6+**. Use a **SLF4JLog**. Any of the SLF4J settings will cause this log to be used.
FileLogPath	Use a **FileLog**
JdbcDriver	Use a **JdbcLog**

MESSAGE STORE

The QuickFIX/J message store implementation can be specified by including the following settings in the default section of the configuration file. The **MemoryStore** is the default if none of the following settings are present in the configuration. It's an error to include settings that imply more than one message store

implementation.

Default/Global Setting	Component Action
JdbcDriver	Use a **JdbcStore**
FileStorePath	Use a **FileStore**
SleepycatDatabaseDir	Use a **SleepcatStore**

MESSAGE FACTORY

A message factory is used to construct domain objects from raw FIX messages. The default message factory is **DefaultMessageFactory**. However, advanced applications may require a custom message factory. This can be set on the QuickFIX/J component.

JMX

Default/Global Setting	Component Action
UseJmx	if **Y**, then enable QuickFIX/J JMX

OTHER DEFAULTS

The component provides some default settings for what are normally required settings in QuickFIX/J configuration files. **SessionStartTime** and **SessionEndTime** default to "00:00:00", meaning the session will not be automatically started and stopped. The **HeartBtInt** (heartbeat interval) defaults to 30 seconds.

MINIMAL INITIATOR CONFIGURATION EXAMPLE

```
[SESSION]
ConnectionType=initiator
BeginString=FIX.4.4
SenderCompID=YOUR_SENDER
TargetCompID=YOUR_TARGET
```

USING THE INOUT MESSAGE EXCHANGE PATTERN

Camel 2.8+

Although the FIX protocol is event-driven and asynchronous, there are specific pairs of messages that represent a request-reply message exchange. To use an InOut exchange pattern, there should be a single request message and single reply message to the request. Examples include an OrderStatusRequest message and UserRequest.

IMPLEMENTING INOUT EXCHANGES FOR CONSUMERS

Add "exchangePattern=InOut" to the QuickFIX/J enpoint URI. The **MessageOrderStatusService** in the example below is a bean with a synchronous service method. The method returns the response to the request (an ExecutionReport in this case) which is then sent back to the requestor session.

```
    from("quickfix:examples/inprocess.cfg?sessionID=FIX.4.2:MARKET-
>TRADER&exchangePattern=InOut")

.filter(header(QuickfixjEndpoint.MESSAGE_TYPE_KEY).isEqualTo(MsgType.ORDER_STATUS_REQ
UEST))
        .bean(new MarketOrderStatusService());
```

IMPLEMENTING INOUT EXCHANGES FOR PRODUCERS

For producers, sending a message will block until a reply is received or a timeout occurs. There is no standard way to correlate reply messages in FIX. Therefore, a correlation criteria must be defined for each type of InOut exchange. The correlation criteria and timeout can be specified using **Exchange** properties.

Description	Key String	Key Constant	Default	Correlation Criteria	"CorrelationCriteria"	QuickfixjProducer.CORRELATION_CRITERIA_KEY	None
Correlation Timeout in Milliseconds	"CorrelationTimeout"	QuickfixjProducer.CORRELATION_TIMEOUT_KEY	1000				

The correlation criteria is defined with a **MessagePredicate** object. The following example will treat a FIX ExecutionReport from the specified session where the transaction type is STATUS and the Order ID matches our request. The session ID should be for the *requestor*, the sender and target CompID fields will be reversed when looking for the reply.

```
exchange.setProperty(QuickfixjProducer.CORRELATION_CRITERIA_KEY,
    new MessagePredicate(new SessionID(sessionID), MsgType.EXECUTION_REPORT)
        .withField(ExecTransType.FIELD, Integer.toString(ExecTransType.STATUS))
        .withField(OrderID.FIELD, request.getString(OrderID.FIELD)));
```

EXAMPLE

The source code contains an example called **RequestReplyExample** that demonstrates the InOut exchanges for a consumer and producer. This example creates a simple HTTP server endpoint that accepts order status requests. The HTTP request is converted to a FIX OrderStatusRequestMessage, is

augmented with a correlation criteria, and is then routed to a quickfix endpoint. The response is then converted to a JSON-formatted string and sent back to the HTTP server endpoint to be provided as the web response.

The Spring configuration have changed from Camel 2.9 onwards. See further below for example.

SPRING CONFIGURATION

Camel 2.6 - 2.8.x

The QuickFIX/J component includes a Spring **FactoryBean** for configuring the session settings within a Spring context. A type converter for QuickFIX/J session ID strings is also included. The following example shows a simple configuration of an acceptor and initiator session with default settings for both sessions.

```
<!-- camel route -->
    <camelContext id="quickfixjContext" xmlns="http://camel.apache.org/schema/spring">
    <route>
    <from uri="quickfix:example"/>
    <filter>
    <simple>${in.header.EventCategory} == 'AppMessageReceived'</simple>
    <to uri="log:test"/>
    </filter>
    </route>
    </camelContext>

    <!-- quickfix component -->
    <bean id="quickfix" class="org.apache.camel.component.quickfixj.QuickfixjComponent">
    <property name="engineSettings">
    <util:map>
    <entry key="quickfix:example" value-ref="quickfixjSettings"/>
    </util:map>
    </property>
    <property name="messageFactory">
    <bean
class="org.apache.camel.component.quickfixj.QuickfixjSpringTest.CustomMessageFactory"/>
    </property>
    </bean>

    <!-- quickfix settings -->
    <bean id="quickfixjSettings"
    class="org.apache.camel.component.quickfixj.QuickfixjSettingsFactory">
    <property name="defaultSettings">
    <util:map>
    <entry key="SocketConnectProtocol" value="VM_PIPE"/>
    <entry key="SocketAcceptProtocol" value="VM_PIPE"/>
    <entry key="UseDataDictionary" value="N"/>
    </util:map>
    </property>
    <property name="sessionSettings">
    <util:map>
    <entry key="FIX.4.2:INITIATOR->ACCEPTOR">
    <util:map>
    <entry key="ConnectionType" value="initiator"/>
    <entry key="SocketConnectHost" value="localhost"/>
```

```
    <entry key="SocketConnectPort" value="5000"/>
    </util:map>
    </entry>
    <entry key="FIX.4.2:ACCEPTOR->INITIATOR">
    <util:map>
    <entry key="ConnectionType" value="acceptor"/>
    <entry key="SocketAcceptPort" value="5000"/>
    </util:map>
    </entry>
    </util:map>
    </property>
    </bean>
```

Camel 2.9 onwards

The QuickFIX/J component includes a **QuickfixjConfiguration** class for configuring the session settings. A type converter for QuickFIX/J session ID strings is also included. The following example shows a simple configuration of an acceptor and initiator session with default settings for both sessions.

```
<!-- camel route -->
<camelContext id="quickfixjContext" xmlns="http://camel.apache.org/schema/spring">
   <route>
      <from uri="quickfix:example"/>
      <filter>
         <simple>${in.header.EventCategory} == 'AppMessageReceived'</simple>
         <to uri="log:test"/>
      </filter>
   </route>
</camelContext>

<!-- quickfix component -->
<bean id="quickfix" class="org.apache.camel.component.quickfixj.QuickfixjComponent">
   <property name="configurations">
      <util:map>
         <entry key="example" value-ref="quickfixjConfiguration"/>
      </util:map>
   </property>
   <property name="messageFactory">
      <bean
class="org.apache.camel.component.quickfixj.QuickfixjSpringTest.CustomMessageFactory"/>
   </property>
</bean>

<!-- quickfix settings -->
<bean id="quickfixjConfiguration"
class="org.apache.camel.component.quickfixj.QuickfixjConfiguration">
   <property name="defaultSettings">
      <util:map>
         <entry key="SocketConnectProtocol" value="VM_PIPE"/>
         <entry key="SocketAcceptProtocol" value="VM_PIPE"/>
         <entry key="UseDataDictionary" value="N"/>
      </util:map>
   </property>
   <property name="sessionSettings">
      <util:map>
         <entry key="FIX.4.2:INITIATOR->ACCEPTOR">
```

```
            <util:map>
              <entry key="ConnectionType" value="initiator"/>
              <entry key="SocketConnectHost" value="localhost"/>
              <entry key="SocketConnectPort" value="5000"/>
            </util:map>
          </entry>
          <entry key="FIX.4.2:ACCEPTOR->INITIATOR">
            <util:map>
              <entry key="ConnectionType" value="acceptor"/>
              <entry key="SocketAcceptPort" value="5000"/>
            </util:map>
          </entry>
        </util:map>
      </property>
    </bean>
```

EXCEPTION HANDLING

QuickFIX/J behavior can be modified if certain exceptions are thrown during processing of a message. If a **RejectLogon** exception is thrown while processing an incoming logon administrative message, then the logon will be rejected.

Normally, QuickFIX/J handles the logon process automatically. However, sometimes an outgoing logon message must be modified to include credentials required by a FIX counterparty. If the FIX logon message body is modified when sending a logon message (EventCategory={{AdminMessageSent}} the modified message will be sent to the counterparty. It is important that the outgoing logon message is being processed *synchronously*. If it is processed asynchronously (on another thread), the FIX engine will immediately send the unmodified outgoing message when it's callback method returns.

FIX SEQUENCE NUMBER MANAGEMENT

If an application exception is thrown during *synchronous* exchange processing, this will cause QuickFIX/J to not increment incoming FIX message sequence numbers and will cause a resend of the counterparty message. This FIX protocol behavior is primarily intended to handle *transport* errors rather than application errors. There are risks associated with using this mechanism to handle application errors. The primary risk is that the message will repeatedly cause application errors each time it's re-received. A better solution is to persist the incoming message (database, JMS queue) immediately before processing it. This also allows the application to process messages asynchronously without losing messages when errors occur.

Although it's possible to send messages to a FIX session before it's logged on (the messages will be sent at logon time), it is usually a better practice to wait until the session is logged on. This eliminates the required sequence number resynchronization steps at logon. Waiting for session logon can be done by setting up a route that processes the **SessionLogon** event category and signals the application to start sending messages.

See the FIX protocol specifications and the QuickFIX/J documentation for more details about FIX sequence number management.

ROUTE EXAMPLES

Several examples are included in the QuickFIX/J component source code (test subdirectories). One of these examples implements a trival trade excecution simulation. The example defines an application component that uses the URI scheme "trade-executor".

The following route receives messages for the trade executor session and passes application messages to the trade executor component.

```
from("quickfix:examples/inprocess.cfg?sessionID=FIX.4.2:MARKET->TRADER").

filter(header(QuickfixjEndpoint.EVENT_CATEGORY_KEY).isEqualTo(QuickfixjEventCategory.AppMessageReceived)).
    to("trade-executor:market");
```

The trade executor component generates messages that are routed back to the trade session. The session ID must be set in the FIX message itself since no session ID is specified in the endpoint URI.

```
from("trade-executor:market").to("quickfix:examples/inprocess.cfg");
```

The trader session consumes execution report messages from the market and processes them.

```
from("quickfix:examples/inprocess.cfg?sessionID=FIX.4.2:TRADER->MARKET").

filter(header(QuickfixjEndpoint.MESSAGE_TYPE_KEY).isEqualTo(MsgType.EXECUTION_REPORT)).

    bean(new MyTradeExecutionProcessor());
```

QUICKFIX/J COMPONENT PRIOR TO CAMEL 2.5

Available since Camel 2.0

The **quickfix** component is an implementation of the QuickFIX/J engine for Java . This engine allows to connect to a FIX server which is used to exchange financial messages according to FIX protocol standard.

Note: The component can be used to send/receives messages to a FIX server.

URI FORMAT

```
quickfix-server:config file
quickfix-client:config file
```

Where **config file** is the location (in your classpath) of the quickfix configuration file used to configure the engine at the startup.

Note: Information about parameters available for quickfix can be found on QuickFIX/J web site.

The quickfix-server endpoint must be used to receive from FIX server FIX messages and quickfix-client endpoint in the case that you want to send messages to a FIX gateway.

EXCHANGE DATA FORMAT

The QuickFIX/J engine is like CXF component a messaging bus using MINA as protocol layer to create the socket connection with the FIX engine gateway.

When QuickFIX/J engine receives a message, then it create a QuickFix.Message instance which is next received by the camel endpoint. This object is a 'mapping object' created from a FIX message formatted initially as a collection of key value pairs data. You can use this object or you can use the method

'toString' to retrieve the original FIX message.

Note: Alternatively, you can use camel bindy dataformat to transform the FIX message into your own Java POJO

When a message must be sent to QuickFix, you must create a **QuickFix.Message** instance.

LAZY CREATING ENGINES

From **Camel 2.12.3** onwards, you can configure the QuickFix component to lazily create and start the engines, which then only start these on-demand. For example, you can use this when you have multiple Camel applications in a cluster with master/slaves. And want the slaves to be standby.

SAMPLES

Direction : to FIX gateway

```
<route>
  <from uri="activemq:queue:fix"/>
  <bean ref="fixService" method="createFixMessage" /> // bean method in charge to transform
message into a QuickFix.Message
  <to uri="quickfix-client:META-INF/quickfix/client.cfg" /> // Quickfix engine who will send the FIX
messages to the gateway
</route>
```

Direction : from FIX gateway

```
<route>
  <from uri="quickfix-server:META-INF/quickfix/server.cfg"/> // QuickFix engine who will receive the
message from FIX gateway
  <bean ref="fixService" method="parseFixMessage" /> // bean method parsing the
QuickFix.Message
  <to uri="uri="activemq:queue:fix"/>" />
</route>
```

CHAPTER 115. RABBITMQ

RABBITMQ COMPONENT

Available as of Camel 2.12

The **rabbitmq:** component allows you produce and consume messages from RabbitMQ instances. Using the RabbitMQ AMQP client, this component offers a pure RabbitMQ approach over the generic AMQP component.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-rabbitmq</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
rabbitmq://hostname[:port]/exchangeName?[options]
```

Where **hostname** is the hostname of the running rabbitmq instance or cluster. Port is optional and if not specified then defaults to the RabbitMQ client default (5672). The exchange name determines which exchange produced messages will sent to. In the case of consumers, the exchange name determines which exchange the queue will bind to.

OPTIONS

Property	Default	Description
autoAck	**true**	If messages should be auto acknowledged.
autoDelete	**true**	If true, the exchange will be deleted when it is no longer in use.
durable	**true**	If we are declaring a durable exchange (the exchange will survive a server restart).
queue	**random uuid**	The queue to receive messages from.

routingKey	**null**	The routing key to use when binding a consumer queue to the exchange. For producer routing keys, you set the header (see header section).
threadPoolSize	**10**	The consumer uses a Thread Pool Executor with a fixed number of threads. This setting allows you to set that number of threads.
username	**null**	username in case of authenticated access.
password	**null**	password for authenticated access.
vhost	/	the vhost for the channel.
exchangeType	**direct**	*Camel 2.12.2:* The exchange type such as direct or topic.
bridgeEndpoint	**false**	*Camel 2.12.3:* If the bridgeEndpoint is true, the producer will ignore the message header of "rabbitmq.EXCHANGE_NAME" and "rabbitmq.ROUTING_KEY"
addresses	**null**	*Camel 2.12.3:* If this option is set, camel-rabbitmq will try to create connection based on the setting of option addresses. The addresses value is a string which looks like "server1:12345, server2:12345".
connectionTimeout	**0**	*Camel 2.14:* Connection timeout.
requestedChannelMax	**0**	*Camel 2.14:* Connection requested channel max (max number of channels offered).
requestedFrameMax	**0**	*Camel 2.14:* Connection requested frame max (max size of frame offered).
requestedHeartbeat	**0**	*Camel 2.14:* Connection requested heartbeat (heart-beat in seconds offered).
sslProtocol	**null**	*Camel 2.14:* Enables SSL on connection, accepted value are `true`, `TLS` and 'SSLv3`

trustManager	**null**	*Camel 2.14:* Configure SSL trust manager, SSL should be enabled for this option to be effective.
clientProperties	**null**	*Camel 2.14:* Connection client properties (client info used in negotiating with the server).
connectionFactory	**null**	*Camel 2.14:* Custom RabbitMQ connection factory. When this option is set, all connection options (connectionTimeout, requestedChannelMax...) set on URI are not used.
automaticRecoveryEnabled	**false**	*Camel 2.14:* Enables connection automatic recovery (uses connection implementation that performs automatic recovery when connection shutdown is not initiated by the application).
networkRecoveryInterval	**5000**	*Camel 2.14:* Network recoverty interval in milliseconds (interval used when recovering from network failure).
topologyRecoveryEnabled	**true**	*Camel 2.14:* Enables connection topology recovery (should topology recovery be performed?).
prefetchEnabled	**false**	*Camel 2.14:* Enables the quality of service on the RabbitMQConsumer side, you need to specify the option of *prefetchSize*, *prefetchCount*, *prefetchGlobal* at the same time
prefetchSize	**0**	*Camel 2.14:* The maximum amount of content (measured in octets) that the server will deliver, 0 if unlimited.
prefetchCount	**0**	*Camel 2.14:* The maximum number of messages that the server will deliver, 0 if unlimited.
prefetchGlobal	**false**	*Camel 2.14:* If the settings should be applied to the entire channel rather than each consumer.
declare	**true**	*Camel 2.14*: If the option is true, camel declare the exchange and queue name and bind them together. If the option is false, camel won't declare the exchange and queue name on the server.

concurrentConsumers	**1**	*Camel 2.14:* Number of concurrent consumers when consuming from broker. (eg similar as to the same option for the JMS component).
deadLetterRoutingKey		*Camel 2.14:* The routing key for the dead letter exchange.
deadLetterExchange		*Camel 2.14:* The name of the dead letter exchange.
deadLetterExchangeType	**direct**	*Camel 2.14:* The type of the dead letter exchange.
channelPoolMaxSize	**10**	*Camel 2.14.1 (Producer only):* Maximum number of channels used to send messages.
channelPoolMaxWait	**1000**	*Camel 2.14.1 (Producer only):* Maximum time (in milliseconds) waiting for a channel.
queueArgsConfigurer	**null**	*Camel 2.15.1:* The custom **ArgsConfigurer** instance which could be used to configure the **Args** map when declaring the queue.
exchangeArgsConfigurer	**null**	*Camel 2.15.1:* The custom **ArgsConfigurer** instance which could be used to configure the **Args** map when declaring the exchange.

CUSTOM CONNECTION FACTORY

```
<bean id="customConnectionFactory" class="com.rabbitmq.client.ConnectionFactory">
  <property name="host" value="localhost"/>
  <property name="port" value="5672"/>
  <property name="username" value="camel"/>
  <property name="password" value="bugsbunny"/>
</bean>
<camelContext>
  <route>
    <from uri="direct:rabbitMQEx2"/>
    <to uri="rabbitmq://localhost:5672/ex2?connectionFactory=#customConnectionFactory"/>
  </route>
</camelContext>
```

HEADERS

The following headers are set on exchanges when consuming messages.

Property	Value
rabbitmq.ROUTING_KEY	The routing key that was used to receive the message, or the routing key that will be used when producing a message
rabbitmq.EXCHANGE_NAME	The exchange the message was received from
rabbitmq.DELIVERY_TAG	The rabbitmq delivery tag of the received message
rabbitmq.REQUEUE	*Camel 2.14.2:* This is used by the consumer to control rejection of the message. When the consumer is complete processing the exchange, and if the exchange failed, then the consumer is going to reject the message from the RabbitMQ broker. The value of this header controls this behaviour. If **false**, the message is discarded/dead-lettered. If **true**, the message is re-queued. Default is **false**.

The following headers are used by the producer. If these are set on the camel exchange then they will be set on the RabbitMQ message.

Property	Value
rabbitmq.ROUTING_KEY	The routing key that will be used when sending the message
rabbitmq.EXCHANGE_NAME	The exchange the message was received from, or sent to
rabbitmq.CONTENT_TYPE	The contentType to set on the RabbitMQ message
rabbitmq.PRIORITY	The priority header to set on the RabbitMQ message
rabbitmq.CORRELATIONID	The correlationId to set on the RabbitMQ message
rabbitmq.MESSAGE_ID	The message id to set on the RabbitMQ message
rabbitmq.DELIVERY_MODE	If the message should be persistent or not
rabbitmq.USERID	The userId to set on the RabbitMQ message
rabbitmq.CLUSTERID	The clusterId to set on the RabbitMQ message
rabbitmq.REPLY_TO	The replyTo to set on the RabbitMQ message

rabbitmq.CONTENT_ENCODING	The contentEncoding to set on the RabbitMQ message
rabbitmq.TYPE	The type to set on the RabbitMQ message
rabbitmq.EXPIRATION	The expiration to set on the RabbitMQ message
rabbitmq.TIMESTAMP	The timestamp to set on the RabbitMQ message
rabbitmq.APP_ID	The appId to set on the RabbitMQ message

Headers are set by the consumer once the message is received. The producer will also set the headers for downstream processors once the exchange has taken place. Any headers set prior to production that the producer sets will be overriden.

MESSAGE BODY

The component will use the camel exchange in body as the rabbit mq message body. The camel exchange in object must be convertible to a byte array. Otherwise the producer will throw an exception of unsupported body type.

SAMPLES

To receive messages from a queue that is bound to an exchange A with the routing key B,

```
from("rabbitmq://localhost/A?routingKey=B")
```

To receive messages from a queue with a single thread with auto acknowledge disabled.

```
from("rabbitmq://localhost/A?routingKey=B&threadPoolSize=1&autoAck=false")
```

To send messages to an exchange called C

```
...to("rabbitmq://localhost/B")
```

CHAPTER 116. REF

REF COMPONENT

The **ref:** component is used for lookup of existing endpoints bound in the Registry.

URI FORMAT

```
ref:someName
```

Where **someName** is the name of an endpoint in the Registry (usually, but not always, the Spring registry). If you are using the Spring registry, **someName** would be the bean ID of an endpoint in the Spring registry.

RUNTIME LOOKUP

This component can be used when you need dynamic discovery of endpoints in the Registry where you can compute the URI at runtime. Then you can look up the endpoint using the following code:

```
// lookup the endpoint
String myEndpointRef = "bigspenderOrder";
Endpoint endpoint = context.getEndpoint("ref:" + myEndpointRef);

Producer producer = endpoint.createProducer();
Exchange exchange = producer.createExchange();
exchange.getIn().setBody(payloadToSend);
// send the exchange
producer.process(exchange);
...
```

And you could have a list of endpoints defined in the Registry such as:

```
<camelContext id="camel" xmlns="http://activemq.apache.org/camel/schema/spring">
    <endpoint id="normalOrder" uri="activemq:order.slow"/>
    <endpoint id="bigspenderOrder" uri="activemq:order.high"/>
    ...
</camelContext>
```

SAMPLE

In the sample below we use the **ref:** in the URI to reference the endpoint with the spring ID, **endpoint2**:

```
<bean id="mybean" class="org.apache.camel.spring.example.DummyBean">
  <property name="endpoint" ref="endpoint1"/>
</bean>

<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
  <jmxAgent id="agent" disabled="true"/>
  <endpoint id="endpoint1" uri="direct:start"/>
  <endpoint id="endpoint2" uri="mock:end"/>
```

```
  <route>
    <from ref="endpoint1"/>
    <to uri="ref:endpoint2"/>
  </route>
</camelContext>
```

You could, of course, have used the **ref** attribute instead:

```
      <to ref="endpoint2"/>
```

Which is the more common way to write it.

CHAPTER 117. REST

REST COMPONENT

Available as of Camel 2.14

The rest component allows to define REST endpoints using the Rest DSL and plugin to other Camel components as the REST transport.

URI FORMAT

```
rest://method:path[:uriTemplate]?[options]
```

URI OPTIONS

Name	Default Value	Description
method		HTTP method which should be one of: get, post, put, patch, delete, head, trace, connect, or options.
path		the base path which support REST syntax. See further below for examples.
uriTemplate		uri template which support REST syntax. See further below for examples.
consumes		media type such as: 'text/xml', or 'application/json' this REST service accepts. By default we accept all kinds of types.
produces		media type such as: 'text/xml', or 'application/json' this REST service returns.

PATH AND URITEMPLATE SYNTAX

The path and uriTemplate option is defined using a REST syntax where you define the REST context path using support for parameters.

TIP

If no uriTemplate is configured then path option works the same way. It does not matter if you configure only path or if you configure both options. Though configuring both a path and uriTemplate is a more common practice with REST.

The following is a Camel route using a a path only

```
from("rest:get:hello")
  .transform().constant("Bye World");
```

And the following route uses a parameter which is mapped to a Camel header with the key "me".

```
from("rest:get:hello/{me}")
  .transform().simple("Bye ${header.me}");
```

The following examples have configured a base path as "hello" and then have two REST services configured using uriTemplates.

```
from("rest:get:hello:/{me}")
  .transform().simple("Hi ${header.me}");

from("rest:get:hello:/french/{me}")
  .transform().simple("Bonjour ${header.me}");
```

MORE EXAMPLES

See Rest DSL which offers more examples and how you can use the Rest DSL to define those in a nicer RESTful way.

There is a **camel-example-servlet-rest-tomcat** example in the Apache Camel distribution, that demonstrates how to use the Rest DSL with SERVLET as transport that can be deployed on Apache Tomcat, or similar web containers.

CHAPTER 118. RESTLET

RESTLET COMPONENT

The **Restlet** component provides Restlet based endpoints for consuming and producing RESTful resources.

IMPORTANT

The Restlet component enables asynchronous mode by default, but this setting appears to cause a performance hit. If this is an issue, you can set the option, **synchronous=true**, on the endpoint URI to improve performance.

URI FORMAT

```
restlet:restletUrl[?options]
```

Format of restletUrl:

```
protocol://hostname[:port][/resourcePattern]
```

Restlet promotes decoupling of protocol and application concerns. The reference implementation of Restlet Engine supports a number of protocols. However, we have tested the HTTP protocol only. The default port is port 80. We do not automatically switch default port based on the protocol yet.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
headerFilterStrategy=#refName	An instance of **RestletHeaderFilterStrategy**	Use the **#** notation (**headerFilterStrategy=#refName**) to reference a header filter strategy in the Camel Registry. The strategy will be plugged into the restlet binding if it is **HeaderFilterStrategyAware**.
restletBinding=# *refName*	An instance of **DefaultRestletBinding**	The bean ID of a **RestletBinding** object in the Camel Registry.

restletMethod	**GET**	On a producer endpoint, specifies the request method to use. On a consumer endpoint, specifies that the endpoint consumes only **restletMethod** requests. The string value is converted to **org.restlet.data.Method** by the **Method.valueOf(String)** method.
restletMethods	*None*	**Consumer only** Specify one or more methods separated by commas (e.g. **restletMethods=post,put**) to be serviced by a restlet consumer endpoint. If both **restletMethod** and **restletMethods** options are specified, the **restletMethod** setting is ignored.
restletRealm	**null**	Use the # notation (**restletRealm=#***refName*) to specify the bean ID of the Realm Map in the Camel registry.
restletUriPatterns=#refName	*None*	**Consumer only** Specify one ore more URI templates to be serviced by a restlet consumer endpoint, using the **#** notation to reference a **List<String>** in the Camel Registry. If a URI pattern has been defined in the endpoint URI, both the URI pattern defined in the endpoint and the **restletUriPatterns** option will be honored.
throwExceptionOnFailure (**2.6 or later**)	**true**	*Producer only* Throws exception on a producer failure.
connectionTimeout	300000	**Since Camel 2.12.3 Producer only** The Client will give up connection if the connection is timeout, 0 for unlimited wait.
socketTimeout	300000	**Since Camel 2.12.3 Producer only** The Client socket receive timeout, 0 for unlimited wait.

disableStreamCache	**false**	**Camel 2.14:** Determines whether or not the raw input stream from Jetty is cached or not (Camel will read the stream into a in memory/overflow to file, Stream caching) cache. By default Camel will cache the Jetty input stream to support reading it multiple times to ensure it Camel can retrieve all data from the stream. However you can set this option to **true** when you for example need to access the raw stream, such as streaming it directly to a file or other persistent store. DefaultRestletBinding will copy the request input stream into a stream cache and put it into message body if this option is **false** to support reading the stream multiple times.

COMPONENT OPTIONS

The Restlet component can be configured with the following options. Notice these are **component** options and cannot be configured on the endpoint, see further below for an example.

Name	Default Value	Description
controllerDaemon	**true**	**Camel 2.10:** Indicates if the controller thread should be a daemon (not blocking JVM exit).
controllerSleepTimeMs	**100**	**Camel 2.10:** Time for the controller thread to sleep between each control.
inboundBufferSize	**8192**	**Camel 2.10:** The size of the buffer when reading messages.
minThreads	**1**	**Camel 2.10:** Minimum threads waiting to service requests.
maxThreads	**10**	**Camel 2.10:** Maximum threads that will service requests.
lowThreads	**8**	**Camel 2.13:** Number of worker threads determining when the connector is considered overloaded.

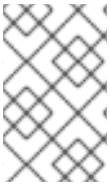
maxQueued	**0**	**Camel 2.13:** Maximum number of calls that can be queued if there aren't any worker thread available to service them. If the value is '0', then no queue is used and calls are rejected if no worker thread is immediately available. If the value is '-1', then an unbounded queue is used and calls are never rejected.
maxConnectionsPerHost	**-1**	**Camel 2.10:** Maximum number of concurrent connections per host (IP address).
maxTotalConnections	**-1**	**Camel 2.10:** Maximum number of concurrent connections in total.
outboundBufferSize	**8192**	**Camel 2.10:** The size of the buffer when writing messages.
persistingConnections	**true**	**Camel 2.10:** Indicates if connections should be kept alive after a call.
pipeliningConnections	**false**	**Camel 2.10:** Indicates if pipelining connections are supported.
threadMaxIdleTimeMs	**60000**	**Camel 2.10:** Time for an idle thread to wait for an operation before being collected.
useForwardedForHeader	**false**	**Camel 2.10:** Lookup the "X-Forwarded-For" header supported by popular proxies and caches and uses it to populate the Request.getClientAddresses() method result. This information is only safe for intermediary components within your local network. Other addresses could easily be changed by setting a fake header and should not be trusted for serious security checks.
reuseAddress	**true**	**Camel 2.10.5/2.11.1:** Enable/disable the SO_REUSEADDR socket option. See java.io.ServerSocket#reuseAddress property for additional details.

disableStreamCache	**false**	**Camel 2.14:** Determines whether or not the raw input stream from Jetty is cached or not (Camel will read the stream into a in memory/overflow to file, Stream caching) cache. By default Camel will cache the Jetty input stream to support reading it multiple times to ensure it Camel can retrieve all data from the stream. However you can set this option to **true** when you for example need to access the raw stream, such as streaming it directly to a file or other persistent store. DefaultRestletBinding will copy the request input stream into a stream cache and put it into message body if this option is **false** to support reading the stream multiple times.

MESSAGE HEADERS

Name	Type	Description
CamelContentType	**String**	Specifies the content type, which can be set on the OUT message by the application/processor. The value is the **content-type** of the response message. If this header is not set, the **content-type** is based on the object type of the OUT message body. In Camel 2.3 onward, if the Content-Type header is specified in the Camel IN message, the value of the header determine the content type for the Restlet request message. nbsp; Otherwise, it is defaulted to "application/x-www-form-urlencoded'. Prior to release 2.3, it is not possible to change the request content type default.
CamelAcceptContentType	**String**	**Since Camel 2.9.3, 2.10.0:** The HTTP Accept request header.
CamelHttpMethod	**String**	The HTTP request method. This is set in the IN message header.

CamelHttpQuery	**String**	The query string of the request URI. It is set on the IN message by **DefaultRestletBinding** when the restlet component receives a request.
CamelHttpResponseCode	**String** or **Integer**	The response code can be set on the OUT message by the application/processor. The value is the response code of the response message. If this header is not set, the response code is set by the restlet runtime engine.
CamelHttpUri	**String**	The HTTP request URI. This is set in the IN message header.
CamelRestletLogin	**String**	Login name for basic authentication. It is set on the IN message by the application and gets filtered before the restlet request header by Apache Camel.
CamelRestletPassword	**String**	Password name for basic authentication. It is set on the IN message by the application and gets filtered before the restlet request header by Apache Camel.
CamelRestletRequest	**Request**	**Camel 2.8:** The **org.restlet.Request** object which holds all request details.
CamelRestletResponse	**Response**	**Camel 2.8:** The **org.restlet.Response** object. You can use this to create responses using the API from Restlet. See examples below.
org.restlet.*		Attributes of a Restlet message that get propagated to Apache Camel IN headers.
cache-control	**String** or **List<CacheDirective>**	**Camel 2.11:** User can set the cache-control with the String value or the List of CacheDirective of Restlet from the camel message header.



NOTE

The underlying Restlet implementation is case sensitive when it comes to parsing header names. For example, to set a the **content-type** header, specify **Content-Type**, and for **location**, specify **Location**, and so on.

MESSAGE BODY

Apache Camel will store the restlet response from the external server on the OUT body. All headers from the IN message will be copied to the OUT message, so that headers are preserved during routing.

RESTLET ENDPOINT WITH AUTHENTICATION

The following route starts a **restlet** consumer endpoint that listens for **POST** requests on http://localhost:8080 . The processor creates a response that echoes the request body and the value of the **id** header.

```
from("restlet:http://localhost:9080/securedOrders?
restletMethod=post&restletRealm=#realm").process(new Processor() {
    public void process(Exchange exchange) throws Exception {
        exchange.getOut().setBody(
                "received [" + exchange.getIn().getBody()
                + "] as an order id = "
                + exchange.getIn().getHeader("id"));
    }
});
```

The **restletRealm** setting in the URI query is used to look up a Realm Map in the registry. If this option is specified, the restlet consumer uses the information to authenticate user logins. Only *authenticated* requests can access the resources. In this sample, we create a Spring application context that serves as a registry. The bean ID of the Realm Map should match the *restletRealmRef*.

```
<util:map id="realm">
 <entry key="admin" value="foo" />
 <entry key="bar" value="foo" />
</util:map>
```

The following sample starts a **direct** endpoint that sends requests to the server on http://localhost:8080 (that is, our restlet consumer endpoint).

```
// Note: restletMethod and restletRealmRef are stripped
// from the query before a request is sent as they are
// only processed by Camel.
from("direct:start-auth").to("restlet:http://localhost:9080/securedOrders?restletMethod=post");
```

That is all we need. We are ready to send a request and try out the restlet component:

```
final String id = "89531";

Map<String, Object> headers = new HashMap<String, Object>();
headers.put(RestletConstants.RESTLET_LOGIN, "admin");
headers.put(RestletConstants.RESTLET_PASSWORD, "foo");
headers.put("id", id);
```

```
String response = (String) template.requestBodyAndHeaders("direct:start-auth",
        "<order foo='1'/>", headers);
```

The sample client sends a request to the **direct:start-auth** endpoint with the following headers:

- **CamelRestletLogin** (used internally by Apache Camel)
- **CamelRestletPassword** (used internally by Apache Camel)
- **id** (application header)

NOTE

org.apache.camel.restlet.auth.login and **org.apache.camel.restlet.auth.password** will not be propagated as Restlet header.

The sample client gets a response like the following:

```
received [<order foo='1'/>] as an order id = 89531
```

SINGLE RESTLET ENDPOINT TO SERVICE MULTIPLE METHODS AND URI TEMPLATES (2.0 OR LATER)

It is possible to create a single route to service multiple HTTP methods using the **restletMethods** option. This snippet also shows how to retrieve the request method from the header:

```
from("restlet:http://localhost:9080/users/{username}?restletMethods=post,get,put")
    .process(new Processor() {
        public void process(Exchange exchange) throws Exception {
            // echo the method
            exchange.getOut().setBody(exchange.getIn().getHeader(Exchange.HTTP_METHOD,
                                                    String.class));

        }
    });
```

In addition to servicing multiple methods, the next snippet shows how to create an endpoint that supports multiple URI templates using the **restletUriPatterns** option. The request URI is available in the header of the IN message as well. If a URI pattern has been defined in the endpoint URI (which is not the case in this sample), both the URI pattern defined in the endpoint and the **restletUriPatterns** option will be honored.

```
from("restlet:http://localhost:9080?restletMethods=post,get&restletUriPatterns=#uriTemplates")
    .process(new Processor() {
        public void process(Exchange exchange) throws Exception {
            // echo the method
            String uri = exchange.getIn().getHeader(Exchange.HTTP_URI, String.class);
            String out = exchange.getIn().getHeader(Exchange.HTTP_METHOD, String.class);
            if ("http://localhost:9080/users/homer".equals(uri)) {
                exchange.getOut().setBody(out + " " + exchange.getIn().getHeader("username",
String.class));
            } else if ("http://localhost:9080/atom/collection/foo/component/bar".equals(uri)) {
```

```
                exchange.getOut().setBody(out + " " + exchange.getIn().getHeader("id", String.class)
                                + " " + exchange.getIn().getHeader("cid", String.class));

            }

        }
    });
```

The **restletUriPatterns=#uriTemplates** option references the **List<String>** bean defined in the Spring XML configuration.

```
<util:list id="uriTemplates">
    <value>/users/{username}</value>
    <value>/atom/collection/{id}/component/{cid}</value>
</util:list>
```

USING RESTLET API TO POPULATE RESPONSE

Available as of Camel 2.8

You may want to use the **org.restlet.Response** API to populate the response. This gives you full access to the Restlet API and fine grained control of the response. See the route snippet below where we generate the response from an inlined Camel Processor:

```
from("restlet:http://localhost:" + portNum + "/users/{id}/like/{beer}")
    .process(new Processor() {
        public void process(Exchange exchange) throws Exception {
            // the Restlet request should be available if neeeded
            Request request = exchange.getIn().getHeader(RestletConstants.RESTLET_REQUEST,
Request.class);
            assertNotNull("Restlet Request", request);

            // use Restlet API to create the response
            Response response =
exchange.getIn().getHeader(RestletConstants.RESTLET_RESPONSE, Response.class);
            assertNotNull("Restlet Response", response);
            response.setStatus(Status.SUCCESS_OK);
            response.setEntity("<response>Beer is Good</response>", MediaType.TEXT_XML);
            exchange.getOut().setBody(response);
        }
    });
```

CONFIGURING MAX THREADS ON COMPONENT

To configure the max threads options you must do this on the component, such as:

```
<bean id="restlet" class="org.apache.camel.component.restlet.RestletComponent">
  <property name="maxThreads" value="100"/>
</bean>
```

USING THE RESTLET SERVLET WITHIN A WEBAPP

Available as of Camel 2.8 There are three possible ways to configure a Restlet application within a servlet container and using the subclassed SpringServerServlet enables configuration within Camel by injecting the Restlet Component.

Use of the Restlet servlet within a servlet container enables routes to be configured with relative paths in URIs (removing the restrictions of hard-coded absolute URIs) and for the hosting servlet container to handle incoming requests (rather than have to spawn a separate server process on a new port).

To configure, add the following to your camel-context.xml;

```
<camelContext>
  <route id="RS_RestletDemo">
    <from uri="restlet:/demo/{id}" />
    <transform>
      <simple>Request type : ${header.CamelHttpMethod} and ID : ${header.id}</simple>
    </transform>
  </route>
</camelContext>

<bean id="RestletComponent" class="org.restlet.Component" />

<bean id="RestletComponentService"
class="org.apache.camel.component.restlet.RestletComponent">
  <constructor-arg index="0">
    <ref bean="RestletComponent" />
  </constructor-arg>
</bean>
```

And add this to your web.xml;

```
<!-- Restlet Servlet -->
<servlet>
  <servlet-name>RestletServlet</servlet-name>
  <servlet-class>org.restlet.ext.spring.SpringServerServlet</servlet-class>
  <init-param>
    <param-name>org.restlet.component</param-name>
    <param-value>RestletComponent</param-value>
  </init-param>
</servlet>

<servlet-mapping>
  <servlet-name>RestletServlet</servlet-name>
  <url-pattern>/rs/*</url-pattern>
</servlet-mapping>
```

You will then be able to access the deployed route at http://localhost:8080/mywebapp/rs/demo/1234 where;

localhost:8080 is the server and port of your servlet container mywebapp is the name of your deployed webapp Your browser will then show the following content;

```
"Request type : GET and ID : 1234"
```

You will need to add dependency on the Spring extension to restlet which you can do in your Maven pom.xml file:

```
<dependency>
  <groupId>org.restlet.jee</groupId>
  <artifactId>org.restlet.ext.spring</artifactId>
  <version>${restlet-version}</version>
</dependency>
```

And you would need to add dependency on the restlet maven repository as well:

```
<repository>
   <id>maven-restlet</id>
   <name>Public online Restlet repository</name>
   <url>http://maven.restlet.org</url>
</repository>
```

CHAPTER 119. RMI

RMI COMPONENT

The **rmi:** component binds Exchanges to the RMI protocol (JRMP).

Since this binding is just using RMI, normal RMI rules still apply regarding what methods can be invoked. This component supports only Exchanges that carry a method invocation from an interface that extends the Remote interface. All parameters in the method should be either Serializable or **Remote** objects.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-rmi</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
rmi://rmi-regisitry-host:rmi-registry-port/registry-path[?options]
```

For example:

```
rmi://localhost:1099/path/to/service
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
method	**null**	As of **Apache Camel 1.3**, you can set the name of the method to invoke.
remoteInterfaces	**null**	Its now possible to use this option from **Camel 2.7:** in the XML DSL. It can be a list of interface names separated by comma.

USING

To call out to an existing RMI service registered in an RMI registry, create a route similar to the following:

```
from("pojo:foo").to("rmi://localhost:1099/foo");
```

To bind an existing camel processor or service in an RMI registry, define an RMI endpoint as follows:

```
RmiEndpoint endpoint= (RmiEndpoint) endpoint("rmi://localhost:1099/bar");
endpoint.setRemoteInterfaces(ISay.class);
from(endpoint).to("pojo:bar");
```

Note that when binding an RMI consumer endpoint, you must specify the **Remote** interfaces exposed.

In XML DSL you can do as follows from **Camel 2.7** onwards:

```
    <camel:route>
        <from uri="rmi://localhost:37541/helloServiceBean?
remoteInterfaces=org.apache.camel.example.osgi.HelloService"/>
        <to uri="bean:helloServiceBean"/>
    </camel:route>
```

CHAPTER 120. ROUTEBOX

ROUTEBOX COMPONENT

Available as of Camel 2.6

ROUTEBOX SUBJECT TO CHANGE

The Routebox component will be revisited in upcoming releases to see if it can be further simplified, be more intuitive and user friendly. The related Context component may be regarded as the simpler component. This component might be deprecated in favor of Context.

The **routebox** component enables the creation of specialized endpoints that offer encapsulation and a strategy based indirection service to a collection of camel routes hosted in an automatically created or user injected camel context.

Routebox endpoints are camel endpoints that may be invoked directly on camel routes. The routebox endpoint performs the following key functions * encapsulation - acts as a blackbox, hosting a collection of camel routes stored in an inner camel context. The inner context is fully under the control of the routebox component and is **JVM bound**. * strategy based indirection - direct payloads sent to the routebox endpoint along a camel route to specific inner routes based on a user defined internal routing strategy or a dispatch map. * exchange propagation - forward exchanges modified by the routebox endpoint to the next segment of the camel route.

The routebox component supports both consumer and producer endpoints.

Producer endpoints are of two flavors * Producers that send or dispatch incoming requests to a external routebox consumer endpoint * Producers that directly invoke routes in an internal embedded camel context thereby not sending requests to an external consumer.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-routebox</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

THE NEED FOR A CAMEL ROUTEBOX ENDPOINT

The routebox component is designed to ease integration in complex environments needing

- a large collection of routes and
- involving a wide set of endpoint technologies needing integration in different ways

In such environments, it is often necessary to craft an integration solution by creating a sense of layering among camel routes effectively organizing them into:

- Coarse grained or higher level routes - aggregated collection of inner or lower level routes exposed as Routebox endpoints that represent an integration focus area. For example:

Focus Area	Coarse-Grained Route Example
Department Focus	HR routes, Sales routes etc
Supply chain & B2B Focus	Shipping routes, Fulfillment routes, 3rd party services etc
Technology Focus	Database routes, JMS routes, Scheduled batch routes etc

- Fine grained routes - routes that execute a singular and specific business and/or integration pattern.

Requests sent to Routebox endpoints on coarse grained routes can then delegate requests to inner fine grained routes to achieve a specific integration objective, collect the final inner result, and continue to progress to the next step along the coarse-grained route.

URI FORMAT

```
routebox:routeboxname[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
dispatchStrategy	**null**	A string representing a key in the Camel Registry matching an object value implementing the interface *org.apache.camel.component.routebox.strategy.RouteboxDispatchStrategy*

dispatchMap	**null**	A string representing a key in the Camel Registry matching an object value of the type HashMap<String, String>. The HashMap key should contain strings that can be matched against the value set for the exchange header **ROUTE_DISPATCH_KEY**. The HashMap value should contain inner route consumer URI's to which requests should be directed.
innerContext	**auto created**	A string representing a key in the Camel Registry matching an object value of the type *org.apache.camel.CamelContext*. If a CamelContext is not provided by the user a CamelContext is automatically created for deployment of inner routes.
innerRegistry	**null**	A string representing a key in the Camel Registry matching an object value that implements the interface *org.apache.camel.spi.Registry*. If Registry values are utilized by inner routes to create endpoints, an innerRegistry parameter must be provided
routeBuilders	**empty List**	A string representing a key in the Camel Registry matching an object value of the type *List<org.apache.camel.builder.RouteBuilder>*. If the user does not supply an innerContext pre-primed with inner routes, the routeBuilders option must be provided as a non-empty list of RouteBuilders containing inner routes
innerProtocol	**Direct**	The Protocol used internally by the Routebox component. Can be Direct or SEDA. **The Routebox component currently offers protocols that are JVM bound.**

sendToConsumer	**true**	Dictates whether a Producer endpoint sends a request to an external routebox consumer. If the setting is false, the Producer creates an embedded inner context and processes requests internally.
forkContext	**true**	The Protocol used internally by the Routebox component. Can be Direct or SEDA. **The Routebox component currently offers protocols that are JVM bound.**
threads	**20**	Number of threads to be used by the routebox to receive requests. **Setting applicable only for innerProtocol SEDA**.
queueSize	**unlimited**	Create a fixed size queue to receive requests. **Setting applicable only for innerProtocol SEDA**.

SENDING/RECEIVING MESSAGES TO/FROM THE ROUTEBOX

Before sending requests it is necessary to properly configure the routebox by loading the required URI parameters into the Registry as shown below. In the case of Spring, if the necessary beans are declared correctly, the registry is automatically populated by Camel.

STEP 1: LOADING INNER ROUTE DETAILS INTO THE REGISTRY

```
@Override
protected JndiRegistry createRegistry() throws Exception {
    JndiRegistry registry = new JndiRegistry(createJndiContext());

    // Wire the routeDefinitions & dispatchStrategy to the outer camelContext where the routebox is
declared
    List<RouteBuilder> routes = new ArrayList<RouteBuilder>();
    routes.add(new SimpleRouteBuilder());
    registry.bind("registry", createInnerRegistry());
    registry.bind("routes", routes);

    // Wire a dispatch map to registry
    HashMap<String, String> map = new HashMap<String, String>();
    map.put("addToCatalog", "seda:addToCatalog");
    map.put("findBook", "seda:findBook");
    registry.bind("map", map);

    // Alternatively wiring a dispatch strategy to the registry
    registry.bind("strategy", new SimpleRouteDispatchStrategy());
```

```
    return registry;
}

private JndiRegistry createInnerRegistry() throws Exception {
    JndiRegistry innerRegistry = new JndiRegistry(createJndiContext());
    BookCatalog catalogBean = new BookCatalog();
    innerRegistry.bind("library", catalogBean);

    return innerRegistry;
}
...
CamelContext context = new DefaultCamelContext(createRegistry());
```

STEP 2: OPTIONALY USING A DISPATCH STRATEGY INSTEAD OF A DISPATCH MAP

Using a dispatch Strategy involves implementing the interface *org.apache.camel.component.routebox.strategy.RouteboxDispatchStrategy* as shown in the example below.

```
public class SimpleRouteDispatchStrategy implements RouteboxDispatchStrategy {

    /* (non-Javadoc)
     * @see
org.apache.camel.component.routebox.strategy.RouteboxDispatchStrategy#selectDestinationUri(java.ut
il.List, org.apache.camel.Exchange)
     */
    public URI selectDestinationUri(List<URI> activeDestinations,
            Exchange exchange) {
        URI dispatchDestination = null;

        String operation = exchange.getIn().getHeader("ROUTE_DISPATCH_KEY", String.class);
        for (URI destination : activeDestinations) {
            if (destination.toASCIIString().equalsIgnoreCase("seda:" + operation)) {
                dispatchDestination = destination;
                break;
            }
        }

        return dispatchDestination;
    }
}
```

STEP 2: LAUNCHING A ROUTEBOX CONSUMER

When creating a route consumer, note that the # entries in the routeboxUri are matched to the created inner registry, routebuilder list and dispatchStrategy/dispatchMap in the CamelContext Registry. Note that all routebuilders and associated routes are launched in the routebox created inner context

```
private String routeboxUri = "routebox:multipleRoutes?
innerRegistry=#registry&routeBuilders=#routes&dispatchMap=#map";
```

```
public void testRouteboxRequests() throws Exception {
    CamelContext context = createCamelContext();
    template = new DefaultProducerTemplate(context);
    template.start();

    context.addRoutes(new RouteBuilder() {
        public void configure() {
            from(routeboxUri)
                .to("log:Routes operation performed?showAll=true");
        }
    });
    context.start();

    // Now use the ProducerTemplate to send the request to the routebox
    template.requestBodyAndHeader(routeboxUri, book, "ROUTE_DISPATCH_KEY",
"addToCatalog");
}
```

STEP 3: USING A ROUTEBOX PRODUCER

When sending requests to the routebox, it is not necessary for producers do not need to know the inner route endpoint URI and they can simply invoke the Routebox URI endpoint with a dispatch strategy or dispatchMap as shown below

It is necessary to set a special exchange Header called **ROUTE_DISPATCH_KEY** (optional for Dispatch Strategy) with a key that matches a key in the dispatch map so that the request can be sent to the correct inner route

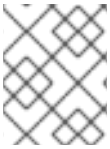
```
from("direct:sendToStrategyBasedRoutebox")
    .to("routebox:multipleRoutes?
innerRegistry=#registry&routeBuilders=#routes&dispatchStrategy=#strategy")
    .to("log:Routes operation performed?showAll=true");

from ("direct:sendToMapBasedRoutebox")
    .setHeader("ROUTE_DISPATCH_KEY", constant("addToCatalog"))
    .to("routebox:multipleRoutes?
innerRegistry=#registry&routeBuilders=#routes&dispatchMap=#map")
    .to("log:Routes operation performed?showAll=true");
```

CHAPTER 121. RSS

RSS COMPONENT

The **rss:** component is used for polling RSS feeds. Apache Camel will default poll the feed every 60th seconds.

Note: The component currently only supports polling (consuming) feeds.



NOTE

Camel-rss internally uses a patched version of ROME hosted on ServiceMix to solve some OSGi class loading issues.

URI FORMAT

```
rss:rssUri
```

Where **rssUri** is the URI to the RSS feed to poll.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Property	Default	Description
splitEntries	**true**	If **true**, Apache Camel splits a feed into its individual entries and returns each entry, poll by poll. For example, if a feed contains seven entries, Apache Camel returns the first entry on the first poll, the second entry on the second poll, and so on. When no more entries are left in the feed, Apache Camel contacts the remote RSS URI to obtain a new feed. If **false**, Apache Camel obtains a fresh feed on every poll and returns all of the feed's entries.

filter	**true**	Use in combination with the **splitEntries** option in order to filter returned entries. By default, Apache Camel applies the **UpdateDateFilter** filter, which returns only new entries from the feed, ensuring that the consumer endpoint never receives an entry more than once. The filter orders the entries chronologically, with the newest returned last.
throttleEntries	**true**	**Camel 2.5:** Sets whether all entries identified in a single feed poll should be delivered immediately. If true, only one entry is processed per consumer.delay. Only applicable when splitEntries is set to true.
lastUpdate	**null**	Use in combination with the **filter** option to block entries earlier than a specific date/time (uses the **entry.updated** timestamp). The format is: **yyyy-MM-ddTHH:MM:ss**. Example: **2007-12-24T17:45:59**.
feedHeader	**true**	Specifies whether to add the ROME **SyndFeed** object as a header.
sortEntries	**false**	If **splitEntries** is **true**, this specifies whether to sort the entries by updated date.
consumer.delay	**60000**	Delay in milliseconds between each poll.
consumer.initialDelay	**1000**	Milliseconds before polling starts.
consumer.userFixedDelay	**false**	Set to **true** to use fixed delay between pools, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.

EXCHANGE DATA TYPES

Apache Camel initializes the In body on the Exchange with a ROME **SyndFeed**. Depending on the value of the **splitEntries** flag, Apache Camel returns either a **SyndFeed** with one **SyndEntry** or a **java.util.List** of **SyndEntrys**.

Option	Value	Behavior
splitEntries	**true**	A single entry from the current feed is set in the exchange.
splitEntries	**false**	The entire list of entries from the current feed is set in the exchange.

MESSAGE HEADERS

Header	Description
CamelRssFeed	Apache Camel 2.0: The entire **SyncFeed** object.

RSS DATAFORMAT

The RSS component ships with an RSS dataformat that can be used to convert between String (as XML) and ROME RSS model objects.

- marshal = from ROME **SyndFeed** to XML **String**
- unmarshal = from XML **String** to ROME **SyndFeed**

A route using this would look something like this:

```
from("rss:file:src/test/data/rss20.xml?
splitEntries=false&consumer.delay=1000").marshal().rss().to("mock:marshal");
```

The purpose of this feature is to make it possible to use Apache Camel's lovely built-in expressions for manipulating RSS messages. As shown below, an XPath expression can be used to filter the RSS message:

```
// only entries with Apache Camel in the title will get through the filter
from("rss:file:src/test/data/rss20.xml?splitEntries=true&consumer.delay=100")
    .marshal().rss().filter().xpath("//item/title[contains(.,'Camel')]").to("mock:result");
```

QUERY PARAMETERS

If the URL for the RSS feed uses query parameters, this component will understand them as well, for example if the feed uses **alt=rss**, then you can for example do **from("rss:http://someserver.com/feeds/posts/default?alt=rss&splitEntries=false&consumer.delay=1000").to("bean:rss");**

FILTERING ENTRIES

You can filter out entries quite easily using XPath, as shown in the data format section above. You can also exploit Apache Camel's Bean Integration to implement your own conditions. For instance, a filter equivalent to the XPath example above would be:

```
// only entries with Camel in the title will get through the filter
from("rss:file:src/test/data/rss20.xml?splitEntries=true&consumer.delay=100").
    filter().method("myFilterBean", "titleContainsCamel").to("mock:result");
```

The custom bean for this would be:

```
public static class FilterBean {
    public boolean titleContainsCamel(@Body SyndFeed feed) {
        SyndEntry firstEntry = (SyndEntry) feed.getEntries().get(0);
        return firstEntry.getTitle().contains("Camel");
    }
}
```

SEE ALSO

- Atom

CHAPTER 122. SALESFORCE

SALESFORCE COMPONENT

Available as of Camel 2.12

This component supports producer and consumer endpoints to communicate with Salesforce using Java DTOs. There is a companion maven plugin Camel Salesforce Plugin that generates these DTOs (see further below).

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-salesforce</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a salesforce component is as follows

```
salesforce:topic?options
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

SUPPORTED SALESFORCE APIS

The component supports the following Salesforce APIs

Producer endpoints can use the following APIs. Most of the APIs process one record at a time, the Query API can retrieve multiple Records.

REST API

- **getVersions** - Gets supported Salesforce REST API versions
- **getResources** - Gets available Salesforce REST Resource endpoints
- **getGlobalObjects** - Gets metadata for all available SObject types
- **getBasicInfo** - Gets basic metadata for a specific SObject type
- **getDescription** - Gets comprehensive metadata for a specific SObject type
- **getSObject** - Gets an SObject using its Salesforce Id
- **createSObject** - Creates an SObject
- **updateSObject** - Updates an SObject using Id
- **deleteSObject** - Deletes an SObject using Id

- **getSObjectWithId** - Gets an SObject using an external (user defined) id field
- **upsertSObject** - Updates or inserts an SObject using an external id
- **deleteSObjectWithId** - Deletes an SObject using an external id
- **query** - Runs a Salesforce SOQL query
- **queryMore** - Retrieves more results (in case of large number of results) using result link returned from the 'query' API
- **search** - Runs a Salesforce SOSL query

For example, the following producer endpoint uses the upsertSObject API, with the sObjectIdName parameter specifying 'Name' as the external id field. The request message body should be an SObject DTO generated using the maven plugin. The response message will either be **null** if an existing record was updated, or **CreateSObjectResult** with an id of the new record, or a list of errors while creating the new object.

```
...to("salesforce:upsertSObject?sObjectIdName=Name")...
```

REST BULK API

Producer endpoints can use the following APIs. All Job data formats, i.e. xml, csv, zip/xml, and zip/csv are supported. The request and response have to be marshalled/unmarshalled by the route. Usually the request will be some stream source like a CSV file, and the response may also be saved to a file to be correlated with the request.

- **createJob** - Creates a Salesforce Bulk Job
- **getJob** - Gets a Job using its Salesforce Id
- **closeJob** - Closes a Job
- **abortJob** - Aborts a Job
- **createBatch** - Submits a Batch within a Bulk Job
- **getBatch** - Gets a Batch using Id
- **getAllBatches** - Gets all Batches for a Bulk Job Id
- **getRequest** - Gets Request data (XML/CSV) for a Batch
- **getResults** - Gets the results of the Batch when its complete
- **createBatchQuery** - Creates a Batch from an SOQL query
- **getQueryResultIds** - Gets a list of Result Ids for a Batch Query
- **getQueryResult** - Gets results for a Result Id

For example, the following producer endpoint uses the createBatch API to create a Job Batch. The in message must contain a body that can be converted into an **InputStream** (usually UTF-8 CSV or XML content from a file, etc.) and header fields 'jobId' for the Job and 'contentType' for the Job content type,

which can be XML, CSV, ZIP_XML or ZIP_CSV. The put message body will contain **BatchInfo** on success, or throw a **SalesforceException** on error.

```
...to("salesforce:createBatchJob")..
```

REST STREAMING API

Consumer endpoints can use the following sytax for streaming endpoints to receive Salesforce notifications on create/update.

To create and subscribe to a topic

```
from("salesforce:CamelTestTopic?
notifyForFields=ALL&notifyForOperations=ALL&sObjectName=Merchandise__c&updateTopic=true&sO
bjectQuery=SELECT Id, Name FROM Merchandise__c")...
```

To subscribe to an existing topic

```
from("salesforce:CamelTestTopic&sObjectName=Merchandise__c")...
```

UPLOADING A DOCUMENT TO A CONTENTWORKSPACE

Create the ContentVersion in Java, using a Processor instance:

```
public class ContentProcessor implements Processor {
    public void process(Exchange exchange) throws Exception {
        Message message = exchange.getIn();

        ContentVersion cv = new ContentVersion();
        ContentWorkspace cw = getWorkspace(exchange);
        cv.setFirstPublishLocationId(cw.getId());
        cv.setTitle("test document");
        cv.setPathOnClient("test_doc.html");
        byte[] document = message.getBody(byte[].class);
        ObjectMapper mapper = new ObjectMapper();
        String enc = mapper.convertValue(document, String.class);
        cv.setVersionDataUrl(enc);
        message.setBody(cv);
    }

    protected ContentWorkspace getWorkSpace(Exchange exchange) {
        // Look up the content workspace somehow, maybe use enrich() to add it to a
        // header that can be extracted here
        ....
    }
}
```

Give the output from the processor to the Salesforce component:

```
from("file:///home/camel/library")
    .to(new ContentProcessor())     // convert bytes from the file into a ContentVersion SObject
                                    // for the salesforce component
    .to("salesforce:createSObject");
```

-

CAMEL SALESFORCE MAVEN PLUGIN

This Maven plug-in generates DTOs for the Camel Salesforce.

USAGE

The plug-in configuration has the following properties.

Option	Description
clientId	Salesforce client Id for Remote API access.
clientSecret	Salesforce client secret for Remote API access.
userName	Salesforce account user name.
password	Salesforce account password (including secret token).
version	Salesforce Rest API version, defaults to 25.0.
outputDirectory	Directory where to place generated DTOs, defaults to **${project.build.directory}/generated-sources/camel-salesforce**.
includes	List of SObject types to include.
excludes	List of SObject types to exclude.
includePattern	Java RegEx for SObject types to include.
excludePattern	Java RegEx for SObject types to exclude.
packageName	Java package name for generated DTOs, defaults to **org.apache.camel.salesforce.dto**.

```
mvn camel-salesforce:generate -DclientId=<clientid> -DclientSecret=<clientsecret> -DuserName=
<username> -Dpassword=<password>
```

The generated DTOs use Jackson and XStream annotations. All Salesforce field types are supported. Date and time fields are mapped to Joda DateTime, and picklist fields are mapped to generated Java Enumerations.

CHAPTER 123. SAP COMPONENT

Abstract

The SAP component is a package consisting of a suite of ten different SAP components. There are remote function call (RFC) components that support the sRFC, tRFC, and qRFC protocols; and there are IDoc components that facilitate communication using messages in IDoc format. The component uses the SAP Java Connector (SAP JCo) library to facilitate bidirectional communication with SAP and the SAP IDoc library to facilitate the transmission of documents in the Intermediate Document (IDoc) format.

123.1. OVERVIEW

Dependencies

Maven users need to add the following dependency to their **pom.xml** file to use this component:

```
<dependency>
  <groupId>org.fusesource</groupId>
  <artifactId>camel-sap</artifactId>
  <version>x.x.x</version>
<dependency>
```

Additional platform restrictions for the SAP component

Because the SAP component depends on the third-party JCo 3.0 and IDoc 3.0 libraries, it can only be installed on the platforms that these libraries support. For more details about the platform restrictions, see Red Hat JBoss Fuse Supported Configurations.

Deploying in a Fuse OSGi Container (non-Fabric)

A prerequisite for using the SAP component is that the SAP Java Connector (SAP JCo) libraries and the SAP IDoc library must be installed into the **lib**/ directory of the Java runtime (**sapjco3.jar**, **libsapjco3.jnilib**, and **sapidoc3.jar**).

You can install the SAP JCo libraries and the SAP IDoc library into the JBoss Fuse OSGi container (non-Fabric) as follows:

1. Download the SAP JCo libraries and the SAP IDoc library from the SAP Service Marketplace (https://websmp210.sap-ag.de/public/connectors), making sure to choose the appropriate version of the libraries for your operating system.

   NOTE

   You require version 3.0.11 or greater of the JCo library and version 3.0.10 or greater of the IDoc library. You must have an *SAP Service Marketplace Account* in order to download and use these libraries.

2. Copy the **sapjco3.jar**, **libsapjco3.jnilib**, and **sapidoc3.jar** library files into the **lib**/ directory of your JBoss Fuse installation.

3. Open both the configuration properties file, **etc**/**config.properties**, and the custom properties

file, **etc/custom.properties**, in a text editor. In the **etc/config.properties** file, look for the **org.osgi.framework.system.packages.extra** property and copy the complete property setting (this setting extends over multiple lines, with a backslash character, \, used to indicate line continuation). Now paste this setting into the **etc/custom.properties** file.

You can now add the extra packages required to support the SAP libraries. In the **etc/custom.properties** file, add the required packages to the **org.osgi.framework.system.packages.extra** setting as shown:

```
org.osgi.framework.system.packages.extra = \
 ... , \
 com.sap.conn.idoc, \
 com.sap.conn.idoc.jco, \
 com.sap.conn.jco, \
 com.sap.conn.jco.ext, \
 com.sap.conn.jco.monitor, \
 com.sap.conn.jco.rt, \
 com.sap.conn.jco.server
```

TIP

Don't forget to include a comma and a backslash, **,** \, at the end of each line preceding the new entries, so that the list is properly continued.

4. You need to restart the container for these changes to take effect.

5. You need to install the **camel-sap** feature in the container. In the Karaf console, enter the following command:

```
JBossFuse:karaf@root> features:install camel-sap
```

Deploying in a Fuse Fabric

A prerequisite for using the SAP component is that the SAP Java Connector (SAP JCo) libraries and the SAP IDoc library must be installed into the **lib**/ directory of the Java runtime (**sapjco3.jar**, **libsapjco3.jnilib**, and **sapidoc3.jar**).

In the case of a Fuse Fabric deployment, this requires some special configuration. There is no point in simply installing the SAP libraries in the Java **lib** directory on a single machine, because Fabric containers need to be deployable anywhere in the network. The correct approach is to define a special profile that is capable of downloading and installing the SAP JCo libraries and the SAP IDoc library on whichever host it is running on.

You can define a profile for the SAP JCo libraries and the SAP IDoc library as follows:

1. Deploy the JCo libraries and the IDoc library (**sapjco3.jar**, **libsapjco3.jnilib**, and **sapidoc3.jar**) to a network accessible location. For example, you could install the libraries in a Web server, so that the JCo libraries and the IDoc library can be downloaded through HTTP URLs, **http://mywebserver/sapjco3.jar**, **http://mywebserver/libsapjco3.jnilib**, and **http://mywebserver/sapidoc3.jar**.

2. Create a new profile, **camel-sap-profile**, by entering the following console command:

```
JBossFuse:karaf@root> profile-create camel-sap-profile
```

3. Edit the agent properties of the **camel-sap-profile** profile, by entering the following console command:

```
JBossFuse:karaf@root> profile-edit camel-sap-profile
```

4. The built-in profile editor starts up. Use this built-in text editor to add the following contents to the agent properties:

```
# Profile:my-camel-sap-profile
attribute.parents = feature-camel

# Deploy JCo3 Libs to Container
lib.sapjco3.jar = http://mywebserver/sapjco3.jar
lib.sapjco3.jnilib = http://mywebserver/libsapjco3.jnilib
lib.sapidoc3.jar = http://mywebserver/sapidoc3.jar

# Append JCo3 Packages and IDoc packages to OSGi system property
# in order to expose JCo3 and IDoc classes to OSGi environment
config.org.osgi.framework.system.packages.extra= \
   ... Packages from etc/config.properties file ...\
   com.sap.conn.jco, \
   com.sap.conn.jco.ext, \
   com.sap.conn.jco.monitor, \
   com.sap.conn.jco.rt, \
   com.sap.conn.jco.server, \
   com.sap.conn.idoc, \
   com.sap.conn.idoc.jco
```

Customize the property settings as follows:

lib.sapjco3.jar

Customize the HTTP URL to the actual location of the **sapjco3.jar** file on your Web server.

lib.sapjco3.jnilib

Customize the HTTP URL to the actual location of the **libsapjco3.jnilib** file on your Web server.

lib.sapidoc3.jar

Customize the HTTP URL to the actual location of the **sapidoc3.jar** file on your Web server.

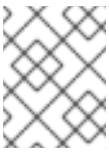
config.org.osgi.framework.system.packages.extra

Open the container configuration properties file, **etc/config.properties**, of your JBoss Fuse installation and look for the **org.osgi.framework.system.packages.extra** property setting. Copy the list of packages from that setting and paste them into the profile's agent properties, replacing the line:

```
   ... Packages from etc/config.properties file ...\
```

NOTE

The **config.*** prefix in **config.org.osgi.framework.system.packages.extra** indicates to Fabric that you are setting a container configuration property in the profile.



NOTE

The backslash, \, is the line continuation character (UNIX convention) and must be followed immediately by a newline character.

Type Ctrl-S to save the properties when you are finished.

5. You can now deploy the **camel-sap-profile** profile to any Fabric container where you want to run the SAP component. For example, to deploy the **camel-sap-profile**profile to the **sap-instance** container:

```
JBossFuse:karaf@root> container-add-profile sap-instance came-sap-profile
```

URI format

There are two different kinds of endpoint provided by the SAP component: the Remote Function Call (RFC) endpoints, and the Intermediate Document (IDoc) endpoints.

The URI formats for the RFC endpoints are as follows:

```
sap-srfc-destination:destinationName:rfcName
sap-trfc-destination:destinationName:rfcName
sap-qrfc-destination:destinationName:queueName:rfcName
sap-srfc-server:serverName:rfcName[?options]
sap-trfc-server:serverName:rfcName[?options]
```

The URI formats for the IDoc endpoints are as follows:

```
sap-idoc-
destination:destinationName:idocType[:idocTypeExtension[:systemRelease[:applicationRelease]]]
sap-idoclist-
destination:destinationName:idocType[:idocTypeExtension[:systemRelease[:applicationRelease]]]
sap-qidoc-
destination:destinationName:queueName:idocType[:idocTypeExtension[:systemRelease[:applicationR
elease]]]
sap-qidoclist-
destination:destinationName:queueName:idocType[:idocTypeExtension[:systemRelease[:applicationR
elease]]]
sap-idoclist-server:serverName:idocType[:idocTypeExtension[:systemRelease[:applicationRelease]]]
[?options]
```

The URI formats prefixed by **sap-*endpointKind*-destination** are used to define destination endpoints (in other words, Camel producer endpoints) and ***destinationName*** is the name of a specific outbound connection to an SAP instance. Outbound connections are named and configured at the component level, as described in Section 123.2.2, “Destination Configuration”.

The URI formats prefixed by **sap-*endpointKind*-server** are used to define server endpoints (in other

words, Camel consumer endpoints) and ***serverName*** is the name of a specific inbound connection from an SAP instance. Inbound connections are named and configured at the component level, as described in the Section 123.2.3, “Server Configuration”.

The other components of an RFC endpoint URI are as follows:

rfcName

(Required) In a destination endpoint URI, is the name of the RFC invoked by the endpoint in the connected SAP instance. In a server endpoint URI, is the name of the RFC handled by the endpoint when invoked from the connected SAP instance.

queueName

Specifies the queue this endpoint sends an SAP request to.

The other components of an IDoc endpoint URI are as follows:

idocType

(Required) Specifies the Basic IDoc Type of an IDoc produced by this endpoint.

idocTypeExtension

Specifies the IDoc Type Extension, if any, of an IDoc produced by this endpoint.

systemRelease

Specifies the associated SAP Basis Release, if any, of an IDoc produced by this endpoint.

applicationRelease

Specifes the associated Application Release, if any, of an IDoc produced by this endpoint.

queueName

Specifies the queue this endpoint sends an SAP request to.

Options for RFC destination endpoints

The RFC destination endpoints (**sap-srfc-destination**, **sap-trfc-destination**, and **sap-qrfc-destination**) support the following URI options:

Name	Default	Description
stateful	**false**	If **true**, specifies that this endpoint initiates an SAP stateful session
transacted	**false**	If **true**, specifies that this endpoint initiates an SAP transaction

Options for RFC server endpoints

The SAP RFC server endpoints (**sap-srfc-server** and **sap-trfc-server**) support the following URI options:

Name	Default	Description
stateful	**false**	If **true**, specifies that this endpoint initiates an SAP stateful session.
propagateExceptions	**false**	*(sap-trfc-server endpoint only)* If **true**, specifies that this endpoint propagates exceptions back to the caller in SAP, instead of the exchange's exception handler

Options for the IDoc List Server endpoint

The SAP IDoc List Server endpoint (**sap-idoclist-server**) supports the following URI options:

Name	Default	Description
propagateExceptions	**false**	If **true**, specifies that this endpoint propagates exceptions back to the caller in SAP, instead of the exchange's exception handler

Summary of the RFC and IDoc endpoints

The SAP component package provides the following RFC and IDoc endpoints:

sap-srfc-destination

JBoss Fuse SAP Synchronous Remote Function Call Destination Camel component. This endpoint should be used in cases where Camel routes require synchronous delivery of requests to and responses from an SAP system.

NOTE

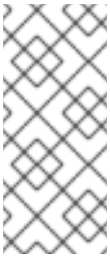
The sRFC protocol used by this component delivers requests and responses to and from an SAP system with *best effort*. In case of a communication error while sending a request, the completion status of a remote function call in the receiving SAP system remains *in doubt*.

sap-trfc-destination

JBoss Fuse SAP Transactional Remote Function Call Destination Camel component. This endpoint should be used in cases where requests must be delivered to the receiving SAP system *at most once*. To accomplish this, the component generates a transaction ID, **tid**, which accompanies every request sent through the component in a route's exchange. The receiving SAP system records the **tid** accompanying a request before delivering the request; if the SAP system receives the request again with the same **tid** it will not deliver the request. Thus if a route encounters a communication error when sending a request through an endpoint of this component, it can retry sending the request within the same exchange knowing it will be delivered and executed only once.

NOTE

The tRFC protocol used by this component is asynchronous and does not return a response. Thus the endpoints of this component do not return a response message.

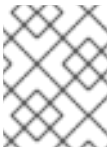


NOTE

This component does not guarantee the order of a series of requests through its endpoints, and the delivery and execution order of these requests may differ on the receiving SAP system due to communication errors and resends of a request. For guaranteed delivery order, please see the JBoss Fuse SAP Queued Remote Function Call Destination Camel component.

sap-qrfc-destination

JBoss Fuse SAP Queued Remote Function Call Destination Camel component. This component extends the capabilities of the JBoss Fuse Transactional Remote Function Call Destination camel component by adding *in order* delivery guarantees to the delivery of requests through its endpoints. This endpoint should be used in cases where a series of requests depend on each other and must be delivered to the receiving SAP system *at most once* and *in order*. The component accomplishes the *at most once* delivery guarantees using the same mechanisms as the JBoss Fuse SAP Transactional Remote Function Call Destination Camel component. The ordering guarantee is accomplished by serializing the requests in the order they are received by the SAP system to an *inbound queue*. Inbound queues are processed by the *QIN scheduler* within SAP. When the inbound queue is *activated*, the QIN Scheduler will execute the queue requests in order.



NOTE

The qRFC protocol used by this component is asynchronous and does not return a response. Thus the endpoints of this component do not return a response message.

sap-srfc-server

JBoss Fuse SAP Synchronous Remote Function Call Server Camel component. This component and its endpoints should be used in cases where a Camel route is required to synchronously handle requests from and responses to an SAP system.

sap-trfc-server

JBoss Fuse SAP Transactional Remote Function Call Server Camel component. This endpoint should be used in cases where the sending SAP system requires *at most once* delivery of its requests to a Camel route. To accomplish this, the sending SAP system generates a transaction ID, **tid**, which accompanies every request it sends to the component's endpoints. The sending SAP system will first check with the component whether a given **tid** has been received by it before sending a series of requests associated with the **tid**. The component will check the list of received **tid**s it maintains, record the sent **tid** if it is not in that list, and then respond to the sending SAP system, indicating whether or not the **tid** had already been recorded. The sending SAP system will only then send the series of requests, if the **tid** has not been previously recorded. This enables a sending SAP system to reliably send a series of requests once to a camel route.

sap-idoc-destination

JBoss Fuse SAP IDoc Destination Camel component. This endpoint should be used in cases where a Camel route is required to send a list of Intermediate Documents (IDocs) to an SAP system.

sap-idoclist-destination

JBoss Fuse SAP IDoc List Destination Camel component. This endpoint should be used in cases where a Camel route is required to send a list of Intermediate documents (IDocs) list to an SAP system.

sap-qidoc-destination

JBoss Fuse SAP Queued IDoc Destination Camel component. This component and its endpoints should be used in cases where a Camel route is required to send a list of Intermediate documents (IDocs) to an SAP system in order.

sap-qidoclist-destination

JBoss Fuse SAP Queued IDoc List Destination Camel component. This component and its endpoints should be used in cases where a camel route is required to send a list of Intermediate documents (IDocs) list to an SAP system in order.

sap-idoclist-server

JBoss Fuse SAP IDoc List Server Camel component. This endpoint should be used in cases where a sending SAP system requires delivery of Intermediate Document lists to a Camel route. This component uses the tRFC protocol to communicate with SAP as described in the `sap-trfc-server-standalone` quick start.

SAP RFC destination endpoint

An RFC destination endpoint supports outbound communication to SAP, which enable these endpoints to make RFC calls out to ABAP function modules in SAP. An RFC destination endpoint is configured to make an RFC call to a specific ABAP function over a specific connection to an SAP instance. An RFC destination is a logical designation for an outbound connection and has a unique name. An RFC destination is specified by a set of connection parameters called *destination data*.

An RFC destination endpoint will extract an RFC request from the input message of the IN-OUT exchanges it receives and dispatch that request in a function call to SAP. The response from the function call will be returned in the output message of the exchange. Since SAP RFC destination endpoints only support outbound communication, an RFC destination endpoint only supports the creation of producers.

SAP RFC server endpoint

An RFC server endpoint supports inbound communication from SAP, which enables ABAP applications in SAP to make RFC calls into server endpoints. An ABAP application interacts with an RFC server endpoint as if it were a remote function module. An RFC server endpoint is configured to receive an RFC call to a specific RFC function over a specific connection from an SAP instance. An RFC server is a logical designation for an inbound connection and has a unique name. An RFC server is specified by a set of connection parameters called *server data*.

An RFC server endpoint will handle an incoming RFC request and dispatch it as the input message of an IN-OUT exchange. The output message of the exchange will be returned as the response of the RFC call. Since SAP RFC server endpoints only support inbound communication, an RFC server endpoint only supports the creation of consumers.

SAP IDoc and IDoc list destination endpoints

An IDoc destination endpoint supports outbound communication to SAP, which can then perform further processing on the IDoc message. An IDoc document represents a business transaction, which can easily be exchanged with non-SAP systems. An IDoc destination is specified by a set of connection parameters called *destination data*.

An IDoc list destination endpoint is similar to an IDoc destination endpoint, except that the messages it handles consist of a *list* of IDoc documents.

SAP IDoc list server endpoint

An IDoc list server endpoint supports inbound communication from SAP, enabling a Camel route to receive a list of IDoc documents from an SAP system. An IDoc list server is specified by a set of connection parameters called *server data*.

Meta-data repositories

A meta-data repository is used to store the following kinds of meta-data:

Interface descriptions of function modules

This meta-data is used by the JCo and ABAP runtimes to check RFC calls to ensure the type-safe transfer of data between communication partners before dispatching those calls. A repository is populated with repository data. Repository data is a map of named function templates. A function template contains the meta-data describing all the parameters and their typing information passed to and from a function module and has the unique name of the function module it describes.

IDoc type descriptions

This meta-data is used by the IDoc runtime to ensure that the IDoc documents are correctly formatted before being sent to a communication partner. A basic IDoc type consists of a name, a list of permitted segments, and a description of the hierarchical relationship between the segments. Some additional constraints can be imposed on the segments: a segment can be mandatory or optional; and it is possible to specify a minimum/maximum range for each segment (defining the number of allowed repetitions of that segment).

SAP destination and server endpoints thus require access to a repository, in order to send and receive RFC calls and in order to send and receive IDoc documents. For RFC calls, the meta-data for all function modules invoked and handled by the endpoints must reside within the repository; and for IDoc endpoints, the meta-data for all IDoc types and IDoc type extensions handled by the endpoints must reside within the repository. The location of the repository used by a destination and server endpoint is specified in the destination data and the server data of their respective connections.

In the case of an SAP destination endpoint, the repository it uses typically resides in an SAP system and it defaults to the SAP system it is connected to. This default requires no explicit configuration in the destination data. Furthermore, the meta-data for the remote function call that a destination endpoint makes will already exist in a repository for any existing function module that it calls. The meta-data for calls made by destination endpoints thus require no configuration in the SAP component.

On the other hand, the meta-data for function calls handled by server endpoints do not typically reside in the repository of an SAP system and must instead be provided by a repository residing in the SAP component. The SAP component maintains a map of named meta-data repositories. The name of a repository corresponds to the name of the server to which it provides meta-data.

123.2. CONFIGURATION

Abstract

The SAP component maintains three maps to store destination data, server data and repository data. The *destination data store* and the *server data store* are configured on a special configuration object, **SapConnectionConfiguration**, which automatically gets injected into the SAP component (in the context of Blueprint XML configuration or Spring XML configuration files). The *repository data store* must be configured directly on the relevant SAP component.

123.2.1. Configuration Overview

Overview

The SAP component maintains three maps to store destination data, server data and repository data. The component's property, **destinationDataStore**, stores destination data keyed by destination name, the property, **serverDataStore**, stores server data keyed by server name and the property, **repositoryDataStore**, stores repository data keyed by repository name. These configurations must be passed to the component during its initialization.

Example

The following example shows how to configure a sample destination data store and a sample server data store in a Blueprint XML file. The **sap-configuration** bean (of type **SapConnectionConfiguration**) will automatically be injected into any SAP component that is used in this XML file.

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint ... >
    ...
    <!-- Configures the Inbound and Outbound SAP Connections -->
    <bean id="sap-configuration"
        class="org.fusesource.camel.component.sap.SapConnectionConfiguration">
        <property name="destinationDataStore">
            <map>
                <entry key="quickstartDest" value-ref="quickstartDestinationData" />
            </map>
        </property>
        <property name="serverDataStore">
            <map>
                <entry key="quickstartServer" value-ref="quickstartServerData" />
            </map>
        </property>
    </bean>

    <!-- Configures an Outbound SAP Connection -->
    <!-- *** Please enter the connection property values for your environment *** -->
    <bean id="quickstartDestinationData"
        class="org.fusesource.camel.component.sap.model.rfc.impl.DestinationDataImpl">
        <property name="ashost" value="example.com" />
        <property name="sysnr" value="00" />
        <property name="client" value="000" />
        <property name="user" value="username" />
        <property name="passwd" value="passowrd" />
        <property name="lang" value="en" />
    </bean>

    <!-- Configures an Inbound SAP Connection -->
    <!-- *** Please enter the connection property values for your environment ** -->
    <bean id="quickstartServerData"
        class="org.fusesource.camel.component.sap.model.rfc.impl.ServerDataImpl">
        <property name="gwhost" value="example.com" />
        <property name="gwserv" value="3300" />
        <!-- The following property values should not be changed -->
        <property name="progid" value="QUICKSTART" />
        <property name="repositoryDestination" value="quickstartDest" />
```

```
        <property name="connectionCount" value="2" />
    </bean>
</blueprint>
```

123.2.2. Destination Configuration

Overview

The configurations for destinations are maintained in the **destinationDataStore** property of the SAP component. Each entry in this map configures a distinct outbound connection to an SAP instance. The key for each entry is the name of the outbound connection and is used in the ***destinationName*** component of a destination endpoint URI as described in the URI format section.

The value for each entry is a destination data configuration object - **org.fusesource.camel.component.sap.model.rfc.impl.DestinationDataImpl** - that specifies the configuration of an outbound SAP connection.

Sample destination configuration

The following Blueprint XML code shows how to configure a sample destination with the name, **quickstartDest**.

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint ... >
    ...
    <!-- Configures the Inbound and Outbound SAP Connections -->
    <bean id="sap-configuration"
        class="org.fusesource.camel.component.sap.SapConnectionConfiguration">
        <property name="destinationDataStore">
            <map>
                <entry key="quickstartDest" value-ref="quickstartDestinationData" />
            </map>
        </property>
    </bean>

    <!-- Configures an Outbound SAP Connection -->
    <!-- *** Please enter the connection property values for your environment
        *** -->
    <bean id="quickstartDestinationData"
        class="org.fusesource.camel.component.sap.model.rfc.impl.DestinationDataImpl">
        <property name="ashost" value="example.com" />
        <property name="sysnr" value="00" />
        <property name="client" value="000" />
        <property name="user" value="username" />
        <property name="passwd" value="password" />
        <property name="lang" value="en" />
    </bean>

</blueprint>
```

For example, after configuring the destination as shown in the preceding Blueprint XML file, you could invoke the **BAPI_FLCUST_GETLIST** remote function call on the **quickstartDest** destination using the following URI:

sap-srfc-destination:quickstartDest:BAPI_FLCUST_GETLIST

Logon and authentication options

Name	Default Value	Des
client		SAP client, mandatory logon parameter
user		Logon user, logon parameter for passwor
aliasUser		Logon user alias, can be used instead of
userId		User identity which is used for logon to th destination configuration uses SSO/asser environment for authentication. The user is set. This ID will never be sent to the SA locally.
passwd		Logon password, logon parameter for pas
lang		Logon language, if not defined, the defau
mysapsso2		Use the specified SAP Cookie Version 2
x509cert		Use the specified X509 certificate for cert
lcheck		Postpone the authentication until the first
useSapGui		Use a visible, hidden, or do not use SAP
codePage		Additional logon parameter to define the parameters. Used in special cases only
getsso2		Order a SSO ticket after logon, the obtain attributes
denyInitialPassword		If set to **1**, using initial passwords will lead

Connection options

Name	Default Value	Des
saprouter		SAP Router string for connection to syste contains the chain of SAP Routers and its **[/S/<port>])+**

sysnr		System number of the SAP ABAP applica
ashost		SAP ABAP application server, mandatory
mshost		SAP message server, mandatory propert
msserv		SAP message server port, optional prope resolve the service names sapmsXXX a l network layer of the operating system. If u names, no look-ups are performed and n
gwhost		Allows specifying a concrete gateway, wh connection to an application server. If not server is used
gwserv		Should be set, when using gwhost. Allow not specified the port of the gateway on th resolve the service names sapgwXXX a l network layer of the operating system. If u names, no lookups are performed and no
r3name		System ID of the SAP system, mandatory
group		Group of SAP application servers, manda

Connection pool options

Name	Default Value	Des
peakLimit	**0**	Maximum number of active outbound cor simultaneously. A value of **0** allows an ur otherwise if the value is less than the valu increased to this value. Default setting is **poolCapacity** not being specified as we
poolCapacity	**1**	Maximum number of idle outbound conne **0** has the effect that there is no connectio
expirationTime		Time in milliseconds after which a free co be closed
expirationPeriod		Period in milliseconds after which the des expiration.
maxGetTime		Maximum time in milliseconds to wait for of connections has already been allocate

Secure network connection options

Name	Default Value	Des
sncMode		Secure network connection (SNC) mode,
sncPartnername		SNC partner, for example: **p:CN=R3, O**
sncQop		SNC level of security: **1** to **9**
sncMyname		Own SNC name. Overrides environment
sncLibrary		Path to library that provides SNC service

Repository options

Name	Default Value	Des
repositoryDest		Specifies which destination should be use
repositoryUser		If a repository destination is not set, and t repository calls. This enables you to use
repositoryPasswd		The password for a repository user. Manc
repositorySnc		*(Optional)* If SNC is used for this destinat connections, if this property is set to **0**. De **jco.client.snc**_mode. For special cases
repositoryRoundtripOptimization		Enable the **RFC_METADATA_GET** AP single round trip. **1** Activates use of **RFC_METADATA_** **0** Deactivates **RFC_METADATA_GE** If the property is not set, the destination i **RFC_METADATA_GET** is available. If **Note:** If the repository is already initialize other destination) this property does not h related to the ABAP System, and should pointing to the same ABAP System. See

Trace configuration options

Name	Default Value	Des
trace		Enable/disable RFC trace (**0** or **1**)
cpicTrace		Enable/disable CPIC trace **[0..3]**

123.2.3. Server Configuration

Overview

The configurations for servers are maintained in the **serverDataStore** property of the SAP component. Each entry in this map configures a distinct inbound connection from an SAP instance. The key for each entry is the name of the outbound connection and is used in the **serverName** component of a server endpoint URI as described in the URI format section.

The value for each entry is a *server data configuration object*, **org.fusesource.camel.component.sap.model.rfc.impl.ServerDataImpl**, that defines the configuration of an inbound SAP connection.

Sample server configuration

The following Blueprint XML code shows how to create a sample server configuration with the name, **quickstartServer**.

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint ... >
    ...
    <!-- Configures the Inbound and Outbound SAP Connections -->
    <bean id="sap-configuration"
        class="org.fusesource.camel.component.sap.SapConnectionConfiguration">
        <property name="destinationDataStore">
            <map>
                <entry key="quickstartDest" value-ref="quickstartDestinationData" />
            </map>
        </property>
        <property name="serverDataStore">
            <map>
                <entry key="quickstartServer" value-ref="quickstartServerData" />
            </map>
        </property>
    </bean>

    <!-- Configures an Outbound SAP Connection -->
    <!-- *** Please enter the connection property values for your environment *** -->
    <bean id="quickstartDestinationData"
        class="org.fusesource.camel.component.sap.model.rfc.impl.DestinationDataImpl">
        <property name="ashost" value="example.com" />
        <property name="sysnr" value="00" />
        <property name="client" value="000" />
        <property name="user" value="username" />
        <property name="passwd" value="passowrd" />
        <property name="lang" value="en" />
    </bean>
```

```
    <!-- Configures an Inbound SAP Connection -->
    <!-- *** Please enter the connection property values for your environment ** -->
    <bean id="quickstartServerData"
       class="org.fusesource.camel.component.sap.model.rfc.impl.ServerDataImpl">
       <property name="gwhost" value="example.com" />
       <property name="gwserv" value="3300" />
       <!-- The following property values should not be changed -->
       <property name="progid" value="QUICKSTART" />
       <property name="repositoryDestination" value="quickstartDest" />
       <property name="connectionCount" value="2" />
    </bean>
</blueprint>
```

Notice how this example also configures a destination connection, **quickstartDest**, which the server uses to retrieve meta-data from a remote SAP instance. This destination is configured in the server data through the **repositoryDestination** option. If you do not configure this option, you would need to create a local meta-data repository instead (see Section 123.2.4, “Repository Configuration”).

For example, after configuring the destination as shown in the preceding Blueprint XML file, you could handle the **BAPI_FLCUST_GETLIST** remote function call from an invoking client, using the following URI:

```
sap-srfc-server:quickstartServer:BAPI_FLCUST_GETLIST
```

Required options

The required options for the server data configuration object are, as follows:

Name	Default Value	Des
gwhost		Gateway host on which the server conne
gwserv		Gateway service, which is the port on wh resolve the service names **sapgwXXX**, network layer of the operating system. If names, no look-ups are performed and n
progid		The program ID with which the registratio and in the destination in the ABAP syste
repositoryDestination		Specifies a destination name that the ser a meta-data repository hosted in a remot
connectionCount		The number of connections that should b

Secure network connection options

The secure network connection options for the server data configuration object are, as follows:

Name	Default Value	Des
sncMode		Secure network connection (SNC) mode,
sncQop		SNC level of security, **1** to **9**
sncMyname		SNC name of your server. Overrides the **p:CN=JCoServer, O=ACompany, C**
sncLib		Path to library which provides SNC servic the **jco.middleware.snc_lib** property i

Other options

The other options for the server data configuration object are, as follows:

Name	Default Value	Des
saprouter		SAP router string to use for a system prof be reached through a SAProuter, when re ABAP System. A typical router string is **/H**
maxStartupDelay		The maximum time (in seconds) between waiting time is doubled from initially 1 sec maximum value is reached or the server
trace		Enable/disable RFC trace (**0** or **1**)
workerThreadCount		The maximum number of threads used by the **connectionCount** is used as the **w** of threads can not exceed 99.
workerThreadMinCount		The minimum number of threads used by **connectionCount** is used as the **work**

123.2.4. Repository Configuration

Overview

The configuration for repositories are maintain in the **repositoryDataStore** property of the SAP Component. Each entry in this map configures a distinct repository. The key for each entry is the name of the repository and this key also corresponds to the name of server to which this repository is attached.

The value of each entry is a repository data configuration object, **org.fusesource.camel.component.sap.model.rfc.impl.RepositoryDataImpl**, that defines the contents of a meta-data repository. A repository data object is a map of function template configuration objects, **org.fuesource.camel.component.sap.model.rfc.impl.FunctionTemplateImpl**. Each entry in this map specifies the interface of a function module and the key for each entry is the name of the function module specified.

Repository data example

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint ... >
    ...
    <!-- Configures the sap-srfc-server component -->
    <bean id="sap-srfc-server"
        class="org.fusesource.camel.component.sap.SapSynchronousRfcServerComponent">
        <property name="repositoryDataStore">
            <map>
                <entry key="nplServer" value-ref="nplRepositoryData" />
            </map>
        </property>
    </bean>

    <!-- Configures a Meta-Data Repository -->
    <bean id="nplRepositoryData"
        class="org.fusesource.camel.component.sap.model.rfc.impl.RepositoryDataImpl">
        <property name="functionTemplates">
            <map>
                <entry key="BOOK_FLIGHT" value-ref="bookFlightFunctionTemplate" />
            </map>
        </property>
    </bean>
    ...
</blueprint>
```

Function template properties

The interface of a function module consists of four parameter lists by which data is transferred back and forth to the function module in an RFC call. Each parameter list consists of one or more fields, each of which is a named parameter transferred in an RFC call. The following parameter lists and exception list are supported:

- The *import parameter list* contains parameter values that are sent to a function module in an RFC call;
- The *export parameter list* contains parameter values that are returned by a function module in an RFC call;
- The *changing parameter list* contains parameter values that are sent to and returned by a function module in an RFC call;
- The *table parameter list* contains internal table values that are sent to and returned by a function module in an RFC call.
- The interface of a function module also consists of an *exception list* of ABAP exceptions that may be raised when the module is invoked in an RFC call.

A function template describes the name and type of parameters in each parameter list of a function interface and the ABAP exceptions thrown by the function. A function template object maintains five property lists of meta-data objects, as described in the following table.

Property	Descrip

importParameterList	A list of list field meta-data objects, **org.fusesource.camel.component.sap.mod** Specifies the parameters that are sent in an RFC c
changingParameterList	A list of list field meta-data objects, **org.fusesource.camel.component.sap.mod** Specifies the parameters that sent and returned in
exportParameterList	A list of list field meta-data objects, **org.fusesource.camel.component.sap.mod** Specifies the parameters that are returned in an RF
tableParameterList	A list of list field meta-data objects, **org.fusesource.camel.component.sap.mod** Specifies the table parameters that are sent and re module.
exceptionList	A list of ABAP exception meta-data objects, **org.fusesource.camel.component.sap.mod** the ABAP exceptions potentially raised in an RFC c

Function template example

The following example shows an outline of how to configure a function template:

```
<bean id="bookFlightFunctionTemplate"
    class="org.fusesource.camel.component.sap.model.rfc.impl.FunctionTemplateImpl">
    <property name="importParameterList">
        <list>
            ...
        </list>
    </property>
    <property name="changingParameterList">
        <list>
            ...
        </list>
    </property>
    <property name="exportParameterList">
        <list>
            ...
        </list>
    </property>
    <property name="tableParameterList">
        <list>
            ...
        </list>
    </property>
    <property name="exceptionList">
        <list>
            ...
```

```
        </list>
      </property>
    </bean>
```

List field meta-data properties

A list field meta-data object, **org.fusesource.camel.component.sap.model.rfc.impl.ListFieldMeataDataImpl**, specifies the name and type of a field in a parameter list. For an elementary parameter field (**CHAR**, **DATE**, **BCD**, **TIME**, **BYTE**, **NUM**, **FLOAT**, **INT**, **INT1**, **INT2**, **DECF16**, **DECF34**, **STRING**, **XSTRING**), the following table lists the configuration properties that may be set on a list field meta-data object:

Name	Default Value	Des
name	-	The name of the parameter field.
type	-	The parameter type of the field.
byteLength	-	The field length in bytes for a non-Unicod parameter type. See Section 123.3, “Mes
unicodeByteLength	-	The field length in bytes for a Unicode lay type. See Section 123.3, “Message Body
decimals	**0**	The number of decimals in field value; on FLOAT. See Section 123.3, “Message Bo
optional	**false**	If **true**, the field is optional and need not

Note that all elementary parameter fields require that the **name**, **type**, **byteLength** and **unicodeByteLength** properties be specified in the field meta-data object. In addition, the **BCD**, **FLOAT**, **DECF16** and **DECF34** fields require the decimal property to be specified in the field meta-data object.

For a complex parameter field of type **TABLE** or **STRUCTURE**, the following table lists the configuration properties that may be set on a list field meta-data object:

Name	Default Value	Des
name	-	The name of the parameter field
type	-	The parameter type of the field
recordMetaData	-	The meta-data for the structure or table. A **org.fusesource.camel.component.s** , is passed to specify the fields in the stru
optional	**false**	If **true**, the field is optional and need not

Note that all complex parameter fields require that the **name**, **type** and **recordMetaData** properties be specified in the field meta-data object. The value of the **recordMetaData** property is a record field meta-data object, **org.fusesource.camel.component.sap.model.rfc.impl.RecordMetaDataImpl**, which specifies the structure of a nested structure or the structure of a table row.

Elementary list field meta-data example

The following meta-data configuration specifies an optional, 24-digit packed BCD number parameter with two decimal places named **TICKET_PRICE**:

```
<bean    class="org.fusesource.camel.component.sap.model.rfc.impl.ListFieldMetaDataImpl">
   <property name="name" value="TICKET_PRICE" />
   <property name="type" value="BCD" />
   <property name="byteLength" value="12" />
   <property name="unicodeByteLength" value="24" />
   <property name="decimals" value="2" />
   <property name="optional" value="true" />
</bean>
```

Complex list field meta-data example

The following meta-data configuration specifies a required **TABLE** parameter named **CONNINFO** with a row structure specified by the **connectionInfo** record meta-data object:

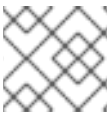
```
<bean    class="org.fusesource.camel.component.sap.model.rfc.impl.ListFieldMetaDataImpl">
   <property name="name" value="CONNINFO" />
   <property name="type" value="TABLE" />
   <property name="recordMetaData" ref="connectionInfo" />
</bean>
```

Record meta-data properties

A record meta-data object, **org.fusesource.camel.component.sap.model.rfc.impl.RecordMetaDataImpl**, specifies the name and contents of a nested **STRUCTURE** or the row of a **TABLE** parameter. A record meta-data object maintains a list of record field meta data objects, **org.fusesource.camel.component.sap.model.rfc.impl.FieldMetaDataImpl**, which specify the parameters that reside in the nested structure or table row.

The following table lists configuration properties that may be set on a record meta-data object:

Name	Default Value	Des
name	-	The name of the record.
recordFieldMetaData	-	The list of record field meta-data objects, **org.fusesource.camel.component.s** Specifies the fields contained within the s



NOTE

All properties of the record meta-data object are required.

Record meta-data example

The following example shows how to configure a record meta-data object:

```
<bean    id="connectionInfo"
        class="org.fusesource.camel.component.sap.model.rfc.impl.RecordMetaDataImpl">
    <property name="name" value="CONNECTION_INFO" />
    <property name="recordFieldMetaData">
        <list>
            ...
        </list>
    </property>
</bean>
```

Record field meta-data properties

A record field meta-data object, **org.fusesource.camel.component.sap.model.rfc.impl.FieldMetaDataImpl**, specifies the name and type of a parameter field withing a structure.

A record field meta-data object is similar to a parameter field meta-data object, except that the offsets of the individual field locations within the nested structure or table row must be additionally specified. The non-Unicode and Unicode offsets of an individual field must be calculated and specified from the sum of non-Unicode and Unicode byte lengths of the preceding fields in the structure or row. Note that failure to properly specify the offsets of fields in nested structures and table rows will cause the field storage of parameters in the underlying JCo and ABAP runtimes to overlap and prevent the proper transfer of values in RFC calls.

For an elementary parameter field (**CHAR**, **DATE**, **BCD**, **TIME**, **BYTE**, **NUM**, **FLOAT**, **INT**, **INT1**, **INT2**, **DECF16**, **DECF34**, **STRING**, **XSTRING**), the following table lists the configuration properties that may be set on a record field meta-data object:

Name	Default Value	Des
name	-	The name of the parameter field
type	-	The parameter type of the field
byteLength	-	The field length in bytes for a non-Unicod parameter type. See Section 123.3, “Mes
unicodeByteLength	-	The field length in bytes for a Unicode lay type. See Section 123.3, “Message Body
byteOffset	-	The field offset in bytes for non-Unicode l field within the enclosing structure.
unicodeByteOffset	-	The field offset in bytes for Unicode layou within the enclosing structure.
decimals	**0**	The number of decimals in field value; on **FLOAT**. See Section 123.3, “Message E

For a complex parameter field of type **TABLE** or **STRUCTURE**, the following table lists the configuration properties that may be set on a record field meta-data object:

Name	Default Value	Des
name	-	The name of the parameter field
type	-	The parameter type of the field
byteOffset	-	The field offset in bytes for non-Unicode l field within the enclosing structure.
unicodeByteOffset	-	The field offset in bytes for Unicode layou within the enclosing structure.
recordMetaData	-	The meta-data for the structure or table. **org.fusesource.camel.component.s** , is passed to specify the fields in the stru

Elementary record field meta-data example

The following meta-data configuration specifies a **DATE** field parameter named **ARRDATE** located 85 bytes into the enclosing structure in the case of a non-Unicode layout and located 170 bytes into the enclosing structure in the case of a Unicode layout:

```
<bean    class="org.fusesource.camel.component.sap.model.rfc.impl.FieldMetaDataImpl">
   <property name="name" value="ARRDATE" />
   <property name="type" value="DATE" />
   <property name="byteLength" value="8" />
   <property name="unicodeByteLength" value="16" />
   <property name="byteOffset" value="85" />
   <property name="unicodeByteOffset" value="170" />
</bean>
```

Complex record field meta-data example

The following meta-data configuration specifies a **STRUCTURE** field parameter named **FLTINFO** with a structure specified by the **flightInfo** record meta-data object. The parameter is located at the beginning of the enclosing structure in both the case of a non-Unicode and Unicode layout.

```
<bean    class="org.fusesource.camel.component.sap.model.rfc.impl.FieldMetaDataImpl">
   <property name="name" value="FLTINFO" />
   <property name="type" value="STRUCTURE" />
   <property name="byteOffset" value="0" />
   <property name="unicodeByteOffset" value="0" />
   <property name="recordMetaData" ref="flightInfo" />
</bean>
```

123.3. MESSAGE BODY FOR RFC

Request and response objects

An SAP endpoint expects to receive a message with a message body containing an SAP request object and will return a message with a message body containing an SAP response object. SAP requests and responses are fixed map data structures containing named fields with each field having a predefined data type.

Note that the named fields in an SAP request and response are specific to an SAP endpoint, with each endpoint defining the parameters in the SAP request and response it will accept. An SAP endpoint provides factory methods to create the request and response objects that are specific to it.

```
public class SAPEndpoint ... {
    ...
    public Structure getRequest() throws Exception;

    public Structure getResponse() throws Exception;
    ...
}
```

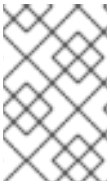
Structure objects

Both SAP request and response objects are represented in Java as a structure object which supports the **org.fusesource.camel.component.sap.model.rfc.Structure** interface. This interface extends both the **java.util.Map** and **org.eclipse.emf.ecore.EObject** interfaces.

```
public interface Structure extends org.eclipse.emf.ecore.EObject,
                                   java.util.Map<String, Object> {

    <T> T get(Object key, Class<T> type);

}
```

The field values in a structure object are accessed through the field's getter methods in the map interface. In addition, the structure interface provides a type-restricted method to retrieve field values.

Structure objects are implemented in the component runtime using the Eclipse Modeling Framework (EMF) and support that framework's **EObject** interface. Instances of a structure object have attached meta-data which define and restrict the structure and contents of the map of fields it provides. This meta-data can be accessed and introspected using the standard methods provided by EMF. Please refer to the EMF documentation for further details.



NOTE

Attempts to get a parameter not defined on a structure object will return null. Attempts to set a parameter not defined on a structure will throw an exception as well as attempts to set the value of a parameter with an incorrect type.

As discussed in the following sections, structure objects can contain fields that contain values of the complex field types, **STRUCTURE** and **TABLE**. Note that it is unnecessary to create instances of these types and add them to the structure. Instances of these field values are created on demand if necessary

when accessed in the enclosing structure.

Field types

The fields that reside within the structure object of an SAP request or response may be either *elementary* or *complex*. An elementary field contains a single scalar value, whereas a complex field will contain one or more fields of either a elementary or complex type.

Elementary field types

An elementary field may be either a character, numeric, hexadecimal or string field type. The following table summarizes the types of elementary fields that may reside in a structure object:

Field Type	Corresponding Java Type	Byte Length	Unicode Byte Length	Number Decimals Digits	
CHAR	**java.lang.String**	1 to 65535	1 to 65535	-	ABAP Type
DATE	**java.util.Date**	8	16	-	ABAP Type
BCD	**java.math.BigDecimal**	1 to 16	1 to 16	0 to 14	ABAP Type number cor
TIME	**java.util.Date**	6	12	-	ABAP Type
BYTE	**byte[]**	1 to 65535	1 to 65535	-	ABAP Type
NUM	**java.lang.String**	1 to 65535	1 to 65535	-	ABAP Type
FLOAT	**java.lang.Double**	8	8	0 to 15	ABAP Type
INT	**java.lang.Integer**	4	4	-	ABAP Type
INT2	**java.lang.Integer**	2	2	-	ABAP Type
INT1	**java.lang.Integer**	1	1	-	ABAP Type
DECF16	**java.match.BigDecimal**	8	8	16	ABAP Type Point Numb
DECF34	**java.math.BigDecimal**	16	16	34	ABAP Type Point Numb
STRING	**java.lang.String**	8	8	-	ABAP Type

XSTRING	**byte[]**	8	8	-	ABAP Type

Character field types

A character field contains a fixed sized character string that may use either a non-Unicode or Unicode character encoding in the underlying JCo and ABAP runtimes. Non-Unicode character strings encode one character per byte. Unicode characters strings are encoded in two bytes using UTF-16 encoding. Character field values are represented in Java as **java.lang.String** objects and the underlying JCo runtime is responsible for the conversion to their ABAP representation.

A character field declares its field length in its associated **byteLength** and **unicodeByteLength** properties, which determine the length of the field's character string in each encoding system.

CHAR

A **CHAR** character field is a text field containing alphanumeric characters and corresponds to the ABAP type C.

NUM

A **NUM** character field is a numeric text field containing numeric characters only and corresponds to the ABAP type N.

DATE

A **DATE** character field is an 8 character date field with the year, month and day formatted as **YYYYMMDD** and corresponds to the ABAP type D.

TIME

A **TIME** character field is a 6 character time field with the hours, minutes and seconds formatted as **HHMMSS** and corresponds to the ABAP type T.

Numeric field types

A numeric field contains a number. The following numeric field types are supported:

INT

An **INT** numeric field is an integer field stored as a 4-byte integer value in the underlying JCo and ABAP runtimes and corresponds to the ABAP type I. An **INT** field value is represented in Java as a **java.lang.Integer** object.

INT2

An **INT2** numeric field is an integer field stored as a 2-byte integer value in the underlying JCo and ABAP runtimes and corresponds to the ABAP type S. An **INT2** field value is represented in Java as a **java.lang.Integer** object.

INT1

An **INT1** field is an integer field stored as a 1-byte integer value in the underlying JCo and ABAP runtimes value and corresponds to the ABAP type B. An **INT1** field value is represented in Java as a **java.lang.Integer** object.

FLOAT

A **FLOAT** field is a binary floating point number field stored as an 8-byte double value in the underlying JCo and ABAP runtimes and corresponds to the ABAP type F. A **FLOAT** field declares the number of decimal digits that the field's value contains in its associated decimal property. In the case of a **FLOAT** field, this decimal property can have a value between 1 and 15 digits. A **FLOAT** field value is represented in Java as a **java.lang.Double** object.

BCD

A **BCD** field is a binary coded decimal field stored as a 1 to 16 byte packed number in the underlying JCo and ABAP runtimes and corresponds to the ABAP type P. A packed number stores two decimal digits per byte. A **BCD** field declares its field length in its associated **byteLength** and **unicodeByteLength** properties. In the case of a **BCD** field, these properties can have a value between 1 and 16 bytes and both properties will have the same value. A **BCD** field declares the number of decimal digits that the field's value contains in its associated decimal property. In the case of a **BCD** field, this decimal property can have a value between 1 and 14 digits. A **BCD** field value is represented in Java as a **java.math.BigDecimal**.

DECF16

A **DECF16** field is a decimal floating point stored as an 8-byte IEEE 754 decimal64 floating point value in the underlying JCo and ABAP runtimes and corresponds to the ABAP type **decfloat16**. The value of a **DECF16** field has 16 decimal digits. The value of a **DECF16** field is represented in Java as **java.math.BigDecimal**.

DECF34

A **DECF34** field is a decimal floating point stored as a 16-byte IEEE 754 decimal128 floating point value in the underlying JCo and ABAP runtimes and corresponds to the ABAP type **decfloat34**. The value of a **DECF34** field has 34 decimal digits. The value of a **DECF34** field is represented in Java as **java.math.BigDecimal**.

Hexadecimal field types

A hexadecimal field contains raw binary data. The following hexadecimal field types are supported:

BYTE

A **BYTE** field is a fixed sized byte string stored as a byte array in the underlying JCo and ABAP runtimes and corresponds to the ABAP type X. A **BYTE** field declares its field length in its associated **byteLength** and **unicodeByteLength** properties. In the case of a **BYTE** field, these properties can have a value between 1 and 65535 bytes and both properties will have the same value. The value of a **BYTE** field is represented in Java as a **byte[]** object.

String field types

A string field references a variable length string value. The length of that string value is not fixed until runtime. The storage for the string value is dynamically created in the underlying JCo and ABAP runtimes. The storage for the string field itself is fixed and contains only a string header.

STRING

A **STRING** field refers to a character string and is stored in the underlying JCo and ABAP runtimes as an 8-byte value. It corresponds to the ABAP type G. The value of the **STRING** field is represented in Java as a **java.lang.String** object.

XSTRING

An **XSTRING** field refers to a byte string and is stored in the underlying JCo and ABAP runtimes as an 8-byte value. It corresponds to the ABAP type Y. The value of the **STRING** field is represented in Java as a **byte[]** object.

Complex field types

A complex field may be either a structure or table field type. The following table summarizes these complex field types.

Field Type	Corresponding Java Type	Byte Length	Unicode Byte Length	Number Decimals Digits	
STRUCTURE	**org.fusesource.camel.component.sap.model.rfc.Structure**	Total of individual field byte lengths	Total of individual field Unicode byte lengths	-	ABAP Type
TABLE	**org.fusesource.camel.component.sap.model.rfc.Table**	Byte length of row structure	Unicode byte length of row structure	-	ABAP Type

Structure field types

A **STRUCTURE** field contains a structure object and is stored in the underlying JCo and ABAP runtimes as an ABAP structure record. It corresponds to either an ABAP type **u** or **v**. The value of a **STRUCTURE** field is represented in Java as a structure object with the interface **org.fusesource.camel.component.sap.model.rfc.Structure**.

Table field types

A **TABLE** field contains a table object and is stored in the underlying JCo and ABAP runtimes as an ABAP internal table. It corresponds to the ABAP type **h**. The value of the field is represented in Java by a table object with the interface **org.fusesource.camel.component.sap.model.rfc.Table**.

Table objects

A table object is a homogeneous list data structure containing rows of structure objects with the same structure. This interface extends both the **java.util.List** and **org.eclipse.emf.ecore.EObject** interfaces.

```
public interface Table<S extends Structure>
    extends org.eclipse.emf.ecore.EObject,
    java.util.List<S> {

    /**
     * Creates and adds table row at end of row list
     */
```

```
    S add();

    /**
     * Creates and adds table row at index in row list
     */
    S add(int index);

}
```

The list of rows in a table object are accessed and managed using the standard methods defined in the list interface. In addition the table interface provides two factory methods for creating and adding structure objects to the row list.

Table objects are implemented in the component runtime using the Eclipse Modeling Framework (EMF) and support that framework's EObject interface. Instances of a table object have attached meta-data which define and restrict the structure and contents of the rows it provides. This meta-data can be accessed and introspected using the standard methods provided by EMF. Please refer to the EMF documentation for further details.

NOTE

Attempts to add or set a row structure value of the wrong type will throw an exception.

123.4. MESSAGE BODY FOR IDOC

IDoc message type

When using one of the IDoc Camel SAP endpoints, the type of the message body depends on which particular endpoint you are using.

For a **sap-idoc-destination** endpoint or a **sap-qidoc-destination** endpoint, the message body is of **Document** type:

```
org.fusesource.camel.component.sap.model.idoc.Document
```

For a **sap-idoclist-destination** endpoint, a **sap-qidoclist-destination** endpoint, or a **sap-idoclist-server** endpoint, the message body is of **DocumentList** type:

```
org.fusesource.camel.component.sap.model.idoc.DocumentList
```

The IDoc document model

For the Camel SAP component, an IDoc document is modelled using the Eclipse Modelling Framework (EMF), which provides a wrapper API around the underlying SAP IDoc API. The most important types in this model are:

```
org.fusesource.camel.component.sap.model.idoc.Document
org.fusesource.camel.component.sap.model.idoc.Segment
```

The **Document** type represents an IDoc document instance. In outline, the **Document** interface exposes the following methods:

```
// Java
package org.fusesource.camel.component.sap.model.idoc;
...
public interface Document extends EObject {
   // Access the field values from the IDoc control record
   String getArchiveKey();
   void setArchiveKey(String value);
   String getClient();
   void setClient(String value);
   ...

   // Access the IDoc document contents
   Segment getRootSegment();
}
```

The following kinds of method are exposed by the **Document** interface:

Methods for accessing the control record

Most of the methods are for accessing or modifying field values of the IDoc control record. These methods are of the form **get*AttributeName***, **set*AttributeName***, where ***AttributeName*** is the name of a field value (see Table 123.1, “IDoc Document Attributes”).

Method for accessing the document contents

The **getRootSegment** method provides access to the document contents (IDoc data records), returning the contents as a **Segment** object. Each **Segment** object can contain an arbitrary number of child segments, and the segments can be nested to an arbitrary degree.

Note, however, that the precise layout of the segment hierarchy is defined by the particular *IDoc type* of the document. When creating (or reading) a segment hierarchy, therefore, you must be sure to follow the exact structure as defined by the IDoc type.

The **Segment** type is used to access the data records of the IDoc document, where the segments are laid out in accordance with the structure defined by the document's IDoc type. In outline, the **Segment** interface exposes the following methods:

```
// Java
package org.fusesource.camel.component.sap.model.idoc;
...
public interface Segment extends EObject, java.util.Map<String, Object> {
   // Returns the value of the '<em><b>Parent</b></em>' reference.
   Segment getParent();

   // Return a immutable list of all child segments
   <S extends Segment> EList<S> getChildren();

   // Returns a list of child segments of the specified segment type.
   <S extends Segment> SegmentList<S> getChildren(String segmentType);

   EList<String> getTypes();

   Document getDocument();

   String getDescription();
```

```
    String getType();

    String getDefinition();

    int getHierarchyLevel();

    String getIdocType();

    String getIdocTypeExtension();

    String getSystemRelease();

    String getApplicationRelease();

    int getNumFields();

    long getMaxOccurrence();

    long getMinOccurrence();

    boolean isMandatory();

    boolean isQualified();

    int getRecordLength();

    <T> T get(Object key, Class<T> type);
}
```

The **getChildren(String segmentType)** method is particularly useful for adding new (nested) children to a segment. It returns an object of type, **SegmentList**, which is defined as follows:

```
// Java
package org.fusesource.camel.component.sap.model.idoc;
...
public interface SegmentList<S extends Segment> extends EObject, EList<S> {
    S add();

    S add(int index);
}
```

Hence, to create a data record of **E1SCU_CRE** type, you could use Java code like the following:

```
Segment rootSegment = document.getRootSegment();

Segment E1SCU_CRE_Segment = rootSegment.getChildren("E1SCU_CRE").add();
```

How an IDoc is related to a Document object

According to the SAP documentation, an IDoc document consists of the following main parts:

Control record

The control record (which contains the meta-data for the IDoc document) is represented by the attributes on the **Document** object—see Table 123.1, “IDoc Document Attributes” for details.

Data records

The data records are represented by the **Segment** objects, which are constructed as a nested hierarchy of segments. You can access the root segment through the **Document.getRootSegment** method.

Status records

In the Camel SAP component, the status records are *not* represented by the document model. But you do have access to the latest status value through the **status** attribute on the control record.

Example of creating a Document instance

For example, Example 123.1, “Creating an IDoc Document in Java” shows how to create an IDoc document with the IDoc type, **FLCUSTOMER_CREATEFROMDATA01**, using the IDoc model API in Java.

Example 123.1. Creating an IDoc Document in Java

```
// Java
import org.fusesource.camel.component.sap.model.idoc.Document;
import org.fusesource.camel.component.sap.model.idoc.Segment;
import org.fusesource.camel.component.sap.util.IDocUtil;

import org.fusesource.camel.component.sap.model.idoc.Document;
import org.fusesource.camel.component.sap.model.idoc.DocumentList;
import org.fusesource.camel.component.sap.model.idoc.IdocFactory;
import org.fusesource.camel.component.sap.model.idoc.IdocPackage;
import org.fusesource.camel.component.sap.model.idoc.Segment;
import org.fusesource.camel.component.sap.model.idoc.SegmentChildren;
...
//
// Create a new IDoc instance using the modelling classes
//


// Get the SAP Endpoint bean from the Camel context.
// In this example, it's a 'sap-idoc-destination' endpoint.
SapTransactionalIDocDestinationEndpoint endpoint =
    exchange.getContext().getEndpoint(
        "bean:SapEndpointBeanID",
        SapTransactionalIDocDestinationEndpoint.class
    );

// The endpoint automatically populates some required control record attributes
Document document = endpoint.createDocument()

// Initialize additional control record attributes
document.setMessageType("FLCUSTOMER_CREATEFROMDATA");
document.setRecipientPartnerNumber("QUICKCLNT");
document.setRecipientPartnerType("LS");
document.setSenderPartnerNumber("QUICKSTART");
document.setSenderPartnerType("LS");

Segment rootSegment = document.getRootSegment();
```

```
Segment E1SCU_CRE_Segment = rootSegment.getChildren("E1SCU_CRE").add();

Segment E1BPSCUNEW_Segment =
E1SCU_CRE_Segment.getChildren("E1BPSCUNEW").add();
E1BPSCUNEW_Segment.put("CUSTNAME", "Fred Flintstone");
E1BPSCUNEW_Segment.put("FORM", "Mr.");
E1BPSCUNEW_Segment.put("STREET", "123 Rubble Lane");
E1BPSCUNEW_Segment.put("POSTCODE", "01234");
E1BPSCUNEW_Segment.put("CITY", "Bedrock");
E1BPSCUNEW_Segment.put("COUNTR", "US");
E1BPSCUNEW_Segment.put("PHONE", "800-555-1212");
E1BPSCUNEW_Segment.put("EMAIL", "fred@bedrock.com");
E1BPSCUNEW_Segment.put("CUSTTYPE", "P");
E1BPSCUNEW_Segment.put("DISCOUNT", "005");
E1BPSCUNEW_Segment.put("LANGU", "E");
```

Document attributes

Table 123.1, “IDoc Document Attributes” shows the control record attributes that you can set on the **Document** object.

Table 123.1. IDoc Document Attributes

Attribute	Length	SAP Field	Description
archiveKey	70	**ARCKEY**	EDI archive key
client	3	**MANDT**	Client
creationDate	8	**CREDAT**	Date IDoc was created
creationTime	6	**CRETIM**	Time IDoc was created
direction	1	**DIRECT**	Direction

Attribute	Length	SAP Field	Description
eDIMessage	14	**REFMES**	Reference to message
eDIMessageGroup	14	**REFGRP**	Reference to message group
eDIMessageType	6	**STDMES**	EDI message type
eDIStandardFlag	1	**STD**	EDI standard
eDIStandardVersion	6	**STDVRS**	Version of EDI standard
eDITransmissionFile	14	**REFINT**	Reference to interchange file
iDocCompoundType	8	**DOCTYP**	IDoc type
iDocNumber	16	**DOCNUM**	IDoc number
iDocSAPRelease	4	**DOCREL**	SAP Release of IDoc
iDocType	30	**IDOCTP**	Name of basic IDoc type
iDocTypeExtension	30	**CIMTYP**	Name of extension type

Attribute	Length	SAP Field	Description
messageCode	3	**MESCOD**	Logical message code
messageFunction	3	**MESFCT**	Logical message function
messageType	30	**MESTYP**	Logical message type
outputMode	1	**OUTMOD**	Output mode
recipientAddress	10	**RCVSAD**	Receiver address (SADR)
recipientLogicalAddress	70	**RCVLAD**	Logical address of receiver
recipientPartnerFunction	2	**RCVPFC**	Partner function of receiver
recipientPartnerNumber	10	**RCVPRN**	Partner number of receiver
recipientPartnerType	2	**RCVPRT**	Partner type of receiver
recipientPort	10	**RCVPOR**	Receiver port (SAP System, EDI subsystem)

Attribute	Length	SAP Field	Description
senderAddress		**SNDSAD**	Sender address (SADR)
senderLogicalAddress	70	**SNDLAD**	Logical address of sender
senderPartnerFunction	2	**SNDPFC**	Partner function of sender
senderPartnerNumber	10	**SNDPRN**	Partner number of sender
senderPartnerType	2	**SNDPRT**	Partner type of sender
senderPort	10	**SNDPOR**	Sender port (SAP System, EDI subsystem)
serialization	20	**SERIAL**	EDI/ALE: Serialization field
status	2	**STATUS**	Status of IDoc
testFlag	1	**TEST**	Test flag

Setting document attributes in Java

When setting the control record attributes in Java (from Table 123.1, “IDoc Document Attributes”), the usual convention for Java bean properties is followed. That is, a **name** attribute can be accessed through the **getName** and **setName** methods, for getting and setting the attribute value. For example, the **iDocType**, **iDocTypeExtension**, and **messageType** attributes can be set as follows on a **Document** object:

```
// Java
document.setIDocType("FLCUSTOMER_CREATEFROMDATA01");
document.setIDocTypeExtension("");
document.setMessageType("FLCUSTOMER_CREATEFROMDATA");
```

Setting document attributes in XML

When setting the control record attributes in XML, the attributes must be set on the **idoc:Document** element. For example, the **iDocType**, **iDocTypeExtension**, and **messageType** attributes can be set as follows:

```
<?xml version="1.0" encoding="ASCII"?>
<idoc:Document ...
            iDocType="FLCUSTOMER_CREATEFROMDATA01"
            iDocTypeExtension=""
            messageType="FLCUSTOMER_CREATEFROMDATA" ... >
   ...
</idoc:Document>
```

123.5. TRANSACTION SUPPORT

BAPI transaction model

The SAP Component supports the BAPI transaction model for outbound communication with SAP. A destination endpoint with a URL containing the transacted option set to **true** will, if necessary, initiate a stateful session on the outbound connection of the endpoint and register a Camel Synchronization object with the exchange. This synchronization object will call the BAPI service method **BAPI_TRANSACTION_COMMIT** and end the stateful session when the processing of the message exchange is complete. If the processing of the message exchange fails, the synchronization object will call the BAPI server method **BAPI_TRANSACTION_ROLLBACK** and end the stateful session.

123.6. XML SERIALIZATION FOR RFC

Overview

SAP request and response objects support an XML serialization format which enable these objects to be serialized to and from an XML document.

XML namespace

Each RFC in a repository defines a specific XML name space for the elements which compose the serialized forms of its Request and Response objects. The form of this namespace URL is as follows:

```
http://sap.fusesource.org/rfc/<Repository Name>/<RFC Name>
```

RFC namespace URLs have a common **http://sap.fusesource.org/rfc** prefix followed by the name of the repository in which the RFC's metadata is defined. The final component in the URL is the name of the RFC itself.

Request and response XML documents

An SAP request object will be serialized into an XML document with the root element of that document named Request and scoped by the namespace of the request's RFC.

```
<?xml version="1.0" encoding="ASCII"?>
<BOOK_FLIGHT:Request
    xmlns:BOOK_FLIGHT="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT">
   ...
</BOOK_FLIGHT:Request>
```

An SAP response object will be serialized into an XML document with the root element of that document named Response and scoped by the namespace of the response's RFC.

```
<?xml version="1.0" encoding="ASCII"?>
<BOOK_FLIGHT:Response
    xmlns:BOOK_FLIGHT="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT">
   ...
</BOOK_FLIGHT:Response>
```

Structure fields

Structure fields in parameter lists or nested structures are serialized as elements. The element name of the serialized structure corresponds to the field name of the structure within the enclosing parameter list, structure or table row entry it resides.

```
<BOOK_FLIGHT:FLTINFO
    xmlns:BOOK_FLIGHT="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT">
   ...
</BOOK_FLIGHT:FLTINFO>
```

Note that the type name of the structure element in the RFC namespace will correspond to the name of the record meta data object which defines the structure, as in the following example:

```
<xs:schema
    targetNamespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT">
    xmlns:xs="http://www.w3.org/2001/XMLSchema">
   ...
   <xs:complexType name="FLTINFO_STRUCTURE”>
   ...
   </xs:complexType>
   ...
</xs:schema>
```

This distinction will be important when specifying a JAXB bean to marshal and unmarshal the structure as will be seen in Section 123.10, “Example 3: Handling Requests from SAP”.

Table fields

Table fields in parameter lists or nested structures are serialized as elements. The element name of the serialized structure will correspond to the field name of the table within the enclosing parameter list, structure, or table row entry it resides. The table element will contain a series of row elements to hold the serialized values of the table's row entries.

```
<BOOK_FLIGHT:CONNINFO
```

```
    xmlns:BOOK_FLIGHT="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT">
  <row ... > ... </row>
  ...
  <row ... > ... </row>
</BOOK_FLIGHT:CONNINFO>
```

Note that the type name of the table element in the RFC namespace will correspond to the name of the record meta data object which defines the row structure of the table suffixed by **_TABLE**. The type name of the table row element in the RFC name corresponds to the name of the record meta data object which defines the row structure of the table, as in the following example:

```
<xs:schema
    targetNamespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT">
    xmlns:xs="http://www.w3.org/2001/XMLSchema">
  ...
  <xs:complextType name="CONNECTION_INFO_STRUCTURE_TABLE”>
    <xs:sequence>
      <xs:element
        name="row”
        minOccures="0”
        maxOccurs="unbounded”
        type="CONNECTION_INFO_STRUCTURE”/>
      ...
      <xs:sequence>
    </xs:sequence>
  </xs:complexType>

  <xs:complextType name="CONNECTION_INFO_STRUCTURE”>
      ...
  </xs:complexType>
  ...
</xs:schema>
```

This distinction will be important when specifying a JAXB bean to marshal and unmarshal the structure as will be seen in Section 123.10, “Example 3: Handling Requests from SAP”.

Elementary fields

Elementary fields in parameter lists or nested structures are serialized as attributes on the element of the enclosing parameter list or structure. The attribute name of the serialized field corresponds to the field name of the field within the enclosing parameter list, structure, or table row entry it resides, as in the following example:

```
<?xml version="1.0" encoding="ASCII"?>
<BOOK_FLIGHT:Request
    xmlns:BOOK_FLIGHT="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT"
    CUSTNAME="James Legrand"
  PASSFORM="Mr"
  PASSNAME="Travelin Joe"
  PASSBIRTH="1990-03-17T00:00:00.000-0500"
  FLIGHTDATE="2014-03-19T00:00:00.000-0400"
  TRAVELAGENCYNUMBER="00000110"
  DESTINATION_FROM="SFO"
  DESTINATION_TO="FRA"/>
```

Date and time formats

Date and Time fields are serialized into attribute values using the following format:

```
yyyy-MM-dd'T'HH:mm:ss.SSSZ
```

Date fields will be serialized with only the year, month, day and timezone components set:

```
DEPDATE="2014-03-19T00:00:00.000-0400"
```

Time fields will be serialized with only the hour, minute, second, millisecond and timezone components set:

```
DEPTIME="1970-01-01T16:00:00.000-0500"
```

123.7. XML SERIALIZATION FOR IDOC

Overview

An IDoc message body can be serialized into an XML string format, with the help of a built-in type converter.

XML namespace

Each serialized IDoc is associated with an XML namespace, which has the following general format:

```
http://sap.fusesource.org/idoc/repositoryName/idocType/idocTypeExtension/systemRelease/applicationRelease
```

Both the ***repositoryName*** (name of the remote SAP meta-data repository) and the ***idocType*** (IDoc document type) are mandatory, but the other components of the namespace can be left blank. For example, you could have an XML namespace like the following:

```
http://sap.fusesource.org/idoc/MY_REPO/FLCUSTOMER_CREATEFROMDATA01///
```

Built-in type converter

The Camel SAP component has a built-in type converter, which is capable of converting a **Document** object or a **DocumentList** object to and from a **String** type.

For example, to serialize a **Document** object to an XML string, you can simply add the following line to a route in XML DSL:

```
<convertBodyTo type="java.lang.String"/>
```

You can also use this approach to a serialized XML message into a **Document** object. For example, given that the current message body is a serialized XML string, you can convert it back into a **Document** object by adding the following line to a route in XML DSL:

```
<convertBodyTo type="org.fusesource.camel.component.sap.model.idoc.Document"/>
```

Sample IDoc message body in XML format

When you convert an IDoc message to a **String**, it is serialized into an XML document, where the root element is either **idoc:Document** (for a single document) or **idoc:DocumentList** (for a list of documents). Example 123.2, “IDoc Message Body in XML” shows a single IDoc document that has been serialized to an **idoc:Document** element.

Example 123.2. IDoc Message Body in XML

```
<?xml version="1.0" encoding="ASCII"?>
<idoc:Document
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:FLCUSTOMER_CREATEFROMDATA01---
="http://sap.fusesource.org/idoc/XXX/FLCUSTOMER_CREATEFROMDATA01///"
    xmlns:idoc="http://sap.fusesource.org/idoc"
    creationDate="2015-01-28T12:39:13.980-0500"
    creationTime="2015-01-28T12:39:13.980-0500"
    iDocType="FLCUSTOMER_CREATEFROMDATA01"
    iDocTypeExtension=""
    messageType="FLCUSTOMER_CREATEFROMDATA"
    recipientPartnerNumber="QUICKCLNT"
    recipientPartnerType="LS"
    senderPartnerNumber="QUICKSTART"
    senderPartnerType="LS">
  <rootSegment xsi:type="FLCUSTOMER_CREATEFROMDATA01---:ROOT" document="/">
    <segmentChildren parent="//@rootSegment">
      <E1SCU_CRE parent="//@rootSegment" document="/">
        <segmentChildren parent="//@rootSegment/@segmentChildren/@E1SCU_CRE.0">
          <E1BPSCUNEW parent="//@rootSegment/@segmentChildren/@E1SCU_CRE.0"
              document="/"
              CUSTNAME="Fred Flintstone" FORM="Mr."
              STREET="123 Rubble Lane"
              POSTCODE="01234"
              CITY="Bedrock"
              COUNTR="US"
              PHONE="800-555-1212"
              EMAIL="fred@bedrock.com"
              CUSTTYPE="P"
              DISCOUNT="005"
              LANGU="E"/>
        </segmentChildren>
      </E1SCU_CRE>
    </segmentChildren>
  </rootSegment>
</idoc:Document>
```

123.8. EXAMPLE 1: READING DATA FROM SAP

Overview

This example demonstrates a route which reads **FlightCustomer** business object data from SAP. The route invokes the **FlightCustomer** BAPI method, **BAPI_FLCUST_GETLIST**, using an SAP synchronous RFC destination endpoint to retrieve the data.

Java DSL for route

The Java DSL for the example route is as follows:

```
from("direct:getFlightCustomerInfo")
    .to("bean:createFlightCustomerGetListRequest")
    .to("sap-srfc-destination:nplDest:BAPI_FLCUST_GETLIST")
    .to("bean:returnFlightCustomerInfo");
```

XML DSL for route

And the Spring DSL for the same route is as follows:

```
<route>
    <from uri="direct:getFlightCustomerInfo"/>
    <to uri="bean:createFlightCustomerGetListRequest"/>
    <to uri="sap-srfc-destination:nplDest:BAPI_FLCUST_GETLIST"/>
    <to uri="bean:returnFlightCustomerInfo"/>
</route>
```

createFlightCustomerGetListRequest bean

The **createFlightCustomerGetListRequest** bean is responsible for building an SAP request object in its exchange method that is used in the RFC call of the subsequent SAP endpoint . The following code snippet demonstrates the sequence of operations to build the request object:

```
public void create(Exchange exchange) throws Exception {

    // Get SAP Endpoint to be called from context.
    SAPEndpoint endpoint =
        exchange.getContext().getEndpoint("bean:returnFlightCustomerInfo",
                                          SAPEndpoint.class);

    // Retrieve bean from message containing Flight Customer name to
    // look up.
    BookFlightRequest bookFlightRequest =
        exchange.getIn().getBody(BookFlightRequest.class);

    // Create SAP Request object from target endpoint.
    Structure request = endpoint.getRequest();

    // Add Customer Name to request if set
    if (bookFlightRequest.getCustomerName() != null &&
        bookFlightRequest.getCustomerName().length() > 0) {
            request.put("CUSTOMER_NAME",
                        bookFlightRequest.getCustomerName());
        }
    } else {
        throw new Exception("No Customer Name");
    }

    // Put request object into body of exchange message.
    exchange.getIn().setBody(request);
}
```

returnFlightCustomerInfo bean

The **returnFlightCustomerInfo** bean is responsible for extracting data from the SAP response object in its exchange method that it receives from the previous SAP endpoint . The following code snippet demonstrates the sequence of operations to extract the data from the response object:

```
public void createFlightCustomerInfo(Exchange exchange) throws Exception {

    // Retrieve SAP response object from body of exchange message.
    Structure flightCustomerGetListResponse =
        exchange.getIn().getBody(Structure.class);

    if (flightCustomerGetListResponse == null) {
        throw new Exception("No Flight Customer Get List Response");
    }

    // Check BAPI return parameter for errors
    @SuppressWarnings("unchecked")
    Table<Structure> bapiReturn =
        flightCustomerGetListResponse.get("RETURN", Table.class);
    Structure bapiReturnEntry = bapiReturn.get(0);
    if (bapiReturnEntry.get("TYPE", String.class) != "S") {
        String message = bapiReturnEntry.get("MESSAGE", String.class);
        throw new Exception("BAPI call failed: " + message);
    }

    // Get customer list table from response object.
    @SuppressWarnings("unchecked")
    Table<? extends Structure> customerList =
        flightCustomerGetListResponse.get("CUSTOMER_LIST", Table.class);

    if (customerList == null || customerList.size() == 0) {
        throw new Exception("No Customer Info.");
    }

    // Get Flight Customer data from first row of table.
    Structure customer = customerList.get(0);

    // Create bean to hold Flight Customer data.
    FlightCustomerInfo flightCustomerInfo = new FlightCustomerInfo();

    // Get customer id from Flight Customer data and add to bean.
    String customerId = customer.get("CUSTOMERID", String.class);
    if (customerId != null) {
        flightCustomerInfo.setCustomerNumber(customerId);
    }

    ...

    // Put bean into body of exchange message.
    exchange.getIn().setHeader("flightCustomerInfo", flightCustomerInfo);

}
```

123.9. EXAMPLE 2: WRITING DATA TO SAP

Overview

This example demonstrates a route which creates a **FlightTrip** business object instance in SAP. The route invokes the **FlightTrip** BAPI method, **BAPI_FLTRIP_CREATE**, using a destination endpoint to create the object.

Java DSL for route

The Java DSL for the example route is as follows:

```
from("direct:createFlightTrip")
    .to("bean:createFlightTripRequest")
    .to("sap-srfc-destination:nplDest:BAPI_FLTRIP_GETLIST?transacted=true")
    .to("bean:returnFlightTripResponse");
```

XML DSL for route

And the Spring DSL for the same route is as follows:

```
<route>
    <from uri="direct:createFlightTrip"/>
    <to uri="bean:createFlightTripRequest"/>
    <to uri="sap-srfc-destination:nplDest:BAPI_FLTRIP_GETLIST?transacted=true"/>
    <to uri="bean:returnFlightTripResponse"/>
</route>
```

Transaction support

Note that the URL for the SAP endpoint has the **transacted** option set to **true**. As discussed in Section 123.5, “Transaction Support”, when this option is enabled the endpoint ensures that an SAP transaction session has been initiated before invoking the RFC call. Because this endpoint’s RFC creates new data in SAP, this options is necessary to make the route's changes permanent in SAP.

Populating request parameters

The **createFlightTripRequest** and **returnFlightTripResponse** beans are responsible for populating request parameters into the SAP request and extracting response parameters from the SAP response respectively following the same sequence of operations as demonstrated in the previous example.

123.10. EXAMPLE 3: HANDLING REQUESTS FROM SAP

Overview

This example demonstrates a route which handles a request from SAP to the **BOOK_FLIGHT** RFC, which is implemented by the route. In addition, it demonstrates the component's XML serialization support, using JAXB to unmarshal and marshal SAP request objects and response objects to custom beans.

This route creates a **FlightTrip** business object on behalf of a travel agent, **FlightCustomer**. The route first unmarshals the SAP request object received by the SAP server endpoint into a custom JAXB bean. This custom bean is then multicasted in the exchange to three sub-routes, which gather the travel agent, flight connection and passenger information required to create the flight trip. The final sub-route creates

the flight trip object in SAP as demonstrated in the previous example. The final sub-route also creates and returns a custom JAXB bean which is marshaled into an SAP response object and returned by the server endpoint.

Java DSL for route

The Java DSL for the example route is as follows:

```
DataFormat jaxb = new JaxbDataFormat("org.fusesource.sap.example.jaxb");

from("sap-srfc-server:nplserver:BOOK_FLIGHT")
    .unmarshal(jaxb)
    .multicast()
    .to("direct:getFlightConnectionInfo",
        "direct:getFlightCustomerInfo",
        "direct:getPassengerInfo")
    .end()
    .to("direct:createFlightTrip")
    .marshal(jaxb);
```

XML DSL for route

And the XML DSL for the same route is as follows:

```
<route>
    <from uri="sap-srfc-server:nplserver:BOOK_FLIGHT"/>
    <unmarshal>
        <jaxb contextPath="org.fusesource.sap.example.jaxb"/>
    </unmarshal>
    <multicast>
        <to uri="direct:getFlightConnectionInfo"/>
        <to uri="direct:getFlightCustomerInfo"/>
        <to uri="direct:getPassengerInfo"/>
    </multicast>
    <to uri="direct:createFlightTrip"/>
    <marshal>
        <jaxb contextPath="org.fusesource.sap.example.jaxb"/>
    </marshal>
</route>
```

BookFlightRequest bean

The following listing illustrates a JAXB bean which unmarshals from the serialized form of an SAP **BOOK_FLIGHT** request object:

```
@XmlRootElement(name="Request",
namespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT")
@XmlAccessorType(XmlAccessType.FIELD)
public class BookFlightRequest {

    @XmlAttribute(name="CUSTNAME")
    private String customerName;

    @XmlAttribute(name="FLIGHTDATE")
```

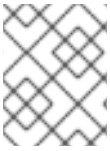
```
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date flightDate;

    @XmlAttribute(name="TRAVELAGENCYNUMBER")
    private String travelAgencyNumber;

    @XmlAttribute(name="DESTINATION_FROM")
    private String startAirportCode;

    @XmlAttribute(name="DESTINATION_TO")
    private String endAirportCode;

    @XmlAttribute(name="PASSFORM")
    private String passengerFormOfAddress;

    @XmlAttribute(name="PASSNAME")
    private String passengerName;

    @XmlAttribute(name="PASSBIRTH")
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date passengerDateOfBirth;

    @XmlAttribute(name="CLASS")
    private String flightClass;

    ...
}
```

BookFlightResponse bean

The following listing illustrates a JAXB bean which marshals to the serialized form of an SAP **BOOK_FLIGHT** response object:

```
@XmlRootElement(name="Response",
namespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT")
@XmlAccessorType(XmlAccessType.FIELD)
public class BookFlightResponse {

    @XmlAttribute(name="TRIPNUMBER")
    private String tripNumber;

    @XmlAttribute(name="TICKET_PRICE")
    private BigDecimal ticketPrice;

    @XmlAttribute(name="TICKET_TAX")
    private BigDecimal ticketTax;

    @XmlAttribute(name="CURRENCY")
    private String currency;

    @XmlAttribute(name="PASSFORM")
    private String passengerFormOfAddress;

    @XmlAttribute(name="PASSNAME")
    private String passengerName;
```

```
    @XmlAttribute(name="PASSBIRTH")
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date passengerDateOfBirth;

    @XmlElement(name="FLTINFO")
    private FlightInfo flightInfo;

    @XmlElement(name="CONNINFO")
    private ConnectionInfoTable connectionInfo;


    ...
}
```



NOTE

The complex parameter fields of the response object are serialized as child elements of the response.

FlightInfo bean

The following listing illustrates a JAXB bean which marshals to the serialized form of the complex structure parameter **FLTINFO**:

```
@XmlRootElement(name="FLTINFO",
namespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT")
@XmlAccessorType(XmlAccessType.FIELD)
public class FlightInfo {

    @XmlAttribute(name="FLIGHTTIME")
    private String flightTime;

    @XmlAttribute(name="CITYFROM")
    private String cityFrom;

    @XmlAttribute(name="DEPDATE")
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date departureDate;

    @XmlAttribute(name="DEPTIME")
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date departureTime;

    @XmlAttribute(name="CITYTO")
    private String cityTo;

    @XmlAttribute(name="ARRDATE")
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date arrivalDate;

    @XmlAttribute(name="ARRTIME")
    @XmlJavaTypeAdapter(DateAdapter.class)
    private Date arrivalTime;
```

```
    ...
}
```

ConnectionInfoTable bean

The following listing illustrates a JAXB bean which marshals to the serialized form of the complex table parameter, **CONNINFO**. Note that the name of the root element type of the JAXB bean corresponds to the name of the row structure type suffixed with **_TABLE** and the bean contains a list of row elements.

```
@XmlRootElement(name="CONNINFO_TABLE",
namespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT")
@XmlAccessorType(XmlAccessType.FIELD)
public class ConnectionInfoTable {

    @XmlElement(name="row")
    List<ConnectionInfo> rows;

    ...
}
```

ConnectionInfo bean

The following listing illustrates a JAXB bean, which marshals to the serialized form of the above tables row elements:

```
@XmlRootElement(name="CONNINFO",
namespace="http://sap.fusesource.org/rfc/nplServer/BOOK_FLIGHT")
@XmlAccessorType(XmlAccessType.FIELD)
public class ConnectionInfo {

    @XmlAttribute(name="CONNID")
    String connectionId;

    @XmlAttribute(name="AIRLINE")
    String airline;

    @XmlAttribute(name="PLANETYPE")
    String planeType;

    @XmlAttribute(name="CITYFROM")
    String cityFrom;

    @XmlAttribute(name="DEPDATE")
    @XmlJavaTypeAdapter(DateAdapter.class)
    Date departureDate;

    @XmlAttribute(name="DEPTIME")
    @XmlJavaTypeAdapter(DateAdapter.class)
    Date departureTime;

    @XmlAttribute(name="CITYTO")
    String cityTo;
```

```
    @XmlAttribute(name="ARRDATE")
    @XmlJavaTypeAdapter(DateAdapter.class)
    Date arrivalDate;

    @XmlAttribute(name="ARRTIME")
    @XmlJavaTypeAdapter(DateAdapter.class)
    Date arrivalTime;

    ...
}
```

CHAPTER 124. SAP NETWEAVER

SAP NETWEAVER GATEWAY COMPONENT

Available as of Camel 2.12

The **sap-netweaver** integrates with the SAP NetWeaver Gateway using HTTP transports.

This camel component supports only producer endpoints.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-sap-netweaver</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a sap netweaver gateway component is as follows

```
sap-netweaver:https://host:8080/path?username=foo&password=secret
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

PREREQUISITES

You would need to have an account to the SAP NetWeaver system to be able to leverage this component. SAP provides a demo setup where you can requires for an account.

This component uses the basic authentication scheme for logging into SAP NetWeaver.

COMPONENT AND ENDPOINT OPTIONS

Name	Default Value	Description
username		Username for account. This is mandatory.
password		Password for account. This is mandatory.
json	**true**	Whether to return data in JSON format. If this option is false, then XML is returned in Atom format.

jsonAsMap	**true**	To transform the JSON from a String to a Map in the message body.
flatternMap	**true**	If the JSON Map contains only a single entry, then flattern by storing that single entry value as the message body.

MESSAGE HEADERS

The following headers can be used by the producer.

Name	Type	Description
CamelNetWeaverCommand	**String**	**Mandatory**: The command to execute in MS ADO.Net Data Service format.

EXAMPLES

This example is using the flight demo example from SAP, which is available online over the internet here.

In the route below we request the SAP NetWeaver demo server using the following url

```
https://sapes1.sapdevcenter.com/sap/opu/odata/IWBEP/RMTSAMPLEFLIGHT_2/
```

And we want to execute the following command

```
FlightCollection(AirLineID='AA',FlightConnectionID='0017',FlightDate=datetime'2012-08-29T00%3A00%3A00')
```

To get flight details for the given flight. The command syntax is in MS ADO.Net Data Service format.

We have the following Camel route

```
from("direct:start")
    .toF("sap-netweaver:%s?username=%s&password=%s", url, username, password)
    .to("log:response")
    .to("velocity:flight-info.vm")
```

Where url, username, and password is defined as:

```
    private String username = "P1909969254";
    private String password = "TODO";
    private String url =
"https://sapes1.sapdevcenter.com/sap/opu/odata/IWBEP/RMTSAMPLEFLIGHT_2/";
    private String command =
"FlightCollection(AirLineID='AA',FlightConnectionID='0017',FlightDate=datetime'2012-08-29T00%3A00%3A00')";
```

The password is invalid. You would need to create an account at SAP first to run the demo.

The velocity template is used for formatting the response to a basic HTML page

```
<html>
  <body>
  Flight information:

  <p/>
  <br/>Airline ID: $body["AirLineID"]
  <br/>Aircraft Type: $body["AirCraftType"]
  <br/>Departure city: $body["FlightDetails"]["DepartureCity"]
  <br/>Departure airport: $body["FlightDetails"]["DepartureAirPort"]
  <br/>Destination city: $body["FlightDetails"]["DestinationCity"]
  <br/>Destination airport: $body["FlightDetails"]["DestinationAirPort"]

  </body>
</html>
```

When running the application you get sampel output:

```
Flight information:
Airline ID: AA
Aircraft Type: 747-400
Departure city: new york
Departure airport: JFK
Destination city: SAN FRANCISCO
Destination airport: SFO
```

- HTTP

CHAPTER 125. SCHEDULER

SCHEDULER COMPONENT

Available as of Camel 2.15

The **scheduler:** component is used to generate message exchanges when a scheduler fires. This component is similar to the Timer component, but it offers more functionality in terms of scheduling. Also this component uses JDK **ScheduledExecutorService**. Where as the timer uses a JDK **Timer**.

You can only consume events from this endpoint.

URI FORMAT

```
scheduler:name[?options]
```

Where **name** is the name of the scheduler, which is created and shared across endpoints. So if you use the same name for all your timer endpoints, only one scheduler thread pool and thread will be used - but you can configure the thread pool to allow more concurrent threads.

You can append query options to the URI in the following format, **?option=value&option=value&...**

Note: The IN body of the generated exchange is **null**. So **exchange.getIn().getBody()** returns **null**.

OPTIONS

Name	Default Value	Description
initialDelay	**1000**	Milliseconds before the first poll starts
period	**1000**	If greater than 0, generate periodic events every **period** milliseconds.
delay	**500**	Milliseconds before the next poll
timeUnit	**MILLISECONDS**	time unit for **initialDelay** and **delay** options.
useFixedDelay	**true**	Controls if fixed delay or fixed rate is used. See ScheduledExecutorService in JDK for details.

pollStrategy		A pluggable **org.apache.camel.PollingConsumerPollingStrategy** allowing you to provide your custom implementation to control error handling usually occurred during the **poll** operation **before** an Exchange have been created and being routed in Camel. In other words the error occurred while the polling was gathering information, for instance access to a file network failed so Camel cannot access it to scan for files. The default implementation will log the caused exception at **WARN** level and ignore it.
runLoggingLevel	**TRACE**	The consumer logs a start/complete log line when it polls. This option allows you to configure the logging level for that.
sendEmptyMessageWhenIdle	**false**	If the polling consumer did not poll any files, you can enable this option to send an empty message (no body) instead.
greedy	**false**	If greedy is enabled, then the ScheduledPollConsumer will run immediately again, if the previous run polled 1 or more messages.

scheduler		Allow to plugin a custom **org.apache.camel.spi.ScheduledPollConsumerScheduler** to use as the scheduler for firing when the polling consumer runs. The default implementation uses the**ScheduledExecutorService** and there is a Quartz2, and Spring based which supports CRON expressions. **Notice:** If using a custom scheduler then the options for **initialDelay**, **useFixedDelay**, **timeUnit**, and**scheduledExecutorService** may not be in use. Use the text **quartz2** to refer to use the Quartz2 scheduler; and use the text **spring** to use the Spring based; and use the text **#myScheduler** to refer to a custom scheduler by its id in the Registry. See Quartz2 page for an example.
schedulerProperties.xxx		To configure additional properties when using a custom **scheduler** or any of the Quartz2, Spring based scheduler.
backoffMultiplier	**0**	To let the scheduled polling consumer backoff if there has been a number of subsequent idles/errors in a row. The multiplier is then the number of polls that will be skipped before the next actual attempt is happening again. When this option is in use then **backoffIdleThreshold** and/or **backoffErrorThreshold** must also be configured.
backoffIdleThreshold	**0**	The number of subsequent idle polls that should happen before the **backoffMultipler** should kick-in
backoffErrorThreshold	**0**	The number of subsequent error polls (failed due some error) that should happen before the **backoffMultipler** should kick-in.

MORE INFORMATION

This component is a scheduler Polling Consumer where you can find more information about the options above, and examples at the Polling Consumer page.

EXCHANGE PROPERTIES

When the timer is fired, it adds the following information as properties to the **Exchange**:

Name	Type	Description
Exchange.TIMER_NAME	**String**	The value of the **name** option.
Exchange.TIMER_FIRED_TIME	**Date**	The time when the consumer fired.

SAMPLE

To set up a route that generates an event every 60 seconds:

```
from("scheduler://foo?period=60s").to("bean:myBean?method=someMethodName");
```

The above route will generate an event and then invoke the **someMethodName** method on the bean called **myBean** in the Registry such as JNDI or Spring.

And the route in Spring DSL:

```
<route>
  <from uri="scheduler://foo?period=60s"/>
  <to uri="bean:myBean?method=someMethodName"/>
</route>
```

FORCING THE SCHEDULER TO TRIGGER IMMEDIATELY WHEN COMPLETED

To let the scheduler trigger as soon as the previous task is complete, you can set the option greedy=true. But beware then the scheduler will keep firing all the time. So use this with caution.

FORCING THE SCHEDULER TO BE IDLE

There can be use cases where you want the scheduler to trigger and be greedy. But sometimes you want "tell the scheduler" that there was no task to poll, so the scheduler can change into idle mode using the backoff options. To do this you would need to set a property on the exchange with the key **Exchange.SCHEDULER_POLLED_MESSAGES** to a boolean value of false. This will cause the consumer to indicate that there was no messages polled.

The consumer will otherwise as by default return 1 message polled to the scheduler, every time the consumer has completed processing the exchange.

- Timer

- Quartz

CHAPTER 126. SCHEMATRON

SCHEMATRON COMPONENT

Available as of Camel 2.14

Schematron is an XML-based language for validating XML instance documents. It is used to make assertions about data in an XML document and it is also used to express operational and business rules. Schematron is an ISO Standard. The schematron component uses the leading implementation of ISO schematron. It is an XSLT based implementation. The schematron rules is run through four XSLT pipelines, which generates a final XSLT which will be used as the basis for running the assertion against the XML document. The component is written in a way that Schematron rules are loaded at the start of the endpoint (only once) this is to minimise the overhead of instantiating a Java Templates object representing the rules.

URI FORMAT

```
schematron://path?[options]
```

URI OPTIONS

Name	Default value	Description
path	mandatory	The path to the schematron rules file. Can either be in class path or location in the file system.
abort	false	flag to abort the route and throw a schematron validation exception.

HEADERS

Name	Description	Type	In/Out
CamelSchematronValidationStatus	The schematron validation status: SUCCESS / FAILED	String	IN
CamelSchematronValidationReport	The schematrion report body in XML format. See an example below	String	IN

URI AND PATH SYNTAX

The following example shows how to invoke the schematron processor in Java DSL. The schematron rules file is sourced from the class path:

```
from("direct:start").to("schematron://sch/schematron.sch").to("mock:result")
```

The following example shows how to invoke the schematron processor in XML DSL. The schematrion rules file is sourced from the file system:

```
<route>
  <from uri="direct:start" />
  <to uri="schematron:///usr/local/sch/schematron.sch" />
  <log message="Schematron validation status: ${in.header.CamelSchematronValidationStatus}" />
  <choice>
    <when>
      <simple>${in.header.CamelSchematronValidationStatus} == 'SUCCESS'</simple>
      <to uri="mock:success" />
    </when>
    <otherwise>
      <log message="Failed schematron validation" />
      <setBody>
        <header>CamelSchematronValidationReport</header>
      </setBody>
      <to uri="mock:failure" />
    </otherwise>
  </choice>
</route>
```

WHERE TO STORE SCHEMATRON RULES?

Schematron rules can change with business requirement, as such it is recommended to store these rules somewhere in file system. When the schematron component endpoint is started, the rules are compiled into XSLT as a Java Templates Object. This is done only once to minimise the overhead of instantiating Java Templates object, which can be an expensive operation for large set of rules and given that the process goes through four pipelines of XSLT transformations. So if you happen to store the rules in the file system, in the event of an update, all you need is to restart the route or the component. No harm in storing these rules in the class path though, but you will have to build and deploy the component to pick up the changes.

SCHEMATRON RULES AND REPORT SAMPLES

Here is an example of schematron rules

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://purl.oclc.org/dsdl/schematron">
  <title>Check Sections 12/07</title>
  <pattern id="section-check">
    <rule context="section">
      <assert test="title">This section has no title</assert>
      <assert test="para">This section has no paragraphs</assert>
    </rule>
  </pattern>
</schema>
```

Here is an example of schematron report:

```
<?xml version="1.0" encoding="UTF-8"?>
<svrl:schematron-output xmlns:svrl="http://purl.oclc.org/dsdl/svrl"
 xmlns:iso="http://purl.oclc.org/dsdl/schematron"
 xmlns:saxon="http://saxon.sf.net/"
```

```
 xmlns:schold="http://www.ascc.net/xml/schematron"
 xmlns:xhtml="http://www.w3.org/1999/xhtml"
 xmlns:xs="http://www.w3.org/2001/XMLSchema"
 xmlns:xsd="http://www.w3.org/2001/XMLSchema" schemaVersion="" title="">

   <svrl:active-pattern document="" />
   <svrl:fired-rule context="chapter" />
   <svrl:failed-assert test="title" location="/doc[1]/chapter[1]">
     <svrl:text>A chapter should have a title</svrl:text>
   </svrl:failed-assert>
   <svrl:fired-rule context="chapter" />
   <svrl:failed-assert test="title" location="/doc[1]/chapter[2]">
     <svrl:text>A chapter should have a title</svrl:text>
   </svrl:failed-assert>
   <svrl:fired-rule context="chapter" />
 </svrl:schematron-output>
```

USEFUL LINKS AND RESOURCES

- Introduction to Schematron by Mulleberry technologies. An excellent document in PDF to get you started on Schematron.
- Schematron official site. This contains links to other resources

CHAPTER 127. SEDA

SEDA COMPONENT

The **seda:** component provides asynchronous SEDA behavior, so that messages are exchanged on a BlockingQueue and consumers are invoked in a separate thread from the producer.

Note that queues are only visible within a *single* CamelContext. If you want to communicate across **CamelContext** instances (for example, communicating between Web applications), see the VM component.

This component does not implement any kind of persistence or recovery, if the VM terminates while messages are yet to be processed. If you need persistence, reliability or distributed SEDA, try using either JMS or ActiveMQ.

SYNCHRONOUS

The Direct component provides synchronous invocation of any consumers when a producer sends a message exchange.

URI FORMAT

```
seda:queueName[?options]
```

Where **queueName** can be any string that uniquely identifies the endpoint within the current CamelContext.

You can append query options to the URI in the following format, **?option=value&option=value&...**

NOTE

When matching consumer entpoints to producer endpoints, only the **queueName** is considered and any option settings are ignored. That is, the identity of a consumer endpoint depends only on the **queueName**. If you want to attach multiple consumers to the same queue, use the approach described in the section called “Using multipleConsumers”.

OPTIONS

Name	Default	Description

size	*Unbounded*	The maximum capacity of the SEDA queue (i.e., the number of messages it can hold). **Notice:** Mind if you use this option, then its the first endpoint being created with the queue name, that determines the size. To make sure all endpoints use same size, then configure the size option on all of them, or the first endpoint being created. From **Camel 2.11** onwards, a validation is taken place to ensure if using mixed queue sizes for the same queue name, Camel would detect this and fail creating the endpoint.
concurrentConsumers	**1**	**Apache Camel 1.6.1/2.0**: Number of concurrent threads processing exchanges.
waitForTaskToComplete	**IfReplyExpected**	Option to specify whether the caller should wait for the async task to complete or not before continuing. The following three options are supported: **Always**, **Never** or **IfReplyExpected**. The first two values are self-explanatory. The last value, **IfReplyExpected**, will only wait if the message is Request Reply based. The default option is **IfReplyExpected**. See more information about Async messaging.
timeout	**30000**	**Apache Camel 2.0:** Timeout in millis a seda producer will at most waiting for an async task to complete. See **waitForTaskToComplete** and Async for more details. In **Camel 2.2** you can now disable timeout by using 0 or a negative value.
multipleConsumers	**false**	**Camel 2.2:** Specifies whether multiple consumers are allowed or not. If enabled, you can use SEDA for a publish/subscribe style of messaging. Send a message to a SEDA queue and have multiple consumers receive a copy of the message.

limitConcurrentConsumers	**true**	**Camel 2.3:** Whether to limit the concurrentConsumers to maximum 500. If its configured with a higher number an exception will be thrown. You can disable this check by turning this option off.
blockWhenFull	**false**	Whether a thread that sends messages to a full SEDA queue will block until the queue's capacity is no longer exhausted. By default, an exception will be thrown stating that the queue is full. By enabling this option, the calling thread will instead block and wait until the message can be accepted.
queueSize		**Component only:** The maximum default size (capacity of the number of messages it can hold) of the SEDA queue. This option is used if **size** is not in use.
pollTimeout	**1000**	*Consumer only* -- The timeout used when polling. When a timeout occurs, the consumer can check whether it is allowed to continue running. Setting a lower value allows the consumer to react more quickly upon shutdown.
purgeWhenStopping	**false**	Whether to purge the task queue when stopping the consumer/route. This allows to stop faster, as any pending messages on the queue is discarded.
queue	**null**	Define the queue instance which will be used by seda endpoint
queueFactory	**null**	Define the QueueFactory which could create the queue for the seda endpoint
failIfNoConsumers	**false**	Whether the producer should fail by throwing an exception, when sending to a SEDA queue with no active consumers.

CHOOSING BLOCKINGQUEUE IMPLEMENTATION

Available as of Camel 2.12

By default, the SEDA component always intantiates LinkedBlockingQueue, but you can use different implementation, you can reference your own BlockingQueue implementation, in this case the size option is not used

```
<bean id="arrayQueue" class="java.util.ArrayBlockingQueue">
<constructor-arg index="0" value="10" ><!-- size -->
<constructor-arg index="1" value="true" ><!-- fairness -->
</bean>
<!-- ... and later -->
<from>seda:array?queue=#arrayQueue</from>
```

Or you can reference a BlockingQueueFactory implementation, 3 implementations are provided LinkedBlockingQueueFactory, ArrayBlockingQueueFactory and PriorityBlockingQueueFactory:

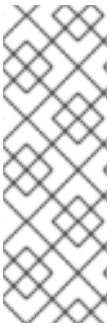
```
<bean id="priorityQueueFactory"
class="org.apache.camel.component.seda.PriorityBlockingQueueFactory">
<property name="comparator">
<bean class="org.apache.camel.demo.MyExchangeComparator" />
</property>
</bean>
<!-- ... and later -->
<from>seda:priority?queueFactory=#priorityQueueFactory&size=100</from>
```

USE OF REQUEST REPLY

The SEDA component supports using Request Reply, where the caller will wait for the Async route to complete. For instance:

```
from("mina:tcp://0.0.0.0:9876?textline=true&sync=true").to("seda:input");

from("seda:input").to("bean:processInput").to("bean:createResponse");
```

In the route above, we have a TCP listener on port 9876 that accepts incoming requests. The request is routed to the **seda:input** queue. As it is a Request Reply message, we wait for the response. When the consumer on the **seda:input** queue is complete, it copies the response to the original message response.



UNTIL 2.2: WORKS ONLY WITH 2 ENDPOINTS

Using Request Reply over SEDA or VM only works with 2 endpoints. You **cannot** chain endpoints by sending to A -> B -> C etc. Only between A -> B. The reason is the implementation logic is fairly simple. To support 3+ endpoints makes the logic much more complex to handle ordering and notification between the waiting threads properly.

This has been improved in **Camel 2.3** onwards, which allows you to chain as many endpoints as you like.

CONCURRENT CONSUMERS

By default, the SEDA endpoint uses a single consumer thread, but you can configure it to use concurrent consumer threads. So instead of thread pools you can use:

```
from("seda:stageName?concurrentConsumers=5").process(...)
```

DIFFERENCE BETWEEN THREAD POOLS AND CONCURRENT CONSUMERS

The *thread pool* is a pool that can increase/shrink dynamically at runtime depending on load, whereas the concurrent consumers are always fixed.

THREAD POOLS

Be aware that adding a thread pool to a SEDA endpoint by doing something like:

```
from("seda:stageName").thread(5).process(...)
```

Can wind up with two **BlockQueues**: one from the SEDA endpoint, and one from the workqueue of the thread pool, which may not be what you want. Instead, you might want to consider configuring a Direct endpoint with a thread pool, which can process messages both synchronously and asynchronously. For example:

```
from("direct:stageName").thread(5).process(...)
```

You can also directly configure number of threads that process messages on a SEDA endpoint using the **concurrentConsumers** option.

SAMPLE

In the route below we use the SEDA queue to send the request to this async queue to be able to send a fire-and-forget message for further processing in another thread, and return a constant reply in this thread to the original caller.

```
public void configure() throws Exception {
    from("direct:start")
        // send it to the seda queue that is async
        .to("seda:next")
        // return a constant response
        .transform(constant("OK"));

    from("seda:next").to("mock:result");
}
```

Here we send a Hello World message and expect the reply to be OK.

```
Object out = template.requestBody("direct:start", "Hello World");
assertEquals("OK", out);
```

The "Hello World" message will be consumed from the SEDA queue from another thread for further processing. Since this is from a unit test, it will be sent to a **mock** endpoint where we can do assertions in the unit test.

USING MULTIPLECONSUMERS

Available as of Camel 2.2

In this example we have defined two consumers and registered them as spring beans.

```
<!-- define the consumers as spring beans -->
<bean id="consumer1" class="org.apache.camel.spring.example.FooEventConsumer"/>

<bean id="consumer2" class="org.apache.camel.spring.example.AnotherFooEventConsumer"/>

<camelContext xmlns="http://camel.apache.org/schema/spring">
    <!-- define a shared endpoint which the consumers can refer to instead of using url -->
    <endpoint id="foo" uri="seda:foo?multipleConsumers=true"/>
</camelContext>
```

Since we have specified **multipleConsumers=true** on the seda foo endpoint we can have those two consumers receive their own copy of the message as a kind of pub-sub style messaging.

As the beans are part of an unit test they simply send the message to a mock endpoint, but notice how we can use @Consume to consume from the seda queue.

```
public class FooEventConsumer {

    @EndpointInject(uri = "mock:result")
    private ProducerTemplate destination;

    @Consume(ref = "foo")
    public void doSomething(String body) {
        destination.sendBody("foo" + body);
    }

}
```

EXTRACTING QUEUE INFORMATION.

If you need it, you can also get information like queue size etc without using JMX like this:

```
SedaEndpoint seda = context.getEndpoint("seda:xxxx");
int size = seda.getExchanges().size()
```

- Disruptor
- VM
- Direct

CHAPTER 128. SERVLET

SERVLET COMPONENT

The **servlet:** component provides HTTP based endpoints for consuming HTTP requests that arrive at a HTTP endpoint and this endpoint is bound to a published Servlet.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-servlet</artifactId>
  <version>x.x.x</version>
  <\!-\- use the same version as your Camel core version \-->
</dependency>
```

URI FORMAT

```
servlet://relative_path[?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
httpBindingRef	**null**	Reference to an **org.apache.camel.component.http.HttpBinding** in the Registry. A **HttpBinding** implementation can be used to customize how to write a response.
matchOnUriPrefix	**false**	Whether or not the **CamelServlet** should try to find a target consumer by matching the URI prefix, if no exact match is found.
servletName	**CamelServlet**	Specifies the servlet name that the servlet endpoint will bind to. If there is no servlet name specified, the servlet endpoint will be bind to first published Servlet.

httpMethodRestrict	**null**	**Camel 2.11:** *(Consumer only)* Used to only allow consuming if the **HttpMethod** matches, such as **GET**/**POST**/**PUT**, and so on. From **Camel 2.15** onwards, multiple methods can be specified, separated by a comma.

MESSAGE HEADERS

Apache Camel will apply the same Message Headers as the HTTP component.

Apache Camel will also populate **allrequest.parameter** and **request.headers**. For example, if a client request has the URL, **http://myserver/myserver?orderid=123**, the exchange will contain a header named **orderid** with the value 123.

USAGE

You can only consume from endpoints generated by the Servlet component. Therefore, it should only be used as input into your Apache Camel routes. To issue HTTP requests against other HTTP endpoints, use the HTTP Component

PUTTING CAMEL JARS IN THE APP SERVER BOOT CLASSPATH

If you put the Camel JARs such as **camel-core**, **camel-servlet**, etc. in the boot classpath of your application server (eg usually in its lib directory), then mind that the servlet mapping list is now shared between multiple deployed Camel application in the app server.

Mind that putting Camel JARs in the boot classpath of the application server is generally not best practice!

So in those situations you **must** define a custom and unique servlet name in each of your Camel application, eg in the **web.xml** define:

```
<servlet>
  <servlet-name>MyServlet</servlet-name>
  <servlet-class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-class>
  <load-on-startup>1</load-on-startup>
</servlet>

<servlet-mapping>
  <servlet-name>MyServlet</servlet-name>
  <url-pattern>/*</url-pattern>
</servlet-mapping>
```

And in your Camel endpoints then include the servlet name as well

```
<route>
  <from uri="servlet://foo?servletName=MyServlet"/>
  ...
</route>
```

From **Camel 2.11** onwards Camel will detect this duplicate and fail to start the application. You can control to ignore this duplicate by setting the servlet init-parameter ignoreDuplicateServletName to true as follows:

```
<servlet>
  <servlet-name>CamelServlet</servlet-name>
  <display-name>Camel Http Transport Servlet</display-name>
  <servlet-class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-class>
  <init-param>
    <param-name>ignoreDuplicateServletName</param-name>
    <param-value>true</param-value>
  </init-param>
</servlet>
```

But its **strongly advised** to use unique servlet-name for each Camel application to avoid this duplication clash, as well any unforeseen side-effects.

SAMPLE

IMPORTANT

From Camel 2.7 onwards its easier to use Servlet in Spring web applications. See Servlet Tomcat Example for details.

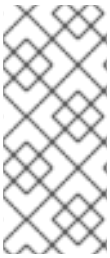
In this sample, we define a route that exposes a HTTP service at **http://localhost:8080/camel/services/hello**. First, you need to publish the CamelHttpTransportServlet through the normal Web Container, or OSGi Service. Use the **Web.xml** file to publish the CamelHttpTransportServlet as follows:

```
<web-app>

  <servlet>
    <servlet-name>CamelServlet</servlet-name>
    <display-name>Camel Http Transport Servlet</display-name>
    <servlet-class>
        org.apache.camel.component.servlet.CamelHttpTransportServlet
    </servlet-class>

  </servlet>

  <servlet-mapping>
    <servlet-name>CamelServlet</servlet-name>
    <url-pattern>/services/*</url-pattern>
  </servlet-mapping>

</web-app>
```

Then you can define your route as follows:

```
from("servlet:///hello?matchOnUriPrefix=true").process(new Processor() {
    public void process(Exchange exchange) throws Exception {
        String contentType = exchange.getIn().getHeader(Exchange.CONTENT_TYPE, String.class);
        String path = exchange.getIn().getHeader(Exchange.HTTP_URI, String.class);
```

```
        path = path.substring(path.lastIndexOf("/"));

        assertEquals("Get a wrong content type", CONTENT_TYPE, contentType);
        // assert camel http header
        String charsetEncoding =
exchange.getIn().getHeader(Exchange.HTTP_CHARACTER_ENCODING, String.class);
        assertEquals("Get a wrong charset name from the message heaer", "UTF-8", charsetEncoding);
        // assert exchange charset
        assertEquals("Get a wrong charset naem from the exchange property", "UTF-8",
exchange.getProperty(Exchange.CHARSET_NAME));
        exchange.getOut().setHeader(Exchange.CONTENT_TYPE, contentType + "; charset=UTF-8");
        exchange.getOut().setHeader("PATH", path);
        exchange.getOut().setBody("<b>Hello World</b>");
    }
});
```



SPECIFY THE RELATIVE PATH FOR CAMEL-SERVLET ENDPOINT

Since we are binding the Http transport with a published servlet, and we don't know the servlet's application context path, the **camel-servlet** endpoint uses the relative path to specify the endpoint's URL. A client can access the **camel-servlet** endpoint through the servlet publish address: **("http://localhost:8080/camel/services") + RELATIVE_PATH("/hello")**.

SAMPLE WHEN USING SPRING 3.X

The standalone Apache Camel package contains a demonstration of how to deploy the Servlet component in the Tomcat Web container. The demonstration is located in the **examples/camel-example-servlet-tomcat** directory. When deploying a Servlet component in the Web container, it is necessary to create a Spring application context explicitly by creating a Spring **ContextLoaderListener** instance in the **WEB-INF/web.xml** file.

For example, to create a Spring application context that loads Spring definitions (including the **camelContext** and route definitions) from the **camel-config.xml** file, define a **web.xml** file as follows:

```
<web-app version="2.4" xmlns="http://java.sun.com/xml/ns/j2ee"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://java.sun.com/xml/ns/j2ee http://java.sun.com/xml/ns/j2ee/web-
app_2_4.xsd">

    <display-name>My Web Application</display-name>

    <!-- location of spring xml files -->
    <context-param>
        <param-name>contextConfigLocation</param-name>
        <param-value>classpath:camel-config.xml</param-value>
    </context-param>

    <!-- the listener that kick-starts Spring -->
    <listener>
        <listener-class>org.springframework.web.context.ContextLoaderListener</listener-class>
    </listener>

    <!-- Camel servlet -->
    <servlet>
```

```
        <servlet-name>CamelServlet</servlet-name>
        <servlet-class>org.apache.camel.component.servlet.CamelHttpTransportServlet</servlet-class>
        <load-on-startup>1</load-on-startup>
    </servlet>

    <!-- Camel servlet mapping -->
    <servlet-mapping>
        <servlet-name>CamelServlet</servlet-name>
        <url-pattern>/camel/*</url-pattern>
    </servlet-mapping>

</web-app>
```

SAMPLE WHEN USING SPRING 2.X

When using the Servlet component in a Camel/Spring application it's often required to load the Spring ApplicationContext *after* the Servlet component has started. This can be accomplished by using Spring's **ContextLoaderServlet** instead of **ContextLoaderListener**. In that case you'll need to start **ContextLoaderServlet** after CamelHttpTransportServlet like this:

```
<web-app>
  <servlet>
        <servlet-name>CamelServlet</servlet-name>
        <servlet-class>
            org.apache.camel.component.servlet.CamelHttpTransportServlet
        </servlet-class>
        <load-on-startup>1</load-on-startup>
  </servlet>
  <servlet>
        <servlet-name>SpringApplicationContext</servlet-name>
        <servlet-class>
            org.springframework.web.context.ContextLoaderServlet
        </servlet-class>
        <load-on-startup>2</load-on-startup>
  </servlet>
<web-app>
```

SAMPLE WHEN USING OSGI

From **Camel 2.6.0**, you can publish the CamelHttpTransportServlet as an OSGi service with help of SpringDM like this.

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:osgi="http://www.springframework.org/schema/osgi"
       xsi:schemaLocation="
       http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
       http://www.springframework.org/schema/osgi
http://www.springframework.org/schema/osgi/spring-osgi.xsd">

    <bean id="camelServlet"
class="org.apache.camel.component.servlet.CamelHttpTransportServlet">
    </bean>
```

```
    <!--
        Enlist it in OSGi service registry
        This will cause two things:
        1) As the pax web whiteboard extender is running the CamelServlet will
          be registered with the OSGi HTTP Service
        2) It will trigger the HttpRegistry in other bundles so the servlet is
          made known there too
    -->
    <osgi:service ref="camelServlet">
        <osgi:interfaces>
            <value>javax.servlet.Servlet</value>
            <value>org.apache.camel.component.http.CamelServlet</value>
        </osgi:interfaces>
        <osgi:service-properties>
            <entry key="alias" value="/camel/services" />
            <entry key="matchOnUriPrefix" value="true" />
            <entry key="servlet-name" value="CamelServlet"/>
        </osgi:service-properties>
    </osgi:service>

</beans>
```

Then use this service in your camel route like this:

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:camel="http://camel.apache.org/schema/spring"
       xmlns:osgi="http://www.springframework.org/schema/osgi"
       xsi:schemaLocation="
       http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans.xsd
       http://www.springframework.org/schema/osgi
http://www.springframework.org/schema/osgi/spring-osgi.xsd
       http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-
spring.xsd">

    <osgi:reference id="servletref" interface="org.apache.camel.component.http.CamelServlet">
          <osgi:listener bind-method="register" unbind-method="unregister">
            <ref bean="httpRegistry"/>
          </osgi:listener>
    </osgi:reference>

    <bean id="httpRegistry" class="org.apache.camel.component.servlet.DefaultHttpRegistry"/>

    <bean id="servlet" class="org.apache.camel.component.servlet.ServletComponent">
        <property name="httpRegistry" ref="httpRegistry" />
    </bean>

    <bean id="servletProcessor" class="org.apache.camel.itest.osgi.servlet.ServletProcessor" />

    <camelContext xmlns="http://camel.apache.org/schema/spring">
        <route>
            <!-- notice how we can use the servlet scheme which is that osgi:reference above -->
            <from uri="servlet:///hello"/>
            <process ref="servletProcessor"/>
```

```
        </route>
    </camelContext>

</beans>
```

Alternatively - pre Camel 2.6 - you can use an **Activator** to publish the CamelHttpTransportServlet on the OSGi platform

```
import java.util.Dictionary;
import java.util.Hashtable;

import org.apache.camel.component.servlet.CamelHttpTransportServlet;
import org.osgi.framework.BundleActivator;
import org.osgi.framework.BundleContext;
import org.osgi.framework.ServiceReference;
import org.osgi.service.http.HttpContext;
import org.osgi.service.http.HttpService;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.osgi.context.BundleContextAware;

public final class ServletActivator implements BundleActivator, BundleContextAware {
    private static final transient Logger LOG = LoggerFactory.getLogger(ServletActivator.class);
    private static boolean registerService;

    /**
     * HttpService reference.
     */
    private ServiceReference httpServiceRef;

    /**
     * Called when the OSGi framework starts our bundle
     */
    public void start(BundleContext bc) throws Exception {
        registerServlet(bc);
    }

    /**
     * Called when the OSGi framework stops our bundle
     */
    public void stop(BundleContext bc) throws Exception {
        if (httpServiceRef != null) {
            bc.ungetService(httpServiceRef);
            httpServiceRef = null;
        }
    }

    protected void registerServlet(BundleContext bundleContext) throws Exception {
        httpServiceRef = bundleContext.getServiceReference(HttpService.class.getName());

        if (httpServiceRef != null && !registerService) {
            LOG.info("Register the servlet service");
            final HttpService httpService = (HttpService)bundleContext.getService(httpServiceRef);
            if (httpService != null) {
                // create a default context to share between registrations
                final HttpContext httpContext = httpService.createDefaultHttpContext();
```

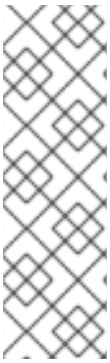
```
                // register the hello world servlet
                final Dictionary<String, String> initParams = new Hashtable<String, String>();
                initParams.put("matchOnUriPrefix", "false");
                initParams.put("servlet-name", "CamelServlet");
                httpService.registerServlet("/camel/services", // alias
                    new CamelHttpTransportServlet(), // register servlet
                    initParams, // init params
                    httpContext // http context
                );
                registerService = true;
            }
        }
    }

    public void setBundleContext(BundleContext bc) {
        try {
            registerServlet(bc);
        } catch (Exception e) {
            LOG.error("Cannot register the servlet, the reason is " + e);
        }
    }

}
```

CHAPTER 129. SERVLETLISTENER COMPONENT

SERVLETLISTENER COMPONENT

Available as of Camel 2.11

This component is used for bootstrapping Camel applications in web applications. For example beforehand people would have to find their own way of bootstrapping Camel, or rely on 3rd party frameworks such as Spring to do it.



SIDEBAR

This component supports Servlet 2.x onwards, which mean it works also in older web containers; which is the goal of this component. Though Servlet 2.x requires to use a web.xml file as configuration.

For Servlet 3.x containers you can use annotation driven configuration to boostrap Camel using the @WebListener, and implement your own class, where you boostrap Camel. Doing this still puts the challenge how to let end users easily configure Camel, which you get for free with the old school web.xml file.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-servletlistener</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

USING

You would need to chose one of the following implementations of the abstract class **org.apache.camel.component.servletlistener.CamelServletContextListener**.

- **JndiCamelServletContextListener** which uses the **JndiRegistry** to leverage JNDI for its registry.
- **SimpleCamelServletContextListener** which uses the **SimpleRegistry** to leverage a **java.util.Map** as its registry.

To use this you need to configure the **org.apache.camel.component.servletlistener.CamelServletContextListener** in the **WEB-INF/web.xml** file as shown below:

```
<web-app>

  <!-- the test parameter is only to be used for unit testing -->
  <!-- you should not use this option for production usage -->
  <context-param>
    <param-name>test</param-name>
    <param-value>true</param-value>
  </context-param>
```

```
  <!-- you can configure any of the properties on CamelContext, eg setName will be configured as
below -->
  <context-param>
    <param-name>name</param-name>
    <param-value>MyCamel</param-value>
  </context-param>

  <!-- configure a route builder to use -->
  <!-- Camel will pickup any parameter names that start with routeBuilder (case ignored) -->
  <context-param>
    <param-name>routeBuilder-MyRoute</param-name>
    <param-value>org.apache.camel.component.servletlistener.MyRoute</param-value>
  </context-param>

  <!-- register Camel as a listener so we can bootstrap Camel when the web application starts -->
  <listener>
    <listener-
class>org.apache.camel.component.servletlistener.SimpleCamelServletContextListener</listener-
class>
  </listener>

</web-app>
```

OPTIONS

The **org.apache.camel.component.servletlistener.CamelServletContextListener** supports the following options which can be configured as context-param in the web.xml file.

Option	Type	Description
propertyPlaceholder.XXX		To configure property placeholders in Camel. You should prefix the option with "propertyPlaceholder.", for example to configure the location, use propertyPlaceholder.location as name. You can configure all the options from the Properties component.
jmx.XXX		To configure JMX. You should prefix the option with "jmx.", for example to disable JMX, use jmx.disabled as name. You can configure all the options from **org.apache.camel.spi.ManagementAgent**. As well the options mentioned on the JMX page.
name	**String**	To configure the name of the CamelContext.

messageHistory	**Boolean**	**Camel 2.12.2:** Whether to enable or disable Message History (enabled by default).
streamCache	**Boolean**	Whether to enable Stream Caching.
trace	**Boolean**	Whether to enable Tracer.
delayer	**Long**	To set a delay value for Delay Interceptor.
handleFault	**Boolean**	Whether to enable handle fault.
errorHandlerRef	**String**	Refers to a context scoped Error Handler to be used.
autoStartup	**Boolean**	Whether to start all routes when starting Camel.
useMDCLogging	**Boolean**	Whether to use MDC Logging.
useBreadcrumb	**Boolean**	Whether to use breadcrumb.
managementNamePattern	**String**	To set a custom naming pattern for JMX MBeans.
threadNamePattern	**String**	To set a custom naming pattern for threads.
properties.XXX		To set custom properties on **CamelContext.getProperties**. This is seldom in use.
routebuilder.XXX		To configure routes to be used. See below for more details.
CamelContextLifecycle		Refers to a FQN classname of an implementation of **org.apache.camel.component.servletlistener.CamelContextLifecycle**. Which allows to execute custom code before and after CamelContext has been started or stopped. See below for further details.
XXX		To set any option on CamelContext.

EXAMPLES

See Servlet Tomcat No Spring Example.

CONFIGURING ROUTES

You need to configure which routes to use in the web.xml file. You can do this in a number of ways, though all the parameters must be prefixed with "routeBuilder".

USING A ROUTEBUILDER CLASS

By default Camel will assume the param-value is a FQN classname for a Camel RouteBuilder class, as shown below:

```
<context-param>
  <param-name>routeBuilder-MyRoute</param-name>
  <param-value>org.apache.camel.component.servletlistener.MyRoute</param-value>
</context-param>
```

You can specify multiple classes in the same param-value as shown below:

```
<context-param>
  <param-name>routeBuilder-routes</param-name>
  <!-- we can define multiple values separated by comma -->
  <param-value>
    org.apache.camel.component.servletlistener.MyRoute,
    org.apache.camel.component.servletlistener.routes.BarRouteBuilder
  </param-value>
</context-param>
```

The name of the parameter does not have a meaning at runtime. It just need to be unique and start with "routeBuilder". In the example above we have "routeBuilder-routes". But you could just as well have named it "routeBuilder.foo".

USING PACKAGE SCANNING

You can also tell Camel to use package scanning, which mean it will look in the given package for all classes of RouteBuilder types and automatic adding them as Camel routes. To do that you need to prefix the value with "packagescan:" as shown below:

```
<context-param>
  <param-name>routeBuilder-MyRoute</param-name>
  <!-- define the routes using package scanning by prefixing with packagescan: -->
  <param-value>packagescan:org.apache.camel.component.servletlistener.routes</param-value>
</context-param>
```

USING A XML FILE

You can also define Camel routes using XML DSL, though as we are not using Spring or Blueprint the XML file can only contain Camel route(s). In the web.xml you refer to the XML file which can be from "classpath", "file" or a "http" url, as shown below:

-

```
  <context-param>
    <param-name>routeBuilder-MyRoute</param-name>
    <param-value>classpath:routes/myRoutes.xml</param-value>
  </context-param>
```

And the XML file is:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- the xmlns="http://camel.apache.org/schema/spring" is needed -->
<routes xmlns="http://camel.apache.org/schema/spring">

  <route id="foo">
    <from uri="direct:foo"/>
    <to uri="mock:foo"/>
  </route>

  <route id="bar">
    <from uri="direct:bar"/>
    <to uri="mock:bar"/>
  </route>

</routes>
```

Notice that in the XML file the root tag is <routes> which must use the namespace "http://camel.apache.org/schema/spring". This namespace is having the spring in the name, but that is because of historical reasons, as Spring was the first and only XML DSL back in the time. At runtime no Spring JARs is needed. Maybe in Camel 3.0 the namespace can be renamed to a generic name.

CONFIGURING PROPERT PLACEHOLDERS

Here is a snippet of a web.xml configuration for setting up property placeholders to load **myproperties.properties** from the classpath

```
  <!-- setup property placeholder to load properties from classpath -->
  <!-- we do this by setting the param-name with propertyPlaceholder. as prefix and then any options
such as location, cache etc -->
  <context-param>
    <param-name>propertyPlaceholder.location</param-name>
    <param-value>classpath:myproperties.properties</param-value>
  </context-param>
  <!-- for example to disable cache on properties component, you do -->
  <context-param>
    <param-name>propertyPlaceholder.cache</param-name>
    <param-value>false</param-value>
  </context-param>
```

CONFIGURING JMX

Here is a snippet of a web.xml configuration for configuring JMX, such as disabling JMX.

```
  <!-- configure JMX by using names that is prefixed with jmx. -->
  <!-- in this example we disable JMX -->
  <context-param>
```

```
    <param-name>jmx.disabled</param-name>
    <param-value>true</param-value>
  </context-param>
```

JNDI OR SIMPLE AS CAMEL REGISTRY

This component uses either JNDI or Simple as the Registry. This allows you to lookup Beans and other services in JNDI, and as well to bind and unbind your own Beans.

This is done from Java code by implementing the **org.apache.camel.component.servletlistener.CamelContextLifecycle**.

USING CUSTOM CAMELCONTEXTLIFECYCLE

In the code below we use the callbacks **beforeStart** and **afterStop** to enlist our custom bean in the Simple Registry, and as well to cleanup when we stop.

```
/**
 * Our custom {@link CamelContextLifecycle} which allows us to enlist beans in the {@link
JndiContext}
 * so the Camel application can lookup the beans in the {@link org.apache.camel.spi.Registry}.
 * <p/>
 * We can of course also do other kind of custom logic as well.
 */
public class MyLifecycle implements CamelContextLifecycle<SimpleRegistry> {

    @Override
    public void beforeStart(ServletCamelContext camelContext, SimpleRegistry registry) throws
Exception {
        // enlist our bean(s) in the registry
        registry.put("myBean", new HelloBean());
    }

    @Override
    public void afterStart(ServletCamelContext camelContext, SimpleRegistry registry) throws
Exception {
        // noop
    }

    @Override
    public void beforeStop(ServletCamelContext camelContext, SimpleRegistry registry) throws
Exception {
        // noop
    }

    @Override
    public void afterStop(ServletCamelContext camelContext, SimpleRegistry registry) throws
Exception {
        // unbind our bean when Camel has been stopped
        registry.remove("myBean");
    }
}
```

Then we need to register this class in the web.xml file as shown below, using the parameter name "CamelContextLifecycle". The value must be a FQN which refers to the class implementing the **org.apache.camel.component.servletlistener.CamelContextLifecycle** interface.

```
<context-param>
  <param-name>CamelContextLifecycle</param-name>
  <param-value>org.apache.camel.component.servletlistener.MyLifecycle</param-value>
</context-param>
```

As we enlisted our HelloBean Bean using the name "myBean" we can refer to this Bean in the Camel routes as shown below:

```
public class MyBeanRoute extends RouteBuilder {
    @Override
    public void configure() throws Exception {
        from("seda:foo").routeId("foo")
            .to("bean:myBean")
            .to("mock:foo");
    }
}
```

Important: If you use **org.apache.camel.component.servletlistener.JndiCamelServletContextListener** then the **CamelContextLifecycle** must use the **JndiRegistry** as well. And likewise if the servlet is **org.apache.camel.component.servletlistener.SimpleCamelServletContextListener** then the **CamelContextLifecycle** must use the **SimpleRegistry**

CHAPTER 130. SHIRO SECURITY

SHIRO SECURITY COMPONENT

Available as of Camel 2.5

The **shiro-security** component in Camel is a security focused component, based on the Apache Shiro security project.

Apache Shiro is a powerful and flexible open-source security framework that cleanly handles authentication, authorization, enterprise session management and cryptography. The objective of the Apache Shiro project is to provide the most robust and comprehensive application security framework available while also being very easy to understand and extremely simple to use.

This camel shiro-security component allows authentication and authorization support to be applied to different segments of a camel route.

Shiro security is applied on a route using a Camel Policy. A Policy in Camel utilizes a strategy pattern for applying interceptors on Camel Processors. It offering the ability to apply cross-cutting concerns (for example. security, transactions etc) on sections/segments of a camel route.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-shiro</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

SHIRO SECURITY BASICS

To employ Shiro security on a camel route, a ShiroSecurityPolicy object must be instantiated with security configuration details (including users, passwords, roles etc). This object must then be applied to a camel route. This ShiroSecurityPolicy Object may also be registered in the Camel registry (JNDI or ApplicationContextRegistry) and then utilized on other routes in the Camel Context.

Configuration details are provided to the ShiroSecurityPolicy using an Ini file (properties file) or an Ini object. The Ini file is a standard Shiro configuration file containing user/role details as shown below

```
[users]
# user 'ringo' with password 'starr' and the 'sec-level1' role
ringo = starr, sec-level1
george = harrison, sec-level2
john = lennon, sec-level3
paul = mccartney, sec-level3

[roles]
# 'sec-level3' role has all permissions, indicated by the
# wildcard '*'
sec-level3 = *

# The 'sec-level2' role can do anything with access of permission
# readonly (*) to help
```

```
sec-level2 = zone1:*

# The 'sec-level1' role can do anything with access of permission
# readonly
sec-level1 = zone1:readonly:*
```

INSTANTIATING A SHIROSECURITYPOLICY OBJECT

A ShiroSecurityPolicy object is instantiated as follows

```
    private final String iniResourcePath = "classpath:shiro.ini";
    private final byte[] passPhrase = {
        (byte) 0x08, (byte) 0x09, (byte) 0x0A, (byte) 0x0B,
        (byte) 0x0C, (byte) 0x0D, (byte) 0x0E, (byte) 0x0F,
        (byte) 0x10, (byte) 0x11, (byte) 0x12, (byte) 0x13,
        (byte) 0x14, (byte) 0x15, (byte) 0x16, (byte) 0x17};
    List<permission> permissionsList = new ArrayList<permission>();
    Permission permission = new WildcardPermission("zone1:readwrite:*");
    permissionsList.add(permission);

    final ShiroSecurityPolicy securityPolicy =
        new ShiroSecurityPolicy(iniResourcePath, passPhrase, true, permissionsList);
```

SHIROSECURITYPOLICY OPTIONS

Name	Default Value	Type	Description
iniResourcePath or ini	**none**	Resource String or Ini Object	A mandatory Resource String for the iniResourcePath or an instance of an Ini object must be passed to the security policy. Resources can be acquired from the file system, classpath, or URLs when prefixed with "file:, classpath:, or url:" respectively. For e.g "classpath:shiro.ini"
passPhrase	**An AES 128 based key**	byte[]	A passPhrase to decrypt ShiroSecurityToken(s) sent along with Message Exchanges

alwaysReauthenticate	**true**	boolean	Setting to ensure re-authentication on every individual request. If set to false, the user is authenticated and locked such than only requests from the same user going forward are authenticated.
permissionsList	**none**	List<Permission>	A List of permissions required in order for an authenticated user to be authorized to perform further action i.e continue further on the route. If no Permissions list is provided to the ShiroSecurityPolicy object, then authorization is deemed as not required
cipherService	**AES**	org.apache.shiro.crypto.CipherService	Shiro ships with AES & Blowfish based CipherServices. You may use one these or pass in your own Cipher implementation
base64	**false**	**boolean**	**Camel 2.12:** To use base64 encoding for the security token header, which allows transferring the header over JMS etc. This option must also be set on **ShiroSecurityTokenInjector** as well.

APPLYING SHIRO AUTHENTICATION ON A CAMEL ROUTE

The ShiroSecurityPolicy, tests and permits incoming message exchanges containing a encrypted SecurityToken in the Message Header to proceed further following proper authentication. The SecurityToken object contains a Username/Password details that are used to determine where the user is a valid user.

```
protected RouteBuilder createRouteBuilder() throws Exception {
    final ShiroSecurityPolicy securityPolicy =
        new ShiroSecurityPolicy("classpath:shiro.ini", passPhrase);

    return new RouteBuilder() {
        public void configure() {
```

```
            onException(UnknownAccountException.class).
               to("mock:authenticationException");
            onException(IncorrectCredentialsException.class).
               to("mock:authenticationException");
            onException(LockedAccountException.class).
               to("mock:authenticationException");
            onException(AuthenticationException.class).
               to("mock:authenticationException");

            from("direct:secureEndpoint").
               to("log:incoming payload").
               policy(securityPolicy).
               to("mock:success");
         }
      };
   }
```

APPLYING SHIRO AUTHORIZATION ON A CAMEL ROUTE

Authorization can be applied on a camel route by associating a Permissions List with the ShiroSecurityPolicy. The Permissions List specifies the permissions necessary for the user to proceed with the execution of the route segment. If the user does not have the proper permission set, the request is not authorized to continue any further.

```
protected RouteBuilder createRouteBuilder() throws Exception {
   final ShiroSecurityPolicy securityPolicy =
      new ShiroSecurityPolicy("./src/test/resources/securityconfig.ini", passPhrase);

   return new RouteBuilder() {
      public void configure() {
         onException(UnknownAccountException.class).
            to("mock:authenticationException");
         onException(IncorrectCredentialsException.class).
            to("mock:authenticationException");
         onException(LockedAccountException.class).
            to("mock:authenticationException");
         onException(AuthenticationException.class).
            to("mock:authenticationException");

         from("direct:secureEndpoint").
            to("log:incoming payload").
            policy(securityPolicy).
            to("mock:success");
      }
   };
}
```

CREATING A SHIROSECURITYTOKEN AND INJECTING IT INTO A MESSAGE EXCHANGE

A ShiroSecurityToken object may be created and injected into a Message Exchange using a Shiro Processor called ShiroSecurityTokenInjector. An example of injecting a ShiroSecurityToken using a ShiroSecurityTokenInjector in the client is shown below

```
ShiroSecurityToken shiroSecurityToken = new ShiroSecurityToken("ringo", "starr");
ShiroSecurityTokenInjector shiroSecurityTokenInjector =
    new ShiroSecurityTokenInjector(shiroSecurityToken, passPhrase);

from("direct:client").
    process(shiroSecurityTokenInjector).
    to("direct:secureEndpoint");
```

SENDING MESSAGES TO ROUTES SECURED BY A SHIROSECURITYPOLICY

Messages and Message Exchanges sent along the camel route where the security policy is applied need to be accompanied by a SecurityToken in the Exchange Header. The SecurityToken is an encrypted object that holds a Username and Password. The SecurityToken is encrypted using AES 128 bit security by default and can be changed to any cipher of your choice.

Given below is an example of how a request may be sent using a ProducerTemplate in Camel along with a SecurityToken

```
 @Test
public void testSuccessfulShiroAuthenticationWithNoAuthorization() throws Exception {
    //Incorrect password
    ShiroSecurityToken shiroSecurityToken = new ShiroSecurityToken("ringo", "stirr");

    // TestShiroSecurityTokenInjector extends ShiroSecurityTokenInjector
    TestShiroSecurityTokenInjector shiroSecurityTokenInjector =
        new TestShiroSecurityTokenInjector(shiroSecurityToken, passPhrase);

    successEndpoint.expectedMessageCount(1);
    failureEndpoint.expectedMessageCount(0);

    template.send("direct:secureEndpoint", shiroSecurityTokenInjector);

    successEndpoint.assertIsSatisfied();
    failureEndpoint.assertIsSatisfied();
}
```

SENDING MESSAGES TO ROUTES SECURED BY A SHIROSECURITYPOLICY (MUCH EASIER FROM CAMEL 2.12 ONWARDS)

From **Camel 2.12** onwards its even easier as you can provide the subject in two different ways.

USING SHIROSECURITYTOKEN

You can send a message to a Camel route with a header of key **ShiroSecurityConstants.SHIRO_SECURITY_TOKEN** of the type **org.apache.camel.component.shiro.security.ShiroSecurityToken** that contains the username and password. For example:

```
    ShiroSecurityToken shiroSecurityToken = new ShiroSecurityToken("ringo", "starr");
```

```
        template.sendBodyAndHeader("direct:secureEndpoint", "Beatle Mania",
ShiroSecurityConstants.SHIRO_SECURITY_TOKEN, shiroSecurityToken);
```

You can also provide the username and password in two different headers as shown below:

```
        Map<String, Object> headers = new HashMap<String, Object>();
        headers.put(ShiroSecurityConstants.SHIRO_SECURITY_USERNAME, "ringo");
        headers.put(ShiroSecurityConstants.SHIRO_SECURITY_PASSWORD, "starr");
        template.sendBodyAndHeaders("direct:secureEndpoint", "Beatle Mania", headers);
```

When you use the username and password headers, then the ShiroSecurityPolicy in the Camel route will automatic transform those into a single header with key ShiroSecurityConstants.SHIRO_SECURITY_TOKEN with the token. Then token is either a **ShiroSecurityToken** instance, of a base64 representation as a String (the latter is when you have set base64=true).

CHAPTER 131. SIP

SIP COMPONENT

Available as of Camel 2.5

The **sip** component in Camel is a communication component, based on the Jain SIP implementation (available under the JCP license).

Session Initiation Protocol (SIP) is an IETF-defined signaling protocol, widely used for controlling multimedia communication sessions such as voice and video calls over Internet Protocol (IP).The SIP protocol is an Application Layer protocol designed to be independent of the underlying transport layer; it can run on Transmission Control Protocol (TCP), User Datagram Protocol (UDP) or Stream Control Transmission Protocol (SCTP).

The Jain SIP implementation supports TCP and UDP only.

The Camel SIP component **only** supports the SIP Publish and Subscribe capability as described in the RFC3903 - Session Initiation Protocol (SIP) Extension for Event

This camel component supports both producer and consumer endpoints.

Camel SIP Producers (Event Publishers) and SIP Consumers (Event Subscribers) communicate event & state information to each other using an intermediary entity called a SIP Presence Agent (a stateful brokering entity).

For SIP based communication, a SIP Stack with a listener **must** be instantiated on both the SIP Producer and Consumer (using separate ports if using localhost). This is necessary in order to support the handshakes & acknowledgements exchanged between the SIP Stacks during communication.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
   <groupId>org.apache.camel</groupId>
   <artifactId>camel-sip</artifactId>
   <version>x.x.x</version>
   <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI scheme for a sip endpoint is as follows:

```
sip://johndoe@localhost:99999[?options]
sips://johndoe@localhost:99999/[?options]
```

This component supports producer and consumer endpoints for both TCP and UDP.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

The SIP Component offers an extensive set of configuration options & capability to create custom stateful headers needed to propagate state via the SIP protocol.

Name	Default Value	Description
stackName	**NAME_NOT_SET**	Name of the SIP Stack instance associated with an SIP Endpoint.
transport	**tcp**	Setting for choice of transport potocol. Valid choices are "tcp" or "udp".
fromUser		Username of the message originator. **Mandatory setting unless a registry based custom FromHeader is specified.**
fromHost		Hostname of the message originator. **Mandatory setting unless a registry based FromHeader is specified**
fromPort		Port of the message originator. **Mandatory setting unless a registry based FromHeader is specified**
toUser		Username of the message receiver. **Mandatory setting unless a registry based custom ToHeader is specified.**
toHost		Hostname of the message receiver. **Mandatory setting unless a registry based ToHeader is specified**
toPort		Portname of the message receiver. **Mandatory setting unless a registry based ToHeader is specified**
maxforwards	0	the number of intermediaries that may forward the message to the message receiver. **Optional setting. May alternatively be set using as registry based MaxForwardsHeader**

eventId		Setting for a String based event Id. **Mandatory setting unless a registry based FromHeader is specified**
eventHeaderName		Setting for a String based event Id. **Mandatory setting unless a registry based FromHeader is specified**
maxMessageSize	**1048576**	Setting for maximum allowed Message size in bytes.
cacheConnections	**false**	Should connections be cached by the SipStack to reduce cost of connection creation. This is useful if the connection is used for long running conversations.
consumer	**false**	This setting is used to determine whether the kind of header (FromHeader,ToHeader etc) that needs to be created for this endpoint
automaticDialogSupport	**off**	Setting to specify whether every communication should be associated with a dialog.
contentType	**text**	Setting for contentType can be set to any valid MimeType.
contentSubType	**xml**	Setting for contentSubType can be set to any valid MimeSubType.
receiveTimeoutMillis	**10000**	Setting for specifying amount of time to wait for a Response and/or Acknowledgement can be received from another SIP stack
useRouterForAllUris	**false**	This setting is used when requests are sent to the Presence Agent via a proxy.
msgExpiration	**3600**	The amount of time a message received at an endpoint is considered valid

presenceAgent	**false**	This setting is used to distingish between a Presence Agent & a consumer. This is due to the fact that the SIP Camel component ships with a basic Presence Agent (for testing purposes only). Consumers have to set this flag to true.

REGISTRY BASED OPTIONS

SIP requires a number of headers to be sent/received as part of a request. These SIP header can be enlisted in the Registry, such as in the Spring XML file.

The values that could be passed in, are the following:

Name	Description
fromHeader	a custom Header object containing message originator settings. Must implement the type javax.sip.header.FromHeader
toHeader	a custom Header object containing message receiver settings. Must implement the type javax.sip.header.ToHeader
viaHeaders	List of custom Header objects of the type javax.sip.header.ViaHeader. Each ViaHeader containing a proxy address for request forwarding. (Note this header is automatically updated by each proxy when the request arrives at its listener)
contentTypeHeader	a custom Header object containing message content details. Must implement the type javax.sip.header.ContentTypeHeader
callIdHeader	a custom Header object containing call details. Must implement the type javax.sip.header.CallIdHeader
maxForwardsHeader	a custom Header object containing details on maximum proxy forwards. This header places a limit on the viaHeaders possible. Must implement the type javax.sip.header.MaxForwardsHeader
eventHeader	a custom Header object containing event details. Must implement the type javax.sip.header.EventHeader

contactHeader	an optional custom Header object containing verbose contact details (email, phone number etc). Must implement the type javax.sip.header.ContactHeader
expiresHeader	a custom Header object containing message expiration details. Must implement the type javax.sip.header.ExpiresHeader
extensionHeader	a custom Header object containing user/application specific details. Must implement the type javax.sip.header.ExtensionHeader

SENDING MESSAGES TO/FROM A SIP ENDPOINT

CREATING A CAMEL SIP PUBLISHER

In the example below, a SIP Publisher is created to send SIP Event publications to a user "agent@localhost:5152". This is the address of the SIP Presence Agent which acts as a broker between the SIP Publisher and Subscriber

- using a SIP Stack named client
- using a registry based eventHeader called evtHdrName
- using a registry based eventId called evtId
- from a SIP Stack with Listener set up as user2@localhost:3534
- The Event being published is EVENT_A
- A Mandatory Header called REQUEST_METHOD is set to Request.Publish thereby setting up the endpoint as a Event publisher"

```
producerTemplate.sendBodyAndHeader(
    "sip://agent@localhost:5152?
stackName=client&eventHeaderName=evtHdrName&eventId=evtid&fromUser=user2&fromHost=localhc
st&fromPort=3534",
    "EVENT_A",
    "REQUEST_METHOD",
    Request.PUBLISH);
```

CREATING A CAMEL SIP SUBSCRIBER

In the example below, a SIP Subscriber is created to receive SIP Event publications sent to a user "johndoe@localhost:5154"

- using a SIP Stack named Subscriber
- registering with a Presence Agent user called agent@localhost:5152

- using a registry based eventHeader called evtHdrName. The evtHdrName contains the Event which is se to "Event_A"
- using a registry based eventId called evtId

```
@Override
protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        @Override
        public void configure() throws Exception {
            // Create PresenceAgent
            from("sip://agent@localhost:5152?
stackName=PresenceAgent&presenceAgent=true&eventHeaderName=evtHdrName&eventId=evtid")
                .to("mock:neverland");

            // Create Sip Consumer(Event Subscriber)
            from("sip://johndoe@localhost:5154?
stackName=Subscriber&toUser=agent&toHost=localhost&toPort=5152&eventHeaderName=evtHdrNam
e&eventId=evtid")
                .to("log:ReceivedEvent?level=DEBUG")
                .to("mock:notification");

        }
    };
}
```

The Camel SIP component also ships with a Presence Agent that is meant to be used for Testing and Demo purposes only. An example of instantiating a Presence Agent is given above.

Note that the Presence Agent is set up as a user agent@localhost:5152 and is capable of communicating with both Publisher as well as Subscriber. It has a separate SIP stackName distinct from Publisher as well as Subscriber. While it is set up as a Camel Consumer, it does not actually send any messages along the route to the endpoint "mock:neverland".

CHAPTER 132. SJMS

SJMS COMPONENT

Available as of Camel 2.11

The Simple JMS Component, or SJMS, is a JMS client for use with Camel that uses well known best practices when it comes to JMS client creation and configuration. SJMS contains a brand new JMS client API written explicitly for Camel eliminating third party messaging implementations keeping it light and resilient. The following features are included:

- Standard Queue and Topic Support (Durable & Non-Durable)
- InOnly & InOut MEP Support
- Asynchronous Producer and Consumer Processing
- Internal JMS Transaction Support

Additional key features include:

- Plugable Connection Resource Management
- Session, Consumer, & Producer Pooling & Caching Management
- Batch Consumers and Producers
- Transacted Batch Consumers & Producers
- Support for Customizable Transaction Commit Strategies (Local JMS Transactions only)

WHY THE S IN SJMS

S stands for Simple and Standard and Springless. Also camel-jms was already taken. :-)

WARNING

This is a rather new component in a complex world of JMS messaging. So this component is ongoing development and hardening. The classic JMS component based on Spring JMS has been hardened and battle tested extensively.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
<groupId>org.apache.camel</groupId>
<artifactId>camel-sjms</artifactId>
<version>x.x.x</version>
<!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
sjms:[queue:|topic:]destinationName[?options]
```

Where **destinationName** is a JMS queue or topic name. By default, the **destinationName** is interpreted as a queue name. For example, to connect to the queue, **FOO.BAR** use:

```
sjms:FOO.BAR
```

You can include the optional **queue:** prefix, if you prefer:

```
sjms:queue:FOO.BAR
```

To connect to a topic, you *must* include the **topic:** prefix. For example, to connect to the topic, **Stocks.Prices**, use:

```
sjms:topic:Stocks.Prices
```

You append query options to the URI using the following format, **?option=value&option=value&...**

COMPONENT OPTIONS AND CONFIGURATIONS

The SJMS Component supports the following configuration options:

Option	Required	Default Value	Description
connectionCount		**1**	The maximum number of connections available to endpoints started under this component
connectionFactory	(/)	**null**	A ConnectionFactory is required to enable the SjmsComponent. It can be set directly or set set as part of a ConnectionResource.
connectionResource		**null**	A ConnectionResource is an interface that allows for customization and container control of the ConnectionFactory. See Plugable Connection Resource Management for further details.
headerFilterStrategy		**DefaultJmsKeyFormatStrategy**	

keyFormatStrategy		**DefaultJmsKeyFormatStrategy**	
transactionCommitStrategy		**null**	
DestinationCreationStrategy		**DefaultDestinationCreationStrategy**	**Camel 2.15.0:** Enables you to set a custom **DestinationCreationStrategy** on the SJMS Component.

Below is an example of how to configure the SjmsComponent with its required ConnectionFactory provider. It will create a single connection by default and store it using the components internal pooling APIs to ensure that it is able to service Session creation requests in a thread safe manner.

```
SjmsComponent component = new SjmsComponent();
component.setConnectionFactory(new ActiveMQConnectionFactory("tcp://localhost:61616"));
getContext().addComponent("sjms", component);
```

For a SjmsComponent that is required to support a durable subscription, you can override the default ConnectionFactoryResource instance and set the **clientId** property.

```
ConnectionFactoryResource connectionResource = new ConnectionFactoryResource();
connectionResource.setConnectionFactory(new
ActiveMQConnectionFactory("tcp://localhost:61616"));
connectionResource.setClientId("myclient-id");

SjmsComponent component = new SjmsComponent();
component.setConnectionResource(connectionResource);
component.setMaxConnections(1);
```

PRODUCER CONFIGURATION OPTIONS

The SjmsProducer Endpoint supports the following properties:

Option	Default Value	Description
acknowledgementMode	**AUTO_ACKNOWLEDGE**	The JMS acknowledgement name, which is one of: **SESSION_TRANSACTED**, **AUTO_ACKNOWLEDGE** or **DUPS_OK_ACKNOWLEDGE**. **CLIENT_ACKNOWLEDGE** is not supported at this time.
consumerCount	**1**	**InOut only.** Defines the number of MessageListener instances that for response consumers.

exchangePattern	**InOnly**	Sets the Producers message exchange pattern.
namedReplyTo	**null**	**InOut only.** Specifies a named reply to destination for responses.
persistent	**true**	Whether a message should be delivered with persistence enabled.
producerCount	**1**	Defines the number of MessageProducer instances.
responseTimeOut	**5000**	**InOut only.** Specifies the amount of time an InOut Producer will wait for its response.
synchronous	**true**	Sets whether the Endpoint will use synchronous or asynchronous processing.
transacted	**false**	If the endpoint should use a JMS Session transaction.
ttl	**-1**	Disabled by default. Sets the Message time to live header.
prefillPool	**true**	**Camel 2.14:** Whether to prefill the producer connection pool on startup, or create connections lazy when needed.
allowNullBody	**true**	**Camel 2.15.1:** Whether to allow sending messages with no body. If **false** and the message body is **null**, a **JMSException** is thrown.

PRODUCER USAGE

INONLY PRODUCER - (DEFAULT)

The InOnly Producer is the default behavior of the SJMS Producer Endpoint.

```
from("direct:start")
.to("sjms:queue:bar");
```

INOUT PRODUCER

To enable InOut behavior append the **exchangePattern** attribute to the URI. By default it will use a dedicated TemporaryQueue for each consumer.

```
from("direct:start")
.to("sjms:queue:bar?exchangePattern=InOut");
```

You can specify a **namedReplyTo** though which can provide a better monitor point.

```
from("direct:start")
.to("sjms:queue:bar?exchangePattern=InOut&namedReplyTo=my.reply.to.queue");
```

CONSUMERS CONFIGURATION OPTIONS

The SjmsConsumer Endpoint supports the following properties:

Option	Default Value	Description
acknowledgementMode	**AUTO_ACKNOWLEDGE**	The JMS acknowledgement name, which is one of: **TRANSACTED**, **AUTO_ACKNOWLEDGE** or **DUPS_OK_ACKNOWLEDGE**. **CLIENT_ACKNOWLEDGE** is not supported at this time.
consumerCount	**1**	Defines the number of MessageListener instances.
durableSubscriptionId	**null**	Required for a durable subscriptions.
exchangePattern	**InOnly**	Sets the Consumers message exchange pattern.
messageSelector	**null**	Sets the message selector.
synchronous	**true**	Sets whether the Endpoint will use synchronous or asynchronous processing.
transacted	**false**	If the endpoint should use a JMS Session transaction.
transactionBatchCount	**1**	The number of exchanges to process before committing a local JMS transaction. The **transacted** property must also be set to true or this property will be ignored.

transactionBatchTimeout	**5000**	The amount of time a the transaction will stay open between messages before committing what has already been consumed. Minimum value is 1000ms.
ttl	**\-1**	Disabled by default. Sets the Message time to live header.

CONSUMER USAGE

INONLY CONSUMER - (DEFAULT)

The InOnly Consumer is the default Exchange behavior of the SJMS Consumer Endpoint.

```
from("sjms:queue:bar")
.to("mock:result");
```

INOUT CONSUMER

To enable InOut behavior append the **exchangePattern** attribute to the URI.

```
from("sjms:queue:in.out.test?exchangePattern=InOut")
.transform(constant("Bye Camel"));
```

ADVANCED USAGE NOTES

PLUGABLE CONNECTION RESOURCE MANAGEMENT

SJMS provides JMS Connection resource management through built-in connection pooling. This eliminates the need to depend on third party API pooling logic. However there may be times that you are required to use an external Connection resource manager such as those provided by J2EE or OSGi containers. For this SJMS provides an interface that can be used to override the internal SJMS Connection pooling capabilities. This is accomplished through the ConnectionResource interface.

The ConnectionResource provides methods for borrowing and returning Connections as needed is the contract used to provide Connection pools to the SJMS component. A user should use when it is necessary to integrate SJMS with an external connection pooling manager.

It is recommended though that for standard ConnectionFactory providers you use the ConnectionFactoryResource implementation that is provided with SJMS as-is or extend as it is optimized for this component.

Below is an example of using the pluggable ConnectionResource with the ActiveMQ PooledConnectionFactory:

```
public class AMQConnectionResource implements ConnectionResource {
private PooledConnectionFactory pcf;

public AMQConnectionResource(String connectString, int maxConnections) {
```

```
super();
pcf = new PooledConnectionFactory(connectString);
pcf.setMaxConnections(maxConnections);
pcf.start();
}

public void stop() {
pcf.stop();
}

@Override
public Connection borrowConnection() throws Exception {
Connection answer = pcf.createConnection();
answer.start();
return answer;
}

@Override
public Connection borrowConnection(long timeout) throws Exception {
// SNIPPED...
}

@Override
public void returnConnection(Connection connection) throws Exception {
// Do nothing since there isn't a way to return a Connection
// to the instance of PooledConnectionFactory
log.info("Connection returned");
}
}
```

Then pass in the ConnectionResource to the SjmsComponent:

```
CamelContext camelContext = new DefaultCamelContext();
AMQConnectionResource pool = new AMQConnectionResource("tcp://localhost:33333", 1);
SjmsComponent component = new SjmsComponent();
component.setConnectionResource(pool);
camelContext.addComponent("sjms", component);
```

To see the full example of its usage please refer to the ConnectionResourceIT.

SESSION, CONSUMER, AND PRODUCER POOLING AND CACHING MANAGEMENT

Coming soon ...

BATCH MESSAGE SUPPORT

The SjmsProducer supports publishing a collection of messages by creating an Exchange that encapsulates a List. This SjmsProducer will take then iterate through the contents of the List and publish each message individually.

If when producing a batch of messages there is the need to set headers that are unique to each message you can use the SJMS BatchMessage class. When the SjmsProducer encounters a BatchMessage List it will iterate each BatchMessage and publish the included payload and headers.

Below is an example of using the BatchMessage class. First we create a List of BatchMessages:

```
List<BatchMessage<String>> messages = new ArrayList<BatchMessage<String>>();
for (int i = 1; i <= messageCount; i++) {
String body = "Hello World " + i;
BatchMessage<String> message = new BatchMessage<String>(body, null);
messages.add(message);
}
```

Then publish the List:

```
template.sendBody("sjms:queue:batch.queue", messages);
```

CUSTOMIZABLE TRANSACTION COMMIT STRATEGIES (LOCAL JMS TRANSACTIONS ONLY)

SJMS provides a developer the means to create a custom and plugable transaction strategy through the use of the TransactionCommitStrategy interface. This allows a user to define a unique set of circumstances that the SessionTransactionSynchronization will use to determine when to commit the Session. An example of its use is the BatchTransactionCommitStrategy which is detailed further in the next section.

TRANSACTED BATCH CONSUMERS AND PRODUCERS

The SjmsComponent has been designed to support the batching of local JMS transactions on both the Producer and Consumer endpoints. How they are handled on each is very different though.

The SjmsConsumer endpoint is a straitforward implementation that will process X messages before committing them with the associated Session. To enable batched transaction on the consumer first enable transactions by setting the **transacted** parameter to true and then adding the **transactionBatchCount** and setting it to any value that is greater than 0. For example the following configuration will commit the Session every 10 messages:

```
sjms:queue:transacted.batch.consumer?transacted=true&transactionBatchCount=10
```

If an exception occurs during the processing of a batch on the consumer endpoint, the Session rollback is invoked causing the messages to be redelivered to the next available consumer. The counter is also reset to 0 for the BatchTransactionCommitStrategy for the associated Session as well. It is the responsibility of the user to ensure they put hooks in their processors of batch messages to watch for messages with the JMSRedelivered header set to true. This is the indicator that messages were rolled back at some point and that a verification of a successful processing should occur.

A transacted batch consumer also carries with it an instance of an internal timer that waits a default amount of time (5000ms) between messages before committing the open transactions on the Session. The default value of 5000ms (minimum of 1000ms) should be adequate for most use-cases but if further tuning is necessary simply set the **transactionBatchTimeout** parameter.

```
sjms:queue:transacted.batch.consumer?
transacted=true&transactionBatchCount=10&transactionBatchTimeout=2000
```

The minimal value that will be accepted is 1000ms as the amount of context switching may cause unnecessary performance impacts without gaining benefit.

The producer endpoint is handled much differently though. With the producer after each message is delivered to its destination the Exchange is closed and there is no longer a reference to that message. To make a available all the messages available for redelivery you simply enable transactions on a Producer Endpoint that is publishing BatchMessages. The transaction will commit at the conclusion of the exchange which includes all messages in the batch list. Nothing additional need be configured. For example:

```
List<BatchMessage<String>> messages = new ArrayList<BatchMessage<String>>();
for (int i = 1; i <= messageCount; i++) {
String body = "Hello World " + i;
BatchMessage<String> message = new BatchMessage<String>(body, null);
messages.add(message);
}
```

Now publish the List with transactions enabled:

```
template.sendBody("sjms:queue:batch.queue?transacted=true", messages);
```

ADDITIONAL NOTES

MESSAGE HEADER FORMAT

The SJMS Component uses the same header format strategy that is used in the Camel JMS Component. This plugable strategy ensures that messages sent over the wire conform to the JMS Message spec.

For the exchange.in.header the following rules apply for the header keys:

Keys starting with JMS or JMSX are reserved. exchange.in.headers keys must be literals and all be valid Java identifiers (do not use dots in the key name). Camel replaces dots & hyphens and the reverse when when consuming JMS messages:

- is replaced by *DOT* and the reverse replacement when Camel consumes the message.
- is replaced by *HYPHEN* and the reverse replacement when Camel consumes the message. See also the option jmsKeyFormatStrategy, which allows use of your own custom strategy for formatting keys.

For the exchange.in.header, the following rules apply for the header values:

MESSAGE CONTENT

To deliver content over the wire we must ensure that the body of the message that is being delivered adheres to the JMS Message Specification. Therefore, all that are produced must either be primitives or their counter objects (such as Integer, Long, Character). The types, String, CharSequence, Date, BigDecimal and BigInteger are all converted to their toString() representation. All other types are dropped.

CLUSTERING

When using InOut with SJMS in a clustered environment you must either use TemporaryQueue destinations or use a unique named reply to destination per InOut producer endpoint. Message correlation is handled by the endpoint, not with message selectors at the broker. The InOut Producer

Endpoint uses Java Concurrency Exchangers cached by the Message JMSCorrelationID. This provides a nice performance increase while reducing the overhead on the broker since all the messages are consumed from the destination in the order they are produced by the interested consumer.

Currently the only correlation strategy is to use the JMSCorrelationId. The InOut Consumer uses this strategy as well ensuring that all responses messages to the included JMSReplyTo destination also have the JMSCorrelationId copied from the request as well.

TRANSACTION SUPPORT

SJMS currently only supports the use of internal JMS Transactions. There is no support for the Camel Transaction Processor or the Java Transaction API (JTA).

DOES SPRINGLESS MEAN I CAN'T USE SPRING?

Not at all. Below is an example of the SJMS component using the Spring DSL:

```
<route id="inout.named.reply.to.producer.route">
  <from uri="direct:invoke.named.reply.to.queue" />
  <to uri="sjms:queue:named.reply.to.queue?
namedReplyTo=my.response.queue&xchangePattern=InOut" />
</route>
```

Springless refers to moving away from the dependency on the Spring JMS API. A new JMS client API is being developed from the ground up to power SJMS.

CHAPTER 133. SMPP

SMPP COMPONENT

This component provides access to an SMSC (Short Message Service Center) over the SMPP protocol to send and receive SMS. The JSMPP library is used for the protocol implementation.

The Camel component currently operates as an ESME (External Short Messaging Entity) and not as an SMSC itself.

Starting with **Camel 2.9** you are also able to execute **ReplaceSm**, **QuerySm**, **SubmitMulti**, **CancelSm** and **DataSm**.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-smpp</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

SMS LIMITATIONS

SMS is neither reliable or secure. Users who require reliable and secure delivery may want to consider using the XMPP or SIP components instead, combined with a smartphone app supporting the chosen protocol.

- *Reliability:* although the SMPP standard offers a range of feedback mechanisms to indicate errors, non-delivery and confirmation of delivery it is not uncommon for mobile networks to hide or simulate these responses. For example, some networks automatically send a delivery confirmation for every message even if the destination number is invalid or not switched on. Some networks silently drop messages if they think they are spam. Spam detection rules in the network may be very crude, sometimes more than 100 messages per day from a single sender may be considered spam.

- *Security:* there is basic encryption for the last hop from the radio tower down to the recipient handset. SMS messages are not encrypted or authenticated in any other part of the network. Some operators allow staff in retail outlets or call centres to browse through the SMS message histories of their customers. Message sender identity can be easily forged. Regulators and even the mobile telephone industry itself has cautioned against the use of SMS in two-factor authentication schemes and other purposes where security is important.

While the Camel component makes it as easy as possible to send messages to the SMS network, it can not offer an easy solution to these problems.

DATA CODING, ALPHABET AND INTERNATIONAL CHARACTER SETS

Data coding and alphabet can be specified on a per-message basis. Default values can be specified for the endpoint. It is important to understand the relationship between these options and the way the component acts when more than one value is set.

Data coding is an 8 bit field in the SMPP wire format. Alphabet corresponds to bits 0-3 of the data coding field. For some types of message, where a message class is used (by setting bit 5 of the data coding

field), the lower two bits of the data coding field are not interpreted as alphabet and only bits 2 and 3 impact the alphabet.

Furthermore, the current version of the JSMPP library only seems to support bits 2 and 3, assuming that bits 0 and 1 are used for the message class. This is why the Alphabet class in JSMPP does not support the value 3 (binary 0011) which indicates ISO-8859-1.

Although JSMPP provides a representation of the message class parameter, the Camel component does not currently provide a way to set it other than manually setting the corresponding bits in the data coding field.

When setting the data coding field in the outgoing message, the Camel component considers the following values and uses the first one it can find:

- The data coding specified in a header,
- The alphabet specified in a header,
- The data coding specified in the endpoint configuration (URI parameter).

In addition to trying to send the data coding value to the SMSC, the Camel component also tries to analyse the message body, convert it to a Java String (Unicode) and convert that to a byte array in the corresponding alphabet When deciding which alphabet to use in the byte array, the Camel SMPP component does not consider the data coding value (header or configuration), it only considers the specified alphabet (from either the header or endpoint parameter).

If some characters in the **String** cannot be represented in the chosen alphabet, they may be replaced by the question mark, **?**, symbol. Users of the API may want to consider checking if their message body can be converted to ISO-8859-1 before passing it to the component and if not, setting the alphabet header to request UCS-2 encoding. If the alphabet and data coding options are not specified at all then the component may try to detect the required encoding and set the data coding for you.

The list of alphabet codes are specified in the SMPP specification v3.4, section 5.2.19. One notable limitation of the SMPP specification is that there is no alphabet code for explicitly requesting use of the GSM 3.38 (7 bit) character set. Choosing the value 0 for the alphabet selects the SMSC default alphabet, this usually means GSM 3.38 but it is not guaranteed. The SMPP gateway Nexmo actually allows the default to be mapped to any other character set with a control panel option. It is suggested that users check with their SMSC operator to confirm exactly which character set is being used as the default.

MESSAGE SPLITTING AND THROTTLING

After transforming a message body from a **String** to a **byte** array, the Camel component is also responsible for splitting the message into parts (within the 140 byte SMS size limit) before passing it to JSMPP. This is completed automatically.

If the GSM 3.38 alphabet is used, the component will pack up to 160 characters into the 140 byte message body. If an 8 bit character set is used (e.g. ISO-8859-1 for western Europe) then 140 characters will be allowed within the 140 byte message body. If 16 bit UCS-2 encoding is used then just 70 characters fit into each 140 byte message.

Some SMSC providers implement throttling rules. Each part of a message that has been split may be counted separately by the provider's throttling mechanism. The Camel Throttler component can be useful for throttling messages in the SMPP route before handing them to the SMSC.

URI FORMAT

```
smpp://[username@]hostname[:port][?options]
smpps://[username@]hostname[:port][?options]
```

If no **username** is provided, then Apache Camel will provide the default value **smppclient**. If no **port** number is provided, then Apache Camel will provide the default value **2775**.**Camel 2.3:** If the protocol name is **smpps**, camel-smpp with try to use SSLSocket to init a connection to the server.

You can append query options to the URI in the following format, **?option=value&option=value&...**

URI OPTIONS

Name	Default Value	Description
password	**password**	Specifies the password to use to log in to the SMSC.
systemType	**cp**	This parameter is used to categorize the type of ESME (External Short Message Entity) that is binding to the SMSC (max. 13 characters).
dataCoding	**0**	**Camel 2.11** Defines the data coding according the SMPP 3.4 specification, section 5.2.19. (Prior to **Camel 2.9**, this option is also supported.) Example data encodings are: • **0**: SMSC Default Alphabet • **3**: Latin 1 (ISO-8859-1) • **4**: Octet unspecified (8-bit binary) • **8**: UCS2 (ISO/IEC-10646) • **13**: Extended Kanji JIS(X 0212-1990)
alphabet	**0**	**Camel 2.5** Defines encoding of data according the SMPP 3.4 specification, section 5.2.19. This option is mapped to **Alphabet.java** and used to create the **byte[]** which is send to the SMSC. Example alphabets are: **0**: SMSC Default Alphabet **4**: 8 bit Alphabet **8**: UCS2 Alphabet

encoding	**ISO-8859-1**	**only for SubmitSm, ReplaceSm and SubmitMulti** Defines the encoding scheme of the short message user data.
enquireLinkTimer	**5000**	Defines the interval in milliseconds between the confidence checks. The confidence check is used to test the communication path between an ESME and an SMSC.
transactionTimer	**10000**	Defines the maximum period of inactivity allowed after a transaction, after which an SMPP entity may assume that the session is no longer active. This timer may be active on either communicating SMPP entity (i.e. SMSC or ESME).
initialReconnectDelay	**5000**	Defines the initial delay in milliseconds after the consumer/producer tries to reconnect to the SMSC, after the connection was lost.
reconnectDelay	**5000**	Defines the interval in milliseconds between the reconnect attempts, if the connection to the SMSC was lost and the previous was not succeed.
registeredDelivery	**1**	**only for SubmitSm, ReplaceSm, SubmitMulti and DataSm** Is used to request an SMSC delivery receipt and/or SME originated acknowledgements. The following values are defined: **0**: No SMSC delivery receipt requested. **1**: SMSC delivery receipt requested where final delivery outcome is success or failure. **2**: SMSC delivery receipt requested where the final delivery outcome is delivery failure.

serviceType	**CMT**	The service type parameter can be used to indicate the SMS Application service associated with the message. The following generic service_types are defined: • **CMT**: Cellular Messaging • **CPT**: Cellular Paging • **VMN**: Voice Mail Notification • **VMA**: Voice Mail Alerting • **WAP**: Wireless Application Protocol • **USSD**: Unstructured Supplementary Services Data
sourceAddr	**1616**	Defines the address of SME (Short Message Entity) which originated this message.
destAddr	**1717**	**only for SubmitSm, SubmitMulti, CancelSm and DataSm** Defines the destination SME address. For mobile terminated messages, this is the directory number of the recipient MS.
sourceAddrTon	**0**	Defines the type of number (TON) to be used in the SME originator address parameters. The following TON values are defined: • **0**: Unknown • **1**: International • **2**: National • **3**: Network Specific • **4**: Subscriber Number • **5**: Alphanumeric • **6**: Abbreviated

destAddrTon	**0**	**only for SubmitSm, SubmitMulti, CancelSm and DataSm** Defines the type of number (TON) to be used in the SME destination address parameters. The following TON values are defined: • **0**: Unknown • **1**: International • **2**: National • **3**: Network Specific • **4**: Subscriber Number • **5**: Alphanumeric • **6**: Abbreviated
sourceAddrNpi	**0**	Defines the numeric plan indicator (NPI) to be used in the SME originator address parameters. The following NPI values are defined: • **0**: Unknown • **1**: ISDN (E163/E164) • **2**: Data (X.121) • **3**: Telex (F.69) • **6**: Land Mobile (E.212) • **8**: National • **9**: Private • **10**: ERMES • **13**: Internet (IP) • **18**: WAP Client Id (to be defined by WAP Forum)

destAddrNpi	**0**	**only for SubmitSm, SubmitMulti, CancelSm and DataSm** Defines the numeric plan indicator (NPI) to be used in the SME destination address parameters. The following NPI values are defined: • **0**: Unknown • **1**: ISDN (E163/E164) • **2**: Data (X.121) • **3**: Telex (F.69) • **6**: Land Mobile (E.212) • **8**: National • **9**: Private • **10**: ERMES • **13**: Internet (IP) • **18**: WAP Client Id (to be defined by WAP Forum)
priorityFlag	**1**	**only for SubmitSm and SubmitMulti** Allows the originating SME to assign a priority level to the short message. Four Priority Levels are supported: • **0**: Level 0 (lowest) priority • **1**: Level 1 priority • **2**: Level 2 priority • **3**: Level 3 (highest) priority

replaceIfPresentFlag	**0**	**only for SubmitSm and SubmitMulti** Used to request the SMSC to replace a previously submitted message, that is still pending delivery. The SMSC will replace an existing message provided that the source address, destination address and service type match the same fields in the new message. The following replace if present flag values are defined: • **0**: Don't replace • **1**: Replace
dataCoding	**0**	**Camel 2.5 onwarts** Defines encoding of data according the SMPP 3.4 specification, section 5.2.19. Example data encodings are: **0**: SMSC Default Alphabet **4**: 8 bit Alphabet **8**: UCS2 Alphabet
typeOfNumber	**0**	Defines the type of number (TON) to be used in the SME. The following TON values are defined: • **0**: Unknown • **1**: International • **2**: National • **3**: Network Specific • **4**: Subscriber Number • **5**: Alphanumeric • **6**: Abbreviated

numberingPlanIndicator	**0**	Defines the numeric plan indicator (NPI) to be used in the SME. The following NPI values are defined: • **0**: Unknown • **1**: ISDN (E163/E164) • **2**: Data (X.121) • **3**: Telex (F.69) • **6**: Land Mobile (E.212) • **8**: National • **9**: Private • **10**: ERMES • **13**: Internet (IP) • **18**: WAP Client Id (to be defined by WAP Forum)
lazySessionCreation	**false**	**Camel 2.8 onwards** Sessions can be lazily created to avoid exceptions, if the SMSC is not available when the Camel producer is started. **Camel 2.11 onwards** Camel will check the in message headers 'CamelSmppSystemId' and 'CamelSmppPassword' of the first exchange. If they are present, Camel will use these data to connect to the SMSC.
httpProxyHost	**null**	**Camel 2.9.1:** If you need to tunnel SMPP through a HTTP proxy, set this attribute to the hostname or ip address of your HTTP proxy.
httpProxyPort	**3128**	**Camel 2.9.1:** If you need to tunnel SMPP through a HTTP proxy, set this attribute to the port of your HTTP proxy.
httpProxyUsername	**null**	**Camel 2.9.1:** If your HTTP proxy requires basic authentication, set this attribute to the username required for your HTTP proxy.

httpProxyPassword	**null**	**Camel 2.9.1:** If your HTTP proxy requires basic authentication, set this attribute to the password required for your HTTP proxy.
sessionStateListener	**null**	**Camel 2.9.3:** You can refer to a **org.jsmpp.session.SessionStateListener** in the **Registry** to receive callbacks when the session state changed.
addressRange	**""**	**Camel 2.11:** You can specify the address range for the **SmppConsumer** as defined in section 5.2.7 of the SMPP 3.4 specification. The **SmppConsumer** will receive messages only from SMSC's which target an address (MSISDN or IP address) within this range.
splittingPolicy	**ALLOW**	**Camel 2.14.1 and 2.15.0:** You can specify a policy for handling long messages, as follows: • **ALLOW** - (the default) long messages are split to 140 bytes per message. • **TRUNCATE** - long messages are split and only the first fragment will be sent to the SMSC. Some carriers drop subsequent fragments so this reduces load on the SMPP connection sending parts of a message that will never be delivered. • **REJECT** - if a message would need to be split, it is rejected with an SMPP **NegativeResponseException** and the reason code signifying the message is too long.

You can have as many of these options as you like.

```
smpp://smppclient@localhost:2775?
password=password&enquireLinkTimer=3000&transactionTimer=5000&systemType=consumer
```

PRODUCER MESSAGE HEADERS

The following message headers can be used to affect the behavior of the SMPP producer

Header	Type	Description
CamelSmppDestAddr	**List/String**	**only for SubmitSm, SubmitMulti, CancelSm and DataSm** Defines the destination SME address(es). For mobile terminated messages, this is the directory number of the recipient MS. Is must be a **List<String>** for SubmitMulti and a **String** otherwise.
CamelSmppDestAddrTon	**Byte**	**only for SubmitSm, SubmitMulti, CancelSm and DataSm** Defines the type of number (TON) to be used in the SME destination address parameters. The following TON values are defined: • **0**: Unknown • **1**: International • **2**: National • **3**: Network Specific • **4**: Subscriber Number • **5**: Alphanumeric • **6**: Abbreviated

CamelSmppDestAddrNpi	**Byte**	**only for SubmitSm, SubmitMulti, CancelSm and DataSm** Defines the numeric plan indicator (NPI) to be used in the SME destination address parameters. The following NPI values are defined: • **0**: Unknown • **1**: ISDN (E163/E164) • **2**: Data (X.121) • **3**: Telex (F.69) • **6**: Land Mobile (E.212) • **8**: National • **9**: Private • **10**: ERMES • **13**: Internet (IP) • **18**: WAP Client Id (to be defined by WAP Forum)
CamelSmppSourceAddr	**String**	Defines the address of SME (Short Message Entity) which originated this message.
CamelSmppSourceAddrTon	**Byte**	Defines the type of number (TON) to be used in the SME originator address parameters. The following TON values are defined: • **0**: Unknown • **1**: International • **2**: National • **3**: Network Specific • **4**: Subscriber Number • **5**: Alphanumeric • **6**: Abbreviated

CamelSmppSourceAddrNpi	**Byte**	Defines the numeric plan indicator (NPI) to be used in the SME originator address parameters. The following NPI values are defined: • **0**: Unknown • **1**: ISDN (E163/E164) • **2**: Data (X.121) • **3**: Telex (F.69) • **6**: Land Mobile (E.212) • **8**: National • **9**: Private • **10**: ERMES • **13**: Internet (IP) • **18**: WAP Client Id (to be defined by WAP Forum)
CamelSmppServiceType	**String**	The service type parameter can be used to indicate the SMS Application service associated with the message. The following generic service_types are defined: • **CMT**: Cellular Messaging • **CPT**: Cellular Paging • **VMN**: Voice Mail Notification • **VMA**: Voice Mail Alerting • **WAP**: Wireless Application Protocol • **USSD**: Unstructured Supplementary Services Data

CamelSmppRegisteredDelivery	**Byte**	**only for SubmitSm, ReplaceSm, SubmitMulti and DataSm** Is used to request an SMSC delivery receipt and/or SME originated acknowledgements. The following values are defined: • **0**: No SMSC delivery receipt requested. • **1**: SMSC delivery receipt requested where final delivery outcome is success or failure. • **2**: SMSC delivery receipt requested where the final delivery outcome is delivery failure.
CamelSmppPriorityFlag	**Byte**	**only for SubmitSm and SubmitMulti** Allows the originating SME to assign a priority level to the short message. Four Priority Levels are supported: • **0**: Level 0 (lowest) priority • **1**: Level 1 priority • **2**: Level 2 priority • **3**: Level 3 (highest) priority
CamelSmppValidityPeriod	**String**/{{Date}}	**only for SubmitSm, SubmitMulti and ReplaceSm** The validity period parameter indicates the SMSC expiration time, after which the message should be discarded if not delivered to the destination. If it's provided as **Date**, it's interpreted as absolute time. **Camel 2.9.1 onwards:** It can be defined in absolute time format or relative time format if you provide it as **String** as specified in chapter 7.1.1 in the smpp specification v3.4.

CamelSmppReplaceIfPresentFlag	**Byte**	**only for SubmitSm and SubmitMulti** The replace if present flag parameter is used to request the SMSC to replace a previously submitted message, that is still pending delivery. The SMSC will replace an existing message provided that the source address, destination address and service type match the same fields in the new message. The following values are defined: • **0**: Don't replace • **1**: Replace
CamelSmppAlphabet / **CamelSmppDataCoding**	**Byte**	**Camel 2.5For SubmitSm, SubmitMulti and ReplaceSm** (Prior to **Camel 2.9** use **CamelSmppDataCoding** instead of **CamelSmppAlphabet**.) The data coding according to the SMPP 3.4 specification, section 5.2.19. Use the URI option **alphabet** settings above.
CamelSmppOptionalParameters	**Map<String, String>**	**Deprecated and will be removed in Camel 2.13.0/3.0.0Camel 2.10.5 and 2.11.1 onwards and only for SubmitSm, SubmitMulti and DataSm** The optional parameters send back by the SMSC.
CamelSmppOptionalParameter	**Map<Short, Object>**	**Camel 2.10.7 and 2.11.2 onwards and only for SubmitSm, SubmitMulti and DataSm** The optional parameter which are send to the SMSC. The value is converted in the following way: **String** -> **org.jsmpp.bean.OptionalParameter.COctetStringbyte[]** -> **org.jsmpp.bean.OptionalParameter.OctetStringByte** -> **org.jsmpp.bean.OptionalParameter.ByteInteger** -> **org.jsmpp.bean.OptionalParameter.IntShort** -> **org.jsmpp.bean.OptionalParameter.Shortnull** -> **org.jsmpp.bean.OptionalParameter.Null**

CamelSmppEncoding	**String**	**Camel 2.14.1 and Camel 2.15.0:** and only for **SubmitSm**, **SubmitMulti** and **DataSm**. Specifies the encoding (character set name) of the bytes in the message body. If the message body is a string then this is not relevant because Java strings are always Unicode. If the body is a byte array then this header can be used to indicate that it is ISO-8859-1 or some other value. Default value is specified by the endpoint configuration parameter encoding.
CamelSmppSplittingPolicy	**String**	**Camel 2.14.1 and Camel 2.15.0:** and only for **SubmitSm**, **SubmitMulti** and **DataSm**. Specifies the policy for message splitting for this exchange. Possible values are described in the endpoint configuration parameter **splittingPolicy**.

The following message headers are used by the SMPP producer to set the response from the SMSC in the message header

Header	Type	Description
CamelSmppId	**List<String>**/{{String}}	The id to identify the submitted short message(s) for later use. **From Camel 2.9.0**: In case of a ReplaceSm, QuerySm, CancelSm and DataSm this header vaule is a **String**. In case of a SubmitSm or SubmitMultiSm this header vaule is a **List<String>**.
CamelSmppSentMessageCount	**Integer**	**From Camel 2.9 onwards only for SubmitSm and SubmitMultiSm** The total number of messages which has been sent.
CamelSmppError	**Map<String, List<Map<String, Object>>>**	**From Camel 2.9 onwards only for SubmitMultiSm** The errors which occurred by sending the short message(s) the form **Map<String, List<Map<String, Object>>>** (messageID : (destAddr : address, error : errorCode)).

CamelSmppOptionalParameters	**Map<String, String>**	**Deprecated and will be removed in Camel 2.13.0/3.0.0From Camel 2.11.1 onwards only for DataSm** The optional parameters which are returned from the SMSC by sending the message.
CamelSmppOptionalParameter	**Map<Short, Object>**	**From Camel 2.10.7, 2.11.2 onwards only for DataSm** The optional parameter which are returned from the SMSC by sending the message. The key is the **Short** code for the optional parameter. The value is converted in the following way: **org.jsmpp.bean.OptionalParameter.COctetString** -> **Stringorg.jsmpp.bean.OptionalParameter.OctetString** -> **byte[]org.jsmpp.bean.OptionalParameter.Byte** -> **Byteorg.jsmpp.bean.OptionalParameter.Int** -> **Integerorg.jsmpp.bean.OptionalParameter.Short** -> **Shortorg.jsmpp.bean.OptionalParameter.Null** -> **null**

CONSUMER MESSAGE HEADERS

The following message headers are used by the SMPP consumer to set the request data from the SMSC in the message header

Header	Type	De
CamelSmppSequenceNumber	**Integer**	**or** to fie
CamelSmppCommandId	**Integer**	**or** SM v3
CamelSmppSourceAddr	**String**	**or** Er

CamelSmppSourceAddrNpi	**Byte**	**or** SM
CamelSmppSourceAddrTon	**Byte**	**or** or
CamelSmppEsmeAddr	**String**	**or** m

CamelSmppEsmeAddrNpi	**Byte**	**or** or
CamelSmppEsmeAddrTon	**Byte**	**or** ac
CamelSmppId	**String**	**or** SM
CamelSmppDelivered	**Integer**	**or** th ne
CamelSmppDoneDate	**Date**	**or** st
CamelSmppFinalStatus	**DeliveryReceiptState**	**or** de ex **A** by re

CamelSmppCommandStatus	**Integer**	**or**
CamelSmppError	**String**	**or** ar SM
CamelSmppSubmitDate	**Date**	**or** th re
CamelSmppSubmitted	**Integer**	**or** re lea
CamelSmppDestAddr	**String**	**or** m
CamelSmppScheduleDeliveryTime	**String**	**or** sh cu sp sp
CamelSmppValidityPeriod	**String**	**or** th tim Se
CamelSmppServiceType	**String**	**or** Ap
CamelSmppRegisteredDelivery	**Byte**	**or** ac

CamelSmppDestAddrNpi	**Byte**	**or** ac
CamelSmppDestAddrTon	**Byte**	**or** pa
CamelSmppMessageType	**String**	**Ca** al re
CamelSmppOptionalParameters	**Map<String, Object>**	**De** **De**
CamelSmppOptionalParameter	**Map<Short, Object>**	**Ca** th fo **St** **by** **By** **In** **Sl**

JSMPP LIBRARY

See the documentation of the JSMPP Library for more details about the underlying library.

EXCEPTION HANDLING

This component supports the general Camel exception handling capabilities.

When an error occurs sending a message with **SubmitSm** (the default action), the **org.apache.camel.component.smpp.SmppException** is thrown with a nested exception, **org.jsmpp.extra.NegativeResponseException**. Call **NegativeResponseException.getCommandStatus()** to obtain the exact SMPP negative response code, the values are explained in the SMPP specification 3.4, section 5.1.3.

Camel 2.8 onwarts: When the SMPP consumer receives a **DeliverSm** or **DataSm** short message and the processing of these messages fails, you can also throw a **ProcessRequestException** instead of handle the failure. In this case, this exception is forwarded to the underlying JSMPP library which will return the included error code to the SMSC. This feature is useful to e.g. instruct the SMSC to resend the short message at a later time. This could be done with the following lines of code:

```
from("smpp://smppclient@localhost:2775?
password=password&enquireLinkTimer=3000&transactionTimer=5000&systemType=consumer")
  .doTry()
    .to("bean:dao?method=updateSmsState")
  .doCatch(Exception.class)
    .throwException(new ProcessRequestException("update of sms state failed", 100))
  .end();
```

Please refer to the SMPP specification for the complete list of error codes and their meanings.

SAMPLES

A route which sends an SMS using the Java DSL:

```
from("direct:start")
  .to("smpp://smppclient@localhost:2775?
password=password&enquireLinkTimer=3000&transactionTimer=5000&systemType=producer");
```

A route which sends an SMS using the Spring XML DSL:

```
<route>
  <from uri="direct:start"/>
  <to uri="smpp://smppclient@localhost:2775?
password=password&nquireLinkTimer=3000&ransactionTimer=5000&ystemType=producer"/>
</route>
```

A route which receives an SMS using the Java DSL:

```
from("smpp://smppclient@localhost:2775?
password=password&enquireLinkTimer=3000&transactionTimer=5000&systemType=consumer")
  .to("bean:foo");
```

A route which receives an SMS using the Spring XML DSL:

-

```
  <route>
    <from uri="smpp://smppclient@localhost:2775?
password=password&nquireLinkTimer=3000&ransactionTimer=5000&ystemType=consumer"/>
    <to uri="bean:foo"/>
  </route>
```

SMSC SIMULATOR

If you need an SMSC simulator for your test, you can use the simulator provided by Logica.

DEBUG LOGGING

This component has log level **DEBUG**, which can be helpful in debugging problems. If you use log4j, you can add the following line to your configuration:

```
log4j.logger.org.apache.camel.component.smpp=DEBUG
```

CHAPTER 134. SNMP

SNMP COMPONENT

The **snmp:** component gives you the ability to poll SNMP capable devices or receiving traps.

URI FORMAT

```
snmp://hostname[:port][?Options]
```

The component supports polling OID values from an SNMP enabled device and receiving traps.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
type	none	The type of action you want to perform. Actually you can enter here **POLL** or **TRAP**. The value **POLL** will instruct the endpoint to poll a given host for the supplied OID keys. If you put in **TRAP** you will setup a listener for SNMP Trap Events.
address	none	This is the IP address and the port of the host to poll or where to setup the Trap Receiver. Example: **127.0.0.1:162**
protocol	**udp**	Here you can select which protocol to use. You can use either **udp** or **tcp**.
retries	**2**	Defines how often a retry is made before canceling the request.
timeout	**1500**	Sets the timeout value for the request in millis.
snmpVersion	**0** (which means SNMPv1)	Sets the SNMP version for the request.
snmpCommunity	**public**	Sets the community octet string for the snmp request.

delay	**60000**	Defines the delay in milliseconds between two poll cycles. Note that in previous releases, this option was specified in units of seconds.
oids	none	Defines which values you are interested in. Please have a look at the Wikipedia to get a better understanding. You may provide a single OID or a coma separated list of OIDs. Example: **oids="1.3.6.1.2.1.1.3.0,1.3.6.1.2.1.25.3.2.1.5.1,1.3.6.1.2.1.25.3.5.1.1.1,1.3.6.1.2.1.43.5.1.1.11.1"**

THE RESULT OF A POLL

Given the situation, that I poll for the following OIDs:

```
1.3.6.1.2.1.1.3.0
1.3.6.1.2.1.25.3.2.1.5.1
1.3.6.1.2.1.25.3.5.1.1.1
1.3.6.1.2.1.43.5.1.1.11.1
```

The result will be the following:

```
<?xml version="1.0" encoding="UTF-8"?>
<snmp>
  <entry>
    <oid>1.3.6.1.2.1.1.3.0</oid>
    <value>6 days, 21:14:28.00</value>
  </entry>
  <entry>
    <oid>1.3.6.1.2.1.25.3.2.1.5.1</oid>
    <value>2</value>
  </entry>
  <entry>
    <oid>1.3.6.1.2.1.25.3.5.1.1.1</oid>
    <value>3</value>
  </entry>
  <entry>
    <oid>1.3.6.1.2.1.43.5.1.1.11.1</oid>
    <value>6</value>
  </entry>
  <entry>
    <oid>1.3.6.1.2.1.1.1.0</oid>
    <value>My Very Special Printer Of Brand Unknown</value>
  </entry>
</snmp>
```

As you maybe recognized there is one more result than requested....1.3.6.1.2.1.1.1.0. This one is filled in by the device automatically in this special case. So it may absolutely happen, that you receive more than you requested...be prepared.

EXAMPLES

Polling a remote device:

```
snmp:192.168.178.23:161?protocol=udp&type=POLL&oids=1.3.6.1.2.1.1.5.0
```

Setting up a trap receiver (*no OID info is needed here!*):

```
snmp:127.0.0.1:162?protocol=udp&type=TRAP
```

From Camel 2.10.0, you can get the community of SNMP TRAP with message header 'securityName', peer address of the SNMP TRAP with message header 'peerAddress'.

Routing example in Java (converts the SNMP PDU to XML String):

```
from("snmp:192.168.178.23:161?protocol=udp&type=POLL&oids=1.3.6.1.2.1.1.5.0").
convertBodyTo(String.class).
to("activemq:snmp.states");
```

CHAPTER 135. SOLR

SOLR COMPONENT

Available as of Camel 2.9

The Solr component allows you to interface with an Apache Lucene Solr server (based on SolrJ 3.5.0).

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-solr</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

The URI format is as follows:

```
solr://host[:port]/solr?[options]
solrs://host[:port]/solr ?[options]
solrCloud://host[:port]/solr?[options]
```

ENDPOINT OPTIONS

The following SolrServer options may be configured on the Solr endpoint.

name	default value	description
maxRetries	**0**	maximum number of retries to attempt in the event of transient errors
soTimeout	**1000**	read timeout on the underlying HttpConnectionManager. This is desirable for queries, but probably not for indexing
connectionTimeout	**100**	connectionTimeout on the underlying HttpConnectionManager
defaultMaxConnectionsPerHost	**2**	maxConnectionsPerHost on the underlying HttpConnectionManager

maxTotalConnections	**20**	maxTotalConnection on the underlying HttpConnectionManager
followRedirects	**false**	indicates whether redirects are used to get to the Solr server
allowCompression	**false**	server side must support gzip or deflate for this to have any effect
requestHandler	/update (xml)	set the request handler to be used
streamingThreadCount	**2**	**Camel 2.9.2** set the number of threads for the StreamingUpdateSolrServer
streamingQueueSize	**10**	**Camel 2.9.2** set the queue size for the StreamingUpdateSolrServer
zkhost	**null**	**Camel 2.14.0** set the zoo keeper host information which the solrCloud could use, such as "zkhost=localhost:8123".
collection	**null**	**Camel 2.14.0** set the collection name which the solrCloud server could use

MESSAGE OPERATIONS

The following Solr operations are currently supported. Simply set an exchange header with a key of **SolrOperation** and a value set to one of the following. Some operations also require the message body to be set.

- the **INSERT** operations use the CommonsHttpSolrServer
- the **INSERT_STREAMING** operations use the StreamingUpdateSolrServer (**Camel 2.9.2**)

operation	message body	descrip
INSERT/INSERT_STREAMING	n/a	adds an
INSERT/INSERT_STREAMING	File	adds an
INSERT/INSERT_STREAMING	SolrInputDocument	**Camel 2**
INSERT/INSERT_STREAMING	String XML	**Camel 2** SolrInpu

ADD_BEAN	bean instance	adds an
ADD_BEANS	collection<bean>	**Camel 2**
DELETE_BY_ID	index id to delete	delete a
DELETE_BY_QUERY	query string	delete a
COMMIT	n/a	perform
ROLLBACK	n/a	perform
OPTIMIZE	n/a	perform comma

EXAMPLE

Below is a simple **INSERT**, **DELETE** and **COMMIT** example

```
from("direct:insert")
    .setHeader(SolrConstants.OPERATION, constant(SolrConstants.OPERATION_INSERT))
    .setHeader(SolrConstants.FIELD + "id", body())
    .to("solr://localhost:8983/solr");

from("direct:delete")
    .setHeader(SolrConstants.OPERATION, constant(SolrConstants.OPERATION_DELETE_BY_ID))
    .to("solr://localhost:8983/solr");

from("direct:commit")
    .setHeader(SolrConstants.OPERATION, constant(SolrConstants.OPERATION_COMMIT))
    .to("solr://localhost:8983/solr");
```

```
<route>
    <from uri="direct:insert"/>
    <setHeader headerName="SolrOperation">
        <constant>INSERT</constant>
    </setHeader>
    <setHeader headerName="SolrField.id">
        <simple>${body}</simple>
    </setHeader>
    <to uri="solr://localhost:8983/solr"/>
</route>
<route>
    <from uri="direct:delete"/>
    <setHeader headerName="SolrOperation">
        <constant>DELETE_BY_ID</constant>
    </setHeader>
    <to uri="solr://localhost:8983/solr"/>
</route>
<route>
    <from uri="direct:commit"/>
```

```
    <setHeader headerName="SolrOperation">
        <constant>COMMIT</constant>
    </setHeader>
    <to uri="solr://localhost:8983/solr"/>
</route>
```

A client would simply need to pass a message body to the insert route or to the delete route, and then call the commit route.

```
    template.sendBody("direct:insert", "1234");
    template.sendBody("direct:commit", null);
    template.sendBody("direct:delete", "1234");
    template.sendBody("direct:commit", null);
```

QUERYING SOLR

Currently, this component doesn't support querying data natively (may be added later). For now, you can query Solr using HTTP as follows:

```
//define the route to perform a basic query
from("direct:query")
    .recipientList(simple("http://localhost:8983/solr/select/?q=${body}"))
    .convertBodyTo(String.class);
...
//query for an id of '1234' (url encoded)
String responseXml = (String) template.requestBody("direct:query", "id%3A1234");
```

For more information, see these resources...

Solr Query Tutorial

Solr Query Syntax

CHAPTER 136. SPLUNK

SPLUNK COMPONENT

Available as of Camel 2.13

The Splunk component provides access to Splunk using the Splunk provided client api, and it enables you to publish and search for events in Splunk.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-splunk</artifactId>
  <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
splunk://[endpoint]?[options]
```

PRODUCER ENDPOINTS:

Endpoint	Description
stream	Streams data to a named index or the default if not specified. When using stream mode be aware of that Splunk has some internal buffer (about 1MB or so) before events gets to the index. If you need realtime, better use submit or tcp mode.
submit	submit mode. Uses Splunk rest api to publish events to a named index or the default if not specified.
tcp	tcp mode. Streams data to a tcp port, and requires a open receiver port in Splunk.

When publishing events the message body should contain a SplunkEvent.

Example

```
    from("direct:start").convertBodyTo(SplunkEvent.class)
        .to("splunk://submit?
username=user&password=123&index=myindex&sourceType=someSourceType&source=mySource"
)...
```

In this example a converter is required to convert to a SplunkEvent class.

CONSUMER ENDPOINTS:

Endpoint	Description
normal	Performs normal search and requires a search query in the search option.
savedsearch	Performs search based on a search query saved in splunk and requires the name of the query in the savedSearch option.

Example

```
    from("splunk://normal?delay=5s&username=user&password=123&initEarliestTime=-
10s&search=search index=myindex sourcetype=someSourcetype")
        .to("direct:search-result");
```

camel-splunk creates a route exchange per search result with a SplunkEvent in the body.

URI OPTIONS

Name	Default Value	Context	Description
host	localhost	Both	Splunk host.
port	8089	Both	Splunk port
username	null	Both	Username for Splunk
password	null	Both	Password for Splunk
connectionTimeout	5000	Both	Timeout in MS when connecting to Splunk server
useSunHttpsHandler	false	Both	Use sun.net.www.protocol.https.Handler Https hanlder to establish the Splunk Connection. Can be useful when running in application servers to avoid app. server https handling.
index	null	Producer	Splunk index to write to
sourceType	null	Producer	Splunk sourcetype arguement
source	null	Producer	Splunk source arguement

tcpReceiverPort	0	Producer	Splunk tcp receiver port when using tcp producer endpoint.
initEarliestTime	null	Consumer	Initial start offset of the first search. Required
earliestTime	null	Consumer	Earliest time of the search time window.
latestTime	null	Consumer	Latest time of the search time window.
count	0	Consumer	A number that indicates the maximum number of entities to return. Note this is not the same as maxMessagesPerPoll which currently is unsupported
search	null	Consumer	The Splunk query to run
savedSearch	null	Consumer	The name of the query saved in Splunk to run
streaming	false	Consumer	*Camel 2.14.0* : Stream exchanges as they are received from Splunk, rather than returning all of them in one batch. This has the benefit of receiving results faster, as well as requiring less memory as exchanges aren't buffered in the component.

MESSAGE BODY

Splunk operates on data in key/value pairs. The SplunkEvent class is a placeholder for such data, and should be in the message body for the producer. Likewise it will be returned in the body per search result for the consumer.

USE CASES

Search Twitter for tweets with music and publish events to Splunk

```
    from("twitter://search?
type=polling&keywords=music&delay=10&consumerKey=abc&consumerSecret=def&accessToken=hij&
ccessTokenSecret=xxx")
        .convertBodyTo(SplunkEvent.class)
        .to("splunk://submit?username=foo&password=bar&index=camel-
tweets&sourceType=twitter&source=music-tweets");
```

To convert a Tweet to a SplunkEvent you could use a converter like

```
@Converter
public class Tweet2SplunkEvent {
    @Converter
    public static SplunkEvent convertTweet(Status status) {
        SplunkEvent data = new SplunkEvent("twitter-message", null);
        //data.addPair("source", status.getSource());
        data.addPair("from_user", status.getUser().getScreenName());
        data.addPair("in_reply_to", status.getInReplyToScreenName());
        data.addPair(SplunkEvent.COMMON_START_TIME, status.getCreatedAt());
        data.addPair(SplunkEvent.COMMON_EVENT_ID, status.getId());
        data.addPair("text", status.getText());
        data.addPair("retweet_count", status.getRetweetCount());
        if (status.getPlace() != null) {
            data.addPair("place_country", status.getPlace().getCountry());
            data.addPair("place_name", status.getPlace().getName());
            data.addPair("place_street", status.getPlace().getStreetAddress());
        }
        if (status.getGeoLocation() != null) {
            data.addPair("geo_latitude", status.getGeoLocation().getLatitude());
            data.addPair("geo_longitude", status.getGeoLocation().getLongitude());
        }
        return data;
    }
}
```

Search Splunk for tweets

```
    from("splunk://normal?username=foo&password=bar&initEarliestTime=-2m&search=search
index=camel-tweets sourcetype=twitter")
        .log("${body}");
```

OTHER COMMENTS

Splunk comes with a variety of options for leveraging machine generated data with prebuilt apps for analyzing and displaying this. For example the jmx app. could be used to publish jmx attributes, eg. route and jvm metrics to Splunk, and displaying this on a dashboard.

SEE ALSO

- Configuring Camel
- Component
- Endpoint
- Getting Started

CHAPTER 137. SPRINGBATCH

SPRING BATCH COMPONENT

The **spring-batch:** component and support classes provide integration bridge between Camel and Spring Batch infrastructure.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-spring-batch</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
spring-batch:jobName[?options]
```

Where **jobName** represents the name of the Spring Batch job located in the Camel registry.

WARNING

This component can only be used to define producer endpoints, which means that you cannot use the Spring Batch component in a **from()** statement.

OPTIONS

Name	Default Value	Description
jobLauncherRef	**null**	**Deprecated and will be removed in Camel 3.0!Camel 2.10:** Use jobLauncher=#theName instead.
jobLauncher	**null**	**Camel 2.11.1:** Explicitly specifies a **JobLauncher** to be used from the Camel Registry.

USAGE

When Spring Batch component receives the message, it triggers the job execution. The job will be executed using the **org.springframework.batch.core.launch.JobLaucher** instance resolved according to the following algorithm:

- if **JobLauncher** is manually set on the component, then use it.
- if **jobLauncherRef** option is set on the component, then search Camel Registry for the **JobLauncher** with the given name. **Deprecated and will be removed in Camel 3.0!**
- if there is **JobLauncher** registered in the Camel Registry under **jobLauncher** name, then use it.
- if none of the steps above allow to resolve the **JobLauncher** and there is exactly one **JobLauncher** instance in the Camel Registry, then use it.

All headers found in the message are passed to the **JobLauncher** as job parameters. **String**, **Long**, **Double** and **java.util.Date** values are copied to the **org.springframework.batch.core.JobParametersBuilder** - other data types are converted to Strings.

EXAMPLES

Triggering the Spring Batch job execution:

```
from("direct:startBatch").to("spring-batch:myJob");
```

Triggering the Spring Batch job execution with the **JobLauncher** set explicitly.

```
from("direct:startBatch").to("spring-batch:myJob?jobLauncherRef=myJobLauncher");
```

Starting from the Camel **2.11.1** **JobExecution** instance returned by the **JobLauncher** is forwarded by the **SpringBatchProducer** as the output message. You can use the **JobExecution** instance to perform some operations using the Spring Batch API directly.

```
from("direct:startBatch").to("spring-batch:myJob").to("mock:JobExecutions");
...
MockEndpoint mockEndpoint = ...;
JobExecution jobExecution =
mockEndpoint.getExchanges().get(0).getIn().getBody(JobExecution.class);
BatchStatus currentJobStatus = jobExecution.getStatus();
```

SUPPORT CLASSES

Apart from the Component, Camel Spring Batch provides also support classes, which can be used to hook into Spring Batch infrastructure.

CAMELITEMREADER

CamelItemReader can be used to read batch data directly from the Camel infrastructure.

For example the snippet below configures Spring Batch to read data from JMS queue.

```
<bean id="camelReader"
class="org.apache.camel.component.spring.batch.support.CamelItemReader">
  <constructor-arg ref="consumerTemplate"/>
  <constructor-arg value="jms:dataQueue"/>
</bean>

<batch:job id="myJob">
```

```
  <batch:step id="step">
    <batch:tasklet>
      <batch:chunk reader="camelReader" writer="someWriter" commit-interval="100"/>
    </batch:tasklet>
  </batch:step>
</batch:job>
```

CAMELITEMWRITER

CamelItemWriter has similar purpose as **CamelItemReader**, but it is dedicated to write chunk of the processed data.

For example the snippet below configures Spring Batch to write data to a JMS queue.

```
<bean id="camelwriter"
class="org.apache.camel.component.spring.batch.support.CamelItemWriter">
  <constructor-arg ref="producerTemplate"/>
  <constructor-arg value="jms:dataQueue"/>
</bean>

<batch:job id="myJob">
  <batch:step id="step">
    <batch:tasklet>
      <batch:chunk reader="someReader" writer="camelwriter" commit-interval="100"/>
    </batch:tasklet>
  </batch:step>
</batch:job>
```

CAMELITEMPROCESSOR

CamelItemProcessor is the implementation of Spring Batch **org.springframework.batch.item.ItemProcessor** interface. The latter implementation relays on Request Reply pattern to delegate the processing of the batch item to the Camel infrastructure. The item to process is sent to the Camel endpoint as the body of the message.

For example the snippet below performs simple processing of the batch item using the Direct endpoint and the Simple expression language.

```
<camel:camelContext>
  <camel:route>
    <camel:from uri="direct:processor"/>
    <camel:setExchangePattern pattern="InOut"/>
    <camel:setBody>
      <camel:simple>Processed ${body}</camel:simple>
    </camel:setBody>
  </camel:route>
</camel:camelContext>

<bean id="camelProcessor"
class="org.apache.camel.component.spring.batch.support.CamelItemProcessor">
  <constructor-arg ref="producerTemplate"/>
  <constructor-arg value="direct:processor"/>
</bean>
```

```
<batch:job id="myJob">
  <batch:step id="step">
    <batch:tasklet>
      <batch:chunk reader="someReader" writer="someWriter" processor="camelProcessor" commit-
interval="100"/>
    </batch:tasklet>
  </batch:step>
</batch:job>
```

CAMELJOBEXECUTIONLISTENER

CamelJobExecutionListener is the implementation of the **org.springframework.batch.core.JobExecutionListener** interface sending job execution events to the Camel endpoint.

The **org.springframework.batch.core.JobExecution** instance produced by the Spring Batch is sent as a body of the message. To distinguish between before- and after-callbacks **SPRING_BATCH_JOB_EVENT_TYPE** header is set to the **BEFORE** or **AFTER** value.

The example snippet below sends Spring Batch job execution events to the JMS queue.

```
<bean id="camelJobExecutionListener"
class="org.apache.camel.component.spring.batch.support.CamelJobExecutionListener">
  <constructor-arg ref="producerTemplate"/>
  <constructor-arg value="jms:batchEventsBus"/>
</bean>

<batch:job id="myJob">
  <batch:step id="step">
    <batch:tasklet>
      <batch:chunk reader="someReader" writer="someWriter" commit-interval="100"/>
    </batch:tasklet>
  </batch:step>
  <batch:listeners>
    <batch:listener ref="camelJobExecutionListener"/>
  </batch:listeners>
</batch:job>
```

CHAPTER 138. SPRINGINTEGRATION

SPRING INTEGRATION COMPONENT

The **spring-integration:** component provides a bridge for Apache Camel components to talk to spring integration endpoints.

URI FORMAT

```
spring-integration:defaultChannelName[?options]
```

Where **defaultChannelName** represents the default channel name which is used by the Spring Integration Spring context. It will equal to the **inputChannel** name for the Spring Integration consumer and the **outputChannel** name for the Spring Integration provider.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Description	Example	Required	Default Value
inputChannel	The Spring integration input channel name that this endpoint wants to consume from, where the specified channel name is defined in the Spring context.	**inputChannel=requestChannel**	No	
outputChannel	The Spring integration output channel name that is used to send messages to the Spring integration context.	**outputChannel=replyChannel**	No	
inOut	The exchange pattern that the Spring integration endpoint should use.	**inOut=true**	No	**inOnly** for the Spring integration consumer and **outOnly** for the Spring integration provider
consumer.delay	Delay in milliseconds between each poll.	**consumer.delay=60000**	No	**500**

consumer.initialDelay	Milliseconds before polling starts.	**consumer.initialDelay=10000**	No	**1000**
consumer.userFixedDelay	Specify **true** to use fixed delay between polls, otherwise fixed rate is used. See the ScheduledExecutorService class for details.	**consumer.userFixedDelay=false**	No	**false**

USAGE

The Spring integration component is a bridge that connects Apache Camel endpoints with Spring integration endpoints through the Spring integration's input channels and output channels. Using this component, we can send Camel messages to Spring Integration endpoints or receive messages from Spring integration endpoints in a Camel routing context.

USING THE SPRING INTEGRATION ENDPOINT

You can set up a Spring integration endpoint using a URI, as follows:

```
<beans:beans xmlns="http://www.springframework.org/schema/integration"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns:beans="http://www.springframework.org/schema/beans"
 xsi:schemaLocation="http://www.springframework.org/schema/beans
   http://www.springframework.org/schema/beans/spring-beans.xsd
   http://www.springframework.org/schema/integration
   http://www.springframework.org/schema/integration/spring-integration.xsd
   http://camel.apache.org/schema/spring
   http://camel.apache.org/schema/spring/camel-spring.xsd">

 <channel id="inputChannel"/>
    <channel id="outputChannel"/>
    <channel id="onewayChannel"/>

 <service-activator input-channel="inputChannel"
          ref="helloService"
          method="sayHello"/>

 <service-activator input-channel="onewayChannel"
          ref="helloService"
          method="greet"/>

 <beans:bean id="helloService"
class="org.apache.camel.component.spring.integration.HelloWorldService"/>

    <camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
      <route>
        <from uri="direct:twowayMessage"/>
```

```
        <!-- Using the &as the separator of & -->
        <to uri="spring-integration:inputChannel?inOut=true&nputChannel=outputChannel"/>
      </route>
      <route>
        <from uri="direct:onewayMessage"/>
        <to uri="spring-integration:onewayChannel?inOut=false"/>
      </route>
    </camelContext>
```

```
<channel id="requestChannel"/>
<channel id="responseChannel"/>

<beans:bean id="myProcessor"
class="org.apache.camel.component.spring.integration.MyProcessor"/>

<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
  <route>
    <!-- Using the &as the separator of & -->
    <from uri="spring-integration://requestChannel?outputChannel=responseChannel&nOut=true"/>
    <process ref="myProcessor"/>
  </route>
</camelContext>
```

Or directly using a Spring integration channel name:

```
<beans:beans xmlns="http://www.springframework.org/schema/integration"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns:beans="http://www.springframework.org/schema/beans"
 xsi:schemaLocation="http://www.springframework.org/schema/beans
   http://www.springframework.org/schema/beans/spring-beans.xsd
   http://www.springframework.org/schema/integration
   http://www.springframework.org/schema/integration/spring-integration.xsd
   http://camel.apache.org/schema/spring
   http://camel.apache.org/schema/spring/camel-spring.xsd">
 <channel id="outputChannel"/>

    <camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">
      <route>
        <!-- camel will create a spring integration endpoint automatically -->
        <from uri="outputChannel"/>
        <to uri="mock:result"/>
      </route>
    </camelContext>
```

THE SOURCE AND TARGET ADAPTER

Spring integration also provides the Spring integration's source and target adapters, which can route messages from a Spring integration channel to a Apache Camel endpoint or from a Apache Camel endpoint to a Spring integration channel.

This example uses the following namespaces:

```
<beans:beans xmlns="http://www.springframework.org/schema/integration"
      xmlns:beans="http://www.springframework.org/schema/beans"
```

```
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xmlns:camel-si="http://camel.apache.org/schema/spring/integration"
      xsi:schemaLocation="
      http://www.springframework.org/schema/beans
      http://www.springframework.org/schema/beans/spring-beans.xsd
      http://www.springframework.org/schema/integration
    http://www.springframework.org/schema/integration/spring-integration.xsd
      http://camel.apache.org/schema/spring/integration
      http://camel.apache.org/schema/spring/integration/camel-spring-integration.xsd
      http://camel.apache.org/schema/spring
      http://camel.apache.org/schema/spring/camel-spring.xsd
    ">
```

You can bind your source or target to a Apache Camel endpoint as follows:

```
<!-- Create the camel context here -->
<camelContext id="camelTargetContext" xmlns="http://camel.apache.org/schema/spring">
    <route>
        <from uri="direct:EndpointA" />
        <to uri="mock:result" />
    </route>
    <route>
        <from uri="direct:EndpointC"/>
        <process ref="myProcessor"/>
      </route>
</camelContext>

<!-- We can bind the camelTarget to the camel context's endpoint by specifying the camelEndpointUri
attribute -->
<camel-si:camelTarget id="camelTargetA" camelEndpointUri="direct:EndpointA"
expectReply="false">
    <camel-si:camelContextRef>camelTargetContext</camel-si:camelContextRef>
</camel-si:camelTarget>

<camel-si:camelTarget id="camelTargetB" camelEndpointUri="direct:EndpointC"
replyChannel="channelC" expectReply="true">
    <camel-si:camelContextRef>camelTargetContext</camel-si:camelContextRef>
</camel-si:camelTarget>

<camel-si:camelTarget id="camelTargetD" camelEndpointUri="direct:EndpointC"
expectReply="true">
    <camel-si:camelContextRef>camelTargetContext</camel-si:camelContextRef>
</camel-si:camelTarget>

<beans:bean id="myProcessor"
class="org.apache.camel.component.spring.integration.MyProcessor"/>
```

```
<!-- spring integration channels -->
<channel id="channelA"/>
<channel id="channelB"/>
<channel id="channelC"/>

<!-- spring integration service activator -->
<service-activator input-channel="channelB" output-channel="channelC" ref="helloService"
method="sayHello"/>
```

```
<!-- custom bean -->
<beans:bean id="helloService"
class="org.apache.camel.component.spring.integration.HelloWorldService"/>

<camelContext id="camelSourceContext" xmlns="http://camel.apache.org/schema/spring">
    <route>
        <from uri="direct:OneWay"/>
        <to uri="direct:EndpointB" />
    </route>
    <route>
        <from uri="direct:TwoWay"/>
        <to uri="direct:EndpointC" />
    </route>
</camelContext>

<!-- camelSource will redirect the message coming for direct:EndpointB to the spring requestChannel
channelA -->

<camel-si:camelSource id="camelSourceA" camelEndpointUri="direct:EndpointB"
                      requestChannel="channelA" expectReply="false">
    <camel-si:camelContextRef>camelSourceContext</camel-si:camelContextRef>
</camel-si:camelSource>

<!-- camelSource will redirect the message coming for direct:EndpointC to the spring requestChannel
channelB
 then it will pull the response from channelC and put the response message back to direct:EndpointC -
->

<camel-si:camelSource id="camelSourceB" camelEndpointUri="direct:EndpointC"
    requestChannel="channelB" replyChannel="channelC" expectReply="true">
    <camel-si:camelContextRef>camelSourceContext</camel-si:camelContextRef>
</camel-si:camelSource>
```

CHAPTER 139. SPRING EVENT

SPRING EVENT COMPONENT

The **spring-event:** component provides access to the Spring **ApplicationEvent** objects. This allows you to publish **ApplicationEvent** objects to a Spring **ApplicationContext** or to consume them. You can then use Enterprise Integration Patterns to process them such as Message Filter.

URI FORMAT

```
spring-event://default[?options]
```

Note, at the moment there are no options for this component. That can easily change in future releases, so please check back.

CHAPTER 140. SPRING LDAP

SPRING LDAP COMPONENT

Available since Camel 2.11

The **spring-ldap:** component provides a Camel wrapper for Spring LDAP.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-spring-ldap</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
spring-ldap:springLdapTemplate[?options]
```

Where **springLdapTemplate** is the name of the Spring LDAP Template bean. In this bean, you configure the URL and the credentials for your LDAP access.

OPTIONS

Name	Type	Description
operation	String	The LDAP operation to be performed. Must be one of **search**, **bind**, or **unbind**.
scope	String	The scope of the search operation. Must be one of **object**, **onelevel**, or **subtree**, see also http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol#Search_and_Compare

USAGE

The component supports producer endpoint only. An attempt to create a consumer endpoint will result in an **UnsupportedOperationException**. The body of the message must be a map (an instance of **java.util.Map**). This map must contain at least an entry with the key **dn** that specifies the root node for the LDAP operation to be performed. Other entries of the map are operation-specific (see below).

The body of the message remains unchanged for the **bind** and **unbind** operations. For the **search** operation, the body is set to the result of the search, see http://static.springsource.org/spring-ldap/site/apidocs/org/springframework/ldap/core/LdapTemplate.html#search%28java.lang.String,%20java.la

SEARCH

The message body must have an entry with the key **filter**. The value must be a String representing a valid LDAP filter, see http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol#Search_and_Compare.

BIND

The message body must have an entry with the key **attributes**. The value must be an instance of javax.naming.directory.Attributes This entry specifies the LDAP node to be created.

UNBIND

No further entries necessary, the node with the specified **dn** is deleted.

Key definitions

In order to avoid spelling errors, the following constants are defined in **org.apache.camel.springldap.SpringLdapProducer**:

- public static final String DN = "dn"
- public static final String FILTER = "filter"
- public static final String ATTRIBUTES = "attributes"

CHAPTER 141. SPRING REDIS

SPRING REDIS COMPONENT

Available as of Camel 2.11

This component allows sending and receiving messages from Redis. Redis is advanced key-value store where keys can contain strings, hashes, lists, sets and sorted sets. In addition it provides pub/sub functionality for inter-app communications. Camel provides a producer for executing commands, consumer for subscribing to pub/sub messages an idempotent repository for filtering out duplicate messages.

PREREQUISITES

In order to use this component, you must have a Redis server running.

URI FORMAT

```
spring-redis://host:port[?options]
```

You can append query options to the URI in the following format, **?options=value&option2=value&...**

URI OPTIONS

Name	Default Value	Context	Description
host	**null**	Both	The host where Redis server is running.
port	**null**	Both	Redis port number.
command	**SET**	Both	Default command, which can be overridden by message header.
channels	**SET**	Consumer	List of topic names or name patterns to subscribe to.
redisTemplate	**null**	Producer	Reference to a pre-configured **org.springframework.data.redis.core.RedisTemplate** instance in the Registry.

connectionFactory	**null**	Both	Reference to an **org.springframework.data.redis.connection.RedisConnectionFactory** instance in the Registry.
listenerContainer	**null**	Consumer	Reference to an **org.springframework.data.redis.listener.RedisMessageListenerContainer** instance in the Registry instance in the Registry.
serializer	**null**	Consumer	Reference to an **org.springframework.data.redis.serializer.RedisSerializer** instance in the Registry.

USAGE

MESSAGE HEADERS EVALUATED BY THE REDIS PRODUCER

The producer issues commands to the server and each command has different set of parameters with specific types. The result from the command execution is returned in the message body.

Hash Commands	Description	Parameters	Result
HSET	Set the string value of a hash field	CamelRedis.Key (String), CamelRedis.Field (String), CamelRedis.Value (Object)	void
HGET	Get the value of a hash field	CamelRedis.Key (String), CamelRedis.Field (String)	String
HSETNX	Set the value of a hash field, only if the field does not exist	CamelRedis.Key (String), CamelRedis.Field (String), CamelRedis.Value (Object)	void

HMSET	Set multiple hash fields to multiple values	CamelRedis.Key (String), CamelRedis.Values(Map <String, Object>)	void
HMGET	Get the values of all the given hash fields	CamelRedis.Key (String), CamelRedis.Fields (Collection<String>)	Collection<Object>
HINCRBY	Increment the integer value of a hash field by the given number	CamelRedis.Key (String), CamelRedis.Field (String), CamelRedis.Value (Long)	Long
HEXISTS	Determine if a hash field exists	CamelRedis.Key (String), CamelRedis.Field (String)	Boolean
HDEL	Delete one or more hash fields	CamelRedis.Key (String), CamelRedis.Field (String)	void
HLEN	Get the number of fields in a hash	CamelRedis.Key (String)	Long
HKEYS	Get all the fields in a hash	CamelRedis.Key (String)	Set<String>
HVALS	Get all the values in a hash	CamelRedis.Key (String)	Collection<Object>
HGETALL	Get all the fields and values in a hash	CamelRedis.Key (String)	Map<String, Object>

List Commands	Description	Parameters	Result
RPUSH	Append one or multiple values to a list	CamelRedis.Key (String), CamelRedis.Value (Object)	Long
RPUSHX	Append a value to a list, only if the list exists	CamelRedis.Key (String), CamelRedis.Value (Object)	Long

LPUSH	Prepend one or multiple values to a list	CamelRedis.Key (String), CamelRedis.Value (Object)	Long
LLEN	Get the length of a list	CamelRedis.Key (String)	Long
LRANGE	Get a range of elements from a list	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long)	List<Object>
LTRIM	Trim a list to the specified range	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long)	void
LINDEX	Get an element from a list by its index	CamelRedis.Key (String), CamelRedis.Index (Long)	String
LINSERT	Insert an element before or after another element in a list	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Pivot (String), CamelRedis.Position (String)	Long
LSET	Set the value of an element in a list by its index	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Index (Long)	void
LREM	Remove elements from a list	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Count (Long)	Long
LPOP	Remove and get the first element in a list	CamelRedis.Key (String)	Object
RPOP	Remove and get the last element in a list	CamelRedis.Key (String)	String

RPOPLPUSH	Remove the last element in a list, append it to another list and return it	CamelRedis.Key (String), CamelRedis.Destination (String)	Object
BRPOPLPUSH	Pop a value from a list, push it to another list and return it; or block until one is available	CamelRedis.Key (String), CamelRedis.Destination (String), CamelRedis.Timeout (Long)	Object
BLPOP	Remove and get the first element in a list, or block until one is available	CamelRedis.Key (String), CamelRedis.Timeout (Long)	Object
BRPOP	Remove and get the last element in a list, or block until one is available	CamelRedis.Key (String), CamelRedis.Timeout (Long)	String

Set Commands	Description	Parameters	Result
SADD	Add one or more members to a set	CamelRedis.Key (String), CamelRedis.Value (Object)	Boolean
SMEMBERS	Get all the members in a set	CamelRedis.Key (String)	Set<Object>
SREM	Remove one or more members from a set	CamelRedis.Key (String), CamelRedis.Value (Object)	Boolean
SPOP	Remove and return a random member from a set	CamelRedis.Key (String)	String
SMOVE	Move a member from one set to another	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Destination (String)	Boolean
SCARD	Get the number of members in a set	CamelRedis.Key (String)	Long

SISMEMBER	Determine if a given value is a member of a set	CamelRedis.Key (String), CamelRedis.Value (Object)	Boolean
SINTER	Intersect multiple sets	CamelRedis.Key (String), CamelRedis.Keys (String)	Set<Object>
SINTERSTORE	Intersect multiple sets and store the resulting set in a key	CamelRedis.Key (String), CamelRedis.Keys (String), CamelRedis.Destination (String)	void
SUNION	Add multiple sets	CamelRedis.Key (String), CamelRedis.Keys (String)	Set<Object>
SUNIONSTORE	Add multiple sets and store the resulting set in a key	CamelRedis.Key (String), CamelRedis.Keys (String), CamelRedis.Destination (String)	void
SDIFF	Subtract multiple sets	CamelRedis.Key (String), CamelRedis.Keys (String)	Set<Object>
SDIFFSTORE	Subtract multiple sets and store the resulting set in a key	CamelRedis.Key (String), CamelRedis.Keys (String), CamelRedis.Destination (String)	void
SRANDMEMBER	Get one or multiple random members from a set	CamelRedis.Key (String)	String

Ordered set Commands	Description	Parameters	Result

ZADD	Add one or more members to a sorted set, or update its score if it already exists	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Score (Double)	Boolean
ZRANGE	Return a range of members in a sorted set, by index	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long), CamelRedis.WithScore (Boolean)	Object
ZREM	Remove one or more members from a sorted set	CamelRedis.Key (String), CamelRedis.Value (Object)	Boolean
ZINCRBY	Increment the score of a member in a sorted set	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Increment (Double)	Double
ZRANK	Determine the index of a member in a sorted set	CamelRedis.Key (String), CamelRedis.Value (Object)	Long
ZREVRANK	Determine the index of a member in a sorted set, with scores ordered from high to low	CamelRedis.Key (String), CamelRedis.Value (Object)	Long
ZREVRANGE	Return a range of members in a sorted set, by index, with scores ordered from high to low	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long), CamelRedis.WithScore (Boolean)	Object
ZCARD	Get the number of members in a sorted set	CamelRedis.Key (String),	Long

ZCOUNT	Count the members in a sorted set with scores within the given values	CamelRedis.Key (String), CamelRedis.Min (Double), CamelRedis.Max (Double)	Long
ZRANGEBYSCORE	Return a range of members in a sorted set, by score	CamelRedis.Key (String), CamelRedis.Min (Double), CamelRedis.Max (Double)	Set<Object>
ZREVRANGEBYSCORE	Return a range of members in a sorted set, by score, with scores ordered from high to low	CamelRedis.Key (String), CamelRedis.Min (Double), CamelRedis.Max (Double)	Set<Object>
ZREMRANGEBYRANK	Remove all members in a sorted set within the given indexes	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long)	void
ZREMRANGEBYSCORE	Remove all members in a sorted set within the given scores	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long)	void
ZUNIONSTORE	Add multiple sorted sets and store the resulting sorted set in a new key	CamelRedis.Key (String), CamelRedis.Keys (String), CamelRedis.Destination (String)	void
ZINTERSTORE	Intersect multiple sorted sets and store the resulting sorted set in a new key	CamelRedis.Key (String), CamelRedis.Keys (String), CamelRedis.Destination (String)	void

String Commands	Description	Parameters	Result

SET	Set the string value of a key	CamelRedis.Key (String), CamelRedis.Value (Object)	void
GET	Get the value of a key	CamelRedis.Key (String)	Object
STRLEN	Get the length of the value stored in a key	CamelRedis.Key (String)	Long
APPEND	Append a value to a key	CamelRedis.Key (String), CamelRedis.Value (String)	Integer
SETBIT	Sets or clears the bit at offset in the string value stored at key	CamelRedis.Key (String), CamelRedis.Offset (Long), CamelRedis.Value (Boolean)	void
GETBIT	Returns the bit value at offset in the string value stored at key	CamelRedis.Key (String), CamelRedis.Offset (Long)	Boolean
SETRANGE	Overwrite part of a string at key starting at the specified offset	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Offset (Long)	void
GETRANGE	Get a substring of the string stored at a key	CamelRedis.Key (String), CamelRedis.Start (Long), CamelRedis.End (Long)	String
SETNX	Set the value of a key, only if the key does not exist	CamelRedis.Key (String), CamelRedis.Value (Object)	Boolean
SETEX	Set the value and expiration of a key	CamelRedis.Key (String), CamelRedis.Value (Object), CamelRedis.Timeout (Long), SECONDS	void

DECRBY	Decrement the integer value of a key by the given number	CamelRedis.Key (String), CamelRedis.Value (Long)	Long
DECR	Decrement the integer value of a key by one	CamelRedis.Key (String),	Long
INCRBY	Increment the integer value of a key by the given amount	CamelRedis.Key (String), CamelRedis.Value (Long)	Long
INCR	Increment the integer value of a key by one	CamelRedis.Key (String)	Long
MGET	Get the values of all the given keys	CamelRedis.Fields (Collection<String>)	List<Object>
MSET	Set multiple keys to multiple values	CamelRedis.Values(Map <String, Object>)	void
MSETNX	Set multiple keys to multiple values, only if none of the keys exist	CamelRedis.Key (String), CamelRedis.Value (Object)	void
GETSET	Set the string value of a key and return its old value	CamelRedis.Key (String), CamelRedis.Value (Object)	Object

Key Commands	Description	Parameters	Result
EXISTS	Determine if a key exists	CamelRedis.Key (String)	Boolea
DEL	Delete a key	CamelRedis.Keys (String)	void
TYPE	Determine the type stored at key	CamelRedis.Key (String)	DataType
KEYS	Find all keys matching the given pattern	CamelRedis.Pattern (String)	Collection<String>
RANDOMKEY	Return a random key from the keyspace	CamelRedis.Pattern (String), CamelRedis.Value (String)	String

RENAME	Rename a key	CamelRedis.Key (String)	void
RENAMENX	Rename a key, only if the new key does not exist	CamelRedis.Key (String), CamelRedis.Value (String)	Boolean
EXPIRE	Set a key's time to live in seconds	CamelRedis.Key (String), CamelRedis.Timeout (Long)	Boolean
SORT	Sort the elements in a list, set or sorted set	CamelRedis.Key (String)	List<Object>
PERSIST	Remove the expiration from a key	CamelRedis.Key (String)	Boolean
EXPIREAT	Set the expiration for a key as a UNIX timestamp	CamelRedis.Key (String), CamelRedis.Timestamp (Long)	Boolean
PEXPIRE	Set a key's time to live in milliseconds	CamelRedis.Key (String), CamelRedis.Timeout (Long)	Boolean
PEXPIREAT	Set the expiration for a key as a UNIX timestamp specified in milliseconds	CamelRedis.Key (String), CamelRedis.Timestamp (Long)	Boolean
TTL	Get the time to live for a key	CamelRedis.Key (String)	Long
MOVE	Move a key to another database	CamelRedis.Key (String), CamelRedis.Db (Integer)	Boolean

Other Command	Description	Parameters	Result
MULTI	Mark the start of a transaction block	none	void
DISCARD	Discard all commands issued after MULTI	none	void

EXEC	Execute all commands issued after MULTI	none	void
WATCH	Watch the given keys to determine execution of the MULTI/EXEC block	CamelRedis.Keys (String)	void
UNWATCH	Forget about all watched keys	none	void
ECHO	Echo the given string	CamelRedis.Value (String)	String
PING	Ping the server	none	String
QUIT	Close the connection	none	void
PUBLISH	Post a message to a channel	CamelRedis.Channel (String), CamelRedis.Message (Object)	void

REDIS CONSUMER

The consumer subscribes to a channel either by channel name using **SUBSCRIBE** or a string pattern using **PSUBSCRIBE** commands. When a message is sent to the channel using PUBLISH command, it will be consumed and the message will be available as Camel message body. The message is also serialized using configured serializer or the default JdkSerializationRedisSerializer.

Message headers set by the Consumer

Header	Type	Description
CamelRedis.Channel	**String**	The channel name, where the message was received.
CamelRedis.Pattern	**String**	The pattern matching the channel, where the message was received.

DEPENDENCIES

Maven users will need to add the following dependency to their pom.xml.

POM.XML

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-spring-redis</artifactId>
  <version>${camel-version}</version>
</dependency>
```

where **${camel-version}** must be replaced by the actual version of Camel (2.11 or higher).

CHAPTER 142. SPRING WEB SERVICES

SPRING WEB SERVICES COMPONENT

The **spring-ws:** component allows you to integrate with Spring Web Services. It offers both *client*side support, for accessing web services, and *server*side support for creating your own contract-first web services.

DEPENDENCIES

As of Camel 2.8 this component ships with Spring-WS 2.0.x which (like the rest of Camel) requires Spring 3.0.x.

Earlier Camel versions shipped Spring-WS 1.5.9 which is compatible with Spring 2.5.x and 3.0.x. In order to run earlier versions of **camel-spring-ws** on Spring 2.5.x you need to add the **spring-webmvc** module from Spring 2.5.x. In order to run Spring-WS 1.5.9 on Spring 3.0.x you need to exclude the OXM module from Spring 3.0.x as this module is also included in Spring-WS 1.5.9 (see this post)

URI FORMAT

The URI scheme for this component is as follows

```
spring-ws:[mapping-type:]address[?options]
```

To expose a web service, **mapping-type** needs to be set to one of the following values:

Mapping type	Description
rootqname	Offers the option to map web service requests based on the qualified name of the root element contained in the message.
soapaction	Used to map web service requests based on the SOAP action specified in the header of the message.
uri	In order to map web service requests that target a specific URI.
xpathresult	Used to map web service requests based on the evaluation of an XPath **expression** against the incoming message. The result of the evaluation should match the XPath result specified in the endpoint URI.

beanname	Allows you to reference a **org.apache.camel.component.spring.ws.bean.CamelEndpointDispatcher** in order to integrate with existing (legacy) endpoint mappings like **PayloadRootQNameEndpointMapping**, **SoapActionEndpointMapping**, etc

As a consumer the **address** should contain a value relevant to the specified mapping-type (e.g. a SOAP action, XPath expression). As a producer the address should be set to the URI of the web service you are calling upon.

You can append query options to the URI in the following format, **?option=value&option=value&...**.

OPTIONS

Name	Required?	Description
soapAction	*No*	SOAP action to include inside a SOAP request when accessing remote web services
wsAddressingAction	*No*	WS-Addressing 1.0 action header to include when accessing web services. The **To** header is set to the *address* of the web service as specified in the endpoint URI (default Spring-WS behavior).
expression	Only when *mapping-type* is **xpathresult**	XPath expression to use in the process of mapping web service requests, should match the result specified by **xpathresult**

timeout	No	**Camel 2.10:** Sets the socket read timeout (in milliseconds) while invoking a webservice using the producer, see URLConnection.setReadTimeout() and CommonsHttpMessageSender.setReadTimeout(). his option works when using the built-in message sender implementations: *CommonsHttpMessageSender* nd *HttpUrlConnectionMessageSender*. ne of these implementations will be used by default for HTTP based services unless you customize the Spring WS configuration options supplied to the component. f you are using a non-standard sender, it is assumed that you will handle your own timeout configuration. **Camel 2.12:** he built-in message sender *HttpComponentsMessageSender* s considered **instead of** *CommonsHttpMessageSender* hich has been deprecated, see HttpComponentsMessageSender.setReadTimeout().
sslContextParameters	No	**Camel 2.10:** eference to an **org.apache.camel.util.jsse.SSLContextParameters** in he Registry. ee Using the JSSE Configuration Utility. his option works when using the built-in message sender implementations: *CommonsHttpMessageSender* nd *HttpUrlConnectionMessageSender*. ne of these implementations will be used by default for HTTP based services unless you customize the Spring WS configuration options supplied to the component. f you are using a non-standard sender, it is assumed that you will handle your own TLS configuration. **Camel 2.12:** he built-in message sender *HttpComponentsMessageSender* s considered **instead of** *CommonsHttpMessageSender* hich has been deprecated.

REGISTRY BASED OPTIONS

The following options can be specified in the registry (most likely a Spring application context) and referenced from the endpoint URI using the ***#beanID*** notation.

Name	Required?	Description

webServiceTemplate	*No*	Option to provide a custom WebServiceTemplate. This allows for full control over client-side web services handling; like adding a custom interceptor or specifying a fault resolver, message sender or message factory.
messageSender	*No*	Option to provide a custom WebServiceMessageSender. For example to perform authentication or use alternative transports
messageFactory	*No*	Option to provide a custom WebServiceMessageFactory. For example when you want Apache Axiom to handle web service messages instead of SAAJ
transformerFactory	*No*	Option to override the default **TransformerFactory**. The provided transformer factory must be of type **javax.xml.transform.TransformerFactory**
endpointMapping	Only when *mapping-type* is **rootqname**, **soapaction**, **uri** or **xpathresult**	Reference to **org.apache.camel.component.spring.ws.bean.CamelEndpointMapping** in the Registry/ApplicationContext. Only one bean is required in the registry to serve all Camel/Spring-WS endpoints. This bean is auto-discovered by the MessageDispatcher and used to map requests to Camel endpoints based on characteristics specified on the endpoint (like root QName, SOAP action, etc)
messageFilter	No	Option to provide a custom MessageFilter since 2.10.3. For example when you want to process your headers or attachments by your own.

MESSAGE HEADERS

Name	Type	Description

CamelSpringWebserviceEndpointUri	**String**	URI of the web service you are accessing as a client; overrides the *address* part of the endpoint URI.
CamelSpringWebserviceSoapAction	**String**	Header to specify the SOAP action of the message; overrides the **soapAction** option, if present
CamelSpringWebserviceAddressingAction	**URI**	Use this header to specify the WS-Addressing action of the message; overrides the **wsAddressingAction** option, if present
CamelSpringWebserviceSoapHeader	Source	**Camel 2.11.1:** Use this header to specify/access the SOAP headers of the message.

ACCESSING WEB SERVICES

To call a **web service** simply define a route:

```
from("direct:example").to("spring-ws:http://foo.com/bar")
```

And sent a message:

```
template.requestBody("direct:example", "<foobar xmlns=\"http://foo.com\"><msg>test
message</msg></foobar>");
```

Remember, if it's a SOAP service you're calling you don't have to include SOAP tags. Spring-WS will perform the XML-to-SOAP marshaling.

SENDING SOAP AND WS-ADDRESSING ACTION HEADERS

When a remote web service requires a SOAP action or use of the WS-Addressing standard you define your route as:

```
from("direct:example")
.to("spring-ws:http://foo.com/bar?soapAction=http://foo.com&wsAddressingAction=http://bar.com")
```

Optionally you can override the endpoint options with header values:

```
template.requestBodyAndHeader("direct:example",
"<foobar xmlns=\"http://foo.com\"><msg>test message</msg></foobar>",
SpringWebserviceConstants.SPRING_WS_SOAP_ACTION, "http://baz.com");
```

USING SOAP HEADERS

Available as of Camel 2.11.1

You can provide the SOAP header(s) as a Camel Message header when sending a message to a spring-ws endpoint, for example given the following SOAP header in a String

```
String body = ...
String soapHeader = "<h:Header xmlns:h=\"http://www.webserviceX.NET/\">
<h:MessageID>1234567890</h:MessageID><h:Nested><h:NestedID>1111</h:NestedID>
</h:Nested></h:Header>";
```

We can set the body and header on the Camel Message as follows:

```
exchange.getIn().setBody(body);
exchange.getIn().setHeader(SpringWebserviceConstants.SPRING_WS_SOAP_HEADER,
soapHeader);
```

And then send the Exchange to a **spring-ws** endpoint to call the Web Service.

Likewise the spring-ws consumer will also enrich the Camel Message with the SOAP header.

For an example see this unit test.

THE HEADER AND ATTACHMENT PROPAGATION

Spring WS Camel supports propagation of the headers and attachments into Spring-WS WebServiceMessage response since version **2.10.3**. The endpoint will use so called "hook" the MessageFilter (default implementation is provided by **BasicMessageFilter**) to propagate the exchange headers and attachments into **WebServiceMessage** response. Now you can use

```
exchange.getOut().getHeaders().put("myCustom","myHeaderValue")
exchange.getIn().addAttachment("myAttachment", new DataHandler(...))
```

Note: If the exchange header in the pipeline contains text, it generates Qname(key)=value attribute in the soap header. Recommended is to create a QName class directly and put into any key into header.

HOW TO USE MTOM ATTACHMENTS

The BasicMessageFilter provides all required information for Apache Axiom in order to produce MTOM message. If you want to use Apache Camel Spring WS within Apache Axiom, here is an example: 1. Simply define the messageFactory as is bellow and Spring-WS will use MTOM strategy to populate your SOAP message with optimized attachments.

```
<bean id="axiomMessageFactory"
class="org.springframework.ws.soap.axiom.AxiomSoapMessageFactory">
<property name="payloadCaching" value="false" />
<property name="attachmentCaching" value="true" />
<property name="attachmentCacheThreshold" value="1024" />
</bean>
```

2. Add into your pom.xml the following dependencies

```
<dependency>
<groupId>org.apache.ws.commons.axiom</groupId>
```

```
<artifactId>axiom-api</artifactId>
<version>1.2.13</version>
</dependency>
<dependency>
<groupId>org.apache.ws.commons.axiom</groupId>
<artifactId>axiom-impl</artifactId>
<version>1.2.13</version>
<scope>runtime</scope>
</dependency>
```

3. Add your attachment into the pipeline, for example using a Processor implementation.

```
private class Attachement implements Processor {
public void process(Exchange exchange) throws Exception
{ exchange.getOut().copyFrom(exchange.getIn()); File file = new File("testAttachment.txt");
exchange.getOut().addAttachment("test", new DataHandler(new FileDataSource(file)));  }
}
```

4. Define endpoint (producer) as ussual, for example like this:

```
from("direct:send")
.process(new Attachement())
.to("spring-ws:http://localhost:8089/mySoapService?
soapAction=mySoap&messageFactory=axiomMessageFactory");
```

5. Now, your producer will generate MTOM message with otpmized attachments.

THE CUSTOM HEADER AND ATTACHMENT FILTERING

If you need to provide your custom processing of either headers or attachments, extend existing BasicMessageFilter and override the appropriate methods or write a brand new implementation of the MessageFilter interface. To use your custom filter, add this into your spring context: You can specify either a global a or a local message filter as follows: a) the global custom filter that provides the global configuration for all Spring-WS endpoints

```
<bean id="messageFilter" class="your.domain.myMessageFiler" scope="singleton" />
```

or b) the local messageFilter directly on the endpoint as follows:

```
to("spring-ws:http://yourdomain.com?messageFilter=#myEndpointSpecificMessageFilter");
```

For more information see CAMEL-5724

If you want to create your own MessageFilter, consider overriding the following methods in the default implementation of MessageFilter in class BasicMessageFilter:

```
protected void doProcessSoapHeader(Message inOrOut, SoapMessage soapMessage)
{your code /*no need to call super*/ }
protected void doProcessSoapAttachements(Message inOrOut, SoapMessage response)
{ your code /*no need to call super*/ }
```

USING A CUSTOM MESSAGESENDER AND MESSAGEFACTORY

A custom message sender or factory in the registry can be referenced like this:

```
from("direct:example")
.to("spring-ws:http://foo.com/bar?
messageFactory=#messageFactory&messageSender=#messageSender")
```

Spring configuration:

```
<!-- authenticate using HTTP Basic Authentication -->
<bean id="messageSender"
class="org.springframework.ws.transport.http.HttpComponentsMessageSender">
 <property name="credentials">
  <bean class="org.apache.commons.httpclient.UsernamePasswordCredentials">
   <constructor-arg index="0" value="admin"/>
   <constructor-arg index="1" value="secret"/>
  </bean>
 </property>
</bean>

<!-- force use of Sun SAAJ implementation, http://static.springsource.org/spring-
ws/sites/1.5/faq.html#saaj-jboss -->
<bean id="messageFactory" class="org.springframework.ws.soap.saaj.SaajSoapMessageFactory">
 <property name="messageFactory">
  <bean class="com.sun.xml.messaging.saaj.soap.ver1_1.SOAPMessageFactory1_1Impl"></bean>
 </property>
</bean>
```

EXPOSING WEB SERVICES

In order to expose a web service using this component you first need to set-up a MessageDispatcher to look for endpoint mappings in a Spring XML file. If you plan on running inside a servlet container you probably want to use a **MessageDispatcherServlet** configured in **web.xml**.

By default the **MessageDispatcherServlet** will look for a Spring XML named /**WEB-INF/spring-ws-servlet.xml**. To use Camel with Spring-WS the only mandatory bean in that XML file is **CamelEndpointMapping**. This bean allows the **MessageDispatcher** to dispatch web service requests to your routes.

web.xml

```
<web-app>
   <servlet>
      <servlet-name>spring-ws</servlet-name>
      <servlet-class>org.springframework.ws.transport.http.MessageDispatcherServlet</servlet-class>
      <load-on-startup>1</load-on-startup>
   </servlet>
   <servlet-mapping>
      <servlet-name>spring-ws</servlet-name>
      <url-pattern>/*</url-pattern>
   </servlet-mapping>
</web-app>
```

spring-ws-servlet.xml

```
<bean id="endpointMapping"
class="org.apache.camel.component.spring.ws.bean.CamelEndpointMapping" />

<bean id="wsdl" class="org.springframework.ws.wsdl.wsdl11.DefaultWsdl11Definition">
  <property name="schema">
    <bean class="org.springframework.xml.xsd.SimpleXsdSchema">
      <property name="xsd" value="/WEB-INF/foobar.xsd"/>
    </bean>
  </property>
  <property name="portTypeName" value="FooBar"/>
  <property name="locationUri" value="/"/>
  <property name="targetNamespace" value="http://example.com/"/>
</bean>
```

More information on setting up Spring-WS can be found in Writing Contract-First Web Services.

ENDPOINT MAPPING IN ROUTES

With the XML configuration in-place you can now use Camel's DSL to define what web service requests are handled by your endpoint. The following route will receive all web service requests that have a root element named **GetFoo** within the **http://example.com/** namespace:

```
from("spring-ws:rootqname:{http://example.com/}GetFoo?endpointMapping=#endpointMapping")
.convertBodyTo(String.class).to(mock:example)
```

The following route will receive web service requests containing the **http://example.com/GetFoo** SOAP action:

```
from("spring-ws:soapaction:http://example.com/GetFoo?endpointMapping=#endpointMapping")
.convertBodyTo(String.class).to(mock:example)
```

The following route will receive all requests sent to **http://example.com/foobar**:

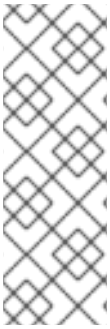
```
from("spring-ws:uri:http://example.com/foobar?endpointMapping=#endpointMapping")
.convertBodyTo(String.class).to(mock:example)
```

The route below receives requests that contain the element **<foobar>abc</foobar>** anywhere inside the message (and the default namespace).

```
from("spring-ws:xpathresult:abc?expression=//foobar&endpointMapping=#endpointMapping")
.convertBodyTo(String.class).to(mock:example)
```

ALTERNATIVE CONFIGURATION, USING EXISTING ENDPOINT MAPPINGS

For every endpoint with mapping-type **beanname** one bean of type **CamelEndpointDispatcher** with a corresponding name is required in the Registry/ApplicationContext. This bean acts as a bridge between the Camel endpoint and an existing endpoint mapping like **PayloadRootQNameEndpointMapping**.



NOTE

The use of the **beanname** mapping-type is primarily meant for (legacy) situations where you're already using Spring-WS and have endpoint mappings defined in a Spring XML file. The **beanname** mapping-type allows you to wire your Camel route into an existing endpoint mapping. When you're starting from scratch it's recommended to define your endpoint mappings as Camel URI's (as illustrated above with **endpointMapping**) since it requires less configuration and is more expressive. Alternatively you could use vanilla Spring-WS with the help of annotations.

An example of a route using **beanname**:

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
 <route>
  <from uri="spring-ws:beanname:QuoteEndpointDispatcher" />
  <to uri="mock:example" />
 </route>
</camelContext>

<bean id="legacyEndpointMapping"
class="org.springframework.ws.server.endpoint.mapping.PayloadRootQNameEndpointMapping">
    <property name="mappings">
        <props>
            <prop key="{http://example.com/}GetFuture">FutureEndpointDispatcher</prop>
            <prop key="{http://example.com/}GetQuote">QuoteEndpointDispatcher</prop>
        </props>
    </property>
</bean>

<bean id="QuoteEndpointDispatcher"
class="org.apache.camel.component.spring.ws.bean.CamelEndpointDispatcher" />
<bean id="FutureEndpointDispatcher"
class="org.apache.camel.component.spring.ws.bean.CamelEndpointDispatcher" />
```

POJO (UN)MARSHALLING

Camel's pluggable data formats offer support for POJO/XML marshalling using libraries such as JAXB, XStream, JibX, Castor and XMLBeans. You can use these data formats in your route to sent and receive POJOs (Plain Old Java Objects), to and from web services.

When *accessing* web services you can marshal the request and unmarshal the response message:

```
JaxbDataFormat jaxb = new JaxbDataFormat(false);
jaxb.setContextPath("com.example.model");

from("direct:example").marshal(jaxb).to("spring-ws:http://foo.com/bar").unmarshal(jaxb);
```

Similarly when *providing* web services, you can unmarshal XML requests to POJOs and marshal the response message back to XML:

```
from("spring-ws:rootqname:{http://example.com/}GetFoo?
endpointMapping=#endpointMapping").unmarshal(jaxb)
.to("mock:example").marshal(jaxb);
```

CHAPTER 143. SQL COMPONENT

SQL COMPONENT

The **sql:** component allows you to work with databases using JDBC queries. The difference between this component and JDBC component is that in case of SQL the query is a property of the endpoint and it uses message payload as parameters passed to the query.

This component uses **spring-jdbc** behind the scenes for the actual SQL handling.

The SQL component also supports:

- a JDBC based repository for the Idempotent Consumer EIP pattern. See further below.
- a JDBC based repository for the Aggregator EIP pattern. See further below.

IMPORTANT

This component can be used as a Transactional Client.

URI FORMAT

WARNING

From Camel 2.11 onwards this component can create both consumer (e.g. **from()**) and producer endpoints (e. g. **to()**).In previous versions, it could only act as a producer.

The SQL component uses the following endpoint URI notation:

```
sql:select * from table where id=# order by name[?options]
```

From Camel 2.11 onwards you can use named parameters by using **#name_of_the_parameter** style as shown:

```
sql:select * from table where id=:#myId order by name[?options]
```

When using named parameters, Camel will lookup the names from, in the given precedence: 1. from message body if its a **java.util.Map** 2. from message headers

If a named parameter cannot be resolved, then an exception is thrown.

From Camel 2.14 onward you can use Simple expressions as parameters as shown:

```
sql:select * from table where id=:#${property.myId} order by name[?options]
```

Notice that the standard **?** symbol that denotes the parameters to an SQL query is substituted with the **#** symbol, because the **?** symbol is used to specify options for the endpoint. The **?** symbol replacement can be configured on endpoint basis.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Type	Default	Description
batch	**boolean**	**false**	**Camel 2.7.5, 2.8.4 and 2.9:** Execute SQL batch update statements. See notes below on how the treatment of the inbound message body changes if this is set to **true**.
dataSourceRef	**String**	**null**	**Deprecated and will be removed in Camel 3.0:** Reference to a **DataSource** to look up in the registry. Use **dataSource=#theName** instead.
dataSource	**String**	**null**	**Camel 2.11:** Reference to a **DataSource** to look up in the registry.
placeholder	**String**	**#**	**Camel 2.4:** Specifies a character that will be replaced to **?** in SQL query. Notice, that it is simple **String.replaceAll()** operation and no SQL parsing is involved (quoted strings will also change)
template.<xxx>		**null**	Sets additional options on the Spring **JdbcTemplate** that is used behind the scenes to execute the queries. For instance, **template.maxRows=10**. For detailed documentation, see the JdbcTemplate javadoc documentation.

allowNamedParameters	**boolean**	**true**	**Camel 2.11:** Whether to allow using named parameters in the queries.
processingStrategy			**Camel 2.11:SQL consumer only:** Allows to plugin to use a custom **org.apache.camel.component.sql.SqlProcessingStrategy** to execute queries when the consumer has processed the rows/batch.
prepareStatementStrategy			**Camel 2.11:** Allows to plugin to use a custom **org.apache.camel.component.sql.SqlPrepareStatementStrategy** to control preparation of the query and prepared statement.
consumer.delay	**long**	**500**	**Camel 2.11:SQL consumer only:** Delay in milliseconds between each poll.
consumer.initialDelay	**long**	**1000**	**Camel 2.11:SQL consumer only:** Milliseconds before polling starts.
consumer.useFixedDelay	**boolean**	**false**	**Camel 2.11:SQL consumer only:** Set to **true** to use fixed delay between polls, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.
maxMessagesPerPoll	**int**	**0**	**Camel 2.11:SQL consumer only:** An integer value to define the maximum number of messages to gather per poll. By default, no maximum is set.

consumer.useIterator	**boolean**	**true**	**Camel 2.11:SQL consumer only:** If **true** each row returned when polling will be processed individually. If **false** the entire **java.util.List** of data is set as the IN body.
consumer.routeEmptyResultSet	**boolean**	**false**	**Camel 2.11:SQL consumer only:** Whether to route a single empty Exchange if there was no data to poll.
consumer.onConsume	**String**	**null**	**Camel 2.11:SQL consumer only:** After processing each row then this query can be executed, if the Exchange was processed successfully, for example to mark the row as processed. The query can have parameter.
consumer.onConsumeFailed	**String**	**null**	**Camel 2.11:SQL consumer only:** After processing each row then this query can be executed, if the Exchange failed, for example to mark the row as failed. The query can have parameter.
consumer.onConsumeBatchComplete	**String**	**null**	**Camel 2.11:SQL consumer only:** After processing the entire batch, this query can be executed to bulk update rows etc. The query cannot have parameters.

consumer.expectedUpdateCount	**int**	**\-1**	**Camel 2.11:SQL consumer only:** If using **consumer.onConsume** then this option can be used to set an expected number of rows being updated. Typically you may set this to **1** to expect one row to be updated.
consumer.breakBatchOnConsumeFail	**boolean**	**false**	**Camel 2.11:SQL consumer only:** If using **consumer.onConsume** and it fails, then this option controls whether to break out of the batch or continue processing the next row from the batch.
alwaysPopulateStatement	**boolean**	**false**	**Camel 2.11:SQL producer only:** If enabled then the **populateStatement** method from **org.apache.camel.component.sql.SqlPrepareStatementStrategy** is always invoked, also if there is no expected parameters to be prepared. When this is **false** then the **populateStatement** is only invoked if there is 1 or more expected parameters to be set; for example this avoids reading the message body/headers for SQL queries with no parameters.

separator	**char**	**,**	**Camel 2.11.1:** The separator to use when parameter values is taken from message body (if the body is a String type), to be inserted at # placeholders. Notice if you use named parameters, then a **Map** type is used instead.
outputType	**String**	**SelectList**	**Camel 2.12.0:** Make the output of consumer or producer to **SelectList** as List of Map, or **SelectOne** as single Java object in the following way: a) If the query has only single column, then that JDBC Column object is returned. (such as **SELECT COUNT(*) FROM PROJECT** will return a Long object. b) If the query has more than one column, then it will return a Map of that result. c) If the **outputClass** is set, then it will convert the query result into an Java bean object by calling all the setters that match the column names. It will assume your class has a default constructor to create instance with. d) If the query resulted in more than one rows, it throws an non-unique result exception. From **Camel 2.14.1** onwards, the **SelectList** also supports mapping each row to a Java object as the **SelectOne** does (only step c).
outputClass	**String**	**null**	**Camel 2.12.0:** Specify the full package and class name to use as conversion when **outputType=SelectOne**.

outputHeader	**String**	**null**	**Camel 2.15:** To store the result as a header instead of the message body. This allows to preserve the existing message body as-is.
parametersCount	**int**	**0**	**Camel 2.11.2/2.12.0** If set greater than zero, then Camel will use this count value of parameters to replace instead of querying via JDBC metadata API. This is useful if the JDBC vendor could not return correct parameters count, then user may override instead.
noop	**boolean**	**false**	**Camel 2.12.0** If set, will ignore the results of the SQL query and use the existing IN message as the OUT message for the continuation of processing

TREATMENT OF THE MESSAGE BODY

The SQL component tries to convert the message body to an object of **java.util.Iterator** type and then uses this iterator to fill the query parameters (where each query parameter is represented by a **#** symbol, or other configured placeholder, in the endpoint URI). If the message body is not an array or collection, the conversion results in an iterator that iterates over only one object, which is the body itself.

For example, if the message body is an instance of **java.util.List**, the first item in the list is substituted into the first occurrence of **#** in the SQL query, the second item in the list is substituted into the second occurrence of **#**, and so on.

If **batch** is set to **true**, then the interpretation of the inbound message body changes slightly - instead of an iterator of parameters, the component expects an iterator that contains the parameter iterators; the size of the outer iterator determines the batch size.

RESULT OF THE QUERY

For **select** operations, the result is an instance of **List<Map<String, Object>>** type, as returned by the JdbcTemplate.queryForList() method. For **update** operations, the result is the number of updated rows, returned as an **Integer**.

By default, the result is placed in the message body. If the **outputHeader** parameter is set, the result is placed in the header. This is an alternative to using a full message enrichment pattern to add headers, it provides a concise syntax for querying a sequence or some other small value into a header. It is

convenient to use **outputHeader** and **outputType** together, for example:

```
from("jms:order.inbox")
 .to("sql:select order_seq.nextval from dual?outputHeader=OrderId&outputType=SelectOne")
 .to("jms:order.booking");
```

HEADER VALUES

When performing **update** operations, the SQL Component stores the update count in the following message headers:

Header	Description
CamelSqlUpdateCount	Apache Camel 2.0: The number of rows updated for **update** operations, returned as an **Integer** object.
CamelSqlRowCount	Apache Camel 2.0: The number of rows returned for **select** operations, returned as an **Integer** object.
CamelSqlQuery	**Camel 2.8:** Query to execute. This query takes precedence over the query specified in the endpoint URI. Note that query parameters in the header *are* represented by a **?** instead of a **#** symbol

When performing **insert** operations, the SQL Component stores the rows with the generated keys and number of these rown in the following message headers (**Available as of Camel 2.12.4, 2.13.1**):

Header	Description
CamelSqlGeneratedKeysRowCount	The number of rows in the header that contains generated keys.
CamelSqlGeneratedKeyRows	Rows that contains the generated keys (a list of maps of keys).

GENERATED KEYS

Available as of Camel 2.12.4, 2.13.1 and 2.14

If you insert data using SQL INSERT, then the RDBMS may support auto generated keys. You can instruct the SQL producer to return the generated keys in headers. To do that set the header **CamelSqlRetrieveGeneratedKeys=true**. Then the generated keys will be provided as headers with the keys listed in the table above.

You can see more details in this unit test.

CONFIGURATION

You can now set a reference to a **DataSource** in the URI directly:

```
sql:select * from table where id=# order by name?dataSourceRef=myDS
```

SAMPLE

In the sample below we execute a query and retrieve the result as a **List** of rows, where each row is a **Map<String, Object** and the key is the column name.

First, we set up a table to use for our sample. As this is based on an unit test, we do it java code:

```
// this is the database we create with some initial data for our unit test
db = new EmbeddedDatabaseBuilder()

.setType(EmbeddedDatabaseType.DERBY).addScript("sql/createAndPopulateDatabase.sql").build();
```

The SQL script **createAndPopulateDatabase.sql** we execute looks like as described below:

```
create table projects (id integer primary key, project varchar(10), license varchar(5));
insert into projects values (1, 'Camel', 'ASF');
insert into projects values (2, 'AMQ', 'ASF');
insert into projects values (3, 'Linux', 'XXX');
```

Then we configure our route and our **sql** component. Notice that we use a **direct** endpoint in front of the **sql** endpoint. This allows us to send an exchange to the **direct** endpoint with the URI, **direct:simple**, which is much easier for the client to use than the long **sql:** URI. Note that the **DataSource** is looked up up in the registry, so we can use standard Spring XML to configure our **DataSource**.

```
from("direct:simple")
    .to("sql:select * from projects where license = # order by id?dataSourceRef=jdbc/myDataSource")
    .to("mock:result");
```

And then we fire the message into the **direct** endpoint that will route it to our **sql** component that queries the database.

```
MockEndpoint mock = getMockEndpoint("mock:result");
mock.expectedMessageCount(1);

// send the query to direct that will route it to the sql where we will execute the query
// and bind the parameters with the data from the body. The body only contains one value
// in this case (XXX) but if we should use multi values then the body will be iterated
// so we could supply a List<String> instead containing each binding value.
template.sendBody("direct:simple", "XXX");

mock.assertIsSatisfied();

// the result is a List
List<?> received = assertIsInstanceOf(List.class,
mock.getReceivedExchanges().get(0).getIn().getBody());

// and each row in the list is a Map
Map<?, ?> row = assertIsInstanceOf(Map.class, received.get(0));

// and we should be able the get the project from the map that should be Linux
assertEquals("Linux", row.get("PROJECT"));
```

We could configure the **DataSource** in Spring XML as follows:

```
<jee:jndi-lookup id="myDS" jndi-name="jdbc/myDataSource"/>
```

USING NAMED PARAMETERS

Available as of Camel 2.11

In the given route below, we want to get all the projects from the projects table. Notice the SQL query has 2 named parameters, :#lic and :#min. Camel will then lookup for these parameters from the message body or message headers. Notice in the example above we set two headers with constant value for the named parameters:

```
from("direct:projects")
  .setHeader("lic", constant("ASF"))
  .setHeader("min", constant(123))
  .to("sql:select * from projects where license = :#lic and id > :#min order by id")
```

Though if the message body is a **java.util.Map** then the named parameters will be taken from the body.

```
from("direct:projects")
  .to("sql:select * from projects where license = :#lic and id > :#min order by id")
```

USING EXPRESSION PARAMETERS

Available as of Camel 2.14

In the given route below, we want to get all the project from the database. It uses the body of the exchange for defining the license and uses the value of a property as the second parameter.

```
from("direct:projects")
  .setBody(constant("ASF"))
  .setProperty("min", constant(123))
  .to("sql:select * from projects where license = :#${body} and id > :#${property.min} order by id")
```

USING THE JDBC BASED IDEMPOTENT REPOSITORY

In this section we will use the JDBC based idempotent repository.

ABSTRACT CLASS

From Camel 2.9 onwards there is an abstract class **org.apache.camel.processor.idempotent.jdbc.AbstractJdbcMessageIdRepository** you can extend to build custom JDBC idempotent repository.

First we have to create the database table which will be used by the idempotent repository.

In **Camel 2.8**, we added the **createdAt** column:

```
CREATE TABLE CAMEL_MESSAGEPROCESSED (
  processorName VARCHAR(255),
```

```
  messageId VARCHAR(100),
  createdAt TIMESTAMP
)
```

WARNING

The SQL Server **TIMESTAMP** type is a fixed-length binary-string type. It does not map to any of the JDBC time types: **DATE**, **TIME**, or **TIMESTAMP**.

We recommend to have a unique constraint on the columns processorName and messageId. Because the syntax for this constraint differs for database to database, we do not show it here.

Second we need to setup a **javax.sql.DataSource** in the spring XML file:

```
<jdbc:embedded-database id="dataSource" type="DERBY" />
```

And finally we can create our JDBC idempotent repository in the spring XML file as well:

```
<bean id="messageIdRepository"
class="org.apache.camel.processor.idempotent.jdbc.JdbcMessageIdRepository">
 <constructor-arg ref="dataSource" />
 <constructor-arg value="myProcessorName" />
</bean>

<camel:camelContext>
 <camel:errorHandler id="deadLetterChannel" type="DeadLetterChannel"
deadLetterUri="mock:error">
  <camel:redeliveryPolicy maximumRedeliveries="0" maximumRedeliveryDelay="0"
logStackTrace="false" />
 </camel:errorHandler>

 <camel:route id="JdbcMessageIdRepositoryTest" errorHandlerRef="deadLetterChannel">
  <camel:from uri="direct:start" />
  <camel:idempotentConsumer messageIdRepositoryRef="messageIdRepository">
   <camel:header>messageId</camel:header>
   <camel:to uri="mock:result" />
  </camel:idempotentConsumer>
 </camel:route>
</camel:camelContext>
```

CUSTOMIZE THE JDBCMESSAGEIDREPOSITORY

Starting with **Camel 2.9.1** you have a few options to tune the **org.apache.camel.processor.idempotent.jdbc.JdbcMessageIdRepository** for your needs:

Parameter	Default Value	Description

createTableIfNotExists	true	Defines whether or not Camel should try to create the table if it doesn't exist.
tableExistsString	SELECT 1 FROM CAMEL_MESSAGEPROCESSED WHERE 1 = 0	This query is used to figure out whether the table already exists or not. It must throw an exception to indicate the table doesn't exist.
createString	CREATE TABLE CAMEL_MESSAGEPROCESSED (processorName VARCHAR(255), messageId VARCHAR(100), createdAt TIMESTAMP)	The statement which is used to create the table.
queryString	SELECT COUNT(*) FROM CAMEL_MESSAGEPROCESSED WHERE processorName = ? AND messageId = ?	The query which is used to figure out whether the message already exists in the repository (the result is not equals to '0'). It takes two parameters. This first one is the processor name (**String**) and the second one is the message id (**String**).
insertString	INSERT INTO CAMEL_MESSAGEPROCESSED (processorName, messageId, createdAt) VALUES (?, ?, ?)	The statement which is used to add the entry into the table. It takes three parameter. The first one is the processor name (**String**), the second one is the message id (**String**) and the third one is the timestamp (**java.sql.Timestamp**) when this entry was added to the repository.
deleteString	DELETE FROM CAMEL_MESSAGEPROCESSED WHERE processorName = ? AND messageId = ?	The statement which is used to delete the entry from the database. It takes two parameter. This first one is the processor name (**String**) and the second one is the message id (**String**).

A customized **org.apache.camel.processor.idempotent.jdbc.JdbcMessageIdRepository** could look like:

```
<bean id="messageIdRepository"
class="org.apache.camel.processor.idempotent.jdbc.JdbcMessageIdRepository">
 <constructor-arg ref="dataSource" />
 <constructor-arg value="myProcessorName" />
 <property name="tableExistsString" value="SELECT 1 FROM
CUSTOMIZED_MESSAGE_REPOSITORY WHERE 1 = 0" />
 <property name="createString" value="CREATE TABLE CUSTOMIZED_MESSAGE_REPOSITORY
(processorName VARCHAR(255), messageId VARCHAR(100), createdAt TIMESTAMP)" />
```

```
 <property name="queryString" value="SELECT COUNT(*) FROM
CUSTOMIZED_MESSAGE_REPOSITORY WHERE processorName = ? AND messageId = ?" />
 <property name="insertString" value="INSERT INTO CUSTOMIZED_MESSAGE_REPOSITORY
(processorName, messageId, createdAt) VALUES (?, ?, ?)" />
 <property name="deleteString" value="DELETE FROM CUSTOMIZED_MESSAGE_REPOSITORY
WHERE processorName = ? AND messageId = ?" />
</bean>
```

USING THE JDBC BASED AGGREGATION REPOSITORY

Available as of Camel 2.6

USING JDBCAGGREGATIONREPOSITORY IN CAMEL 2.6

In Camel 2.6, the JdbcAggregationRepository is provided in the **camel-jdbc-aggregator** component. From Camel 2.7 onwards, the **JdbcAggregationRepository** is provided in the **camel-sql** component.

JdbcAggregationRepository is an **AggregationRepository** which on the fly persists the aggregated messages. This ensures that you will not loose messages, as the default aggregator will use an in memory only **AggregationRepository**. The **JdbcAggregationRepository** allows together with Camel to provide persistent support for the Aggregator.

It has the following options:

Option	Type	Description
dataSource	**DataSource**	**Mandatory:** The **javax.sql.DataSource** to use for accessing the database.
repositoryName	**String**	**Mandatory:** The name of the repository.
transactionManager	**TransactionManager**	**Mandatory:** The **org.springframework.transaction.PlatformTransactionManager** to mange transactions for the database. The TransactionManager must be able to support databases.
lobHandler	**LobHandler**	A **org.springframework.jdbc.support.lob.LobHandler** to handle Lob types in the database. Use this option to use a vendor specific LobHandler, for example when using Oracle.

returnOldExchange	boolean	Whether the get operation should return the old existing Exchange if any existed. By default this option is **false** to optimize as we do not need the old exchange when aggregating.
useRecovery	boolean	Whether or not recovery is enabled. This option is by default **true**. When enabled the Camel Aggregator automatic recover failed aggregated exchange and have them resubmitted.
recoveryInterval	long	If recovery is enabled then a background task is run every x'th time to scan for failed exchanges to recover and resubmit. By default this interval is 5000 millis.
maximumRedeliveries	int	Allows you to limit the maximum number of redelivery attempts for a recovered exchange. If enabled then the Exchange will be moved to the dead letter channel if all redelivery attempts failed. By default this option is disabled. If this option is used then the **deadLetterUri** option must also be provided.
deadLetterUri	String	An endpoint uri for a Dead Letter Channel where exhausted recovered Exchanges will be moved. If this option is used then the **maximumRedeliveries** option must also be provided.
storeBodyAsText	boolean	**Camel 2.11:** Whether to store the message body as String which is human readable. By default this option is **false** storing the body in binary format.
headersToStoreAsText	**List<String>**	**Camel 2.11:** Allows to store headers as String which is human readable. By default this option is disabled, storing the headers in binary format.

optimisticLocking	**false**	**Camel 2.12:** To turn on optimistic locking, which often would be needed in clustered environments where multiple Camel applications shared the same JDBC based aggregation repository.
jdbcOptimisticLockingExceptionMapper		**Camel 2.12:** Allows to plugin a custom **org.apache.camel.processor.aggregate.jdbc.JdbcOptimisticLockingExceptionMapper** to map vendor specific error codes to an optimistick locking error, for Camel to perform a retry. This requires **optimisticLocking** to be enabled.

WHAT IS PRESERVED WHEN PERSISTING

JdbcAggregationRepository will only preserve any **Serializable** compatible data types. If a data type is not such a type its dropped and a **WARN** is logged. And it only persists the **Message** body and the **Message** headers. The **Exchange** properties are **not** persisted.

From Camel 2.11 onwards you can store the message body and select(ed) headers as String in separate columns.

RECOVERY

The **JdbcAggregationRepository** will by default recover any failed Exchange. It does this by having a background tasks that scans for failed Exchanges in the persistent store. You can use the **checkInterval** option to set how often this task runs. The recovery works as transactional which ensures that Camel will try to recover and redeliver the failed Exchange. Any Exchange which was found to be recovered will be restored from the persistent store and resubmitted and send out again.

The following headers is set when an Exchange is being recovered/redelivered:

Header	Type	Description
Exchange.REDELIVERED	Boolean	Is set to true to indicate the Exchange is being redelivered.
Exchange.REDELIVERY_COUNTER	Integer	The redelivery attempt, starting from 1.

Only when an Exchange has been successfully processed it will be marked as complete which happens when the **confirm** method is invoked on the **AggregationRepository**. This means if the same Exchange fails again it will be kept retried until it success.

You can use option **maximumRedeliveries** to limit the maximum number of redelivery attempts for a given recovered Exchange. You must also set the **deadLetterUri** option so Camel knows where to send the Exchange when the **maximumRedeliveries** was hit.

You can see some examples in the unit tests of camel-sql, for example this test.

DATABASE

To be operational, each aggregator uses two table: the aggregation and completed one. By convention the completed has the same name as the aggregation one suffixed with **"_COMPLETED"**. The name must be configured in the Spring bean with the **RepositoryName** property. In the following example aggregation will be used.

The table structure definition of both table are identical: in both case a String value is used as key (**id**) whereas a Blob contains the exchange serialized in byte array. However one difference should be remembered: the **id** field does not have the same content depending on the table. In the aggregation table **id** holds the correlation Id used by the component to aggregate the messages. In the completed table, **id** holds the id of the exchange stored in corresponding the blob field.

Here is the SQL query used to create the tables, just replace **"aggregation"** with your aggregator repository name.

```
CREATE TABLE aggregation (
    id varchar(255) NOT NULL,
    exchange blob NOT NULL,
    constraint aggregation_pk PRIMARY KEY (id)
);
CREATE TABLE aggregation_completed (
    id varchar(255) NOT NULL,
    exchange blob NOT NULL,
    constraint aggregation_completed_pk PRIMARY KEY (id)
);
```

STORING BODY AND HEADERS AS TEXT

Available as of Camel 2.11

You can configure the **JdbcAggregationRepository** to store message body and select(ed) headers as String in separate columns. For example to store the body, and the following two headers **companyName** and **accountName** use the following SQL:

```
CREATE TABLE aggregationRepo3 (
    id varchar(255) NOT NULL,
    exchange blob NOT NULL,
    body varchar(1000),
    companyName varchar(1000),
    accountName varchar(1000),
    constraint aggregationRepo3_pk PRIMARY KEY (id)
);
CREATE TABLE aggregationRepo3_completed (
    id varchar(255) NOT NULL,
    exchange blob NOT NULL,
    body varchar(1000),
    companyName varchar(1000),
```

```
    accountName varchar(1000),
    constraint aggregationRepo3_completed_pk PRIMARY KEY (id)
);
```

And then configure the repository to enable this behavior as shown below:

```
    <bean id="repo3"
class="org.apache.camel.processor.aggregate.jdbc.JdbcAggregationRepository">
        <property name="repositoryName" value="aggregationRepo3"/>
        <property name="transactionManager" ref="txManager3"/>
        <property name="dataSource" ref="dataSource3"/>
        <!-- configure to store the message body and following headers as text in the repo -->
        <property name="storeBodyAsText" value="true"/>
        <property name="headersToStoreAsText">
          <list>
           <value>companyName</value>
          <value>accountName</value>
          </list>
        </property>
    </bean>
```

CODEC (SERIALIZATION)

Since they can contain any type of payload, Exchanges are not serializable by design. It is converted into a byte array to be stored in a database BLOB field. All those conversions are handled by the **JdbcCodec** class. One detail of the code requires your attention: the **ClassLoadingAwareObjectInputStream**.

The **ClassLoadingAwareObjectInputStream** has been reused from the Apache ActiveMQ project. It wraps an **ObjectInputStream** and use it with the **ContextClassLoader** rather than the **currentThread** one. The benefit is to be able to load classes exposed by other bundles. This allows the exchange body and headers to have custom types object references.

TRANSACTION

A Spring **PlatformTransactionManager** is required to orchestrate transaction.

SERVICE (START/STOP)

The **start** method verify the connection of the database and the presence of the required tables. If anything is wrong it will fail during starting.

AGGREGATOR CONFIGURATION

Depending on the targeted environment, the aggregator might need some configuration. As you already know, each aggregator should have its own repository (with the corresponding pair of table created in the database) and a data source. If the default lobHandler is not adapted to your database system, it can be injected with the **lobHandler** property.

Here is the declaration for Oracle:

```
    <bean id="lobHandler" class="org.springframework.jdbc.support.lob.OracleLobHandler">
        <property name="nativeJdbcExtractor" ref="nativeJdbcExtractor"/>
    </bean>
```

```
    <bean id="nativeJdbcExtractor"
class="org.springframework.jdbc.support.nativejdbc.CommonsDbcpNativeJdbcExtractor"/>

    <bean id="repo" class="org.apache.camel.processor.aggregate.jdbc.JdbcAggregationRepository">
        <property name="transactionManager" ref="transactionManager"/>
        <property name="repositoryName" value="aggregation"/>
        <property name="dataSource" ref="dataSource"/>
        <!-- Only with Oracle, else use default -->
        <property name="lobHandler" ref="lobHandler"/>
    </bean>
```

OPTIMISTIC LOCKING

From **Camel 2.12** onwards you can turn on **optimisticLocking** and use this JDBC based aggregation repository in a clustered environment where multiple Camel applications shared the same database for the aggregation repository. If there is a race condition there JDBC driver will throw a vendor specific exception which the **JdbcAggregationRepository** can react upon. To know which caused exceptions from the JDBC driver is regarded as an optimistick locking error we need a mapper to do this. Therefore there is a **org.apache.camel.processor.aggregate.jdbc.JdbcOptimisticLockingExceptionMapper** allows you to implement your custom logic if needed. There is a default implementation **org.apache.camel.processor.aggregate.jdbc.DefaultJdbcOptimisticLockingExceptionMapper** which works as follows:

The following check is done:

- If the caused exception is an **SQLException** then the SQLState is checked if starts with 23.
- If the caused exception is a **DataIntegrityViolationException**
- If the caused exception class name has "ConstraintViolation" in its name.
- optional checking for FQN class name matches if any class names has been configured

You can in addition add FQN classnames, and if any of the caused exception (or any nested) equals any of the FQN class names, then its an optimistick locking error.

Here is an example, where we define 2 extra FQN class names from the JDBC vendor.

```
    <bean id="repo" class="org.apache.camel.processor.aggregate.jdbc.JdbcAggregationRepository">
        <property name="transactionManager" ref="transactionManager"/>
        <property name="repositoryName" value="aggregation"/>
        <property name="dataSource" ref="dataSource"/>
        <property name"jdbcOptimisticLockingExceptionMapper" ref="myExceptionMapper"/>
    </bean>

    <!-- use the default mapper with extra FQN class names from our JDBC driver -->
    <bean id="myExceptionMapper"
class="org.apache.camel.processor.aggregate.jdbc.DefaultJdbcOptimisticLockingExceptionMapper">
      <property name="classNames">
        <util:set>
          <value>com.foo.sql.MyViolationExceptoion</value>
          <value>com.foo.sql.MyOtherViolationExceptoion</value>
```

```
        </util:set>
      </property>
    </bean>
```

See also:

- JDBC

CHAPTER 144. SSH

SSH

Available as of Camel 2.10

The SSH component enables access to SSH servers such that you can send an SSH command, and process the response.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-ssh</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
ssh:[username[:password]@]host[:port][?options]
```

OPTIONS

Name	Default Value	Description
host		Hostname of SSH Server
port	**22**	Port of the SSH Server
username		Username used for authenticating with SSH Server.
password		Password used for authenticating with SSH Server. Used if **keyPairProvider** is null.
keyPairProvider		Refers to a **org.apache.sshd.common.KeyPairProvider** to use for loading keys for authentication. If this option is used, then **password** is not used.
keyType	**ssh-rsa**	Refers to a key type to load from **keyPairProvider**. The key types can for example be "ssh-rsa" or "ssh-dss".

certResource	**null**	**Camel 2.11:** Path reference to a public key certificate. Prefix path with **classpath:**, **file:**, or **http:**.
certFilename	**null**	**@deprecated:** Use **certResource** instead. Refers to a filename to use within file based **keyPairProvider**.
timeout	**30000**	Milliseconds to wait beforing timing out connection to SSH Server.

CONSUMER ONLY OPTIONS

Name	Default Value	Description
initialDelay	**1000**	Milliseconds before polling the SSH server starts.
delay	**500**	Milliseconds before the next poll of the SSH Server.
useFixedDelay	**true**	Controls if fixed delay or fixed rate is used. See **ScheduledExecutorService** in JDK for details.
pollCommand	**null**	Command to send to SSH Server during each poll cycle. You may need to end your command with a newline, and that must be URL encoded **%0A**.

USAGE AS A PRODUCER ENDPOINT

When the SSH Component is used as a Producer (**.to("ssh://...")**), it will send the message body as the command to execute on the remote SSH server.

Here is an example of this within the XML DSL. Note that the command has an XML encoded newline (**&10;**).

```
<route id="camel-example-ssh-producer">
  <from uri="direct:exampleSshProducer"/>
  <setBody>
    <constant>features:list&#10;</constant>
  </setBody>
```

```
  <to uri="ssh://karaf:karaf@localhost:8101"/>
  <log message="${body}"/>
</route>
```

AUTHENTICATION

The SSH Component can authenticate against the remote SSH server using one of two mechanisms: Public Key certificate or username/password. Configuring how the SSH Component does authentication is based on how and which options are set.

1. First, it will look to see if the **certResource** option has been set, and if so, use it to locate the referenced Public Key certificate and use that for authentication.

2. If **certResource** is not set, it will look to see if a **keyPairProvider** has been set, and if so, it will use that to for certificate based authentication.

3. If neither **certResource** nor **keyPairProvider** are set, it will use the **username** and **password** options for authentication.

The following route fragment shows an SSH polling consumer using a certificate from the classpath.

In the XML DSL,

```
<route>
  <from uri="ssh://scott@localhost:8101?
certResource=classpath:test_rsa&seFixedDelay=true&elay=5000&ollCommand=features:list%0A"/>
  <log message="${body}"/>
</route>
```

In the Java DSL,

```
from("ssh://scott@localhost:8101?
certResource=classpath:test_rsa&useFixedDelay=true&delay=5000&pollCommand=features:list%0A")

    .log("${body}");
```

An example of using Public Key authentication is provided in **examples/camel-example-ssh-security**.

CERTIFICATE DEPENDENCIES

You will need to add some additional runtime dependencies if you use certificate based authentication. The dependency versions shown are as of Camel 2.11, you may need to use later versions depending what version of Camel you are using.

```
<dependency>
  <groupId>org.apache.sshd</groupId>
  <artifactId>sshd-core</artifactId>
  <version>0.8.0</version>
</dependency>
<dependency>
  <groupId>org.bouncycastle</groupId>
  <artifactId>bcpg-jdk15on</artifactId>
  <version>1.47</version>
</dependency>
```

```
<dependency>
  <groupId>org.bouncycastle</groupId>
  <artifactId>bcpkix-jdk15on</artifactId>
  <version>1.47</version>
</dependency>
```

EXAMPLE

See the **examples/camel-example-ssh** and **examples/camel-example-ssh-security** in the Camel distribution.

CHAPTER 145. STAX

STAX COMPONENT

Available as of Camel 2.9

The StAX component allows messages to be process through a SAX ContentHandler. Another feature of this component is to allow to iterate over JAXB records using StAX, for example using the Splitter EIP.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-stax</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
stax:content-handler-class
```

example:

```
stax:org.superbiz.FooContentHandler
```

From **Camel 2.11.1** onwards you can lookup a **org.xml.sax.ContentHandler** bean from the Registry using the # syntax as shown:

```
stax:#myHandler
```

USAGE OF A CONTENT HANDLER AS STAX PARSER

The message body after the handling is the handler itself.

Here an example:

```
from("file:target/in")
  .to("stax:org.superbiz.handler.CountingHandler")
  // CountingHandler implements org.xml.sax.ContentHandler or extends
org.xml.sax.helpers.DefaultHandler
  .process(new Processor() {
    @Override
    public void process(Exchange exchange) throws Exception {
        CountingHandler handler = exchange.getIn().getBody(CountingHandler.class);
        // do some great work with the handler
    }
  });
```

ITERATE OVER A COLLECTION USING JAXB AND STAX

First we suppose you have JAXB objects.

For instance a list of records in a wrapper object:

```
import java.util.ArrayList;
import java.util.List;
import javax.xml.bind.annotation.XmlAccessType;
import javax.xml.bind.annotation.XmlAccessorType;
import javax.xml.bind.annotation.XmlElement;
import javax.xml.bind.annotation.XmlRootElement;

@XmlAccessorType(XmlAccessType.FIELD)
@XmlRootElement(name = "records")
public class Records {
    @XmlElement(required = true)
    protected List<Record> record;

    public List<Record> getRecord() {
        if (record == null) {
            record = new ArrayList<Record>();
        }
        return record;
    }
}
```

and

```
import javax.xml.bind.annotation.XmlAccessType;
import javax.xml.bind.annotation.XmlAccessorType;
import javax.xml.bind.annotation.XmlAttribute;
import javax.xml.bind.annotation.XmlType;

@XmlAccessorType(XmlAccessType.FIELD)
@XmlType(name = "record", propOrder = { "key", "value" })
public class Record {
    @XmlAttribute(required = true)
    protected String key;

    @XmlAttribute(required = true)
    protected String value;

    public String getKey() {
        return key;
    }

    public void setKey(String key) {
        this.key = key;
    }

    public String getValue() {
        return value;
    }

    public void setValue(String value) {
```

```
        this.value = value;
    }
}
```

Then you get a XML file to process:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<records>
  <record value="v0" key="0"/>
  <record value="v1" key="1"/>
  <record value="v2" key="2"/>
  <record value="v3" key="3"/>
  <record value="v4" key="4"/>
  <record value="v5" key="5"/>
</record>
```

The StAX component provides an **StAXBuilder** which can be used when iterating XML elements with the Camel Splitter

```
from("file:target/in")
    .split(stax(Record.class)).streaming()
        .to("mock:records");
```

Where **stax** is a static method on **org.apache.camel.component.stax.StAXBuilder** which you can static import in the Java code. The stax builder is by default namespace aware on the XMLReader it uses. From **Camel 2.11.1** onwards you can turn this off by setting the boolean parameter to false, as shown below:

```
from("file:target/in")
    .split(stax(Record.class, false)).streaming()
        .to("mock:records");
```

THE PREVIOUS EXAMPLE WITH XML DSL

The example above could be implemented as follows in XML DSL

```
<!-- use STaXBuilder to create the expression we want to use in the route below for splitting the XML
file -->
<!-- notice we use the factory-method to define the stax method, and to pass in the parameter as a
constructor-arg -->
<bean id="staxRecord" class="org.apache.camel.component.stax.StAXBuilder" factory-
method="stax">
  <!-- FQN class name of the POJO with the JAXB annotations -->
  <constructor-arg index="0" value="org.apache.camel.component.stax.model.Record"/>
</bean>

<camelContext xmlns="http://camel.apache.org/schema/spring">
  <route>
    <!-- pickup XML files -->
    <from uri="file:target/in"/>
    <split streaming="true">
      <!-- split the file using StAX (ref to bean above) -->
      <!-- and use streaming mode in the splitter -->
      <ref>staxRecord</ref>
```

```
      <!-- and send each splitted to a mock endpoint, which will be a Record POJO instance -->
      <to uri="mock:records"/>
    </split>
  </route>
</camelContext>
```

CHAPTER 146. STOMP

STOMP COMPONENT

Available as of Camel 2.12

The **stomp:** component is used for communicating with Stomp compliant message brokers, like Apache ActiveMQ or ActiveMQ Apollo

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-stomp</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
stomp:queue:destination[?options]
```

Where **destination** is the name of the queue.

OPTIONS

Property	Default	Description
brokerURL	**tcp://localhost:61613**	The URI of the Stomp broker to connect to
login		The username
passcode		The password

You can append query options to the URI in the following format, **?option=value&option=value&...**

SAMPLES

Sending messages:

```
from("direct:foo").to("stomp:queue:test");
```

Consuming messages:

```
from("stomp:queue:test").transform(body().convertToString()).to("mock:result")
```

CHAPTER 147. STREAM

STREAM COMPONENT

The **stream:** component provides access to the **System.in**, **System.out** and **System.err** streams as well as allowing streaming of file and URL.

URI FORMAT

```
stream:in[?options]
stream:out[?options]
stream:err[?options]
stream:header[?options]
```

In addition, the **file** and **url** endpoint URIs are supported in **Apache Camel 2.0**:

```
stream:file?fileName=/foo/bar.txt
stream:url[?options]
```

If the **stream:header** URI is specified, the **stream** header is used to find the stream to write to. This option is available only for stream producers (that is, it cannot appear in **from()**).

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Default Value	Description
delay	**0**	Initial delay in milliseconds before consuming or producing the stream.
encoding	*JVM Default*	As of 1.4, you can configure the encoding (is a charset name) to use text-based streams (for example, message body is a **String** object). If not provided, Apache Camel uses the JVM default Charset.
promptMessage	**null**	**Apache Camel 2.0:** Message prompt to use when reading from **stream:in**; for example, you could set this to **Enter a command:**
promptDelay	**0**	**Apache Camel 2.0:** Optional delay in milliseconds before showing the message prompt.

initialPromptDelay	**2000**	**Apache Camel 2.0:** Initial delay in milliseconds before showing the message prompt. This delay occurs only once. Can be used during system startup to avoid message prompts being written while other logging is done to the system out.
fileName	**null**	**Apache Camel 2.0:** When using the **stream:file** URI format, this option specifies the filename to stream to/from.
url	**null**	When using the **stream:url** URI format, this option specifies the URL to stream to/from. The input/output stream will be opened using the JDK URLConnection facility.
scanStream	**false**	**Apache Camel 2.0:** To be used for continuously reading a stream such as the unix **tail** command. **Camel 2.4 to Camel 2.6:** will retry opening the file if it is overwritten, somewhat like **tail --retry**
retry	**false**	**Camel 2.7:** will retry opening the file if it's overwritten, somewhat like **tail --retry**
scanStreamDelay	**0**	**Apache Camel 2.0:** Delay in milliseconds between read attempts when using **scanStream**.
groupLines	**0**	**Camel 2.5:** To group X number of lines in the consumer. For example to group 10 lines and therefore only spit out an Exchange with 10 lines, instead of 1 Exchange per line.
autoCloseCount	**0**	**Camel 2.10.0:** (2.9.3 and 2.8.6) Number of messages to process before closing stream on Producer side. Never close stream by default (only when Producer is stopped). If more messages are sent, the stream is reopened for another **autoCloseCount** batch.

closeOnDone	**false**	**Camel 2.11.0:** This option is used in combination with Splitter and streaming to the same file. The idea is to keep the stream open and only close when the Splitter is done, to improve performance. Mind this requires that you only stream to the same file, and not 2 or more files.

MESSAGE CONTENT

The **stream:** component supports either **String** or **byte[]** for writing to streams. Just add either **String** or **byte[]** content to the **message.in.body**. Messages sent to the **stream:** producer in binary mode are not followed by the newline character (as opposed to the **String** messages). Message with **null** body will not be appended to the output stream.

SAMPLES

In the following sample we route messages from the **direct:in** endpoint to the **System.out** stream:

```
// Route messages to the standard output.
from("direct:in").to("stream:out");

// Send String payload to the standard output.
// Message will be followed by the newline.
template.sendBody("direct:in", "Hello Text World");

// Send byte[] payload to the standard output.
// No newline will be added after the message.
template.sendBody("direct:in", "Hello Bytes World".getBytes());
```

The following sample demonstrates how the header type can be used to determine which stream to use. In the sample we use our own output stream, **MyOutputStream**.

```
private OutputStream mystream = new MyOutputStream();
private StringBuffer sb = new StringBuffer();

@Test
public void testStringContent() {
    template.sendBody("direct:in", "Hello");
    // StreamProducer appends \n in text mode
    assertEquals("Hello\n", sb.toString());
}

@Test
public void testBinaryContent() {
    template.sendBody("direct:in", "Hello".getBytes());
    // StreamProducer is in binary mode so no \n is appended
    assertEquals("Hello", sb.toString());
}

protected RouteBuilder createRouteBuilder() {
```

```
    return new RouteBuilder() {
        public void configure() {
            from("direct:in").setHeader("stream", constant(mystream)).
                to("stream:header");
        }
    };
}

private class MyOutputStream extends OutputStream {

    public void write(int b) throws IOException {
        sb.append((char)b);
    }
}
```

The following sample demonstrates how to continuously read a file stream (analogous to the UNIX **tail** command):

```
from("stream:file?
fileName=/server/logs/server.log&scanStream=true&scanStreamDelay=1000").to("bean:logService?
method=parseLogLine");
```

NOTE

One difficulty with using the combination of **scanStream** and **retry** is that the file will be re-opened and scanned with each iteration of **scanStreamDelay**. Until NIO2 is available, we cannot reliably detect when a file is deleted or recreated.

CHAPTER 148. STRINGTEMPLATE

STRING TEMPLATE

The **string-template:** component allows you to process a message using a String Template. This can be ideal when using Templating to generate responses for requests.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-stringtemplate</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
string-template:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
contentCache	**false**	Cache for the resource content when its loaded. Note : as of **Camel 2.9** cached resource content can be cleared via JMX using the endpoint's **clearContentCache** operation.
delimiterStart	**null**	**Since Camel 2.11.1** , configuring the variable start delimiter
delimiterStop	**null**	**Since Camel 2.11.1** , configuring the variable end delimiter

HEADERS

Apache Camel will store a reference to the resource in the message header with key, **org.apache.camel.stringtemplate.resource**. The Resource is an **org.springframework.core.io.Resource** object.

HOT RELOADING

The string template resource is by default hot-reloadable for both file and classpath resources (expanded jar). If you set **contentCache=true**, Apache Camel loads the resource only once and hot-reloading is not possible. This scenario can be used in production when the resource never changes.

STRINGTEMPLATE ATTRIBUTES

Apache Camel will provide exchange information as attributes (just a **java.util.Map**) to the string template. The Exchange is transfered as:

key	value
exchange	The Exchange itself.
headers	The headers of the In message.
camelContext	The Camel Context.
request	The In message.
in	The In message.
body	The In message body.
out	The Out message (only for InOut message exchange pattern).
response	The Out message (only for InOut message exchange pattern).

Since Camel 2.14, you can define the custom context map by setting the message header "**CamelStringTemplateVariableMap**" just like the below code.

```
Map<String, Object> variableMap = new HashMap<String, Object>();
Map<String, Object> headersMap = new HashMap<String, Object>();
headersMap.put("name", "Willem");
variableMap.put("headers", headersMap);
variableMap.put("body", "Monday");
variableMap.put("exchange", exchange);
exchange.getIn().setHeader("CamelStringTemplateVariableMap", variableMap);
```

SAMPLES

For example you could use a string template as follows in order to formulate a response to a message:

```
from("activemq:My.Queue").
  to("string-template:com/acme/MyResponse.tm");
```

THE EMAIL SAMPLE

In this sample we want to use a string template to send an order confirmation email. The email template is laid out in **StringTemplate** as: This example works for **camel 2.11.0**. If your camel version is less than 2.11.0, the variables should be started and ended with $.

```
Dear <headers.lastName>, <headers.firstName>

Thanks for the order of <headers.item>.

Regards Camel Riders Bookstore
<body>
```

And the java code is as follows:

```
private Exchange createLetter() {
    Exchange exchange = context.getEndpoint("direct:a").createExchange();
    Message msg = exchange.getIn();
    msg.setHeader("firstName", "Claus");
    msg.setHeader("lastName", "Ibsen");
    msg.setHeader("item", "Camel in Action");
    msg.setBody("PS: Next beer is on me, James");
    return exchange;
}

@Test
public void testVelocityLetter() throws Exception {
    MockEndpoint mock = getMockEndpoint("mock:result");
    mock.expectedMessageCount(1);
    mock.expectedBodiesReceived("Dear Ibsen, Claus! Thanks for the order of Camel in Action.
Regards Camel Riders Bookstore PS: Next beer is on me, James");

    template.send("direct:a", createLetter());

    mock.assertIsSatisfied();
}

protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            from("direct:a").to("string-
template:org/apache/camel/component/stringtemplate/letter.tm").to("mock:result");
        }
    };
}
```

CHAPTER 149. STUB

STUB COMPONENT

Available as of Camel 2.10

The **stub:** component provides a simple way to stub out any physical endpoints while in development or testing, allowing you for example to run a route without needing to actually connect to a specific SMTP or HTTP endpoint. Just add **stub:** in front of any endpoint URI to stub out the endpoint.

Internally the Stub component creates VM endpoints. The main difference between Stub and VM is that VM will validate the URI and parameters you give it, so putting vm: in front of a typical URI with query arguments will usually fail. Stub won't though, as it basically ignores all query parameters to let you quickly stub out one or more endpoints in your route temporarily.

URI FORMAT

```
stub:someUri
```

Where **someUri** can be any URI with any query parameters.

EXAMPLES

Here are a few samples:

- stub:smtp://somehost.foo.com?user=whatnot&something=else
- stub:http://somehost.bar.com/something

CHAPTER 150. SWAGGER

Abstract

The Swagger component enables users to create API docs for any Rest-defined routes and endpoints in a CamelContext file. The Swagger component creates a servlet integrated with the CamelContext that pulls information from each Rest endpoint to generate the API docs (JSON file).

150.1. OVERVIEW

Available as of Camel 2.14

The Rest DSL can be integrated with the **camel-swagger** component, which is used for exposing REST services and their APIs using Swagger.

Dependencies

Maven users need to add the following dependency to their **pom.xml** file to use this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-swagger</artifactId>
  <version>x.x.x</version>
  <!-- Use the same version as your Camel core version -->
<dependency>
```

Selecting the Swagger servlet

Which servlet you use depends on the Camel version you use:

- Camel 2.15.x

  org.apache.camel.component.swagger.DefaultCamelSwaggerServlet

  NOTE

  This default servlet integrates with any environment, using JMX to discover the CamelContext(s) to use. It replaces both Camel 2.14.x servlets, which are deprecated from Camel 2.15 onwards.

- Camel 2.14.x

  The Swagger servlet is integrated with either Spring or the **servletListener** component:

  - Spring

    org.apache.camel.component.swagger.spring.SpringRestSwaggerApiDeclarationServlet

  - **servletListener** component

org.apache.camel.component.swagger.servletlistener.ServletListenerRestSwaggerApiDelarationServlet

Servlet configuration parameters

All of the servlets support these options:

Parameter	Type	Description
api.contact	String	Specifies an email used for API-related correspondence
api.description	String	[**Required**] Provides a short description of the application
api.license	String	Specifies the name of the license used for the API
api.licenseUrl	String	Specifies the URL of the license used for the API
api.path	String	[**Required**] Specifies the location at which the API is available. • **Camel 2.15 +**—Enter the relative path only: **host:port/context-path/api.path** At run time, camel-swagger calculates the absolute api path. • **Camel 2.14.x**—Enter the absolute api path: **protocol://host:port/context-path/api.path**.
api.termsOfServiceUrl	String	Specifies the URL to the Terms of Service of the API
api.title	String	[**Required**] Specifies the title of the application
api.version	String	Specifies the version of the API. The default is **0.0.0**.

Parameter	Type	Description
base.path	String	[**Required**] Specifies the location at which the REST services are available. • **Camel 2.15 +**—Enter the relative path only: **host:port/context-path/base.path**. At run time, camel-swagger calculates the absolute base path. • **Camel 2.14.x**—Enter the absolute base path: **protocol://host:port/context-path/base.path**.
cors	Boolean	Specifies whether to enable CORS. This parameter enables CORS for the API browser only. It does not enable access to the REST services. The default is **false**. Using the CorsFilter (see x) is recommended instead of using this parameter.
swagger.version	String	Specifies the version of the Swagger Specification. The default is **1.2**.

Using the CorsFilter

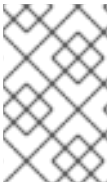
If you use the Swagger UI to view the REST API, you will likely need to enable support for CORS. When the Swagger UI is hosted and running on a different hostname/port than the REST APIs, it needs access to the REST resources across the origin (CORS). The CorsFilter adds the necessary HTTP headers to enable CORS.

For all requests, the CorsFilter sets these headers:

- Access-Control-Allow-Origin = *
- Access-Control-Allow-Methods = GET, HEAD, POST, PUT, DELETE, TRACE, OPTIONS, CONNECT, PATCH
- Access-Control-Max-Age = 3600
- Access-Control-Allow-Headers = Origin, Accept, X-Requested-With, Content-Type, Access-Control-Request-Method, Access-Control-Request-Headers

To use it, with WAR deployments, add **org.apache.camel.component.swagger.RestSwaggerCorsFilter** to your **WEB-INF/web.xml** file. For example:

```
<!-- Use CORs filter so people can use Swagger UI to browse and test the APIs -->

<filter>
    <filter-name>RestSwaggerCorsFilter</filter-name
    <filter-class>org.apache.camel.component.swagger.RestSwaggerCorsFilter</filter-class>
</filter>

<filter-mapping>
    <filter-name>RestSwaggerCorsFilter</filter-name>
    <url-pattern>/api-docs/*</url-pattern>
    <url-pattern>/rest/*</url-pattern>
</filter-mapping>
```



NOTE

This example shows a very simple CORS filter. You may need to use a more sophisticated filter to set header values differently for a given client or to block certain clients, and so on.

150.2. CONFIGURING WAR DEPLOYMENTS

For WAR implementations, you need to configure the servlet options in the **WEB-INF/web.xml** file.

Camel 2.15.x

Use relative paths for both the base.path and api.path parameters.

For example, to set up the Camel Swagger API servlet for any environment:

```
...
<servlet>

  <servlet-name>ApiDeclarationServlet</servlet-name>
  <servlet-class>org.apache.camel.component.swagger.DefaultCamelSwaggerServlet</servlet-class>

<!-- Specify the base.path and the api.path values using relative notation
because the actual paths will be calculated at runtime as
http://server:port/contextpath/rest and http://server:port/contextpath/api-docs,
respectively -->
  <init-param>
    <param-name>base.path</param-name>
    <param-value>rest</param-value>
  </init-param>
    <init-param>
    <param-name>api.path</param-name>
    <param-value>api-docs</param-value>
  </init-param>

  <init-param>
    <param-name>api.version</param-name>
```

```
    <param-value>1.2.3</param-value>
  </init-param>
  <init-param>
    <param-name>api.title</param-name>
    <param-value>User Services</param-value>
  </init-param>
   <init-param>
    <param-name>api.description</param-name>
    <param-value>Camel Rest Example with Swagger that provides a User Rest
    service</param-value>
  </init-param>
  <load-on-startup>2</load-on-startup>

</servlet>

<!-- swagger api declaration -->
<servlet-mapping>
   <servlet-name>ApiDeclarationServlet</servlet-name>
   <url-pattern>/api-docs/*</url-pattern>
</servlet-mapping>
```

Camel 2.14.x

Both servlets, **org.apache.camel.component.swagger.spring.SpringRestSwaggerApiDeclarationServlet** and **org.apache.camel.component.swagger.servletlistener.ServletListenerRestSwaggerApiDelaration Servlet**, support the same options.

Use absolute paths for both the base.path and api.path parameters.

For example, to set up the Camel Swagger API servlet for Spring:

```
...
<servlet>

  <servlet-name>ApiDeclarationServlet</servlet-name>
  <servlet-
class>org.apache.camel.component.swagger.spring.SpringRestSwaggerApiDeclarationServlet</servl
et-class>

  <init-param>
    <param-name>base.path</param-name>
    <param-value>http://localhost:8080/rest</param-value>
  </init-param>
   <init-param>
    <param-name>api.path</param-name>
    <param-value>http://localhost:8080/api-docs</param-value>
  </init-param>

  <init-param>
    <param-name>api.version</param-name>
    <param-value>1.2.3</param-value>
  </init-param>
  <init-param>
    <param-name>api.title</param-name>
```

```
    <param-value>User Services</param-value>
  </init-param>
   <init-param>
    <param-name>api.description</param-name>
    <param-value>Camel Rest Example with Swagger that provides a User Rest
    service</param-value>
  </init-param>
  <load-on-startup>2</load-on-startup>

</servlet>

<!-- swagger api declaration -->
<servlet-mapping>
   <servlet-name>ApiDeclarationServlet</servlet-name>
   <url-pattern>/api-docs/*</url-pattern>
</servlet-mapping>
```

150.3. CONFIGURING OSGI DEPLOYMENTS

The **org.apache.camel.component.swagger.DefaultCamelSwaggerServlet** supports the options described in the section called “Servlet configuration parameters”.

For OSGi deployments, you need to configure the servlet options and REST configuration in the **blueprint.xml** file; for example:

```
<?xml version="1.0" encoding="UTF-8"?>
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="
            http://www.osgi.org/xmlns/blueprint/v1.0.0
            http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd
            http://camel.apache.org/schema/blueprint
            http://camel.apache.org/schema/blueprint/camel-blueprint.xsd">


    <service interface="javax.servlet.http.HttpServlet">
        <service-properties>
            <entry key="alias" value="/api-docs/*"/>
            <entry key="init-prefix" value="init."/>
            <entry key="init.base.path" value="//localhost:8080/"/>
            <entry key="init.api.path" value="//localhost:8181/api-docs"/>
            <entry key="init.api.title" value="Camel Rest Example API"/>
            <entry key="init.api.version" value="1.2"/>
            <entry key="init.api.description"
                value="Camel Rest Example with Swagger that provides an User REST service"/>
        </service-properties>
        <bean class="org.apache.camel.component.swagger.DefaultCamelSwaggerServlet" />
    </service>

    <!--
      The namespace for the camelContext element in Blueprint
      is 'http://camel.apache.org/schema/blueprint'.

      While it is not required to assign id's to the <camelContext/> and <route/> elements,
      it is a good idea to set those for runtime management purposes (logging, JMX MBeans, ...)
```

```
    -->

    <camelContext id="log-example-context"
        xmlns="http://camel.apache.org/schema/blueprint">

        <restConfiguration component="jetty" port="8080"/>
        <rest path="/say">
            <get uri="/hello">
                <to uri="direct:hello"/>
            </get>
            <get uri="/bye" consumes="application/json">
                <to uri="direct:bye"/>
            </get>
            <post uri="/bye">
                <to uri="mock:update"/>
            </post>
        </rest>
        <route id="rte1-log-example">
            <from uri="direct:hello"/>
            <transform>
                <constant>Hello World</constant>
            </transform>
        </route>
        <route id="rte2-log-example">
            <from uri="direct:bye"/>
            <transform>
                <constant>Bye World</constant>
            </transform>
        </route>

    </camelContext>

</blueprint>
```

service

The **service** element exposes the camel swagger servlet (**<bean class="org.apache.camel.component.swagger.DefaultCamelSwaggerServlet"/>**) and initializes several servlet properties.

alias

The **alias** property binds the camel swagger servlet to **/api-docs/***.

init-prefix

The **init-prefix** property sets the prefix for all camel swagger servlet properties to **init.**. This is analogous to using **init-param** elements in the **web.xml** configuration in WAR implementations.

restConfiguration

In the camelContext, the **restConfiguration** element specifies Jetty as the web servlet on port 8080.

rest

In the camelContext, the **rest** element sets two REST endpoints and routes them to the camel endpoints defined in the following two **route** elements.

CHAPTER 151. TEST

TEST COMPONENT

The **test** component extends the Mock component to support pulling messages from another endpoint on startup to set the expected message bodies on the underlying Mock endpoint. That is, you use the test endpoint in a route and messages arriving on it will be implicitly compared to some expected messages extracted from some other location.

So you can use, for example, an expected set of message bodies as files. This will then set up a properly configured Mock endpoint, which is only valid if the received messages match the number of expected messages and their message payloads are equal.

Maven users will need to add the following dependency to their **pom.xml** for this component when using **Camel 2.8** or older:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-spring</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

From Camel 2.9 onwards the Test component is provided directly in the camel-core.

URI FORMAT

```
test:expectedMessagesEndpointUri
```

Where **expectedMessagesEndpointUri** refers to some other Component URI that the expected message bodies are pulled from before starting the test.

URI OPTIONS

Name	Default Value	Description
timeout	**2000**	**Camel 2.12:** The timeout to use when polling for message bodies from the URI.

EXAMPLE

For example, you could write a test case as follows:

```
from("seda:someEndpoint").
  to("test:file://data/expectedOutput?noop=true");
```

If your test then invokes the MockEndpoint.assertIsSatisfied(camelContext) method, your test case will perform the necessary assertions.

Here is a real example test case using Mock and Spring along with its Spring XML.

To see how you can set other expectations on the test endpoint, see the Mock component.

CHAPTER 152. TIMER

TIMER COMPONENT

The **timer:** component is used to generate message exchanges when a timer fires You can only consume events from this endpoint.

URI FORMAT

```
timer:name[?options]
```

Where **name** is the name of the **Timer** object, which is created and shared across endpoints. So if you use the same name for all your timer endpoints, only one **Timer** object and thread will be used.

You can append query options to the URI in the following format, **?option=value&option=value&...**

Note: The IN body of the generated exchange is **null**. So **exchange.getIn().getBody()** returns **null**.

ADVANCED SCHEDULER

See also the Quartz component that supports much more advanced scheduling.

SPECIFY TIME IN HUMAN FRIENDLY FORMAT

In **Camel 2.3** onwards you can specify the time in human friendly syntax.

OPTIONS

Name	Default Value	Description
time	**null**	A **java.util.Date** the **first** event should be generated. If using the URI, the pattern expected is: **yyyy-MM-dd HH:mm:ss** or **yyyy-MM-dd'T'HH:mm:ss**.
pattern	**null**	Allows you to specify a custom **Date** pattern to use for setting the time option using URI syntax.
period	**1000**	If greater than 0, generate periodic events every **period** milliseconds.

delay	**1000**	The number of milliseconds to wait before the first event is generated. Should not be used in conjunction with the **time** option. The default value has been changed to **1000** from **Camel 2.11** onwards. In older releases the default value is **0**.
fixedRate	**false**	Events take place at approximately regular intervals, separated by the specified period.
daemon	**true**	Specifies whether or not the thread associated with the timer endpoint runs as a daemon.
repeatCount	**0**	**Camel 2.8:** Specifies a maximum limit of number of fires. So if you set it to 1, the timer will only fire once. If you set it to 5, it will only fire five times. A value of zero or negative means fire forever.

EXCHANGE PROPERTIES

When the timer is fired, it adds the following information as properties to the **Exchange**:

Name	Type	Description
Exchange.TIMER_NAME	**String**	The value of the **name** option.
Exchange.TIMER_TIME	**Date**	The value of the **time** option.
Exchange.TIMER_PERIOD	**long**	The value of the **period** option.
Exchange.TIMER_FIRED_TIME	**Date**	The time when the consumer fired.
Exchange.TIMER_COUNTER	**Long**	**Camel 2.8:** The current fire counter. Starts from 1.

MESSAGE HEADERS

When the timer is fired, it adds the following information as headers to the IN message

Name	Type	Description

Exchange.TIMER_FIRED_TIME	**java.util.Date**	The time when the consumer fired

SAMPLE

To set up a route that generates an event every 60 seconds:

```
from("timer://foo?fixedRate=true&period=60000").to("bean:myBean?method=someMethodName");
```

TIP

Instead of 60000 you can specify the more readable, **period=60s**.

The above route will generate an event and then invoke the **someMethodName** method on the bean called **myBean** in the Registry such as JNDI or Spring.

And the route in Spring DSL:

```
<route>
  <from uri="timer://foo?fixedRate=true&amp;period=60000"/>
  <to uri="bean:myBean?method=someMethodName"/>
</route>
```

FIRING ONLY ONCE

Available as of Camel 2.8

You may want to fire a message in a Apache Camel route only once, such as when starting the route. To do that, you use the **repeatCount** option as follows:

```
<route>
  <from uri="timer://foo?repeatCount=1"/>
  <to uri="bean:myBean?method=someMethodName"/>
</route>
```

See also:

- Quartz

CHAPTER 153. TWITTER

TWITTER

Available as of Camel 2.10

The Twitter component enables the most useful features of the Twitter API by encapsulating Twitter4J. It allows direct, polling, or event-driven consumption of timelines, users, trends, and direct messages. Also, it supports producing messages as status updates or direct messages.

Twitter now requires the use of OAuth for all client application authentication. In order to use camel-twitter with your account, you'll need to create a new application within Twitter at https://dev.twitter.com/apps/new and grant the application access to your account. Finally, generate your access token and secret.

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-twitter</artifactId>
    <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
twitter://endpoint[?options]
```

TWITTERCOMPONENT:

The twitter component can be configured with the Twitter account settings which is mandatory to configure before using. You can also configure these options directly in the endpoint.

Option	Description
consumerKey	The consumer key
consumerSecret	The consumer secret
accessToken	The access token
accessTokenSecret	The access token secret

CONSUMER ENDPOINTS:

Rather than the endpoints returning a **List** through one single route exchange, **camel-twitter** creates one route exchange per returned object. As an example, if **timeline/home** results in five statuses, the route will be executed five times (once for each **Status**).

Endpoint	Context	Body Type	Notice
directmessage	direct, polling	**twitter4j.DirectMessage**	
search	direct, polling	**twitter4j.Tweet**	
streaming/filter	event, polling	**twitter4j.Status**	
streaming/sample	event, polling	**twitter4j.Status**	
timeline/home	direct, polling	**twitter4j.Status**	
timeline/mentions	direct, polling	**twitter4j.Status**	
timeline/public	direct, polling	**twitter4j.Status**	@deprecated. Use timeline/home or direct/home instead. Removed from **Camel 2.11** onwards.
timeline/retweetsofme	direct, polling	**twitter4j.Status**	
timeline/user	direct, polling	**twitter4j.Status**	
trends/daily	**Camel 2.10.1:** direct, polling	twitter4j.Status	@deprecated. Removed from Camel 2.11 onwards.
trends/weekly	**Camel 2.10.1:** direct, polling	twitter4j.Status	@deprecated. Removed from Camel 2.11 onwards.

PRODUCER ENDPOINTS:

Endpoint	Body Type
directmessage	**String**
search	**List<twitter4j.Tweet>**
timeline/user	**String**

URI OPTIONS

Name	Default Value	Description
type	**direct**	direct, event, or polling
delay	**60**	in seconds
consumerKey	**null**	Consumer Key. Can also be configured on the **TwitterComponent** level instead.
consumerSecret	**null**	Consumer Secret. Can also be configured on the **TwitterComponent** level instead.
accessToken	**null**	Access Token. Can also be configured on the **TwitterComponent** level instead.
accessTokenSecret	**null**	Access Token Secret. Can also be configured on the **TwitterComponent** level instead.
user	**null**	Username, used for user timeline consumption, direct message production, etc.
locations	**null**	'lat,lon;lat,lon;...' Bounding boxes, created by pairs of lat/lons. Can be used for streaming/filter
keywords	**null**	'foo1,foo2,foo3...' Can be used for search and streaming/filter. See Advanced search for keywords syntax for searching with for example OR.
userIds	**null**	'username,username...' Can be used for streaming/filter
filterOld	**true**	Filter out old tweets, that has previously been polled. This state is stored in memory only, and based on last tweet id. **Since Camel 2.11.0** The search producer supports this option

sinceId	**1**	**Camel 2.11.0:** The last tweet id which will be used for pulling the tweets. It is useful when the camel route is restarted after a long running.
lang	**null**	**Camel 2.11.0:** The lang string ISO_639-1 which will be used for searching
count	**null**	**Camel 2.11.0:** Limiting number of results per page.
numberOfPages	**1**	**Camel 2.11.0:** The number of pages result which you want camel-twitter to consume.
httpProxyHost	**null**	**Camel 2.12.3:** The http proxy host which can be used for the camel-twitter.
httpProxyPort	**null**	**Camel 2.12.3:** The http proxy port which can be used for the camel-twitter.
httpProxyUser	**null**	**Camel 2.12.3:** The http proxy user which can be used for the camel-twitter.
httpProxyPassword	**null**	**Camel 2.12.3:** The http proxy password which can be used for the camel-twitter.
useSSL	**true**	**Camel 2.12.3:** Using the SSL to connect the api.twitter.com if the option is true.

MESSAGE HEADER

Name	Description
CamelTwitterKeywords	This header is used by the search producer to change the search key words dynamically.
CamelTwitterSearchLanguage	**Camel 2.11.0:** This header can override the option of **lang** which set the search language for the search endpoint dynamically

CamelTwitterCount	**Camel 2.11.0** This header can override the option of **count** which sets the max twitters that will be returned.
CamelTwitterNumberOfPages	**Camel 2.11.0** This header can converrid the option of **numberOfPages** which sets how many pages we want to twitter returns.

MESSAGE BODY

All message bodies utilize objects provided by the Twitter4J API.

TO CREATE A STATUS UPDATE WITHIN YOUR TWITTER PROFILE, SEND THIS PRODUCER A STRING BODY.

```
from("direct:foo")
  .to("twitter://timeline/user?consumerKey=[s]&consumerSecret=[s]&accessToken=
[s]&accessTokenSecret=[s]);
```

TO POLL, EVERY 5 SEC., ALL STATUSES ON YOUR HOME TIMELINE:

```
from("twitter://timeline/home?type=polling&delay=5&consumerKey=[s]&consumerSecret=
[s]&accessToken=[s]&accessTokenSecret=[s]")
  .to("bean:blah");
```

TO SEARCH FOR ALL STATUSES WITH THE KEYWORD 'CAMEL':

```
from("twitter://search?type=direct&keywords=camel&consumerKey=[s]&consumerSecret=
[s]&accessToken=[s]&accessTokenSecret=[s]")
  .to("bean:blah");
```

SEARCHING USING A PRODUCER WITH STATIC KEYWORDS

```
from("direct:foo")
  .to("twitter://search?keywords=camel&consumerKey=[s]&consumerSecret=[s]&accessToken=
[s]&accessTokenSecret=[s]");
```

SEARCHING USING A PRODUCER WITH DYNAMIC KEYWORDS FROM HEADER

In the bar header we have the keywords we want to search, so we can assign this value to the **CamelTwitterKeywords** header.

```
from("direct:foo")
  .setHeader("CamelTwitterKeywords", header("bar"))
  .to("twitter://search?consumerKey=[s]&consumerSecret=[s]&accessToken=
```

```
[s]&accessTokenSecret=[s]");
```

EXAMPLE

See also the Twitter Websocket Example.

- Twitter Websocket Example

CHAPTER 154. VALIDATION

VALIDATION COMPONENT

The Validation component performs XML validation of the message body using the JAXP Validation API and based on any of the supported XML schema languages, which defaults to XML Schema

Note that the Jing component also supports the following useful schema languages:

- RelaxNG Compact Syntax
- RelaxNG XML Syntax

The MSV component also supports RelaxNG XML Syntax.

URI FORMAT

```
validator:someLocalOrRemoteResource
```

Where **someLocalOrRemoteResource** is some URL to a local resource on the classpath or a full URL to a remote resource or resource on the file system which contains the XSD to validate against. For example:

- **msv:org/foo/bar.xsd**
- **msv:file:../foo/bar.xsd**
- **msv:http://acme.com/cheese.xsd**
- **validator:com/mypackage/myschema.xsd**

Maven users will need to add the following dependency to their **pom.xml** for this component when using **Camel 2.8** or older:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-spring</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

From Camel 2.9 onwards the Validation component is provided directly in the camel-core.

OPTIONS

Option	Default	Description
resourceResolver	**null**	**Camel 2.9:** Reference to a **org.w3c.dom.ls.LSResourceResolver** in the Registry.

useDom	**false**	**Apache Camel 2.0:** Whether **DOMSource**/{{DOMResult}} or **SaxSource**/{{SaxResult}} should be used by the validator.
useSharedSchema	**true**	**Camel 2.3:** Whether the **Schema** instance should be shared or not. This option is introduced to work around a JDK 1.6.x bug. Xerces should not have this issue.
failOnNullBody	**true**	**Camel 2.9.5/2.10.3:** Whether to fail if no body exists.
headerName	**null**	**Camel 2.11:** To validate against a header instead of the message body.
failOnNullHeader	**true**	**Camel 2.11:** Whether to fail if no header exists when validating against a header.

EXAMPLE

The following example shows how to configure a route from endpoint **direct:start** which then goes to one of two endpoints, either **mock:valid** or **mock:invalid** based on whether or not the XML matches the given schema (which is supplied on the classpath).

```
<route>
   <from uri="direct:start"/>
   <doTry>
      <to uri="validator:org/apache/camel/component/validator/schema.xsd"/>
      <to uri="mock:valid"/>
      <doCatch>
         <exception>org.apache.camel.ValidationException</exception>
         <to uri="mock:invalid"/>
      </doCatch>
      <doFinally>
         <to uri="mock:finally"/>
      </doFinally>
   </doTry>
</route>
```

CHAPTER 155. VELOCITY

VELOCITY

The **velocity:** component allows you to process a message using an Apache Velocity template. This can be ideal when using Templating to generate responses for requests.

URI FORMAT

```
velocity:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template (for example, **file://folder/myfile.vm**).

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Option	Default	Description
loaderCache	**true**	Velocity based file loader cache.
contentCache	**true**	Cache for the resource content when it is loaded. Note : as of Camel 2.9 cached resource content can be cleared via JMX using the endpoint's **clearContentCache** operation.
encoding	**null**	Character encoding of the resource content.
propertiesFile	**null**	New option in Camel 2.1: The URI of the properties file which is used for VelocityEngine initialization.

MESSAGE HEADERS

The velocity component sets a couple headers on the message (you can't set these yourself and from Camel 2.1 velocity component will not set these headers which will cause some side effect on the dynamic template support):

Header	Description
CamelVelocityResourceUri	The **templateName** as a **String** object.

Headers set during the Velocity evaluation are returned to the message and added as headers. Then it is effectively possible to return values from Velocity to the Message. For example, to set the header value of **fruit** in the Velocity template, **template.tm**:

```
$in.setHeader("fruit", "Apple")
```

The **fruit** header is now accessible from the **message.out.headers**.

VELOCITY CONTEXT

Apache Camel will provide exchange information in the Velocity context (just a **Map**). The **Exchange** is transfered as:

key	value
exchange	The **Exchange** itself.
exchange.properties	The **Exchange** properties.
headers	The headers of the In message.
camelContext	The Camel Context instance.
request	The In message.
in	The In message.
body	The In message body.
out	The Out message (only for InOut message exchange pattern).
response	The Out message (only for InOut message exchange pattern).

Since Camel-2.14, you can setup a custom Velocity Context yourself by setting the message header **CamelVelocityContext** just like this

```
VelocityContext velocityContext = new VelocityContext(variableMap);
exchange.getIn().setHeader("CamelVelocityContext", velocityContext);
```

HOT RELOADING

The Velocity template resource is, by default, hot reloadable for both file and classpath resources (expanded jar). If you set **contentCache=true**, Apache Camel will only load the resource once, and thus hot reloading is not possible. This scenario can be used in production, when the resource never changes.

DYNAMIC TEMPLATES

Available as of Camel 2.1 Camel provides two headers by which you can define a different resource location for a template or the template content itself. If any of these headers is set then Camel uses this over the endpoint configured resource. This allows you to provide a dynamic template at runtime.

Header	Type	Description
CamelVelocityResourceUri	String	**Camel 2.1:** A URI for the template resource to use instead of the endpoint configured.
CamelVelocityTemplate	String	**Camel 2.1:** The template to use instead of the endpoint configured.

SAMPLES

For example you could use something like

```
from("activemq:My.Queue").
  to("velocity:com/acme/MyResponse.vm");
```

To use a Velocity template to formulate a response to a message for InOut message exchanges (where there is a **JMSReplyTo** header).

If you want to use InOnly and consume the message and send it to another destination, you could use the following route:

```
from("activemq:My.Queue").
  to("velocity:com/acme/MyResponse.vm").
  to("activemq:Another.Queue");
```

And to use the content cache, e.g. for use in production, where the **.vm** template never changes:

```
from("activemq:My.Queue").
  to("velocity:com/acme/MyResponse.vm?contentCache=true").
  to("activemq:Another.Queue");
```

And a file based resource:

```
from("activemq:My.Queue").
  to("velocity:file://myfolder/MyResponse.vm?contentCache=true").
  to("activemq:Another.Queue");
```

In **Camel 2.1** it's possible to specify what template the component should use dynamically via a header, so for example:

```
from("direct:in").
  setHeader("CamelVelocityResourceUri").constant("path/to/my/template.vm").
  to("velocity:dummy");
```

In **Camel 2.1** it's possible to specify a template directly as a header the component should use dynamically via a header, so for example:

```
from("direct:in").
  setHeader("CamelVelocityTemplate").constant("Hi this is a velocity template that can do templating
${body}").
  to("velocity:dummy");
```

THE EMAIL SAMPLE

In this sample we want to use Velocity templating for an order confirmation email. The email template is laid out in Velocity as:

```
Dear ${headers.lastName}, ${headers.firstName}

Thanks for the order of ${headers.item}.

Regards Camel Riders Bookstore
${body}
```

And the java code:

```
private Exchange createLetter() {
    Exchange exchange = context.getEndpoint("direct:a").createExchange();
    Message msg = exchange.getIn();
    msg.setHeader("firstName", "Claus");
    msg.setHeader("lastName", "Ibsen");
    msg.setHeader("item", "Camel in Action");
    msg.setBody("PS: Next beer is on me, James");
    return exchange;
}

@Test
public void testVelocityLetter() throws Exception {
    MockEndpoint mock = getMockEndpoint("mock:result");
    mock.expectedMessageCount(1);
    mock.expectedBodiesReceived("Dear Ibsen, Claus\n\nThanks for the order of Camel in
Action.\n\nRegards Camel Riders Bookstore\nPS: Next beer is on me, James");

    template.send("direct:a", createLetter());

    mock.assertIsSatisfied();
}

protected RouteBuilder createRouteBuilder() throws Exception {
    return new RouteBuilder() {
        public void configure() throws Exception {
            from("direct:a").to("velocity:org/apache/camel/component/velocity/letter.vm").to("mock:result");
        }
    };
}
```

CHAPTER 156. VERTX

VERTX COMPONENT

Available as of Camel 2.12

The **vertx** component is for working with the Vertx EventBus.

The vertx EventBus sends and receives JSON events.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-vertx</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
vertx:channelName[?options]
```

OPTIONS

Name	Default Value	Description
pubSub	**false**	**Camel 2.12.3:** Whether to use publish/subscribe instead of point to point when sending to a vertx endpoint.

You can append query options to the URI in the following format, ?option=value&option=value&...

CHAPTER 157. VM

VM COMPONENT

The **vm:** component provides asynchronous SEDA behavior, exchanging messages on a BlockingQueue and invoking consumers in a separate thread pool.

This component differs from the SEDA component in that VM supports communication across CamelContext instances - so you can use this mechanism to communicate across web applications (provided that **camel-core.jar** is on the **system/boot** classpath).

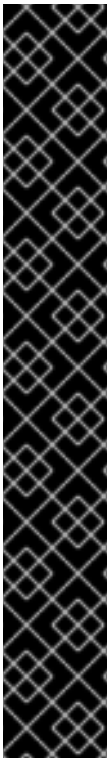
VM is an extension to the SEDA component.

URI FORMAT

```
vm:queueName[?options]
```

Where **queueName** can be any string to uniquely identify the endpoint within the JVM (or at least within the classloader that loaded camel-core.jar)

You can append query options to the URI in the following format: **?option=value&option=value&...**



BEFORE CAMEL 2.3 - SAME URI MUST BE USED FOR BOTH PRODUCER AND CONSUMER

An exactly identical VM endpoint URI **must** be used for both the producer and the consumer endpoint. Otherwise, Camel will create a second VM endpoint despite that the **queueName** portion of the URI is identical. For example:

```
from("direct:foo").to("vm:bar?concurrentConsumers=5");

from("vm:bar?concurrentConsumers=5").to("file://output");
```

Notice that we have to use the full URI, including options in both the producer and consumer.

In Camel 2.4 this has been fixed so that only the queue name must match. Using the queue name **bar**, we could rewrite the previous exmple as follows:

```
from("direct:foo").to("vm:bar");

from("vm:bar?concurrentConsumers=5").to("file://output");
```

OPTIONS

See the SEDA component for options and other important usage details as the same rules apply to the VM component.

SAMPLES

In the route below we send exchanges across CamelContext instances to a VM queue named **order.email**:

```
from("direct:in").bean(MyOrderBean.class).to("vm:order.email");
```

And then we receive exchanges in some other Camel context (such as deployed in another **.war** application):

```
from("vm:order.email").bean(MyOrderEmailSender.class);
```

- SEDA

CHAPTER 158. WEATHER

WEATHER COMPONENT

Available as of Camel 2.12

The **weather:** component is used for polling weather information from Open Weather Map - a site that provides free global weather and forecast information. The information is returned as a json String object.

Camel will poll for updates to the current weather and forecasts once per hour by default.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-weather</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
weather://<unused name>[?options]
```

OPTIONS

Property	Default	Description
location	**null**	If null Camel will try and determine your current location using the geolocation of your ip address, else specify the city,country. For well known city names, Open Weather Map will determine the best fit, but multiple results may be returned. Hence specifying and country as well will return more accurate data. If you specify "current" as the location then the component will try to get the current latitude and longitude and use that to get the weather details. You can use lat and lon options instead of location.
lat	**null**	Latitude of location. You can use lat and lon options instead of location.

lon	**null**	Longitude of location. You can use lat and lon options instead of location.
period	**null**	If null, the current weather will be returned, else use values of 5, 7, 14 days. Only the numeric value for the forecast period is actually parsed, so spelling, capitalisation of the time period is up to you (its ignored)
headerName	**null**	To store the weather result in this header instead of the message body. This is useable if you want to keep current message body as-is.
mode	**JSON**	The output format of the weather data. The possible values are **HTML**, **JSON** or **XML**
units	**METRIC**	The units for temperature measurement. The possible values are **IMPERIAL** or **METRIC**
consumer.delay	**3600000**	Delay in millis between each poll (default is 1 hour)
consumer.initialDelay	**1000**	Millis before polling starts.
consumer.userFixedDelay	**false**	If **true**, use fixed delay between polls, otherwise fixed rate is used. See ScheduledExecutorService in JDK for details.

You can append query options to the URI in the following format, **?option=value&option=value&...**

EXCHANGE DATA FORMAT

Camel will deliver the body as a json formatted java.lang.String (see the **mode** option above).

MESSAGE HEADERS

Header	Description
CamelWeatherQuery	The original query URL sent to the Open Weather Map site

CamelWeatherLocation	Used by the producer to override the endpoint location and use the location from this header instead.

SAMPLES

In this sample we find the 7 day weather forecast for Madrid, Spain:

```
from("weather:foo?location=Madrid,Spain&period=7 days").to("jms:queue:weather");
```

To just find the current weather for your current location you can use this:

```
from("weather:foo").to("jms:queue:weather");
```

And to find the weather using the producer we do:

```
from("direct:start")
  .to("weather:foo?location=Madrid,Spain");
```

And we can send in a message with a header to get the weather for any location as shown:

```
  String json = template.requestBodyAndHeader("direct:start", "", "CamelWeatherLocation",
"Paris,France", String.class);
```

And to get the weather at the current location, then:

```
  String json = template.requestBodyAndHeader("direct:start", "", "CamelWeatherLocation", "current",
String.class);
```

CHAPTER 159. WEBSOCKET

WEBSOCKET COMPONENT

Available as of Camel 2.10

The **websocket** component provides websocket endpoints for communicating with clients using websocket. The component uses Eclipse Jetty Server which implements the IETF specification (drafts and RFC 6455). It supports the protocols ws:// and wss://. To use wss:// protocol, the SSLContextParameters must be defined.

VERSION CURRENTLY SUPPORTED

As Camel 2.10 uses Jetty 7.5.4.v20111024, only the D00 to D13 IETF implementations are available. Camel 2.11 uses Jetty 7.6.7.

URI FORMAT

```
websocket://hostname[:port][/resourceUri][?options]
```

You can append query options to the URI in the following format, **?option=value&option=value&...**

COMPONENT OPTIONS

The **WebsocketComponent** can be configured prior to use, to setup host, to act as a websocket server.

Option	Default	Description
host	0.0.0.0	The hostname.
port	9292	The port number.
staticResources	**null**	Path for static resources such as index.html files etc. If this option has been configured, then a server is started on the given hostname and port, to service the static resources, eg such as an index.html file. If this option has not been configured, then no server is started.
sslContextParameters		Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility.

enableJmx	**false**	If this option is true, Jetty JMX support will be enabled for this endpoint.
sslKeyPassword	**null**	**Consumer only**: The password for the keystore when using SSL.
sslPassword	**null**	**Consumer only**: The password when using SSL.
sslKeystore	**null**	**Consumer only**: The path to the keystore.
minThreads	**null**	**Consumer only**: To set a value for minimum number of threads in server thread pool.
maxThreads	**null**	**Consumer only**: To set a value for maximum number of threads in server thread pool.
threadPool	**null**	**Consumer only**: To use a custom thread pool for the server.

ENDPOINT OPTIONS

The **WebsocketEndpoint** can be configured prior to use

Option	Default	Description
sslContextParametersRef		**Deprecated and will be removed in Camel 3.0:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility. Use the **sslContextParameters** option instead
sslContextParameters		**Camel 2.11.1:** Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility.

sendToAll	**null**	**Producer only:** To send to all websocket subscribers. Can be used to configure on endpoint level, instead of having to use the **WebsocketConstants.SEND_TO_ALL** header on the message.
staticResources	**null**	The root directory for the web resources or classpath. Use the protocol file: or classpath: depending if you want that the component loads the resource from file system or classpath.
sslContextParameters		Reference to a **org.apache.camel.util.jsse.SSLContextParameters** in the Registry. This reference overrides any configured SSLContextParameters at the component level. See Using the JSSE Configuration Utility.
enableJmx	**false**	If this option is true, Jetty JMX support will be enabled for this endpoint. See Jetty JMX support for more details.
sslKeyPassword	**null**	**Consumer only**: The password for the keystore when using SSL.
sslPassword	**null**	**Consumer only**: The password when using SSL.
sslKeystore	**null**	**Consumer only**: The path to the keystore.
minThreads	**null**	**Consumer only**: To set a value for minimum number of threads in server thread pool.
maxThreads	**null**	**Consumer only**: To set a value for maximum number of threads in server thread pool.
threadPool	**null**	**Consumer only**: To use a custom thread pool for the server.

MESSAGE HEADERS

The websocket component uses 2 headers to indicate to either send messages back to a single/current client, or to all clients.

Key	Description
WebsocketConstants.SEND_TO_ALL	Sends the message to all clients which are currently connected. You can use the **sendToAll** option on the endpoint instead of using this header.
WebsocketConstants.CONNECTION_KEY	Sends the message to the client with the given connection key.

USAGE

In this example we let Camel exposes a websocket server which clients can communicate with. The websocket server uses the default host and port, which would be **0.0.0.0:9292**. The example will send back an echo of the input. To send back a message, we need to send the transformed message to the same endpoint **"websocket://echo"**. This is needed because by default the messaging is InOnly.

```
// expose a echo websocket client, that sends back an echo
from("websocket://echo")
    .log(">>> Message received from WebSocket Client : ${body}")
    .transform().simple("${body}${body}")
    // send back to the client, by sending the message to the same endpoint
    // this is needed as by default messages is InOnly
    // and we will by default send back to the current client using the provided connection key
    .to("websocket://echo");
```

This example is part of an unit test, which you can find here. As a client we use the AHC library which offers support for web socket as well.

Here is another example where webapp resources location have been defined to allow the Jetty Application Server to not only register the WebSocket servlet but also to expose web resources for the browser. Resources should be defined under the webapp directory.

```
from("activemq:topic:newsTopic")
   .routeId("fromJMStoWebSocket")
   .to("websocket://localhost:8443/newsTopic?sendToAll=true&staticResources=classpath:webapp");
```

SETTING UP SSL FOR WEBSOCKET COMPONENT

USING THE JSSE CONFIGURATION UTILITY

As of Camel 2.10, the WebSocket component supports SSL/TLS configuration through the Camel JSSE Configuration Utility. This utility greatly decreases the amount of component specific code you need to write and is configurable at the endpoint and component levels. The following examples demonstrate how to use the utility with the Cometd component.

PROGRAMMATIC CONFIGURATION OF THE COMPONENT

```
KeyStoreParameters ksp = new KeyStoreParameters();
ksp.setResource("/users/home/server/keystore.jks");
ksp.setPassword("keystorePassword");
```

```
KeyManagersParameters kmp = new KeyManagersParameters();
kmp.setKeyStore(ksp);
kmp.setKeyPassword("keyPassword");

TrustManagersParameters tmp = new TrustManagersParameters();
tmp.setKeyStore(ksp);

SSLContextParameters scp = new SSLContextParameters();
scp.setKeyManagers(kmp);
scp.setTrustManagers(tmp);

CometdComponent commetdComponent = getContext().getComponent("cometds",
CometdComponent.class);
commetdComponent.setSslContextParameters(scp);
```

SPRING DSL BASED CONFIGURATION OF ENDPOINT

```
...
  <camel:sslContextParameters
      id="sslContextParameters">
    <camel:keyManagers
        keyPassword="keyPassword">
      <camel:keyStore
          resource="/users/home/server/keystore.jks"
          password="keystorePassword"/>
    </camel:keyManagers>
    <camel:trustManagers>
      <camel:keyStore
          resource="/users/home/server/keystore.jks"
          password="keystorePassword"/>
    </camel:trustManagers>
  </camel:sslContextParameters>...
...
  <to uri="websocket://127.0.0.1:8443/test?sslContextParameters=#sslContextParameters"/>...
```

JAVA DSL BASED CONFIGURATION OF ENDPOINT

```
...
    protected RouteBuilder createRouteBuilder() throws Exception {
        return new RouteBuilder() {
            public void configure() {

                String uri = "websocket://127.0.0.1:8443/test?
sslContextParameters=#sslContextParameters";

                from(uri)
                    .log(">>> Message received from WebSocket Client : ${body}")
                    .to("mock:client")
                    .loop(10)
                        .setBody().constant(">> Welcome on board!")
                        .to(uri);
...
```

- AHC
- Jetty
- Twitter Websocket Example demonstrates how to poll a constant feed of twitter searches and publish results in real time using web socket to a web page.

CHAPTER 160. XMLRPC

XMLRPC COMPONENT

Available as of Camel 2.11

This component provides a dataformat for xml, which allows serialization and deserialization of request messages and response message using Apache XmlRpc's bindary dataformat. You can also invoke the XMLRPC Service through the camel-xmlrpc producer.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-xmlrpc</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

XMLRPC OVERVIEW

It's a spec and a set of implementations that allow software running on disparate operating systems, running in different environments to make procedure calls over the Internet.

It's remote procedure calling using HTTP as the transport and XML as the encoding. XML-RPC is designed to be as simple as possible, while allowing complex data structures to be transmitted, processed and returned.

An example of a typical XML-RPC request would be:

```
<?xml version="1.0"?>
<methodCall>
  <methodName>examples.getStateName</methodName>
  <params>
    <param>
        <value><i4>40</i4></value>
    </param>
  </params>
</methodCall>
```

An example of a typical XML-RPC response would be:

```
<?xml version="1.0"?>
<methodResponse>
  <params>
    <param>
        <value><string>South Dakota</string></value>
    </param>
  </params>
</methodResponse>
```

A typical XML-RPC fault would be:

```
<?xml version="1.0"?>
<methodResponse>
  <fault>
    <value>
      <struct>
        <member>
          <name>faultCode</name>
          <value><int>4</int></value>
        </member>
        <member>
          <name>faultString</name>
          <value><string>Too many parameters.</string></value>
        </member>
      </struct>
    </value>
  </fault>
</methodResponse>
```

URI FORMAT

```
xmlrpc://serverUri[?options]
```

OPTIONS

Property	Default	Description
basicEncoding	**null**	Sets the encoding for basic authentication, null means UTF-8 is chosen.
basicUserName	**null**	The user name for basic authentication.
basicPassword	**null**	The password for basic authentication.
clientConfigurer	**null**	The reference id of the XmlRpcClient configurer which implement the interface of XmlRpcClientConfigurer to setup the XmlRpcClient as user wants. The value should be start with "#" such as "#myConfigurer"
connectionTimeout	**0**	Set the connection timeout in milliseconds, 0 is to disable it

contentLengthOptional	**false**	whether a "Content-Length" header may be omitted. The XML-RPC specification demands, that such a header be present.
enabledForExceptions	**false**	whether the response should contain a "faultCause" element in case of errors. The "faultCause" is an exception, which the server has trapped and written into a byte stream as a serializable object.
enabledForExtensions	**false**	whether extensions are enabled. By default, the client or server is strictly compliant to the XML-RPC specification and extensions are disabled.
encoding	**null**	Sets the requests encoding, null means UTF-8 is chosen.
gzipCompressing	**false**	Whether gzip compression is being used for transmitting the request.
gzipRequesting	**false**	Whether gzip compression is being used for transmitting the request.
replyTimeout	**0**	Set the reply timeout in milliseconds, 0 is to disable it.
userAgent	**null**	The http user agent header to set when doing xmlrpc requests

MESSAGE HEADERS

Camel XmlRpc uses these headers.

Header	Description
CamelXmlRpcMethodName	The XmlRpc method name which will be use for invoking the XmlRpc server.

USING THE XMLRPC DATA FORMAT

As the XmlRpc message could be request or response, when you use the XmlRpcDataFormat, you need to specify the dataformat is for request or not.

```
<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">

    <!-- we define the xml rpc data formats to be used -->
    <dataFormats>
        <xmlrpc id="xmlrpcRequest" request="true"/>
        <xmlrpc id="xmlrpcResponse" request="false"/>
    </dataFormats>

    <route>
        <from uri="direct:request"/>
        <marshal ref="xmlrpcRequest"/>
        <unmarshal>
          <xmlrpc request="true"/>
        </unmarshal>
        <to uri="mock:request" />
    </route>

    <route>
        <from uri="direct:response"/>
        <marshal>
           <xmlrpc request="false"/>
        </marshal>
        <unmarshal ref="xmlrpcResponse"/>
        <to uri="mock:response" />
    </route>
</camelContext>
```

INVOKE XMLRPC SERVICE FROM CLIENT

To invoke the XmlRpc service, you need to specify the methodName on the message header and put the parameters into the message body like below code, then you can get the result message as you want. If the fault message is return, you should get an exception which cause if XmlRpcException.

```
   String response = template.requestBodyAndHeader(xmlRpcServiceAddress, new Object[]{"me"},
XmlRpcConstants.METHOD_NAME, "hello", String.class);
```

HOW TO CONFIGURE THE XMLRPCCLIENT WITH JAVA CODE

camel-xmlrpc provides a pluggable strategy for configuring the XmlRpcClient used by the component, user just to implement the **XmlRpcClientConfigurer** interface and can configure the XmlRpcClient as he wants. The clientConfigure instance reference can be set through the uri option clientConfigure.

```
import org.apache.xmlrpc.client.XmlRpcClient;
import org.apache.xmlrpc.client.XmlRpcClientConfigImpl;

public class MyClientConfigurer implements XmlRpcClientConfigurer {

    @Override
    public void configureXmlRpcClient(XmlRpcClient client) {
        // get the configure first
        XmlRpcClientConfigImpl clientConfig = (XmlRpcClientConfigImpl)client.getClientConfig();
        // change the value of clientConfig
        clientConfig.setEnabledForExtensions(true);
```

```
        // set the option on the XmlRpcClient
        client.setMaxThreads(10);
    }

}
```

CHAPTER 161. XML SECURITY COMPONENT

XML SECURITY COMPONENT

Available as of Camel 2.12.0

With this Apache Camel component, you can generate and validate XML signatures as described in the W3C standard XML Signature Syntax and Processing or as described in the successor version 1.1. For XML Encryption support, please refer to the XML Security Data Format.

You can find an introduction to XML signature here. The implementation of the component is based on JSR 105, the Java API corresponding to the W3C standard and supports the Apache Santuario and the JDK provider for JSR 105. The implementation will first try to use the Apache Santuario provider; if it does not find the Santuario provider, it will use the JDK provider. Further, the implementation is DOM based.

Since Camel 2.15.0 we also provide support for XAdES-BES/EPES for the signer endpoint; see the section called “XAdES-BES/EPES for the Signer Endpoint”.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-xmlsecurity</artifactId>
    <version>x.x.x</version>
    <!-- use the same version as your Camel core version -->
</dependency>
```

XML SIGNATURE WRAPPING MODES

XML Signature differs between enveloped, enveloping, and detached XML signature. In the enveloped XML signature case, the XML Signature is wrapped by the signed XML Document; which means that the XML signature element is a child element of a parent element, which belongs to the signed XML Document. In the enveloping XML signature case, the XML Signature contains the signed content. All other cases are called detached XML signatures. A certain form of detached XML signature is supported since **Camel 2.14.0**.

In the enveloped XML signature case, the supported generated XML signature has the following structure (Variables are surrounded by []).

```
    <[parent element]>
      ... <!-- Signature element is added as last child of the parent element-->
      <Signature Id="generated_unique_signature_id">
        <SignedInfo>
            <Reference URI="">
                <Transform Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature"/>
                (<Transform>)* <!-- By default "http://www.w3.org/2006/12/xml-c14n11" is added to the
transforms -->
                <DigestMethod>
                <DigestValue>
            </Reference>
            (<Reference URI="#[keyinfo_Id]">
                <Transform Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315"/>
                <DigestMethod>
```

```
                <DigestValue>
            </Reference>)?
            <!-- further references possible, see option 'properties' below -->
        </SignedInfo>
        <SignatureValue>
        (<KeyInfo Id="[keyinfo_id]">)?
        <!-- Object elements possible, see option 'properties' below -->
    </Signature>
</[parent element]>
```

In the enveloping XML signature case, the supported generated XML signature has the structure:

```
<Signature Id="generated_unique_signature_id">
  <SignedInfo>
        <Reference URI="#generated_unique_object_id" type="[optional_type_value]">
            (<Transform>)* <!-- By default "http://www.w3.org/2006/12/xml-c14n11" is added to the
transforms -->
            <DigestMethod>
            <DigestValue>
        </Reference>
        (<Reference URI="#[keyinfo_id]">
            <Transform Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315"/>
            <DigestMethod>
            <DigestValue>
        </Reference>)?
         <!-- further references possible, see option 'properties' below  -->
    </SignedInfo>
    <SignatureValue>
    (<KeyInfo Id="[keyinfo_id]">)?
    <Object Id="generated_unique_object_id"/> <!-- The Object element contains the in-message
body -->
    <!-- The object ID can either be generated or set by the option parameter "contentObjectId" -->
    <!-- Further Object elements possible, see option 'properties' below -->
</Signature>
```

As of **Camel 2.14.0** detached XML signatures with the following structure are supported (see also the section called “Detached XML Signatures as Siblings of the Signed Elements”):

```
(<[signed element] Id="[id_value]">
<!-- signed element must have an attribute of type ID -->
    ...

</[signed element]>
<other sibling/>*
<!-- between the signed element and the corresponding signature element, there can be other
siblings.
 Signature element is added as last sibling. -->
<Signature Id="generated_unique_ID">
        <SignedInfo>
            <CanonicalizationMethod>
            <SignatureMethod>
            <Reference URI="#[id_value]" type="[optional_type_value]">
            <!-- reference URI contains the ID attribute value of the signed element -->
                (<Transform>)* <!-- By default "http://www.w3.org/2006/12/xml-c14n11" is added to the
transforms -->
```

```
                <DigestMethod>
                <DigestValue>
            </Reference>
            (<Reference URI="#[generated_keyinfo_Id]">
                <Transform Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315"/>
                <DigestMethod>
                <DigestValue>
            </Reference>)?
        </SignedInfo>
        <SignatureValue>
        (<KeyInfo Id="[generated_keyinfo_id]">)?
</Signature>)+
```

URI FORMAT

The camel component consists of two endpoints which have the following URI format.

```
xmlsecurity:sign:name[?options]
xmlsecurity:verify:name[?options]
```

- With the signer endpoint, you can generate a XML signature for the body of the in-message which can be either a XML document or a plain text. The enveloped enveloping, or detached (as of **Camel 12.14**) XML signature(s) will be set to the body of the out-message.
- With the verifier endpoint, you can validate an enveloped or enveloping XML signature or even several detached (as of **Camel 2.14.0**) XML signatures contained in the body of the in-message; if the validation is successful, then the original content is extracted from the XML signature and set to the body of the out-message.
- The **name** part in the URI can be chosen by the user to distinguish between different signer/verifier endpoints within the camel context.

BASIC EXAMPLE

The following example shows the basic usage of the component.

```
from("direct:enveloping").to("xmlsecurity:sign://enveloping?keyAccessor=#accessor",
                             "xmlsecurity:verify://enveloping?keySelector=#selector","mock:result")
```

In Spring XML:

```
<from uri="direct:enveloping" />
  <to uri="xmlsecurity:sign://enveloping?keyAccessor=#accessor" />
  <to uri="xmlsecurity:verify://enveloping?keySelector=#selector" />
<to uri="mock:result" />
```

For the signing process, a private key is necessary. You specify a key accessor bean which provides this private key. For the validation, the corresponding public key is necessary; you specify a key selector bean which provides this public key.

The key accessor bean must implement the KeyAccessor interface. The package **org.apache.camel.component.xmlsecurity.api** contains the default implementation class DefaultKeyAccessor which reads the private key from a Java keystore.

The key selector bean must implement the javax.xml.crypto.KeySelector interface. The package **org.apache.camel.component.xmlsecurity.api** contains the default implementation class DefaultKeySelector which reads the public key from a keystore.

In the example, the default signature algorithm **http://www.w3.org/2000/09/xmldsig#rsa-sha1** is used. You can set the signature algorithm of your choice by the option **signatureAlgorithm** (see below). The signer endpoint creates an **enveloping** XML signature. If you want to create an **enveloped** XML signature then you must specify the parent element of the Signature element; see option **parentLocalName** for more details.

For creating detached XML signatures, see the section called “Detached XML Signatures as Siblings of the Signed Elements”.

COMMON SIGNING AND VERIFYING OPTIONS

There are options which can be used for both endpoints, signer and verifier.

Name	Type	Default	D
uriDereferencer	javax.xml.crypto.URIDereferencer	null	U sp
baseUri	String	null	B
cryptoContextProperties	Map<String, ? extends Object>	null	C pr **o** to **ja** **o** **B** **B**
disallowDoctypeDecl	Boolean	Boolean.TRUE	In
omitXmlDeclaration	Boolean	Boolean.FALSE	In
clearHeaders	Boolean	Boolean.TRUE	In of
schemaResourceUri	String	null	Si sc ca se
outputXmlEncoding	String	null	Si

SIGNING OPTIONS

The signer endpoint has the following options.

Name	Type	Default	Description
keyAccessor	KeyAccessor	null	Provides the signing key and the KeyInfo instance. There is an example implementation which uses a keystore, see DefaultKeyAccessor
addKeyInfoReference	Boolean	Boolean.TRUE	Indicates whether a **Reference** element referring to the **KeyInfo** element provided by the key accessor should be added to the XML signature.
signatureAlgorithm	String	**http://www.w3.org/2000/09/xmldsig#rsa-sha1**	signature algorithm consisting of a digest and encryption algorithm. The digest algorithm is used to calculate the digest of the SignedInfo element and the encryption algorithm is used to sign this digest. Possible values: **http://www.w3.org/2000/09/xmldsig#dsa-sha1**, **http://www.w3.org/2000/09/xmldsig#rsa-sha1**, **http://www.w3.org/2001/04/xmldsig-more#rsa-sha256**, **http://www.w3.org/2001/04/xmldsig-more#rsa-sha384**, **http://www.w3.org/2001/04/xmldsig-more#rsa-sha512**

digestAlgorithm	String	see description	Digest algorithm for calculating the digest of the in-message body. If not specified then the digest algorithm of the signature algorithm is used. Possible values: **http://www.w3.org/2000/09/xmldsig#sha1**, **http://www.w3.org/2001/04/xmlenc#sha256**, **http://www.w3.org/2001/04/xmldsig-more#sha384**, **http://www.w3.org/2001/04/xmlenc#sha512**.
parentLocalName	String	null	Local name of the parent of the **Signature** element. The **Signature** element will be added at the end of the children of the parent. Necessary for enveloped XML signature. If this option and the **parentXpath** option are **null**, an enveloping XML signature is created. See also option **parentNamespace**. Alternatively you can specify the parent via the option **parentXpath**.
parentNamespace	String	null	Namespace of the parent of the Signature element. See option **parentLocalName**

parentXpath	XPathFilterParameterSpec	null	Since **Camel 2.15.0**. XPath to the parent of the **Signature** element. The **Signature** element will be added at the end of the children of the parent. Necessary for enveloped XML signature. If this option and the **parentLocalName** option are **null**, an enveloping XML signature is created. Alternatively, you can specify the parent via the option **parentLocalName**. Example: **/p1:root/SecurityItem[last()]**. This example will select the last sibling with the name **SecurityItem**. Such kind of selection is not possible with the option **parentLocalName**.
canonicalizationMethod	javax.xml.crypto.AlgorithmMethod	C14n	Canonicalization method used to canonicalize the SignedInfo element before the digest is calculated. You can use the helper methods XmlSignatureHelper.getCanonicalizationMethod(String algorithm) or getCanonicalizationMethod(String algorithm, List<String> inclusiveNamespacePrefixes) to create a canonicalization method.

transformMethods	List<javax.xml.crypto.AlgorithmMethod>	see description	Transforms which are executed on the message body before the digest is calculated. By default, C14n is added and in the case of enveloped signature (see option **parentLocalName**) also http://www.w3.org/2000/09/xmldsig#enveloped-signature is added at position 0 of the list. Use methods in XmlSignatureHelper to create the transform methods.
prefixForXmlSignatureNamespace	String	**ds**	Prefix for the XML signature namespace. If **null** is specified or an empty string then no prefix is used for the signature namespace.

contentReferenceUri	String	See description	The URI of the reference to the signed content (in-message body). If **null** and we are in the enveloped XML signature case then the URI is set to an empty string. If **null** and we are in the enveloping XML signature case then the URI is set to **generated_object_id**, which means that the reference points to the **Object** element containing the in-message body. You can use this option to reference a specific part in your in-message body if you do not want to sign the complete in-message body. This value can be overwritten by the header **CamelXmlSignatureContentReferenceUri**. Please be aware, if you want to use a value of an XML ID attribute (example: **#ID_value**), you must provide the information about the ID attribute via a **doctype** definition contained in the input XML document. This option is ignored in the case of detached signature, when the option **xpathsToIdAttributes** is set.
contentReferenceType	String	null	Value of the type attribute of the content reference. This value can be overwritten by the header "CamelXmlSignatureContentReferenceType"

plainText	Boolean	Boolean.FALSE	Indicates whether the in-message body contains plain text. Normally, the signature generator treats the incoming message body as XML. If the message body is plain text, then you must set this option to **true**. The value can be overwritten by the header **CamelXmlSignature MessageIsPlainText**.
plainTextEncoding	String	null	Only used when the option **plainText** is set to **true**. Then you can specify the encoding of the plain text. If **null** then UTF-8 is used. The value can be overwritten by the header "CamelXmlSignatureMessageIsPlainTextEncoding".
properties	XmlSignatureProperties	null	For adding additional References and Objects to the XML signature which contain additional properties, you can provide a bean which implements the XmlSignatureProperties interface.
contentObjectId	String	null	Value of the **Id** attribute of the **Object** element. Only used in the enveloping XML signature case. If **null**, a unique value is generated. Available as of 2.12.2

xpathsToIdAttributes	List<XPathFilterParameterSpec>	empty list	**Since 2.14.0**. List of XPATH expressions to ID attributes of elements to be signed. Used for the detached XML Signatures. Can only be used in combination with the option **schemaResourceUri**. The value can be overwritten by the header "**CamelXmlSignatureXpathsToIdAttributes**". If the option **parentLocalName** is set at the same time then an exception is thrown. The class **XPathFilterParameterSpec** has the package **javax.xml.crypto.dsig.spec**. For further information, see sub-chapter "Detached XML Signatures as Siblings of the Signed Elements".
signatureId	String	null	**Since 2.14.0**. Value of the Id attribute of the Signature element. If **null** then a unique Id is generated. If the value is the empty string ("") then no Id attribute is added to the Signature element.

VERIFYING OPTIONS

The verifier endpoint has the following options.

Name	Type	Default	Description
keySelector	javax.xml.crypto.KeySelector	null	Provides the key for validating the XML signature. There is an example implementation which uses a keystore, see DefaultKeySelector.

xmlSignatureChecker	XmlSignatureChecker	null	This interface allows the application to check the XML signature before the validation is executed. This step is recommended in http://www.w3.org/TR/xmldsig-bestpractices/#check-what-is-signed
validationFailedHandler	ValidationFailedHandler	DefaultValidationFailedHandler	Handles the different validation failed situations. The default implementation throws specific exceptions for the different situations (All exceptions have the package name **org.apache.camel.component.xmlsecurity.api** and are a sub-class of **XmlSignatureInvalidException**. If the signature value validation fails, a **XmlSignatureInvalidValueException** is thrown. If a reference validation fails, a **XmlSignatureInvalidContentHashException** is thrown. For more detailed information, see the JavaDoc.
xmlSignature2Message	XmlSignature2Message	DefaultXmlSignature2Message	Bean which maps the XML signature to the ouput-message after the validation. How this mapping should be done can be configured by the options **outputNodeSearchType**, **outputNodeSearch**, and **removeSignatureElements**. The default implementation offers three possibilities which are related to the three output node search

			types "Default", "ElementName", and "XPath". The default implementation determines a node which is then serialized and set to the body of the ouput message. If the search type is "ElementName" then the ouput node (which must be in this case an element) is determined by the local name and namespace defined in the search value (see option **outputNodeSearch**). If the search type is "XPath" then the output node is determined by the XPath specified in the search value (in this case the ouput node can be of type "Element", "TextNode" or "Document"). If the output node search type is "Default" then the following rules apply: In the enveloped XML signature case (there is a reference with URI="" and transform "http://www.w3.org/2000/09/xmldsig#enveloped-signature"), the incoming XML document without the Signature element is set to the output message body. In the non-enveloped XML signature case, the message body is determined from a referenced Object; this is explained in more detail in chapter "Output Node Determination in Enveloping XML Signature Case".

outputNodeSearchType	String	"Default"	Determines the type of the search of the output node. See option **xmlSignature2Message**. The default implementation **DefaultXmlSignature2Message** supports the three search types "Default", "ElementName", and "XPath".
outputNodeSearch	Object	null	Search value of the output node search. The type depends on the search type. For the default search implementation **DefaultXmlSignature2Message** the following values can be supplied. If the search type is "Default", then the search value is not used. If the search type is "ElementName", then the search value contains the namespace and local name of the output element. The namespace must be embraced in brackets. If the search type is "XPath", the search value contains an instance of **javax.xml.crypto.dsig.spec.XPathFilterParameterSpec** which represents an XPath. You can create such an instance via the method **XmlSignatureHelper.getXpathFilter(String xpath, Map<String, String> namespaceMap)**. The XPath determines the output node which can be of type Element, TextNode, or Document.

removeSignatureElements	Boolean	Boolean.FALSE	Indicator for removing Signature elements in the output message in the enveloped XML signature case. Used in the **XmlSignature2Message** instance. The default implementation does use this indicator for the two search types "ElementName" and "XPath".
secureValidation	Boolean	Boolean.TRUE	Enables secure validation. If true then secure validation is enabled - see here for more information.

OUTPUT NODE DETERMINATION IN ENVELOPING XML SIGNATURE CASE

After the validation the node is extracted from the XML signature document which is finally returned to the output-message body. In the enveloping XML signature case, the default implementation DefaultXmlSignature2Message of XmlSignature2Message does this for the node search type "Default" in the following way (see option **xmlSignature2Message**):

First an Object reference is determined:

- Only same document references are taken into account (URI must start with '#')
- Also indirect same document references to an object via manifest are taken into account.
- The resulting number of Object references must be 1.

Then, the Object is dereferenced and the Object must only contain one XML element. This element is returned as output node.

This does mean that the enveloping XML signature must have either the structure

```
<Signature>
    <SignedInfo>
      <Reference URI="#object"/>
      <!-- further references possible but they must not point to an Object or Manifest containing an
object reference -->
      ...
    </SignedInfo>

    <Object Id="object">
       <!-- contains one XML element which is extracted to the message body -->
    <Object>
    <!-- further object elements possible which are not referenced-->
```

```
        ...
        (<KeyInfo>)?
    </Signature>
```

or the structure

```
    <Signature>
        <SignedInfo>
          <Reference URI="#manifest"/>
          <!-- further references  are possible but they must not point to an Object or other manifest
containing an object reference -->
          ...
        </SignedInfo>

        <Object >
          <Manifest Id="manifest">
            <Reference URI=#object/>
          </Manifest>
        </Objet>
        <Object Id="object">
           <!-- contains the DOM node which is extracted to the message body -->
        </Object>
         <!-- further object elements possible which are not referenced -->
        ...
        (<KeyInfo>)?
    </Signature>
```

DETACHED XML SIGNATURES AS SIBLINGS OF THE SIGNED ELEMENTS

Since 2.14.0.

You can create detached signatures where the signature is a sibling of the signed element. The following example contains two detached signatures. The first signature is for the element "C" and the second signature is for element "A". The signatures are **nested**; the second signature is for the element A which also contains the first signature.

Example 161.1. Example Detached XML Signatures

```
<?xml version="1.0" encoding="UTF-8" ?>
<root>
   <A ID="IDforA">
      <B>
         <C ID="IDforC">
            <D>dvalue</D>
         </C>
         <ds:Signature xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
            Id="_6bf13099-0568-4d76-8649-faf5dcb313c0">
            <ds:SignedInfo>
               <ds:CanonicalizationMethod
                  Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315" />
               <ds:SignatureMethod
                  Algorithm="http://www.w3.org/2000/09/xmldsig#rsa-sha1" />
               <ds:Reference URI="#IDforC">
```

```
                    ...
                </ds:Reference>
            </ds:SignedInfo>
            <ds:SignatureValue>aUDFmiG71</ds:SignatureValue>
        </ds:Signature>
    </B>
</A>
<ds:Signature xmlns:ds="http://www.w3.org/2000/09/xmldsig#"Id="_6b02fb8a-30df-42c6-ba25-
76eba02c8214">
    <ds:SignedInfo>
        <ds:CanonicalizationMethod
            Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315" />
        <ds:SignatureMethod
            Algorithm="http://www.w3.org/2000/09/xmldsig#rsa-sha1" />
        <ds:Reference URI="#IDforA">
            ...
        </ds:Reference>
    </ds:SignedInfo>
    <ds:SignatureValue>q3tvRoGgc8cMUqUSzP6C21zb7tt04riPnDuk=</ds:SignatureValue>
</ds:Signature>
<root>
```

The example shows that you can sign several elements and that for each element a signature is created as sibling. The elements to be signed must have an attribute of type ID. The ID type of the attribute must be defined in the XML schema (see option schemaResourceUri). You specify a list of XPATH expressions pointing to attributes of type ID (see option xpathsToIdAttributes). These attributes determine the elements to be signed. The elements are signed by the same key given by the keyAccessor bean. Ements with higher (=deeper) hierarachy level are signed first. In the example, the element "C" is signed before the element "A".

Example 161.2. Java DSL Example

```
from("direct:detached")
  .to("xmlsecurity:sign://detached?
keyAccessor=#keyAccessorBeant&xpathsToIdAttributes=#xpathsToIdAttributesBean&schemaResou
ceUri=Test.xsd")
  .to("xmlsecurity:verify://detached?
keySelector=#keySelectorBean&schemaResourceUri=org/apache/camel/component/xmlsecurity/Tes
.xsd")
  .to("mock:result");
```

Example 161.3. Spring Example

```
<bean id="xpathsToIdAttributesBean" class="java.util.ArrayList">
    <constructor-arg type="java.util.Collection">
        <list>
            <bean
                class="org.apache.camel.component.xmlsecurity.api.XmlSignatureHelper"
                factory-method="getXpathFilter">
                <constructor-arg type="java.lang.String"
                    value="/ns:root/a/@ID" />
```

```
                <constructor-arg>
                  <map key-type="java.lang.String" value-type="java.lang.String">
                    <entry key="ns" value="http://test" />
                  </map>
                </constructor-arg>
              </bean>
            </list>
          </constructor-arg>
        </bean>
...
        <from uri="direct:detached" />
            <to
              uri="xmlsecurity:sign://detached?
keyAccessor=#keyAccessorBean&amp;xpathsToIdAttributes=#xpathsToIdAttributesBean&amp;sche
maResourceUri=Test.xsd" />
            <to
              uri="xmlsecurity:verify://detached?
keySelector=#keySelectorBean&amp;schemaResourceUri=Test.xsd" />
            <to uri="mock:result" />
```

XADES-BES/EPES FOR THE SIGNER ENDPOINT

Available as of Camel 2.15.0 XML Advanced Electronic Signatures (XAdES) defines extensions to XML Signature. This standard was defined by the European Telecomunication Standards Institute and allows you to create signatures which are compliant to the European Union Directive (1999/93/EC) on a Community framework for electronic signatures. XAdES defines different sets of signature properties which are called signature forms. We support the signature forms *Basic Electronic Signature* (XAdES-BES) and *Explicit Policy Based Electronic Signature (XAdES-EPES) for the Signer Endpoint. The forms Electronic Signature with Validation Data* XAdES-T and XAdES-C are not supported. We support the following properties of the XAdES-EPES form ("?" denotes zero or one occurrence):

```
<QualifyingProperties Target>
  <SignedProperties>
    <SignedSignatureProperties>
      (SigningTime)?
      (SigningCertificate)?
      (SignaturePolicyIdentifier)
      (SignatureProductionPlace)?
      (SignerRole)?
    </SignedSignatureProperties>
    <SignedDataObjectProperties>
      (DataObjectFormat)?
      (CommitmentTypeIndication)?
    </SignedDataObjectProperties>
  </SignedProperties>
</QualifyingProperties>
```

The properties of the XAdES-BES form are the same except that the **SignaturePolicyIdentifier** property is not part of XAdES-BES.

You can configure the XAdES-BES/EPES properties via the bean

org.apache.camel.component.xmlsecurity.api.XAdESSignatureProperties or **org.apache.camel.component.xmlsecurity.api.DefaultXAdESSignatureProperties. XAdESSignatureProperties** does support all properties mentioned above except the **SigningCertificate** property. To get the **SigningCertificate** property, you must overwrite either the method **XAdESSignatureProperties.getSigningCertificate()** or **XAdESSignatureProperties.getSigningCertificateChain().** The class **DefaultXAdESSignatureProperties** overwrites the method **getSigningCertificate()** and allows you to specify the signing certificate via a keystore and alias. The following example shows all parameters you can specify. If you do not need certain parameters you can just omit them.

```
        Keystore keystore = ... // load a keystore
        DefaultKeyAccessor accessor = new DefaultKeyAccessor();
        accessor.setKeyStore(keystore);
        accessor.setPassword("password");
        accessor.setAlias("cert_alias"); // signer key alias

        DefaultXAdESSignatureProperties props = new DefaultXAdESSignatureProperties();
        props.setNamespace("http://uri.etsi.org/01903/v1.3.2#"); // sets the namespace for the
XAdES elements; the namspace is related to the XAdES version, default value is
"http://uri.etsi.org/01903/v1.3.2#", other possible values are "http://uri.etsi.org/01903/v1.1.1#" and
"http://uri.etsi.org/01903/v1.2.2#"
        props.setPrefix("etsi"); // sets the prefix for the XAdES elements, default value is "etsi"

        // signing certificate
        props.setKeystore(keystore));
        props.setAlias("cert_alias"); // specify the alias of the signing certificate in the keystore =
signer key alias
        props.setDigestAlgorithmForSigningCertificate(DigestMethod.SHA256); // possible values for
the algorithm are "http://www.w3.org/2000/09/xmldsig#sha1",
"http://www.w3.org/2001/04/xmlenc#sha256", "http://www.w3.org/2001/04/xmldsig-
more#sha384", "http://www.w3.org/2001/04/xmlenc#sha512", default value is
"http://www.w3.org/2001/04/xmlenc#sha256"
        props.setSigningCertificateURIs(Collections.singletonList("http://certuri"));

        // signing time
        props.setAddSigningTime(true);

        // policy
        props.setSignaturePolicy(XAdESSignatureProperties.SIG_POLICY_EXPLICIT_ID);
        // also the values XAdESSignatureProperties.SIG_POLICY_NONE ("None"), and
XAdESSignatureProperties.SIG_POLICY_IMPLIED ("Implied")are possible, default value is
XAdESSignatureProperties.SIG_POLICY_EXPLICIT_ID ("ExplicitId")
        // For "None" and "Implied" you must not specify any further policy parameters
        props.setSigPolicyId("urn:oid:1.2.840.113549.1.9.16.6.1");
        props.setSigPolicyIdQualifier("OIDAsURN"); //allowed values are empty string, "OIDAsURI",
"OIDAsURN"; default value is empty string
        props.setSigPolicyIdDescription("invoice version 3.1");
        props.setSignaturePolicyDigestAlgorithm(DigestMethod.SHA256);// possible values for the
algorithm are "http://www.w3.org/2000/09/xmldsig#sha1",
http://www.w3.org/2001/04/xmlenc#sha256", "http://www.w3.org/2001/04/xmldsig-more#sha384",
"http://www.w3.org/2001/04/xmlenc#sha512", default value is
http://www.w3.org/2001/04/xmlenc#sha256"
        props.setSignaturePolicyDigestValue("OhixI6upD6av8N7pEvDABhEL6hM=");
        // you can add  qualifiers for the signature policy either by specifying text or an XML fragment
```

```
with the root element "SigPolicyQualifier"
        props.setSigPolicyQualifiers(Arrays
            .asList(new String[] {
                "<SigPolicyQualifier xmlns=\"http://uri.etsi.org/01903/v1.3.2#\">
<SPURI>http://test.com/sig.policy.pdf</SPURI><SPUserNotice><ExplicitText>display
text</ExplicitText>"
                    + "</SPUserNotice></SigPolicyQualifier>", "category B" }));
        props.setSigPolicyIdDocumentationReferences(Arrays.asList(new String[]
{"http://test.com/policy.doc.ref1.txt",
            "http://test.com/policy.doc.ref2.txt" }));

        // production place
        props.setSignatureProductionPlaceCity("Munich");
        props.setSignatureProductionPlaceCountryName("Germany");
        props.setSignatureProductionPlacePostalCode("80331");
        props.setSignatureProductionPlaceStateOrProvince("Bavaria");

        //role
        // you can add claimed roles either by specifying text or an XML fragment with the root
element "ClaimedRole"
        props.setSignerClaimedRoles(Arrays.asList(new String[] {"test",
            "<a:ClaimedRole xmlns:a=\"http://uri.etsi.org/01903/v1.3.2#\">
<TestRole>TestRole</TestRole></a:ClaimedRole>" }));
        props.setSignerCertifiedRoles(Collections.singletonList(new
XAdESEncapsulatedPKIData("Ahixl6upD6av8N7pEvDABhEL6hM=",
            "http://uri.etsi.org/01903/v1.2.2#DER", "IdCertifiedRole")));

        // data object format
        props.setDataObjectFormatDescription("invoice");
        props.setDataObjectFormatMimeType("text/xml");
        props.setDataObjectFormatIdentifier("urn:oid:1.2.840.113549.1.9.16.6.2");
        props.setDataObjectFormatIdentifierQualifier("OIDAsURN"); //allowed values are empty
string, "OIDAsURI", "OIDAsURN"; default value is empty string
        props.setDataObjectFormatIdentifierDescription("identifier desc");
        props.setDataObjectFormatIdentifierDocumentationReferences(Arrays.asList(new String[] {
            "http://test.com/dataobject.format.doc.ref1.txt",
"http://test.com/dataobject.format.doc.ref2.txt" }));

        //commitment
        props.setCommitmentTypeId("urn:oid:1.2.840.113549.1.9.16.6.4");
        props.setCommitmentTypeIdQualifier("OIDAsURN"); //allowed values are empty string,
"OIDAsURI", "OIDAsURN"; default value is empty string
        props.setCommitmentTypeIdDescription("description for commitment type ID");
        props.setCommitmentTypeIdDocumentationReferences(Arrays.asList(new String[]
{"http://test.com/commitment.ref1.txt",
            "http://test.com/commitment.ref2.txt" }));
        // you can specify a commitment type qualifier either by simple text or an XML fragment with
root element "CommitmentTypeQualifier"
        props.setCommitmentTypeQualifiers(Arrays.asList(new String[] {"commitment qualifier",
            "<c:CommitmentTypeQualifier xmlns:c=\"http://uri.etsi.org/01903/v1.3.2#\"><C>c</C>
</c:CommitmentTypeQualifier>" }));

 beanRegistry.bind("xmlSignatureProperties",props);
 beanRegistry.bind("keyAccessorDefault",keyAccessor);

 // you must reference the properties bean in the "xmlsecurity" URI
```

```
 from("direct:xades").to("xmlsecurity:sign://xades?
keyAccessor=#keyAccessorDefault&properties=#xmlSignatureProperties")
                    .to("mock:result");
```

```
  ...
  <from uri="direct:xades" />
          <to
             uri="xmlsecurity:sign://xades?
keyAccessor=#accessorRsa&amp;properties=#xadesProperties" />
          <to uri="mock:result" />
  ...
  <bean id="xadesProperties"
      class="org.apache.camel.component.xmlsecurity.api.XAdESSignatureProperties">
      <!-- For more properties see the the previous Java DSL example.
           If you want to have a signing certificate then use the bean class
DefaultXAdESSignatureProperties (see the previous Java DSL example). -->
      <property name="signaturePolicy" value="ExplicitId" />
      <property name="sigPolicyId" value="http://www.test.com/policy.pdf" />
      <property name="sigPolicyIdDescription" value="factura" />
      <property name="signaturePolicyDigestAlgorithm"
value="http://www.w3.org/2000/09/xmldsig#sha1" />
      <property name="signaturePolicyDigestValue" value="Ohixl6upD6av8N7pEvDABhEL1hM="
/>
      <property name="signerClaimedRoles" ref="signerClaimedRoles_XMLSigner" />
      <property name="dataObjectFormatDescription" value="Factura electrónica" />
      <property name="dataObjectFormatMimeType" value="text/xml" />
   </bean>
   <bean class="java.util.ArrayList" id="signerClaimedRoles_XMLSigner">
      <constructor-arg>
         <list>
            <value>Emisor</value>
            <value>&lt;ClaimedRole
               xmlns=&quot;http://uri.etsi.org/01903/v1.3.2#&quot;&gt;&lt;test
               xmlns=&quot;http://test.com/&quot;&gt;test&lt;/test&gt;&lt;/ClaimedRole&gt;</value>
         </list>
      </constructor-arg>
   </bean>
```

HEADERS

Header	Type	Description
CamelXmlSignatureXAdESQualifyingPropertiesId	String	for the 'Id' attribute value of **QualifyingProperties** element
CamelXmlSignatureXAdESSignedDataObjectPropertiesId	String	for the 'Id' attribute value of **SignedDataObjectProperties** element

CamelXmlSignatureXAdESSignedSignaturePropertiesId	String	for the 'Id' attribute value of **SignedSignatureProperties** element
CamelXmlSignatureXAdESDataObjectFormatEncoding	String	for the value of the **Encoding** element of the **DataObjectFormat** element
CamelXmlSignatureXAdESNamespace	String	overwrites the XAdES namespace parameter value
CamelXmlSignatureXAdESPrefix	String	overwrites the XAdES prefix parameter value

LIMITATIONS WITH REGARD TO XADES VERSION 1.4.2

- No support for signature form XAdES-T and XAdES-C
- Only signer part implemented. Verifier part currently not available.
- No support for the '**QualifyingPropertiesReference**' element (see section 6.3.2 of spec).
- No support for the **Transforms** element contained in the **SignaturePolicyId** element contained in the **SignaturePolicyIdentifier element**
- No support of the **CounterSignature** element --> no support for the **UnsignedProperties** element
- At most one **DataObjectFormat** element. More than one **DataObjectFormat** element makes no sense because we have only one data object which is signed (this is the incoming message body to the XML signer endpoint).
- At most one **CommitmentTypeIndication** element. More than one **CommitmentTypeIndication**element makes no sense because we have only one data object which is signed (this is the incoming message body to the XML signer endpoint).
- A **CommitmentTypeIndication** element contains always the **AllSignedDataObjects** element. The **ObjectReference** element within **CommitmentTypeIndication** element is not supported.
- The **AllDataObjectsTimeStamp** element is not supported
- The **IndividualDataObjectsTimeStamp** element is not supported

SEE ALSO

- Best Practices

CHAPTER 162. XMPP

XMPP COMPONENT

The **xmpp:** component implements an XMPP (Jabber) transport.

URI FORMAT

```
xmpp://[login@]hostname[:port][/participant][?Options]
```

The component supports both room based and private person-person conversations. The component supports both producer and consumer (you can get messages from XMPP or send messages to XMPP). Consumer mode supports rooms.

You can append query options to the URI in the following format, **?option=value&option=value&...**

OPTIONS

Name	Description
room	If this option is specified, the component will connect to MUC (Multi User Chat). Usually, the domain name for MUC is different from the login domain. For example, if you are **superman@jabber.org** and want to join the **krypton** room, then the room URL is **krypton@conference.jabber.org**. Note the **conference** part.
user	User name (without server name). If not specified, anonymous login will be attempted.
password	Password.
resource	XMPP resource. The default is **Camel**.
createAccount	If **true**, an attempt to create an account will be made. Default is **false**.
participant	JID (Jabber ID) of person to receive messages. **room** parameter has precedence over **participant**.
nickname	Use nickname when joining room. If room is specified and nickname is not, **user** will be used for the nickname.
serviceName	The name of the service you are connecting to. For Google Talk, this would be **gmail.com**.

testConnectionOnStartup	*Camel 2.11* Specifies whether to test the connection on startup. This is used to ensure that the XMPP client has a valid connection to the XMPP server when the route starts. Camel throws an exception on startup if a connection cannot be established. When this option is set to false, Camel will attempt to establish a "lazy" connection when needed by a producer, and will poll for a consumer connection until the connection is established. Default is **true**.
connectionPollDelay	*Camel 2.11* The amount of time in seconds between polls to verify the health of the XMPP connection, or between attempts to establish an initial consumer connection. Camel will try to re-establish a connection if it has become inactive. Default is **10 seconds**.
pubsub	**Camel 2.15:** Accept pubsub packets on input. Default is **false**.
doc	**Camel 2.15:** Set a doc header on the *In* message containing a Document form of the incoming packet; default is **true**, if presence or pubsub are true, otherwise **false**.

HEADERS AND SETTING SUBJECT OR LANGUAGE

Apache Camel sets the message IN headers as properties on the XMPP message. You can configure a **HeaderFilterStategy** if you need custom filtering of headers.The **Subject** and **Language** of the XMPP message are also set if they are provided as IN headers.

EXAMPLES

User **superman** to join room **krypton** at **jabber** server with password, **secret**:

```
xmpp://superman@jabber.org/?room=krypton@conference.jabber.org&password=secret
```

User **superman** to send messages to **joker**:

```
xmpp://superman@jabber.org/joker@jabber.org?password=secret
```

Routing example in Java:

```
from("timer://kickoff?period=10000").
setBody(constant("I will win!\n Your Superman.")).
to("xmpp://superman@jabber.org/joker@jabber.org?password=secret");
```

Consumer configuration, which writes all messages from **joker** into the queue, **evil.talk**.

```
from("xmpp://superman@jabber.org/joker@jabber.org?password=secret").
to("activemq:evil.talk");
```

Consumer configuration, which listens to room messages:

```
from("xmpp://superman@jabber.org/?password=secret&room=krypton@conference.jabber.org").
to("activemq:krypton.talk");
```

Room in short notation (no domain part):

```
from("xmpp://superman@jabber.org/?password=secret&room=krypton").
to("activemq:krypton.talk");
```

When connecting to the Google Chat service, you'll need to specify the **serviceName** as well as your credentials:

```
// send a message from fromuser@gmail.com to touser@gmail.com
from("direct:start").
        to("xmpp://talk.google.com:5222/touser@gmail.com?
serviceName=gmail.com&user=fromuser&password=secret").
        to("mock:result");
```

CHAPTER 163. XQUERY ENDPOINT

XQUERY

The **xquery:** component allows you to process a message using an XQuery template. This can be ideal when using Templating to generate respopnses for requests.

URI FORMAT

```
xquery:templateName
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template.

For example you could use something like this:

```
from("activemq:My.Queue").
  to("xquery:com/acme/mytransform.xquery");
```

To use an XQuery template to formulate a response to a message for InOut message exchanges (where there is a **JMSReplyTo** header).

If you want to use InOnly, consume the message, and send it to another destination, you could use the following route:

```
from("activemq:My.Queue").
  to("xquery:com/acme/mytransform.xquery").
  to("activemq:Another.Queue");
```

CHAPTER 164. XSLT

XSLT

The **xslt:** component allows you to process a message using an XSLT template. This can be ideal when using Templating to generate respopnses for requests.

URI FORMAT

```
xslt:templateName[?options]
```

Where **templateName** is the classpath-local URI of the template to invoke; or the complete URL of the remote template. Refer to the Spring Documentation for more detail of the URI syntax

You can append query options to the URI in the following format, **?option=value&option=value&...**

Here are some example URIs

URI	Description
xslt:com/acme/mytransform.xsl	Refers to the file, **com/acme/mytransform.xsl**, on the classpath.
xslt:file:///foo/bar.xsl	Refers to the file, **/foo/bar.xsl**.
xslt:http://acme.com/cheese/foo.xsl	Refers to the remote HTTP resource.

From Camel 2.9 onwards the XSLT component is provided directly in the camel-core.

OPTIONS

Name	Default Value	Description
converter	**null**	Option to override default XmlConverter. Will lookup for the converter in the Registry. The provided converted must be of type org.apache.camel.converter.jaxp.XmlConverter.
transformerFactory	**null**	Option to override default TransformerFactory. Will lookup for the transformerFactory in the Registry. The provided transformer factory must be of type **javax.xml.transform.TransformerFactory**.

transformerFactoryClass	**null**	Option to override default TransformerFactory. Will create a **TransformerFactoryClass** instance and set it to the converter.
uriResolver	**null**	**Camel 2.3**: Allows you to use a custom **javax.xml.transformation.URIResolver**. Camel will by default use its own implementation **org.apache.camel.builder.xml.XsltUriResolver** which is capable of loading from classpath.
resultHandlerFactory	**null**	**Camel 2.3:** Allows you to use a custom **org.apache.camel.builder.xml.ResultHandlerFactory** which is capable of using custom **org.apache.camel.builder.xml.ResultHandler** types.
failOnNullBody	**true**	**Camel 2.3:** Whether or not to throw an exception if the input body is null.
deleteOutputFile	**false**	**Camel 2.6:** If you have **output=file** then this option dictates whether or not the output file should be deleted when the Exchange is done processing. For example suppose the output file is a temporary file, then it can be a good idea to delete it after use.

output	**string**	**Camel 2.3:** Option to specify which output type to use. Possible values are: **string, bytes, DOM, file**. The first three options are all in memory based, where as **file** is streamed directly to a **java.io.File**. For **file** you **must** specify the filename in the IN header with the key **Exchange.XSLT_FILE_NAME** which is also **CamelXsltFileName**. Also any paths leading to the filename must be created beforehand, otherwise an exception is thrown at runtime.
contentCache	**true**	**Camel 2.6:** Cache for the resource content (the stylesheet file) when it is loaded. If set to **false** Camel will reloader the stylesheet file on each message processing. This is good for development.
allowStAX	**true**	**Camel 2.8.3/2.9:** Whether to allow using StAX as the **javax.xml.transform.Source**.
transformerCacheSize	**0**	**Camel 2.9.3/2.10.1:** The number of **javax.xml.transform.Transformer** object that are cached for reuse to avoid calls to **Template.newTransformer()**.
saxon	**false**	**Camel 2.11:** Whether to use Saxon as the **transformerFactoryClass**. If enabled then the class **net.sf.saxon.TransformerFactoryImpl**. You would need to add Saxon to the classpath.

errorListener		**Camel 2.14:** Allows to configure to use a custom **javax.xml.transform.ErrorListener**. Beware when doing this then the default error listener which captures any errors or fatal errors and store information on the Exchange as properties is not in use. So only use this option for special use-cases.

USING XSLT ENDPOINTS

For example you could use something like

```
from("activemq:My.Queue").
  to("xslt:com/acme/mytransform.xsl");
```

To use an XSLT template to forumulate a response for a message for InOut message exchanges (where there is a **JMSReplyTo** header).

If you want to use InOnly and consume the message and send it to another destination you could use the following route:

```
from("activemq:My.Queue").
  to("xslt:com/acme/mytransform.xsl").
  to("activemq:Another.Queue");
```

GETTING PARAMETERS INTO THE XSLT TO WORK WITH

By default, all headers are added as parameters which are available in the XSLT. To do this you will need to declare the parameter so it is then *useable*.

```
<setHeader headerName="myParam"><constant>42</constant></setHeader>
<to uri="xslt:MyTransform.xsl"/>
```

And the XSLT just needs to declare it at the top level for it to be available:

```
<xsl: ..... >

  <xsl:param name="myParam"/>

   <xsl:template ...>
```

SPRING XML VERSIONS

To use the above examples in Spring XML you would use something like

```
<camelContext xmlns="http://activemq.apache.org/camel/schema/spring">
  <route>
    <from uri="activemq:My.Queue"/>
```

```
    <to uri="xslt:org/apache/camel/spring/processor/example.xsl"/>
    <to uri="activemq:Another.Queue"/>
  </route>
</camelContext>
```

There is a test case along with its Spring XML if you want a concrete example.

USING XSL:INCLUDE

Camel provides its own implementation of **URIResolver** which allows Camel to load included files from the classpath and more intelligent than before.

For example this include:

```
<xsl:include href="staff_template.xsl"/>
```

Will now be located relative from the starting endpoint, which for example could be:

```
.to("xslt:org/apache/camel/component/xslt/staff_include_relative.xsl")
```

Which means Camel will locate the file in the **classpath** as **org/apache/camel/component/xslt/staff_template.xsl**. This allows you to use xsl include and have xsl files located in the same folder such as we do in the example **org/apache/camel/component/xslt**.

You can use the following two prefixes **classpath:** or **file:** to instruct Camel to look either in classpath or file system. If you omit the prefix then Camel uses the prefix from the endpoint configuration. If that neither has one, then classpath is assumed.

You can also refer back in the paths such as

```
<xsl:include href="../staff_other_template.xsl"/>
```

Which then will resolve the xsl file under **org/apache/camel/component**.

USING XSL:INCLUDE AND DEFAULT PREFIX

When using xsl:include such as:

```
<xsl:include href="staff_template.xsl"/>
```

Then in Camel 2.10.3 and older, then Camel will use "classpath:" as the default prefix, and load the resource from the classpath. This works for most cases, but if you configure the starting resource to load from file,

```
.to("xslt:file:etc/xslt/staff_include_relative.xsl")
```

.. then you would have to prefix all your includes with "file:" as well.

```
<xsl:include href="file:staff_template.xsl"/>
```

From Camel 2.10.4 onwards we have made this easier as Camel will use the prefix from the endpoint configuration as the default prefix. So from Camel 2.10.4 onwards you can do:

-

```
<xsl:include href="staff_template.xsl"/>
```

Which will load the staff_template.xsl resource from the file system, as the endpoint was configured with "file:" as prefix. You can still though explicit configure a prefix, and then mix and match. And have both file and classpath loading. But that would be unusual, as most people either use file or classpath based resources.

DYNAMIC STYLESHEETS

To provide a dynamic stylesheet at runtime you can define a dynamic URI. For example, you can do this using the Recipient List Enterprise Integration Pattern (EIP), which is invoked using the **.recipientList** command in the Java DSL.

ACCESSING WARNINGS, ERRORS AND FATALERRORS FROM XSLT ERRORLISTENER

Available as of Camel 2.14

From Camel 2.14 onwards, any warning/error or fatalError is stored on the current Exchange as a property with the keys **Exchange.XSLT_ERROR**, **Exchange.XSLT_FATAL_ERROR**, or **Exchange.XSLT_WARNING** which allows end users to get hold of any errors happening during transformation.

For example in the stylesheet below, we want to terminate if a staff has an empty dob field. And to include a custom error message using xsl:message.

```
<xsl:template match="/">
  <html>
    <body>
      <xsl:for-each select="staff/programmer">
        <p>Name: <xsl:value-of select="name"/><br />
          <xsl:if test="dob=''">
            <xsl:message terminate="yes">Error: DOB is an empty string!</xsl:message>
          </xsl:if>
        </p>
      </xsl:for-each>
    </body>
  </html>
</xsl:template>
```

This information is not available on the Exchange stored as an Exception that contains the message in the **getMessage()** method on the exception. The exception is stored on the Exchange as a warning with the key **Exchange.XSLT_WARNING.**

CHAPTER 165. YAMMER

YAMMER

Available as of Camel 2.12

The Yammer component allows you to interact with the Yammer enterprise social network. Consuming messages, users, and user relationships is supported as well as creating new messages.

Yammer uses OAuth 2 for all client application authentication. In order to use camel-yammer with your account, you'll need to create a new application within Yammer and grant the application access to your account. Finally, generate your access token. More details are at https://developer.yammer.com/authentication/

Maven users will need to add the following dependency to their pom.xml for this component:

```
<dependency>
    <groupId>org.apache.camel</groupId>
    <artifactId>camel-yammer</artifactId>
    <version>${camel-version}</version>
</dependency>
```

URI FORMAT

```
yammer:[function]?[options]
```

YAMMERCOMPONENT

The yammer component can be configured with the Yammer account settings which are mandatory to configure before using. You can also configure these options directly in the endpoint.

Option	Description
consumerKey	The consumer key
consumerSecret	The consumer secret
accessToken	The access token

CONSUMING MESSAGES

The camel-yammer component provides several endpoints for consuming messages:

URI	Description

yammer:messages?options	All public messages in the user's (whose access token is being used to make the API call) Yammer network. Corresponds to "All" conversations in the Yammer web interface.
yammer:my_feed?options	The user's feed, based on the selection they have made between "Following" and "Top" conversations.
yammer:algo?options	The algorithmic feed for the user that corresponds to "Top" conversations, which is what the vast majority of users will see in the Yammer web interface.
yammer:following?options	The "Following" feed which is conversations involving people, groups and topics that the user is following.
yammer:sent?options	All messages sent by the user.
yammer:private?options	Private messages received by the user.
yammer:received?options	**Camel 2.12.1:** All messages received by the user

URI OPTIONS FOR CONSUMING MESSAGES

Name	Default Value	Description
useJson	**false**	Set to true if you want to use raw JSON rather than converting to POJOs.
delay	**5000**	in milliseconds
consumerKey	**null**	Consumer Key. Can also be configured on the **YammerComponent** level instead.
consumerSecret	**null**	Consumer Secret. Can also be configured on the **YammerComponent** level instead.
accessToken	**null**	Access Token. Can also be configured on the **YammerComponent** level instead.

limit	**-1**	Return only the specified number of messages. Works for threaded=true and threaded=extended.
threaded	**null**	threaded=true will only return the first message in each thread. This parameter is intended for apps which display message threads collapsed. threaded=extended will return the thread starter messages in order of most recently active as well as the two most recent messages, as they are viewed in the default view on the Yammer web interface.
olderThan	**-1**	Returns messages older than the message ID specified as a numeric string. This is useful for paginating messages. For example, if you're currently viewing 20 messages and the oldest is number 2912, you could append "?olderThan=2912? to your request to get the 20 messages prior to those you're seeing.
newerThan	**-1**	Returns messages newer than the message ID specified as a numeric string. This should be used when polling for new messages. If you're looking at messages, and the most recent message returned is 3516, you can make a request with the parameter "?newerThan=3516? to ensure that you do not get duplicate copies of messages already on your page.

MESSAGE FORMAT

All messages by default are converted to a POJO model provided in the org.apache.camel.component.yammer.model package. The original message coming from yammer is in JSON. For all message consuming & producing endpoints, a Messages object is returned. Take for example a route like:

```
from("yammer:messages?
consumerKey=aConsumerKey&consumerSecret=aConsumerSecretKey&accessToken=aAccessToken"
.to("mock:result");
```

and lets say the yammer server returns:


```
{
 "messages":[
  {
   "replied_to_id":null,
   "network_id":7654,
   "url":"https://www.yammer.com/api/v1/messages/305298242",
   "thread_id":305298242,
   "id":305298242,
   "message_type":"update",
   "chat_client_sequence":null,
   "body":{
    "parsed":"Testing yammer API...",
    "plain":"Testing yammer API...",
    "rich":"Testing yammer API..."
   },
   "client_url":"https://www.yammer.com/",
   "content_excerpt":"Testing yammer API...",
   "created_at":"2013/06/25 18:14:45 +0000",
   "client_type":"Web",
   "privacy":"public",
   "sender_type":"user",
   "liked_by":{
    "count":1,
    "names":[
     {
      "permalink":"janstey",
      "full_name":"Jonathan Anstey",
      "user_id":1499642294
     }

    ]

   },
   "sender_id":1499642294,
   "language":null,
   "system_message":false,
   "attachments":[

   ],
   "direct_message":false,
   "web_url":"https://www.yammer.com/redhat.com/messages/305298242"
  },
  {
   "replied_to_id":null,
   "network_id":7654,
   "url":"https://www.yammer.com/api/v1/messages/294326302",
   "thread_id":294326302,
   "id":294326302,
   "message_type":"system",
   "chat_client_sequence":null,
   "body":{
    "parsed":"(Principal Software Engineer) has [[tag:14658]] the redhat.com network. Take a moment
to welcome Jonathan.",
    "plain":"(Principal Software Engineer) has #joined the redhat.com network. Take a moment to
```

```
welcome Jonathan.",
    "rich":"(Principal Software Engineer) has #joined the redhat.com network. Take a moment to
welcome Jonathan."
   },
   "client_url":"https://www.yammer.com/",
   "content_excerpt":"(Principal Software Engineer) has #joined the redhat.com network. Take a
moment to welcome Jonathan.",
   "created_at":"2013/05/10 19:08:29 +0000",
   "client_type":"Web",
   "sender_type":"user",
   "privacy":"public",
   "liked_by":{
    "count":0,
    "names":[

    ]

   }
  }
  ]

 }
```

Camel will marshal that into a Messages object containing 2 Message objects. As shown below there is a rich object model that makes it easy to get any information you need:

```
        Exchange exchange = mock.getExchanges().get(0);
        Messages messages = exchange.getIn().getBody(Messages.class);

        assertEquals(2, messages.getMessages().size());
        assertEquals("Testing yammer API...", messages.getMessages().get(0).getBody().getPlain());
        assertEquals("(Principal Software Engineer) has #joined the redhat.com network. Take a
moment to welcome Jonathan.", messages.getMessages().get(1).getBody().getPlain());
```

That said, marshaling this data into POJOs is not free so if you need you can switch back to using pure JSON by adding the useJson=false option to your URI.

CREATING MESSAGES

To create a new message in the account of the current user, you can use the following URI:

```
yammer:messages?[options]
```

The current Camel message body is what will be used to set the text of the Yammer message. The response body will include the new message formatted the same way as when you consume messages (i.e. as a Messages object by default).

Take this route for instance:

```
from("direct:start").to("yammer:messages?
consumerKey=aConsumerKey&consumerSecret=aConsumerSecretKey&accessToken=aAccessToken"
.to("mock:result");
```

By sending to the direct:start endpoint a "Hi from Camel!" message body:

```
template.sendBody("direct:start", "Hi from Camel!");
```

a new message will be created in the current user's account on the server and also this new message will be returned to Camel and converted into a Messages object. Like when consuming messages you can interrogate the Messages object:

```
Exchange exchange = mock.getExchanges().get(0);
Messages messages = exchange.getIn().getBody(Messages.class);

assertEquals(1, messages.getMessages().size());
assertEquals("Hi from Camel!", messages.getMessages().get(0).getBody().getPlain());
```

RETRIEVING USER RELATIONSHIPS

The camel-yammer component can retrieve user relationships:

```
yammer:relationships?[options]
```

URI OPTIONS FOR RETRIEVING RELATIONSHIPS

Name	Default Value	Description
useJson	**false**	Set to true if you want to use raw JSON rather than converting to POJOs.
delay	**5000**	in milliseconds
consumerKey	**null**	Consumer Key. Can also be configured on the **YammerComponent** level instead.
consumerSecret	**null**	Consumer Secret. Can also be configured on the **YammerComponent** level instead.
accessToken	**null**	Access Token. Can also be configured on the **YammerComponent** level instead.
userId	**current user**	To view the relationships for a user other than the current user.

RETRIEVING USERS

The camel-yammer component provides several endpoints for retrieving users:

URI	Description
yammer:users?[options]	Retrieve users in the current user's Yammer network.
yammer:current?[options]	View data about the current user.

URI OPTIONS FOR RETRIEVING USERS

Name	Default Value	Description
useJson	**false**	Set to true if you want to use raw JSON rather than converting to POJOs.
delay	**5000**	in milliseconds
consumerKey	**null**	Consumer Key. Can also be configured on the **YammerComponent** level instead.
consumerSecret	**null**	Consumer Secret. Can also be configured on the **YammerComponent** level instead.
accessToken	**null**	Access Token. Can also be configured on the **YammerComponent** level instead.

USING AN ENRICHER

It is helpful sometimes (or maybe always in the case of users or relationship consumers) to use an enricher pattern rather than a route initiated with one of the polling consumers in camel-yammer. This is because the consumers will fire repeatedly, however often you set the delay for. If you just want to look up a user's data, or grab a message at a point in time, it is better to call that consumer once and then get one with your route.

Lets say you have a route that at some point needs to go out and fetch user data for the current user. Rather than polling for this user over and over again, use the pollEnrich DSL method:

```
from("direct:start").pollEnrich("yammer:current?
consumerKey=aConsumerKey&consumerSecret=aConsumerSecretKey&accessToken=aAccessToken"
.to("mock:result");
```

This will go out and fetch the current user's User object and set it as the Camel message body.

CHAPTER 166. ZOOKEEPER

ZOOKEEPER

Available as of Camel 2.9

The ZooKeeper component allows interaction with a ZooKeeper cluster and exposes the following features to Camel:

1. Creation of nodes in any of the ZooKeeper create modes.
2. Get and Set the data contents of arbitrary cluster nodes.
3. Create and retrieve the list the child nodes attached to a particular node.
4. A Distributed RoutePolicy that leverages a Leader election coordinated by ZooKeeper to determine if exchanges should get processed.

Maven users will need to add the following dependency to their **pom.xml** for this component:

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-zookeeper</artifactId>
  <version>x.x.x</version>
  <!-- use the same version as your Camel core version -->
</dependency>
```

URI FORMAT

```
zookeeper://zookeeper-server[:port][/path][?options]
```

The path from the uri specifies the node in the ZooKeeper server (aka znode) that will be the target of the endpoint.

OPTIONS

Name	Default Value	Description
path		The node in the ZooKeeper server (aka znode)
listChildren	**false**	Whether the children of the node should be listed
repeat	**false**	Should changes to the znode be 'watched' and repeatedly processed.
backoff	**5000**	The time interval to backoff for after an error before retrying.

timeout	**5000**	The time interval to wait on connection before timing out.
create	**false**	Should the endpoint create the node if it does not currently exist.
createMode	**EPHEMERAL**	The create mode that should be used for the newly created node (see below).
sendEmptyMessageOnDelete	**true**	**Camel 2.10:** Upon the delete of a znode, should an empty message be send to the consumer

USE CASES

READING FROM A ZNODE.

The following snippet will read the data from the znode '/somepath/somenode/' provided that it already exists. The data retrieved will be placed into an exchange and passed onto the rest of the route.

```
from("zookeeper://localhost:39913/somepath/somenode").to("mock:result");
```

if the node does not yet exist then a flag can be supplied to have the endpoint await its creation

```
from("zookeeper://localhost:39913/somepath/somenode?awaitCreation=true").to("mock:result");
```

READING FROM A ZNODE - (ADDITIONAL CAMEL 2.10 ONWARDS)

When data is read due to a WatchedEvent received from the ZooKeeper ensemble, the CamelZookeeperEventType header holds ZooKeeper's EventType value from that WatchedEvent. If the data is read initially (not triggered by a WatchedEvent) the CamelZookeeperEventType header will not be set.

WRITING TO A ZNODE.

The following snippet will write the payload of the exchange into the znode at '/somepath/somenode/' provided that it already exists

```
from("direct:write-to-znode").to("zookeeper://localhost:39913/somepath/somenode");
```

For flexibility, the endpoint allows the target znode to be specified dynamically as a message header. If a header keyed by the string 'CamelZooKeeperNode' is present then the value of the header will be used as the path to the znode on the server. For instance using the same route definition above, the following code snippet will write the data not to '/somepath/somenode' but to the path from the header '/somepath/someothernode'

```
Exchange e = createExchangeWithBody(testPayload);
template.sendBodyAndHeader("direct:write-to-znode", e, "CamelZooKeeperNode",
"/somepath/someothernode");
```

To also create the node if it does not exist the 'create' option should be used.

```
from("direct:create-and-write-to-znode").to("zookeeper://localhost:39913/somepath/somenode?
create=true");
```

Starting **version 2.11** it is also possible to **delete** a node using the header 'CamelZookeeperOperation' by setting it to 'DELETE'.

```
from("direct:delete-znode").setHeader(ZooKeeperMessage.ZOOKEEPER_OPERATION,
constant("DELETE")).to("zookeeper://localhost:39913/somepath/somenode");
```

or equivalently

```
<route>
  <from uri="direct:delete-znode" />
  <setHeader headerName="CamelZookeeperOperation">
    <constant>DELETE</constant>
  </setHeader>
  <to uri="zookeeper://localhost:39913/somepath/somenode" />
</route>
```

ZooKeeper nodes can have different types; they can be 'Ephemeral' or 'Persistent' and 'Sequenced' or 'Unsequenced'. For further information of each type you can check here. By default endpoints will create unsequenced, ephemeral nodes, but the type can be easily manipulated via a uri config parameter or via a special message header. The values expected for the create mode are simply the names from the CreateMode enumeration

- **PERSISTENT**
- **PERSISTENT_SEQUENTIAL**
- **EPHEMERAL**
- **EPHEMERAL_SEQUENTIAL**

For example to create a persistent znode via the URI config

```
from("direct:create-and-write-to-persistent-
znode").to("zookeeper://localhost:39913/somepath/somenode?
create=true&createMode=PERSISTENT");
```

or using the header 'CamelZookeeperCreateMode'

```
Exchange e = createExchangeWithBody(testPayload);
template.sendBodyAndHeader("direct:create-and-write-to-persistent-znode", e,
"CamelZooKeeperCreateMode", "PERSISTENT");
```

ZOOKEEPER ENABLED ROUTE POLICY.

ZooKeeper allows for very simple and effective leader election out of the box; This component exploits this election capability in a RoutePolicy to control when and how routes are enabled. This policy would typically be used in fail-over scenarios, to control identical instances of a route across a cluster of Camel based servers. A very common scenario is a simple 'Master-Slave' setup where there are multiple instances of a route distributed across a cluster but only one of them, that of the master, should be running at a time. If the master fails, a new master should be elected from the available slaves and the route in this new master should be started.

The policy uses a common znode path across all instances of the RoutePolicy that will be involved in the election. Each policy writes its id into this node and zookeeper will order the writes in the order it received them. The policy then reads the listing of the node to see what postion of its id; this postion is used to determine if the route should be started or not. The policy is configured at startup with the number of route instances that should be started across the cluster and if its position in the list is less than this value then its route will be started. For a Master-slave scenario, the route is configured with 1 route instance and only the first entry in the listing will start its route. All policies watch for updates to the listing and if the listing changes they recalculate if their route should be started. For more info on Zookeeper's Leader election capability see this page.

The following example uses the node '/someapplication/somepolicy' for the election and is set up to start only the top '1' entries in the node listing i.e. elect a master

```
ZooKeeperRoutePolicy policy = new
ZooKeeperRoutePolicy("zookeeper:localhost:39913/someapp/somepolicy", 1);
from("direct:policy-controlled").routePolicy(policy).to("mock:controlled");
```