Red Hat Single Sign-On 7.6

Red Hat Single Sign-On for OpenShift

For Use with Red Hat Single Sign-On 7.6

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Legal Notice

Abstract

This guide consists of basic information and instructions to get started with Red Hat Single Sign-On 7.6 for OpenShift

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MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see our CTO Chris Wright's message .

CHAPTER 1. INTRODUCTION TO RED HAT SINGLE SIGN-ON FOR OPENSHIFT

1.1. WHAT IS RED HAT SINGLE SIGN-ON?

Red Hat Single Sign-On is an integrated sign-on solution available as a Red Hat JBoss Middleware for OpenShift containerized image. The Red Hat Single Sign-On for OpenShift image provides an authentication server for users to centrally log in, log out, register, and manage user accounts for web applications, mobile applications, and RESTful web services.

Red Hat Single Sign-On for OpenShift is available on the following platforms: x86_64, IBM Z, and IBM Power Systems.

1.2. COMPARISON: RED HAT SINGLE SIGN-ON FOR OPENSHIFT IMAGE VERSUS RED HAT SINGLE SIGN-ON

The Red Hat Single Sign-On for OpenShift image version number 7.6.9 is based on Red Hat Single Sign-On 7.6.9. There are some important differences in functionality between the Red Hat Single Sign-On for OpenShift image and Red Hat Single Sign-On that should be considered:

The Red Hat Single Sign-On for OpenShift image includes all of the functionality of Red Hat Single Sign-On. In addition, the Red Hat Single Sign-On-enabled JBoss EAP image automatically handles OpenID Connect or SAML client registration and configuration for ***.war*** deployments that contain **<auth-method>KEYCLOAK</auth-method>** or **<auth-method>KEYCLOAK-SAML</auth-method>** in their respective **web.xml** files.

1.3. TEMPLATES FOR USE WITH THIS SOFTWARE

Red Hat offers multiple OpenShift application templates using the Red Hat Single Sign-On for OpenShift image version number 7.6.9. These templates define the resources needed to develop Red Hat Single Sign-On 7.6.9 server based deployment. The templates can mainly be split into two categories: passthrough templates and reencryption templates. Some other miscellaneous templates also exist.

1.3.1. Passthrough templates

These templates require that HTTPS, JGroups keystores, and a truststore for the Red Hat Single Sign-On server exist beforehand. They secure the TLS communication using passthrough TLS termination.

- ***sso76-ocp3-https***, ***sso76-ocp4-https***: Red Hat Single Sign-On 7.6.9 backed by internal H2 database on the same pod.
- ***sso76-ocp3-postgresql***, ***sso76-ocp4-postgresql***: Red Hat Single Sign-On 7.6.9 backed by ephemeral PostgreSQL database on a separate pod.
- ***sso76-ocp3-postgresql-persistent***, ***sso76-ocp4-postgresql-persistent***: Red Hat Single Sign-On 7.6.9 backed by persistent PostgreSQL database on a separate pod.

NOTE

Templates for using Red Hat Single Sign-On with MySQL / MariaDB databases have been removed and are not available since Red Hat Single Sign-On version 7.4.

1.3.2. Re-encryption templates

Separate re-encryption templates exist for OpenShift 3.x and for OpenShift 4.x

1.3.2.1. OpenShift 3.x

The OpenShift 3.x templates use the service-ca.crt CA bundle file as part of the Service Serving Certificate Secrets to generate TLS certificates and keys for serving secure content. The Red Hat Single Sign-On truststore is also created automatically, containing the **/var/run/secrets/kubernetes.io/serviceaccount/service-ca.crt** CA certificate file, which is used to sign the certificate for the HTTPS keystore.

The truststore for the Red Hat Single Sign-On server is pre-populated with the all known, trusted CA certificate files found in the Java system path. These templates secure the TLS communication using re-encryption TLS termination. The JGroups cluster traffic is authenticated using the **AUTH** protocol and encrypted using the **ASYM_ENCRYPT** protocol.

- ***sso76-ocp3-x509-https***: Red Hat Single Sign-On 7.6.9 with auto-generated HTTPS keystore and Red Hat Single Sign-On truststore, backed by internal H2 database.

- ***sso76-ocp3-x509-postgresql-persistent***: Red Hat Single Sign-On 7.6.9 with auto-generated HTTPS keystore and Red Hat Single Sign-On truststore, backed by persistent PostgreSQL database.

1.3.2.2. OpenShift 4.x

The OpenShift 4.x templates use the internal service serving x509 certificate secrets to automatically create the HTTPS keystore used for serving secure content. These templates use a new service CA bundle that contains the **service.beta.openshift.io/inject-cabundle=true** ConfigMap definition.

The truststore for the Red Hat Single Sign-On server is pre-populated with the all known, trusted CA certificate files found in the Java system path. These templates secure the TLS communication using re-encryption TLS termination. The JGroups cluster traffic is authenticated using the **AUTH** protocol and encrypted using the **ASYM_ENCRYPT** protocol.

- ***sso76-ocp4-x509-https***: Red Hat Single Sign-On 7.6.9 with auto-generated HTTPS keystore and Red Hat Single Sign-On truststore, backed by internal H2 database. The **ASYM_ENCRYPT** JGroups protocol is used for encryption of cluster traffic.

- ***sso76-ocp4-x509-postgresql-persistent***: Red Hat Single Sign-On 7.6.9 with auto-generated HTTPS keystore and Red Hat Single Sign-On truststore, backed by persistent PostgreSQL database. The **ASYM_ENCRYPT** JGroups protocol is used for encryption of cluster traffic.

1.3.3. Other templates

Other templates that integrate with Red Hat Single Sign-On are also available:

- ***eap64-sso-s2i***: Red Hat Single Sign-On-enabled Red Hat JBoss Enterprise Application Platform 6.4.

- ***eap71-sso-s2i***: Red Hat Single Sign-On-enabled Red Hat JBoss Enterprise Application Platform 7.1.

- ***datavirt63-secure-s2i***: Red Hat Single Sign-On-enabled Red Hat JBoss Data Virtualization 6.3.

These templates contain environment variables specific to Red Hat Single Sign-On that enable automatic Red Hat Single Sign-On client registration when deployed.

Additional resources

- Automatic and Manual Red Hat Single Sign-On Client Registration Methods
- Passthrough TLS termination, OpenShift 3.11
- Re-encryption TLS termination, OpenShift 3.11
- Secured Routes, OpenShift 4.11

1.4. VERSION COMPATIBILITY AND SUPPORT

For details about OpenShift image version compatibility, see the Supported Configurations page.

NOTE

The Red Hat Single Sign-On for OpenShift image versions between 7.0 and 7.5 are deprecated and they will no longer receive updates of image and application templates.

To deploy new applications, use the 7.6 version of the Red Hat Single Sign-On for OpenShift image along with the application templates specific to this image version.

CHAPTER 2. CONFIGURING RED HAT SINGLE SIGN-ON FOR OPENSHIFT

2.1. USING THE RED HAT SINGLE SIGN-ON FOR OPENSHIFT IMAGE STREAMS AND APPLICATION TEMPLATES

Red Hat JBoss Middleware for OpenShift images are pulled on demand from the secured Red Hat Registry: registry.redhat.io, which requires authentication. To retrieve content, you will need to log into the registry using the Red Hat account.

To consume container images from ***registry.redhat.io*** in shared environments such as OpenShift, it is recommended for an administrator to use a Registry Service Account, also referred to as authentication tokens, in place of an individual person's Red Hat Customer Portal credentials.

Procedure

1. To create a Registry Service Account, navigate to the Registry Service Account Management Application, and log in if necessary.
2. From the ***Registry Service Accounts*** page, click ***Create Service Account***.
3. Provide a name for the Service Account, for example ***registry.redhat.io-sa***. It will be prepended with a fixed, random string.
   a. Enter a description for the Service Account, for example ***Service account to consume container images from registry.redhat.io.***.
   b. Click ***Create***.
4. After the Service Account was created, click the ***registry.redhat.io-sa*** link in the ***Account name*** column of the table presented on the ***Registry Service Accounts*** page.
5. Finally, click the ***OpenShift Secret*** tab, and perform all steps listed on that page.

See the Red Hat Container Registry Authentication article for more information.

Procedure

1. Ensure that you are logged in as a cluster administrator or a user with project administrator access to the global **openshift** project:
2. Choose a command based on your version of OpenShift Container Platform.
   a. If you are running an OpenShift Container Platform v3 based cluster instance on (some) of your master host(s), perform the following:

      ```
      $ oc login -u system:admin
      ```

   b. If you are running an OpenShift Container Platform v4 based cluster instance, log in to the CLI as the kubeadmin user:

      ```
      $ oc login -u kubeadmin -p password https://openshift.example.com:6443
      ```

3. Run the following commands to update the core set of Red Hat Single Sign-On 7.6.9 resources for OpenShift in the **openshift** project.
   If you are using an OpenShift 3.x cluster, use these commands:

```
$ for resource in sso76-image-stream.json \
  passthrough/ocp-3.x/sso76-ocp3-https.json \
  passthrough/ocp-3.x/sso76-ocp3-postgresql.json \
  passthrough/ocp-3.x/sso76-ocp3-postgresql-persistent.json \
  reencrypt/ocp-3.x/sso76-ocp3-x509-https.json \
  reencrypt/ocp-3.x/sso76-ocp3-x509-postgresql-persistent.json
do
  oc replace -n openshift --force -f \
  https://raw.githubusercontent.com/jboss-container-images/redhat-sso-7-openshift-
image/sso76-dev/templates/${resource}
done
```

   If you are using an OpenShift 4.x cluster, use these commands:

```
$ for resource in sso76-image-stream.json \
  passthrough/ocp-4.x/sso76-ocp4-https.json \
  passthrough/ocp-4.x/sso76-ocp4-postgresql.json \
  passthrough/ocp-4.x/sso76-ocp4-postgresql-persistent.json \
  reencrypt/ocp-4.x/sso76-ocp4-x509-https.json \
  reencrypt/ocp-4.x/sso76-ocp4-x509-postgresql-persistent.json
do
  oc replace -n openshift --force -f \
  https://raw.githubusercontent.com/jboss-container-images/redhat-sso-7-openshift-
image/sso76-dev/templates/${resource}
done
```

4. Run the following command to install the Red Hat Single Sign-On 7.6.9 OpenShift image streams in the **openshift** project:

```
$ oc -n openshift import-image rh-sso-7/sso76-openshift-rhel8:7.6 --
from=registry.redhat.io/rh-sso-7/sso76-openshift-rhel8:7.6 --confirm
```

2.2. DEPLOYING THE RED HAT SINGLE SIGN-ON IMAGE

2.2.1. Preparing for the deployment

Procedure

1. Log in to the OpenShift CLI with a user that holds the *cluster:admin* role.

2. Create a new project:

```
$ oc new-project sso-app-demo
```

3. Add the **view** role to the **default** service account. This enables the service account to view all the resources in the **sso-app-demo** namespace, which is necessary for managing the cluster.

```
$ oc policy add-role-to-user view system:serviceaccount:$(oc project -q):default
```

2.2.2. Deploying the Red Hat Single Sign-On Image using the application template

You can deploy the template using one of these interfaces:

- OpenShift CLI
- OpenShift 3.x web console
- OpenShift 4.x web console

2.2.2.1. Deploying the Template using OpenShift CLI

Prerequisites

- Perform the steps described in Using the Red Hat Single Sign-On for OpenShift Image Streams and application templates.

Procedure

1. List the available Red Hat Single Sign-On application templates:

```
$ oc get templates -n openshift -o name | grep -o 'sso76.\+' | sort
sso76-ocp3-https
sso76-ocp3-postgresql
sso76-ocp3-postgresql-persistent
sso76-ocp3-x509-https
sso76-ocp3-x509-postgresql-persistent
sso76-ocp4-https
sso76-ocp4-postgresql
sso76-ocp4-postgresql-persistent
sso76-ocp4-x509-https
sso76-ocp4-x509-postgresql-persistent
```

2. Deploy the selected one:

```
$ oc new-app --template=sso76-ocp4-x509-https
--> Deploying template "openshift/sso76-ocp4-x509-https" to project sso-app-demo

    Red Hat Single Sign-On 7.6 (Ephemeral)
    ---------
    An example Red Hat Single Sign-On 7 application. For more information about using this
template, see <link xlink:href="https://github.com/jboss-openshift/application-
templates">https://github.com/jboss-openshift/application-templates</link>.

    A new Red Hat Single Sign-On service has been created in your project. The admin
username/password for accessing the master realm using the Red Hat Single Sign-On
console is IACfQO8v/nR7llVSVb4Dye3TNRbXoXhRpAKTmiCRc. The HTTPS keystore used
for serving secure content, the JGroups keystore used for securing JGroups
communications, and server truststore used for securing Red Hat Single Sign-On requests
were automatically created using OpenShift's service serving x509 certificate secrets.

    * With parameters:
      * Application Name=sso
      * JGroups Cluster Password=jg0Rssom0gmHBnooDF3Ww7V4Mu5RymmB #
generated
```

```
        * Datasource Minimum Pool Size=
        * Datasource Maximum Pool Size=
        * Datasource Transaction Isolation=
        * ImageStream Namespace=openshift
        * Red Hat Single Sign-On Administrator Username=IACfQO8v # generated
        * Red Hat Single Sign-On Administrator
Password=nR7llVSVb4Dye3TNRbXoXhRpAKTmiCRc # generated
        * Red Hat Single Sign-On Realm=
        * Red Hat Single Sign-On Service Username=
        * Red Hat Single Sign-On Service Password=
        * Container Memory Limit=1Gi

--> Creating resources ...
    service "sso" created
    service "secure-sso" created
    service "sso-ping" created
    route "sso" created
    route "secure-sso" created
    deploymentconfig "sso" created
--> Success
    Run 'oc status' to view your app.
```

2.2.2.2. Deploying the Template using the OpenShift 3.x Web Console

Prerequisites

- Perform the steps described in Using the Red Hat Single Sign-On for OpenShift Image Streams and application templates.

Procedure

1. Log in to the OpenShift web console and select the **sso-app-demo** project space.
2. Click **Add to Project**, then **Browse Catalog** to list the default image streams and templates.
3. Use the **Filter by Keyword** search bar to limit the list to those that match *sso*. You may need to click **Middleware**, then **Integration** to show the desired application template.
4. Select an Red Hat Single Sign-On application template. This example uses ***Red Hat Single Sign-On 7.6 (Ephemeral)***.
5. Click **Next** in the **Information** step.
6. From the **Add to Project** drop-down menu, select the *sso-app-demo* project space. Then click **Next**.
7. Select **Do not bind at this time** radio button in the **Binding** step. Click **Create** to continue.
8. In the **Results** step, click the **Continue to the project overview**link to verify the status of the deployment.

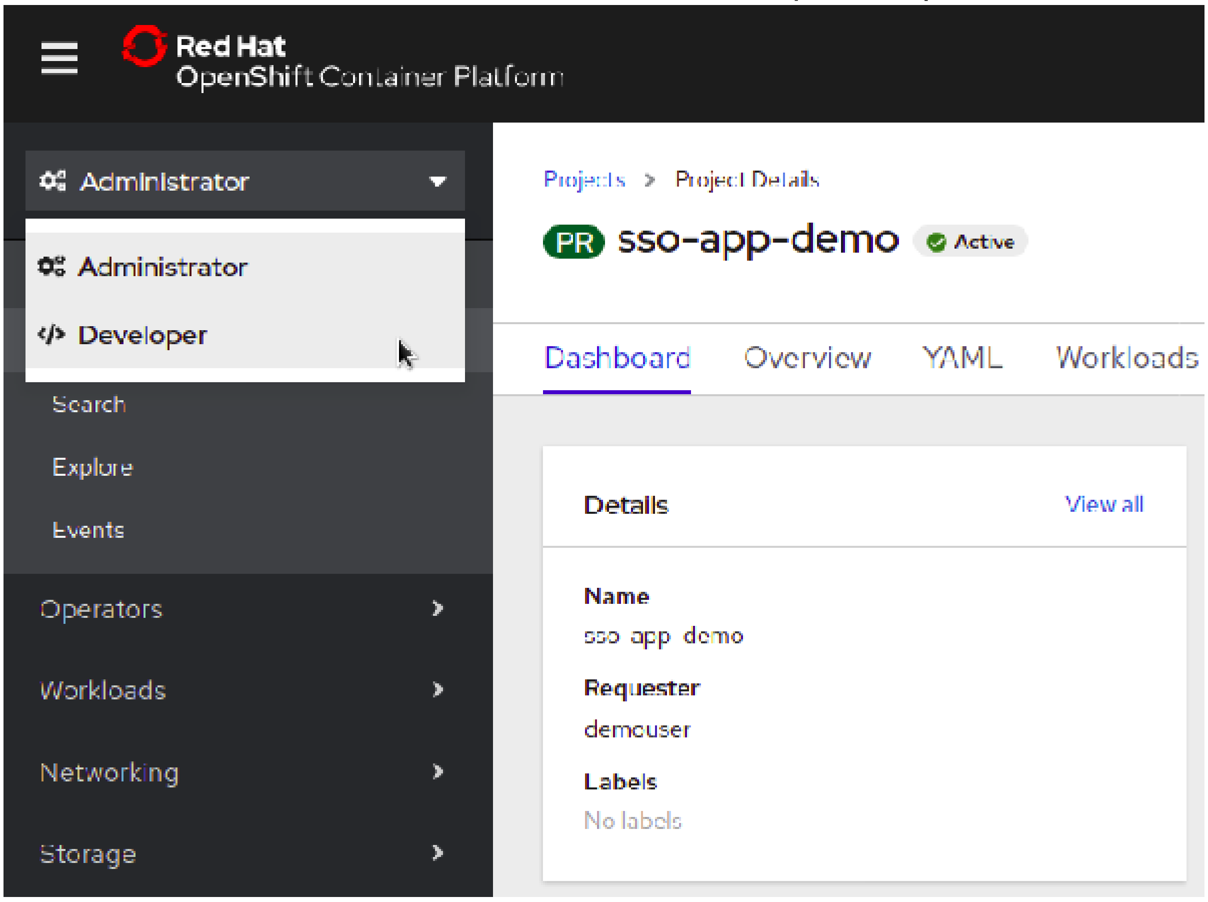
2.2.2.3. Deploying the Template using the OpenShift 4.x Web Console

Prerequisites

- Perform the steps described in Using the Red Hat Single Sign-On for OpenShift Image Streams and application templates.

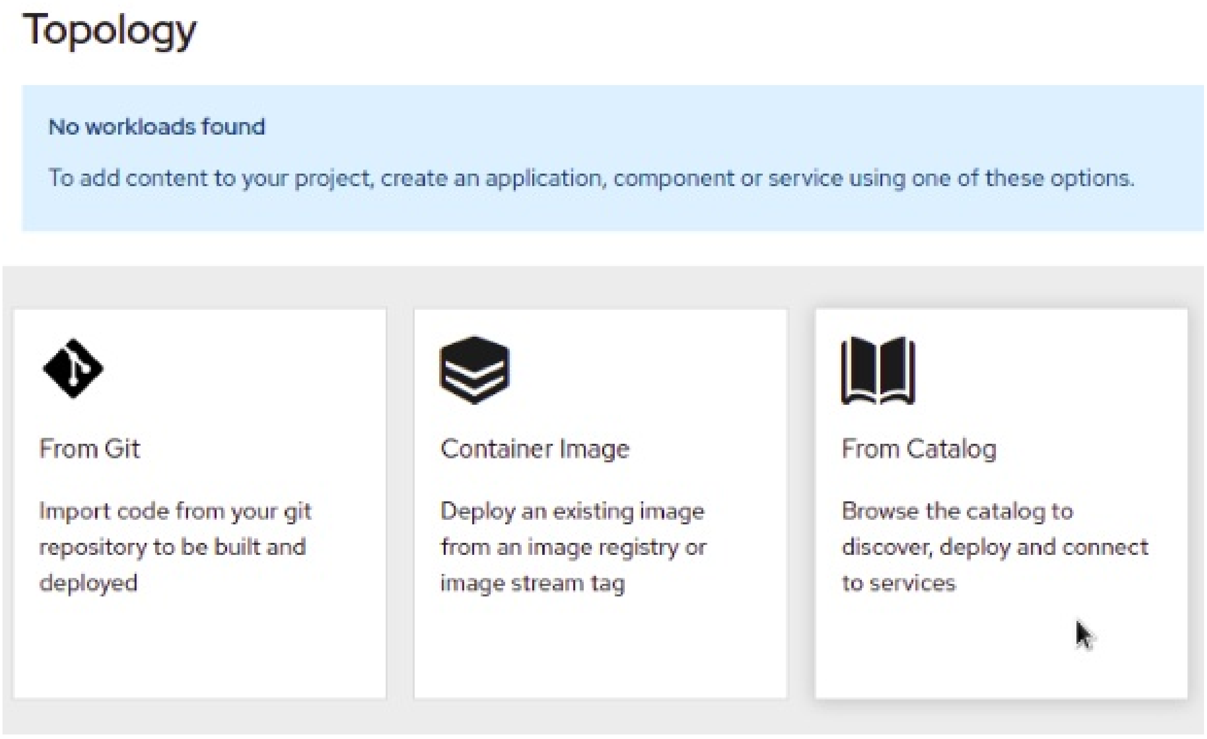
Procedure

1. Log in to the OpenShift web console and select the *sso-app-demo* project space.
2. On the left sidebar, click the **Administrator** tab and then click **</> Developer**.



Name
sso app demo
Requester
demouser
Labels
No labels

3. Click **From Catalog**.


Topology

No workloads found

To add content to your project, create an application, component or service using one of these options.

From Git

Import code from your git repository to be built and deployed

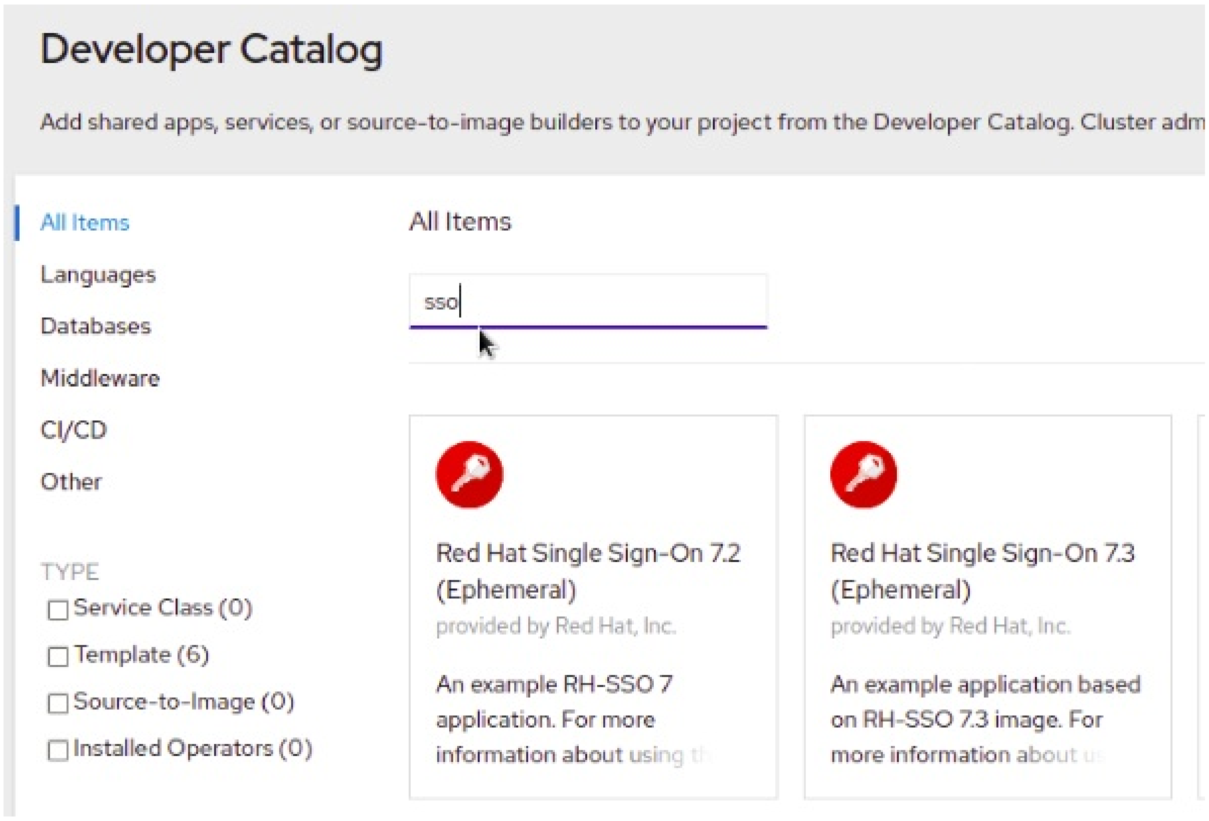
Container Image

Deploy an existing image from an image registry or image stream tag

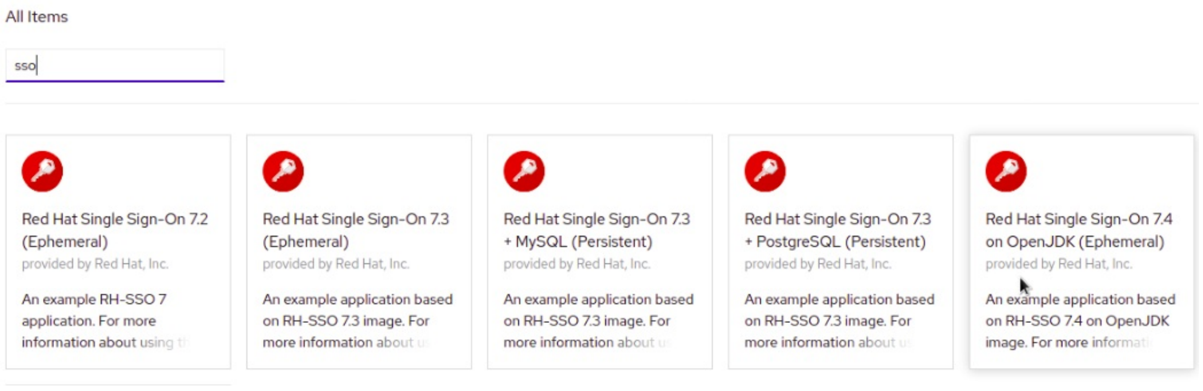
From Catalog

Browse the catalog to discover, deploy and connect to services

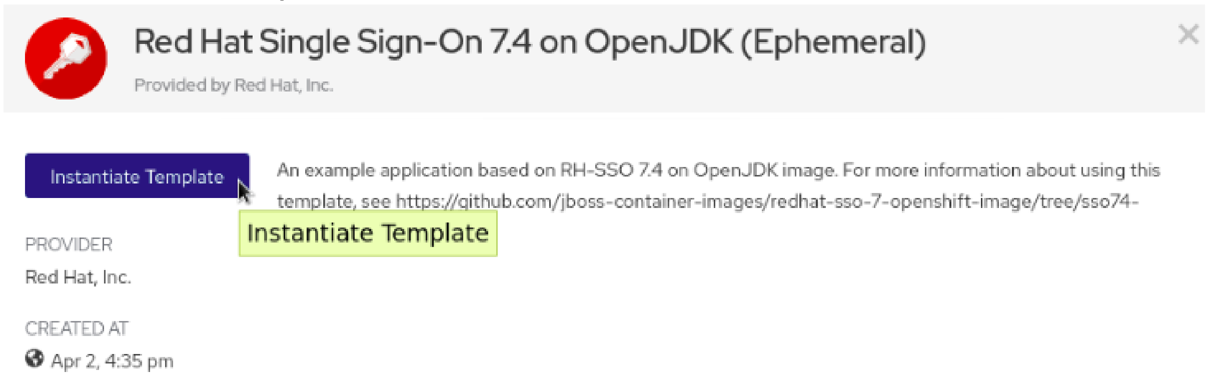
4. Search for **sso**.


Developer Catalog
Add shared apps, services, or source-to-image builders to your project from the Developer Catalog. Cluster adm
All Items
Languages
Databases
Middleware
CI/CD
Other
TYPE
Service Class (0)
Template (6)
Source-to-Image (0)
Installed Operators (0)
All Items
sso
Red Hat Single Sign-On 7.2 (Ephemeral)
provided by Red Hat, Inc.
An example RH-SSO 7 application. For more information about using th
Red Hat Single Sign-On 7.3 (Ephemeral)
provided by Red Hat, Inc.
An example application based on RH-SSO 7.3 image. For more information about us

5. Choose a template such as **Red Hat Single Sign-On 7.6 on OpenJDK (Ephemeral)**


All Items
sso
Red Hat Single Sign-On 7.2 (Ephemeral)
provided by Red Hat, Inc.
An example RH-SSO 7 application. For more information about using t
Red Hat Single Sign-On 7.3 (Ephemeral)
provided by Red Hat, Inc.
An example application based on RH-SSO 7.3 image. For more information about u
Red Hat Single Sign-On 7.3 + MySQL (Persistent)
provided by Red Hat, Inc.
An example application based on RH-SSO 7.3 image. For more information about u
Red Hat Single Sign-On 7.3 + PostgreSQL (Persistent)
provided by Red Hat, Inc.
An example application based on RH-SSO 7.3 image. For more information about u
Red Hat Single Sign-On 7.4 on OpenJDK (Ephemeral)
provided by Red Hat, Inc.
An example application based on RH-SSO 7.4 on OpenJDK image. For more informat

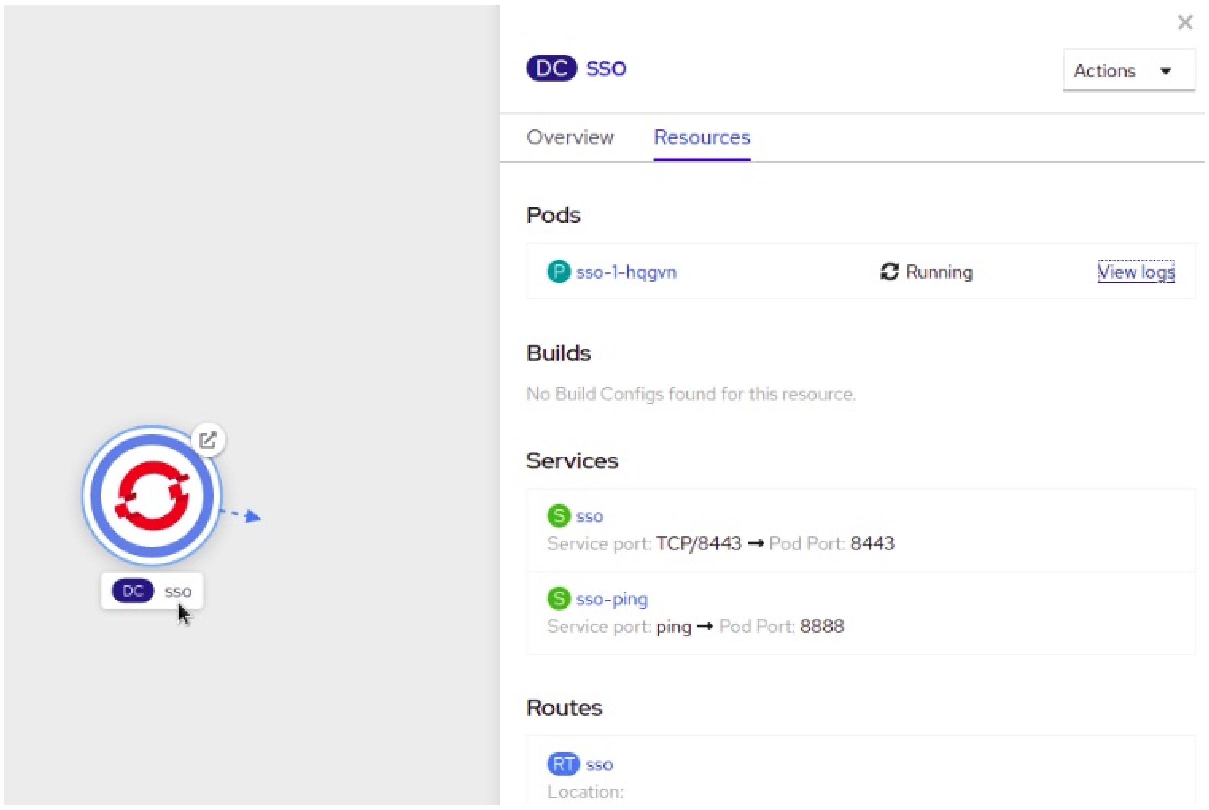
6. Click **Instantiate Template**.



An example application based on RH-SSO 7.4 on OpenJDK image. For more information about using this template, see https://github.com/jboss-container-images/redhat-sso-7-openshift-image/tree/sso74-

7. Adjust the template parameters if necessary and click **Create**.

8. Verify the Red Hat Single Sign-On for OpenShift image was deployed.



Pods

sso-1-hqgvn Running View logs

Builds

No Build Configs found for this resource.

Services

sso
Service port: TCP/8443 → Pod Port: 8443

sso-ping
Service port: ping → Pod Port: 8888

Routes

RT sso
Location:

2.3. ACCESSING THE ADMINISTRATOR CONSOLE OF THE RED HAT SINGLE SIGN-ON POD

Procedure

1. After the template is deployed, identify the available routes.

```
$ oc get routes
NAME     HOST/PORT
sso      sso-sso-app-demo.openshift.example.com
```

2. Access the Red Hat Single Sign-On Admin Console.

```
https://sso-sso-app-demo.openshift.example.com/auth/admin
```

3. Provide the login credentials for the administrator account.

CHAPTER 3. PERFORMING ADVANCED PROCEDURES

This chapter describes advanced procedures, such as setting up keystores and a truststore for the Red Hat Single Sign-On server, creating an administrator account, as well as an overview of available Red Hat Single Sign-On client registration methods, and guidance on configuring clustering.

3.1. DEPLOYING PASSTHROUGH TLS TERMINATION TEMPLATES

You can deploy using these templates. They require HTTPS, JGroups keystores and the Red Hat Single Sign-On server truststore to already exist, and therefore can be used to instantiate the Red Hat Single Sign-On server pod using your custom HTTPS, JGroups keystores and Red Hat Single Sign-On server truststore.

3.1.1. Preparing the deployment

Procedure

1. Log in to the OpenShift CLI with a user that holds the *cluster:admin* role.

2. Create a new project:

```
$ oc new-project sso-app-demo
```

3. Add the **view** role to the **default** service account. This enables the service account to view all the resources in the sso-app-demo namespace, which is necessary for managing the cluster.

```
$ oc policy add-role-to-user view system:serviceaccount:$(oc project -q):default
```

3.1.2. Creating HTTPS and JGroups Keystores, and Truststore for the Red Hat Single Sign-On Server

In this procedure, the ***openssl*** toolkit is used to generate a CA certificate to sign the HTTPS keystore, and create a truststore for the Red Hat Single Sign-On server. The ***keytool***, a package **included with the Java Development Kit**, is then used to generate self-signed certificates for these keystores.

The Red Hat Single Sign-On application templates, using re-encryption TLS termination, do not **require** or **expect** the HTTPS and JGroups keystores and Red Hat Single Sign-On server truststore to be prepared beforehand.

The re-encryption templates use OpenShift's internal Service serving certificate secrets to automatically create the HTTPS and JGroups keystores. The Red Hat Single Sign-On server truststore is also created automatically. It is pre-populated with the all known, trusted CA certificate files found in the Java system path.

NOTE

If you want to provision the Red Hat Single Sign-On server using existing HTTPS / JGroups keystores, use some of the passthrough templates instead.

Prerequisites

The Red Hat Single Sign-On application templates using passthrough TLS termination require the following to be deployed:

- An HTTPS keystore used for encryption of https traffic,
- The JGroups keystore used for encryption of JGroups communications between nodes in the cluster, and
- Red Hat Single Sign-On server truststore used for securing the Red Hat Single Sign-On requests

> **NOTE**
>
> For production environments Red Hat recommends that you use your own SSL certificate purchased from a verified Certificate Authority (CA) for SSL-encrypted connections (HTTPS).
>
> See the JBoss Enterprise Application Platform Security Guide for more information on how to create a keystore with self-signed or purchased SSL certificates.

Create the HTTPS keystore:

Procedure

1. Generate a CA certificate. Pick and remember the password. Provide identical password, when signing the certificate sign request with the CA certificate below:

```
$ openssl req -new -newkey rsa:4096 -x509 -keyout xpaas.key -out xpaas.crt -days 365 -subj
"/CN=xpaas-sso-demo.ca"
```

2. Generate a private key for the HTTPS keystore. Provide **mykeystorepass** as the keystore password:

```
$ keytool -genkeypair -keyalg RSA -keysize 2048 -dname "CN=secure-sso-sso-app-
demo.openshift.example.com" -alias jboss -keystore keystore.jks
```

3. Generate a certificate sign request for the HTTPS keystore. Provide **mykeystorepass** as the keystore password:

```
$ keytool -certreq -keyalg rsa -alias jboss -keystore keystore.jks -file sso.csr
```

4. Sign the certificate sign request with the CA certificate. Provide the same password that was used to generate the CA certificate:

```
$ openssl x509 -req -extfile  <(printf "subjectAltName=DNS:secure-sso-sso-app-
demo.openshift.example.com") -CA xpaas.crt -CAkey xpaas.key -in sso.csr -out sso.crt -days
365 -CAcreateserial
```

> **NOTE**
>
> To make the preceding command work on one line, the command includes the process substitution (**<() syntax**). Be sure that your current shell environment supports such syntax. Otherwise, you can encounter a **syntax error near unexpected token `('** message.

5. Import the CA certificate into the HTTPS keystore. Provide **mykeystorepass** as the keystore password. Reply **yes** to **Trust this certificate? [no]:** question:

   ```
   $ keytool -import -file xpaas.crt -alias xpaas.ca -keystore keystore.jks
   ```

6. Import the signed certificate sign request into the HTTPS keystore. Provide **mykeystorepass** as the keystore password:

   ```
   $ keytool -import -file sso.crt -alias jboss -keystore keystore.jks
   ```

Generate a secure key for the JGroups keystore:

Provide **password** as the keystore password:

```
$ keytool -genseckey -alias secret-key -storetype JCEKS -keystore jgroups.jceks
```

Import the CA certificate into a new Red Hat Single Sign-On server truststore:

Provide **mykeystorepass** as the truststore password. Reply **yes** to **Trust this certificate? [no]:** question:

```
$ keytool -import -file xpaas.crt -alias xpaas.ca -keystore truststore.jks
```

3.1.3. Creating secrets

Procedure

You create objects called secrets that OpenShift uses to hold sensitive information, such as passwords or keystores.

1. Create the secrets for the HTTPS and JGroups keystores, and Red Hat Single Sign-On server truststore, generated in the previous section.

   ```
   $ oc create secret generic sso-app-secret --from-file=keystore.jks --from-file=jgroups.jceks --
   from-file=truststore.jks
   ```

2. Link these secrets to the default service account, which is used to run Red Hat Single Sign-On pods.

   ```
   $ oc secrets link default sso-app-secret
   ```

Additional resources

- What is a secret?
- Default project service accounts and roles

3.1.4. Deploying a Passthrough TLS template using the OpenShift CLI

After you create keystores and secrets, deploy a passthrough TLS termination template by using the **oc** command.

3.1.4.1. oc command guidelines

In the following **oc** command, the values of ***SSO_ADMIN_USERNAME***, ***SSO_ADMIN_PASSWORD***, ***HTTPS_PASSWORD***, ***JGROUPS_ENCRYPT_PASSWORD***, and ***SSO_TRUSTSTORE_PASSWORD*** variables match the default values from the ***sso76-ocp4-https*** Red Hat Single Sign-On application template.

For production environments, Red Hat recommends that you consult the on-site policy for your organization for guidance on generating a strong user name and password for the administrator user account of the Red Hat Single Sign-On server, and passwords for the HTTPS and JGroups keystores, and the truststore of the Red Hat Single Sign-On server.

Also, when you create the template, make the passwords match the passwords provided when you created the keystores. If you used a different username or password, modify the values of the parameters in your template to match your environment.

NOTE

You can determine the alias names associated with the certificate by using the following ***keytool*** commands. The ***keytool*** is a package included with the Java Development Kit.

```
$ keytool -v -list -keystore keystore.jks | grep Alias
Enter keystore password:  mykeystorepass
Alias name: xpaas.ca
Alias name: jboss
```

```
$ keytool -v -list -keystore jgroups.jceks -storetype jceks | grep Alias
Enter keystore password:  password
Alias name: secret-key
```

The ***SSO_ADMIN_USERNAME***, ***SSO_ADMIN_PASSWORD***, and the ***SSO_REALM*** template parameters in the following command are optional.

3.1.4.2. Sample oc command

```
$ oc new-app --template=sso76-ocp4-https \
 -p HTTPS_SECRET="sso-app-secret" \
 -p HTTPS_KEYSTORE="keystore.jks" \
 -p HTTPS_NAME="jboss" \
 -p HTTPS_PASSWORD="mykeystorepass" \
 -p JGROUPS_ENCRYPT_SECRET="sso-app-secret" \
 -p JGROUPS_ENCRYPT_KEYSTORE="jgroups.jceks" \
 -p JGROUPS_ENCRYPT_NAME="secret-key" \
 -p JGROUPS_ENCRYPT_PASSWORD="password" \
 -p SSO_ADMIN_USERNAME="admin" \
 -p SSO_ADMIN_PASSWORD="redhat" \
 -p SSO_REALM="demorealm" \
 -p SSO_TRUSTSTORE="truststore.jks" \
 -p SSO_TRUSTSTORE_PASSWORD="mykeystorepass" \
 -p SSO_TRUSTSTORE_SECRET="sso-app-secret"
--> Deploying template "openshift/sso76-ocp4-https" to project sso-app-demo

     Red Hat Single Sign-On 7.6.9 (Ephemeral with passthrough TLS)
     ---------
     An example Red Hat Single Sign-On 7 application. For more information about using this
template, see https://github.com/jboss-openshift/application-templates.
```

```
    A new Red Hat Single Sign-On service has been created in your project. The admin
username/password for accessing the master realm via the Red Hat Single Sign-On console is
admin/redhat. Please be sure to create the following secrets: "sso-app-secret" containing the
keystore.jks file used for serving secure content; "sso-app-secret" containing the jgroups.jceks file
used for securing JGroups communications; "sso-app-secret" containing the truststore.jks file used
for securing Red Hat Single Sign-On requests.

    * With parameters:
      * Application Name=sso
      * Custom http Route Hostname=
      * Custom https Route Hostname=
      * Server Keystore Secret Name=sso-app-secret
      * Server Keystore Filename=keystore.jks
      * Server Keystore Type=
      * Server Certificate Name=jboss
      * Server Keystore Password=mykeystorepass
      * Datasource Minimum Pool Size=
      * Datasource Maximum Pool Size=
      * Datasource Transaction Isolation=
      * JGroups Secret Name=sso-app-secret
      * JGroups Keystore Filename=jgroups.jceks
      * JGroups Certificate Name=secret-key
      * JGroups Keystore Password=password
      * JGroups Cluster Password=yeSppLfp # generated
      * ImageStream Namespace=openshift
      * Red Hat Single Sign-On Administrator Username=admin
      * Red Hat Single Sign-On Administrator Password=redhat
      * Red Hat Single Sign-On Realm=demorealm
      * Red Hat Single Sign-On Service Username=
      * Red Hat Single Sign-On Service Password=
      * Red Hat Single Sign-On Trust Store=truststore.jks
      * Red Hat Single Sign-On Trust Store Password=mykeystorepass
      * Red Hat Single Sign-On Trust Store Secret=sso-app-secret
      * Container Memory Limit=1Gi

--> Creating resources ...
   service "sso" created
   service "secure-sso" created
   service "sso-ping" created
   route "sso" created
   route "secure-sso" created
   deploymentconfig "sso" created
--> Success
   Run 'oc status' to view your app.
```

Additional resources

- Passthrough TLS Termination

3.2. CUSTOMIZING THE HOSTNAME FOR THE RED HAT SINGLE SIGN-ON SERVER

The hostname SPI introduced a flexible way to configure the hostname for the Red Hat Single Sign-On server. The default hostname provider one is **default**. This provider provides enhanced functionality over the original **request** provider which is now deprecated. Without additional settings, it uses the request headers to determine the hostname similarly to the original **request** provider.

For configuration options of the **default** provider, refer to the Server Installation and Configuration Guide. The **frontendUrl** option can be configured via **SSO_FRONTEND_URL** environment variable.

NOTE

For backward compatibility, **SSO_FRONTEND_URL** settings is ignored if **SSO_HOSTNAME** is also set.

Another option of hostname provider is **fixed**, which allows configuring a fixed hostname. The latter makes sure that only valid hostnames can be used and allows internal applications to invoke the Red Hat Single Sign-On server through an alternative URL.

Procedure

Run the following commands to set the **fixed** hostname SPI provider for the Red Hat Single Sign-On server:

1. Deploy the Red Hat Single Sign-On for OpenShift image with ***SSO_HOSTNAME*** environment variable set to the desired hostname of the Red Hat Single Sign-On server.

```
$ oc new-app --template=sso76-ocp4-x509-https \
  -p SSO_HOSTNAME="rh-sso-server.openshift.example.com"
```

2. Identify the name of the route for the Red Hat Single Sign-On service.

```
$ oc get routes
NAME     HOST/PORT
sso      sso-sso-app-demo.openshift.example.com
```

3. Change the **host:** field to match the hostname specified as the value of the ***SSO_HOSTNAME*** environment variable above.

NOTE

Adjust the **rh-sso-server.openshift.example.com** value in the following command as necessary.

```
$ oc patch route/sso --type=json -p '[{"op": "replace", "path": "/spec/host", "value": "rh-sso-server.openshift.example.com"}]'
```

If successful, the previous command will return the following output:

```
route "sso" patched
```

3.3. CONNECTING TO AN EXTERNAL DATABASE

Red Hat Single Sign-On can be configured to connect to an external (to OpenShift cluster) database. In order to achieve this, you need to modify the **sso-{database name}** Endpoints object to point to the proper address. The procedure is described in the OpenShift manual.

The easiest way to get started is to deploy Red Hat Single Sign-On from a template and then modify the Endpoints object. You might also need to update some of the datasource configuration variables in the DeploymentConfig. Once you're done, just roll a new deployment out.

3.4. CLUSTERING

3.4.1. Configuring a JGroups discovery mechanism

Clustering in OpenShift is achieved through one of two discovery mechanisms: **Kubernetes** or **DNS**. They can be set:

- Either by configuring the JGroups protocol stack directly in the **standalone-openshift.xml** configuration file with either the **<kubernetes.KUBE_PING/>** or **<dns.DNS_PING/>** elements,
- Or by specifying the **JGROUPS_PING_PROTOCOL** environment variable which can be set to either **dns.DNS_PING** or **kubernetes.KUBE_PING**.

The OpenShift 4.x templates are configured to use the **dns.DNS_PING** mechanism with the **spec.ipFamilyPolicy** field set to **PreferDualStack** to enable dual-stack configured clusters by default . However **kubernetes.KUBE_PING** is the default option used by the image if no value is specified for the **JGROUPS_PING_PROTOCOL** environment variable.

3.4.1.1. Configuring DNS_PING on a single-stack configured cluster

For **DNS_PING** to work on **IPv4 or IPv6 single-stack cluster**, the following steps must be taken:

1. The **OPENSHIFT_DNS_PING_SERVICE_NAME** environment variable must be set to the name of the ping service for the cluster. If not set, the server will act as if it is a single-node cluster (a "cluster of one").
2. The **OPENSHIFT_DNS_PING_SERVICE_PORT** environment variables should be set to the port number on which the ping service is exposed. The **DNS_PING** protocol will attempt to discern the port from the SRV records, if it cannot discern the port, this variable will default to 8888.
3. A ping service which exposes the ping port must be defined. This service should be "headless" (ClusterIP=None) and must have the following:
   a. The port must be named for port discovery to work.
   b. The **spec.publishNotReadyAddresses** field of this service must be set to **"true"**. Omitting the setting of this boolean will result in each node forming their own "cluster of one" during startup, then merging their cluster into the other nodes' clusters after startup (as the other nodes are not detected until after they have started).

Example definition of a ping service for use with DNS_PING on a single-stack (IPv4 or IPv6) cluster

```
kind: Service
apiVersion: v1
spec:
  clusterIP: None
  ipFamilyPolicy: SingleStack
  ports:
  - name: ping
```

```
      port: 8888
    publishNotReadyAddresses: true
    selector:
      deploymentConfig: sso
  metadata:
    name: sso-ping
    annotations:
      description: "The JGroups ping port for clustering."
```

3.4.1.2. Configuring DNS_PING on a dual-stack configured cluster

Moreover, for the **DNS_PING** to work also on **dual-network clusters** that support both IPv4 and IPv6 address families, the **spec.ipFamilyPolicy** field of the ping service for the cluster must be set to **PreferDualStack** or **RequireDualStack**. This setting ensures the control plane assigns both IPv4 and IPv6 cluster IP addresses for the ping service on clusters that have dual-stack configured, enables reverse DNS lookups for both IPv4 and IPv6 IP addresses to work properly, and creates corresponding DNS SRV records for the ping headless service as illustrated below:

Example of ping service DNS SRV records on a dual-stack configured cluster with **spec.ipFamilyPolicy** matching **PreferDualStack**

```
$ host -t SRV "${OPENSHIFT_DNS_PING_SERVICE_NAME}"
sso-ping.dual-stack-demo.svc.cluster.local has SRV record 0 50 8888 10-128-0-239.sso-ping.dual-stack-demo.svc.cluster.local.
sso-ping.dual-stack-demo.svc.cluster.local has SRV record 0 50 8888 fd01-0-0-1--b8.sso-ping.dual-stack-demo.svc.cluster.local.
```

Example definition of a ping service for use with DNS_PING on dual-stack (IPv4 and IPv6) cluster

```
kind: Service
apiVersion: v1
spec:
  clusterIP: None
  ipFamilyPolicy: PreferDualStack
  ports:
  - name: ping
    port: 8888
  publishNotReadyAddresses: true
  selector:
    deploymentConfig: sso
metadata:
  name: sso-ping
  annotations:
    description: "The JGroups ping port for clustering."
```

3.4.1.3. Configuring KUBE_PING

For **KUBE_PING** to work, the following steps must be taken:

1. The **KUBERNETES_NAMESPACE** environment variable must be set. If not set, the server will act as if it is a single-node cluster (a "cluster of one").

2. The **KUBERNETES_LABELS** environment variables should be set. If not set, pods outside of your application (even if they are in your namespace) will try to join.

3. Authorization must be granted to the service account the pod is running under to be allowed to access Kubernetes' REST api. You grant authorization on the command line. Refer to the following policy commands examples:

Example 3.1. Policy commands

Using the **default** service account in the **myproject** namespace:

```
oc policy add-role-to-user view system:serviceaccount:myproject:default -n myproject
```

Using the **sso-service-account** in the **myproject** namespace:

```
oc policy add-role-to-user view system:serviceaccount:myproject:sso-service-account -n
myproject
```

NOTE

Since the **kubernetes.KUBE_PING** discovery mechanism does not require an extra ping service for the cluster, it works using the aforementioned steps on both a single-stack and a dual-stack configured clusters.

Refer to a dedicated section of JBoss EAP for OpenShift documentation to:

- Explore available environment variables to encrypt JGroups traffic
- Considerations for scaling up pods

3.5. USING CUSTOM JDBC DRIVER

To connect to any database, the JDBC driver for that database must be present and Red Hat Single Sign-On configured properly. Currently, the only JDBC driver available in the image is the PostgreSQL JDBC driver. For any other database, you need to extend the Red Hat Single Sign-On image with a custom JDBC driver and a CLI script to register it and set up the connection properties. The following steps illustrate how to do that, taking MariaDB driver as an example. Update the example for other database drivers accordingly.

Procedure

1. Create an empty directory.

2. Download the JDBC driver binaries into this directory.

3. Create a new **Dockerfile** file in this directory with the following contents. For other databases, replace **mariadb-java-client-2.5.4.jar** with the filename of the respective driver:

```
FROM rh-sso-7/sso76-openshift-rhel8:latest

COPY sso-extensions.cli /opt/eap/extensions/
COPY mariadb-java-client-2.5.4.jar /opt/eap/extensions/jdbc-driver.jar
```

4. Create a new **sso-extensions.cli** file in this directory with the following contents. Update the values of the variables in italics according to the deployment needs:

```
batch

set DB_DRIVER_NAME=mariadb
set DB_USERNAME=username
set DB_PASSWORD=password
set DB_DRIVER=org.mariadb.jdbc.Driver
set DB_XA_DRIVER=org.mariadb.jdbc.MariaDbDataSource
set DB_JDBC_URL=jdbc:mariadb://jdbc-host/keycloak
set DB_EAP_MODULE=org.mariadb

set FILE=/opt/eap/extensions/jdbc-driver.jar

module add --name=$DB_EAP_MODULE --resources=$FILE --
dependencies=javax.api,javax.resource.api
/subsystem=datasources/jdbc-driver=$DB_DRIVER_NAME:add( \
  driver-name=$DB_DRIVER_NAME, \
  driver-module-name=$DB_EAP_MODULE, \
  driver-class-name=$DB_DRIVER, \
  driver-xa-datasource-class-name=$DB_XA_DRIVER \
)
/subsystem=datasources/data-source=KeycloakDS:remove()
/subsystem=datasources/data-source=KeycloakDS:add( \
  jndi-name=java:jboss/datasources/KeycloakDS, \
  enabled=true, \
  use-java-context=true, \
  connection-url=$DB_JDBC_URL, \
  driver-name=$DB_DRIVER_NAME, \
  user-name=$DB_USERNAME, \
  password=$DB_PASSWORD \
)

run-batch
```

5. In this directory, build your image by typing the following command, replacing the **project/name:tag** with arbitrary name. **docker** can be used instead of **podman**.

```
$ podman build -t docker-registry-default/project/name:tag .
```

6. After the build finishes, push your image to the registry used by OpenShift to deploy your image. Refer to the OpenShift guide for details.

7. If you want to use this image with the custom JDBC driver that you built in the previous step with the existing Red Hat Single Sign-On OpenShift DeploymentConfig that was previously created by some Red Hat Single Sign-On OpenShift template, you need to patch the DeploymentConfig definition. Enter the following command:

```
$ oc patch dc/sso --type=json -p '[{"op": "replace", "path":
"/spec/triggers/0/imageChangeParams/from/name", "value": "sso76-openshift-rhel8-image-
with-custom-jdbc-driver:latest"}]'
"sso" patched
```

This command assumes the image stream name and tag combination of the Red Hat Single Sign-On image with the custom JDBC driver is "sso76-openshift-rhel8-image-with-custom-jdbc-driver:latest."

3.6. CREATING THE ADMINISTRATOR ACCOUNT FOR RED HAT SINGLE SIGN-ON SERVER

Red Hat Single Sign-On does not provide any pre-configured management account out of the box. This administrator account is necessary for logging into the **master** realm's management console and performing server maintenance operations such as creating realms or users or registering applications intended to be secured by Red Hat Single Sign-On.

The administrator account can be created:

- By providing values for the ***SSO_ADMIN_USERNAME*** and ***SSO_ADMIN_PASSWORD*** parameters, when deploying the Red Hat Single Sign-On application template, or
- By a remote shell session to particular Red Hat Single Sign-On pod , if the Red Hat Single Sign-On for OpenShift image is deployed without an application template.

NOTE

Red Hat Single Sign-On allows an initial administrator account to be created by the Welcome Page web form, but only if the Welcome Page is accessed from localhost; this method of administrator account creation is not applicable for the Red Hat Single Sign-On for OpenShift image.

3.6.1. Creating the Administrator Account using template parameters

When deploying Red Hat Single Sign-On application template, the ***SSO_ADMIN_USERNAME*** and ***SSO_ADMIN_PASSWORD*** parameters denote the username and password of the Red Hat Single Sign-On server's administrator account to be created for the **master** realm.

Both of these parameters are required. If not specified, they are auto generated and displayed as an OpenShift instructional message when the template is instantiated.

The lifespan of the Red Hat Single Sign-On server's administrator account depends upon the storage type used to store the Red Hat Single Sign-On server's database:

- For an in-memory database mode (***sso76-ocp3-https***, ***sso76-ocp4-https***, ***sso76-ocp3-x509-https***, and ***sso76-ocp4-x509-https*** templates), the account exists throughout the lifecycle of the particular Red Hat Single Sign-On pod (stored account data is lost upon pod destruction),
- For an ephemeral database mode (***sso76-ocp3-postgresql*** and ***sso76-ocp4-postgresql*** template), the account exists throughout the lifecycle of the database pod. Even if the Red Hat Single Sign-On pod is destructed, the stored account data is preserved under the assumption that the database pod is still running,
- For persistent database mode (***sso76-ocp3-postgresql-persistent***, ***sso76-ocp4-postgresql-persistent***, ***sso76-ocp3-x509-postgresql-persistent***, and ***sso76-ocp4-x509-postgresql-persistent*** templates), the account exists throughout the lifecycle of the persistent medium used to hold the database data. This means that the stored account data is preserved even when both the Red Hat Single Sign-On and the database pods are destructed.

It is a common practice to deploy an Red Hat Single Sign-On application template to get the corresponding OpenShift deployment config for the application, and then reuse that deployment config multiple times (every time a new Red Hat Single Sign-On application needs to be instantiated).

In the case of **ephemeral or persistent database mode**, after creating the RH_SSO server's administrator account, remove the ***SSO_ADMIN_USERNAME*** and ***SSO_ADMIN_PASSWORD*** variables from the deployment config before deploying new Red Hat Single Sign-On applications.

Procedure

Run the following commands to prepare the previously created deployment config of the Red Hat Single Sign-On application for reuse after the administrator account has been created:

1. Identify the deployment config of the Red Hat Single Sign-On application.

```
$ oc get dc -o name
deploymentconfig/sso
deploymentconfig/sso-postgresql
```

2. Clear the ***SSO_ADMIN_USERNAME*** and ***SSO_ADMIN_PASSWORD*** variables setting.

```
$ oc set env dc/sso \
  -e SSO_ADMIN_USERNAME="" \
  -e SSO_ADMIN_PASSWORD=""
```

3.6.2. Creating the Administrator Account via a remote shell session to Red Hat Single Sign-On Pod

You use the following commands to create an administrator account for the **master** realm of the Red Hat Single Sign-On server, when deploying the Red Hat Single Sign-On for OpenShift image directly from the image stream without using a template.

Prerequisite

- Red Hat Single Sign-On application pod has been started.

Procedure

1. Identify the Red Hat Single Sign-On application pod.

```
$ oc get pods
NAME                   READY     STATUS    RESTARTS   AGE
sso-12-pt93n            1/1       Running   0          1m
sso-postgresql-6-d97pf   1/1       Running   0          2m
```

2. Open a remote shell session to the Red Hat Single Sign-On for OpenShift container.

```
$ oc rsh sso-12-pt93n
sh-4.2$
```

3. Create the Red Hat Single Sign-On server administrator account for the **master** realm at the command line with the **add-user-keycloak.sh** script.

```
sh-4.2$ cd /opt/eap/bin/
```

```
sh-4.2$ ./add-user-keycloak.sh \
        -r master \
        -u sso_admin \
        -p sso_password
Added 'sso_admin' to '/opt/eap/standalone/configuration/keycloak-add-user.json', restart
server to load user
```

NOTE

The 'sso_admin' / 'sso_password' credentials in the example above are for demonstration purposes only. Refer to the password policy applicable within your organization for guidance on how to create a secure user name and password.

4. Restart the underlying JBoss EAP server instance to load the newly added user account. Wait for the server to restart properly.

```
sh-4.2$ ./jboss-cli.sh --connect ':reload'
{
    "outcome" => "success",
    "result" => undefined
}
```

WARNING

When restarting the server it is important to restart just the JBoss EAP process within the running Red Hat Single Sign-On container, and not the whole container. This is because restarting the whole container will recreate it from scratch, without the Red Hat Single Sign-On server administration account for the **master** realm.

5. Log in to the **master** realm's Admin Console of the Red Hat Single Sign-On server using the credentials created in the steps above. In the browser, navigate to **http://sso-<project-name>.<hostname>/auth/admin** for the Red Hat Single Sign-On web server, or to **https://secure-sso-<project-name>.<hostname>/auth/admin** for the encrypted Red Hat Single Sign-On web server, and specify the user name and password used to create the administrator user.

Additional resources

- Templates for use with this software

3.7. CUSTOMIZING THE DEFAULT BEHAVIOR OF THE RED HAT SINGLE SIGN-ON IMAGE

You can change the default behavior of the Red Hat Single Sign-On image such as enabling TechPreview features or enabling debugging. This section describes how to make this change by using the JAVA_OPTS_APPEND variable.

Prerequisites

This procedure assumes that the Red Hat Single Sign-On for OpenShift image has been previously deployed using one of the following templates:

- *sso76-ocp3-postgresql*
- *sso76-ocp4-postgresql*
- *sso76-ocp3-postgresql-persistent*
- *sso76-ocp4-postgresql-persistent*
- *sso76-ocp3-x509-postgresql-persistent*
- *sso76-ocp4-x509-postgresql-persistent*

Procedure

You can use the OpenShift web console or the CLI to change the default behavior.

If you use the OpenShift web console, you add the JAVA_OPTS_APPEND variable to the sso deployment config. For example, to enable TechPreview features, you set the variable as follows:

```
JAVA_OPTS_APPEND="-Dkeycloak.profile=preview"
```

If you use the CLI, use the following commands to enable TechPreview features when the Red Hat Single Sign-On pod was deployed using a template that is mentioned under Prerequisites.

1. Scale down the Red Hat Single Sign-On pod:

   ```
   $ oc get dc -o name
   deploymentconfig/sso
   deploymentconfig/sso-postgresql

   $ oc scale --replicas=0 dc sso
   deploymentconfig "sso" scaled
   ```

   NOTE

   In the preceding command, **sso-postgresql** appears because a PostgreSQL template was used to deploy the Red Hat Single Sign-On for OpenShift image.

2. Edit the deployment config to set the JAVA_OPTS_APPEND variable. For example, to enable TechPreview features, you set the variable as follows:

   ```
   $ oc env dc/sso -e "JAVA_OPTS_APPEND=-Dkeycloak.profile=preview"
   ```

3. Scale up the Red Hat Single Sign-On pod:

   ```
   $ oc scale --replicas=1 dc sso
   deploymentconfig "sso" scaled
   ```

4. Test a TechPreview feature of your choice.

3.8. DEPLOYMENT PROCESS

Once deployed, the ***sso76-ocp3-https***, ***sso76-ocp4-https*** templates and either the ***sso76-ocp3-x509-https*** or the ***sso76-ocp4-x509-https*** template create a single pod that contains both the database and the Red Hat Single Sign-On servers. The ***sso76-ocp3-postgresql***, ***sso76-ocp4-postgresql***, ***sso76-ocp3-postgresql-persistent***, ***sso76-ocp4-postgresql-persistent***, and either the ***sso76-ocp3-x509-postgresql-persistent*** or the ***sso76-ocp4-x509-postgresql-persistent*** template create two pods, one for the database server and one for the Red Hat Single Sign-On web server.

After the Red Hat Single Sign-On web server pod has started, it can be accessed at its custom configured hostnames, or at the default hostnames:

- **http://sso-*<project-name>*.*<hostname>*/auth/admin**: for the Red Hat Single Sign-On web server, and
- **https://secure-sso-*<project-name>*.*<hostname>*/auth/admin**: for the encrypted Red Hat Single Sign-On web server.

Use the administrator user credentials to log in into the **master** realm's Admin Console.

3.9. RED HAT SINGLE SIGN-ON CLIENTS

Clients are Red Hat Single Sign-On entities that request user authentication. A client can be an application requesting Red Hat Single Sign-On to provide user authentication, or it can be making requests for access tokens to start services on behalf of an authenticated user. See the Managing Clients chapter of the Red Hat Single Sign-On documentation for more information.

Red Hat Single Sign-On provides OpenID-Connect and SAML client protocols.

OpenID-Connect is the preferred protocol and uses three different access types:

- **public**: Useful for JavaScript applications that run directly in the browser and require no server configuration.
- **confidential**: Useful for server-side clients, such as EAP web applications, that need to perform a browser login.
- **bearer-only**: Useful for back-end services that allow bearer token requests.

It is required to specify the client type in the **<auth-method>** key of the application **web.xml** file. This file is read by the image at deployment. Set the value of **<auth-method>** element to:

- **KEYCLOAK** for the OpenID Connect client.
- **KEYCLOAK-SAML** for the SAML client.

The following is an example snippet for the application **web.xml** to configure an OIDC client:

```
...
<login-config>
        <auth-method>KEYCLOAK</auth-method>
</login-config>
...
```

3.9.1. Automatic and manual Red Hat Single Sign-On client registration methods

A client application can be automatically registered to an Red Hat Single Sign-On realm by using credentials passed in variables specific to the ***eap64-sso-s2i***, ***eap71-sso-s2i***, and ***datavirt63-secure-s2i*** templates.

Alternatively, you can manually register the client application by configuring and exporting the Red Hat Single Sign-On client adapter and including it in the client application configuration.

3.9.1.1. Automatic Red Hat Single Sign-On client registration

Automatic Red Hat Single Sign-On client registration is determined by Red Hat Single Sign-On environment variables specific to the ***eap64-sso-s2i***, ***eap71-sso-s2i***, and ***datavirt63-secure-s2i*** templates. The Red Hat Single Sign-On credentials supplied in the template are then used to register the client to the Red Hat Single Sign-On realm during deployment of the client application.

The Red Hat Single Sign-On environment variables included in the ***eap64-sso-s2i***, ***eap71-sso-s2i***, and ***datavirt63-secure-s2i*** templates are:

Variable	Description
HOSTNAME_HTTP	Custom hostname for http service route. Leave blank for default hostname of <application-name>.<project>.<default-domain-suffix>
HOSTNAME_HTTPS	Custom hostname for https service route. Leave blank for default hostname of <application-name>.<project>.<default-domain-suffix>
SSO_URL	The Red Hat Single Sign-On web server authentication address: https://secure-sso-*<project-name>*.*<hostname>*/auth
SSO_REALM	The Red Hat Single Sign-On realm created for this procedure.
SSO_USERNAME	The name of the *realm management user*.
SSO_PASSWORD	The password of the user.
SSO_PUBLIC_KEY	The public key generated by the realm. It is located in the **Keys** tab of the **Realm Settings** in the Red Hat Single Sign-On console.
SSO_BEARER_ONLY	If set to **true**, the OpenID Connect client is registered as bearer-only.
SSO_ENABLE_CORS	If set to **true**, the Red Hat Single Sign-On adapter enables Cross-Origin Resource Sharing (CORS).

If the Red Hat Single Sign-On client uses the SAML protocol, the following additional variables need to be configured:

Variable	Description
SSO_SAML_KEYSTORE_SECRET	Secret to use for access to SAML keystore. The default is *sso-app-secret*.
SSO_SAML_KEYSTORE	Keystore filename in the SAML keystore secret. The default is *keystore.jks*.
SSO_SAML_KEYSTORE_PASSWORD	Keystore password for SAML. The default is *mykeystorepass*.
SSO_SAML_CERTIFICATE_NAME	Alias for keys/certificate to use for SAML. The default is *jboss*.

See Example Workflow: Automatically Registering EAP Application in Red Hat Single Sign-On with OpenID-Connect Client for an end-to-end example of the automatic client registration method using an OpenID-Connect client.

3.9.1.2. Manual Red Hat Single Sign-On client registration

Manual Red Hat Single Sign-On client registration is determined by the presence of a deployment file in the client application's *../configuration/* directory. These files are exported from the client adapter in the Red Hat Single Sign-On web console. The name of this file is different for OpenID-Connect and SAML clients:

OpenID-Connect	*../configuration/secure-deployments*
SAML	*../configuration/secure-saml-deployments*

These files are copied to the Red Hat Single Sign-On adapter configuration section in the *standalone-openshift.xml* at when the application is deployed.

There are two methods for passing the Red Hat Single Sign-On adapter configuration to the client application:

- Modify the deployment file to contain the Red Hat Single Sign-On adapter configuration so that it is included in the *standalone-openshift.xml* file at deployment, or
- Manually include the OpenID-Connect *keycloak.json* file, or the SAML *keycloak-saml.xml* file in the client application's **../WEB-INF** directory.

See Example Workflow: Manually Configure an Application to Use Red Hat Single Sign-On Authentication, Using SAML Client for an end-to-end example of the manual Red Hat Single Sign-On client registration method using a SAML client.

3.10. USING RED HAT SINGLE SIGN-ON VAULT WITH OPENSHIFT SECRETS

Several fields in the Red Hat Single Sign-On administration support obtaining the value of a secret from an external vault, see Server Administration Guide. The following example shows how to set up the file-based plaintext vault in OpenShift and set it up to be used for obtaining an SMTP password.

Procedure

1. Specify a directory for the vault using the ***SSO_VAULT_DIR*** environment variable. You can introduce the ***SSO_VAULT_DIR*** environment variable directly in the environment in your deployment configuration. It can also be included in the template by addding the following snippets at the appropriate places in the template:

```
"parameters": [
   ...
   {
      "displayName": "RH-SSO Vault Secret directory",
      "description": "Path to the RH-SSO Vault directory.",
      "name": "SSO_VAULT_DIR",
      "value": "",
      "required": false
   }
   ...
]

env: [
   ...
   {
      "name": "SSO_VAULT_DIR",
      "value": "${SSO_VAULT_DIR}"
   }
   ...
]
```

NOTE

The files plaintext vault provider will be configured only when you set ***SSO_VAULT_DIR*** environment variable.

2. Create a secret in your OpenShift cluster:

```
$ oc create secret generic rhsso-vault-secrets --from-literal=master_smtp-password=mySMTPPsswd
```

3. Mount a volume to your deployment config using the **${SSO_VAULT_DIR}** as the path. For a deployment that is already running:

```
$ oc set volume dc/sso --add --mount-path=${SSO_VAULT_DIR} --secret-name=rhsso-vault-secrets
```

4. After a pod is created you can use a customized string within your Red Hat Single Sign-On configuration to refer to the secret. For example, for using **mySMTPPsswd** secret created in this tutorial, you can use **${vault.smtp-password}** within the **master** realm in the configuration of the smtp password and it will be replaced by **mySMTPPsswd** when used.

3.11. LIMITATIONS

OpenShift does not currently accept OpenShift role mapping from external providers. If Red Hat Single Sign-On is used as an authentication gateway for OpenShift, users created in Red Hat Single Sign-On must have the roles added using the OpenShift Administrator **oc adm policy** command.

For example, to allow an Red Hat Single Sign-On-created user to view a project namespace in OpenShift:

```
$ oc adm policy add-role-to-user view <user-name> -n <project-name>
```

CHAPTER 4. TUTORIALS

The tutorials in this chapter assume that you have an OpenShift instance similar to the one created by performing the installation of the OpenShift Container Platform cluster.

4.1. UPDATING A DATABASE FOR A NEW RED HAT SINGLE SIGN-ON FOR OPENSHIFT IMAGE VERSION

Note the following points related to the update:

- Rolling updates from a previous versions of Red Hat Single Sign-On for OpenShift to version 7.6.9 are not supported as databases and caches are not backward compatible.
- PostgreSQL server version 13 is required for the templates used for Red Hat Single Sign-On for OpenShift 7.6.9. If you have an obsolete PostgreSQL version, you update the PostgreSQL version before you update the database.
- Instances from versions of the Red Hat Single Sign-On for OpenShift cannot be runnng before upgrade. They cannot run concurrently against the same database.
- Pre-generated scripts are not available. They are generated dynamically depending on the database.

You have three choices for updating the database:

- If you have an obsolete PostgreSQL server version, upgrade the PostgreSQL server and then migrate the database.
- Allow Red Hat Single Sign-On 7.6.9 to automatically migrate the database schema
- Update the database manually

NOTE

By default the database is automatically migrated when you start Red Hat Single Sign-On 7.6.9 for the first time.

4.1.1. PostgreSQL version upgrade and database migration

The PostgreSQL server present in the Red Hat Single Sign-On 7.6.9 templates may be different from the previously used version. For example, consider this scenario:

- You are running a Red Hat Single Sign-On for OpenShift container image with PostgreSQL pods using version 10 of the PostgreSQL server.
- The Red Hat Single Sign-On 7.6.9 container images require the PostgreSQL pods to use version 13 of the PostgreSQL server.

The following procedure describes how to upgrade the PostgreSQL version to 13 and then migrate the database.

Procedure

1. Start by performing a database level backup.

```
$ oc rsh <POSTGRE-SQL-POD> pg_dump -C <DATABASE> rhsso_db.bak
```

2. Scale down the **sso** pod.

```
$ oc scale dc/sso --replicas=0
```

3. Edit **dc/sso-postgresql**.

```
$ oc edit dc/sso-postgresql
```

Switch **ImageStreamTag** to **:postgresql:13-el8**.

```
- imageChangeParams:
    automatic: true
    containerNames:
    - sso-postgresql
    from:
      kind: ImageStreamTag
      name: postgresql:13-el8
      namespace: openshift
```

4. Wait for the **sso-postgresql** pod to be running and stable.

5. Ensure the pod **sso-postgresql** has the correct version.

```
$ oc rsh dc/sso-postgresql /bin/bash -c "psql --version"
psql (PostgreSQL) 13.5
```

6. Unset the variable **POSTGRESQL_UPGRADE** and let the **sso-postgresql** pod deploy again.

```
$ oc set env dc/sso-postgresql POSTGRESQL_UPGRADE-
```

7. Wait again for the **sso-posgresql** pod to be running and stable.

8. Run the following commands to update the core set of Red Hat Single Sign-On 7.6.9 resources for OpenShift in the **openshift** project:
If you are using an OpenShift 3.x cluster, use these commands:

```
$ for resource in sso76-image-stream.json \
  passthrough/ocp-3.x/sso76-ocp3-https.json \
  passthrough/ocp-3.x/sso76-ocp3-postgresql.json \
  passthrough/ocp-3.x/sso76-ocp3-postgresql-persistent.json \
  reencrypt/ocp-3.x/sso76-ocp3-x509-https.json \
  reencrypt/ocp-3.x/sso76-ocp3-x509-postgresql-persistent.json
do
  oc replace -n openshift --force -f \
  https://raw.githubusercontent.com/jboss-container-images/redhat-sso-7-openshift-
image/sso76-dev/templates/${resource}
done
```

If you are using an OpenShift 4.x cluster, use these commands:

```
$ for resource in sso76-image-stream.json \
  passthrough/ocp-4.x/sso76-ocp4-https.json \
  passthrough/ocp-4.x/sso76-ocp4-postgresql.json \
  passthrough/ocp-4.x/sso76-ocp4-postgresql-persistent.json \
  reencrypt/ocp-4.x/sso76-ocp4-x509-https.json \
  reencrypt/ocp-4.x/sso76-ocp4-x509-postgresql-persistent.json
do
  oc replace -n openshift --force -f \
  https://raw.githubusercontent.com/jboss-container-images/redhat-sso-7-openshift-
image/sso76-dev/templates/${resource}
done
```

9. Run the following command to install the Red Hat Single Sign-On 7.6.9 OpenShift image streams in the **openshift** project:

```
$ oc -n openshift import-image rh-sso-7/sso76-openshift-rhel8:7.6 --
from=registry.redhat.io/rh-sso-7/sso76-openshift-rhel8:7.6 --confirm
```

10. Update the image change trigger in the existing deployment config to reference the Red Hat Single Sign-On 7.6.9 image.

```
$ oc patch dc/sso --type=json -p '[{"op": "replace", "path":
"/spec/triggers/0/imageChangeParams/from/name", "value": "sso76-openshift-rhel8:7.6"}]'
"sso" patched
```

11. Start rollout of the new Red Hat Single Sign-On 7.6.9 images based on the latest image defined in the image change triggers.

```
$ oc rollout latest dc/sso
```

12. Scale the **sso** pod back up to one replica.

NOTE

You might want to temporarily increase the Liveness and Readiness Probes thresholds and values in seconds from **dc/sso**. This step performs a Database Upgrade on the first boot, which might take a while.

```
$ oc scale --replicas=1 dc/sso
```

NOTE

If you have more than one replica, consider scaling up to a single replica. After Red Hat Single Sign-On starts, you can scale back to the original number of replicas.

4.1.2. Automatic database migration

This process assumes that you are running a previous version of the Red Hat Single Sign-On for OpenShift image, backed by a PostgreSQL database (deployed in ephemeral or persistent mode) that is running in a separate pod.

Prerequisites

- Perform the steps described in Preparing Red Hat Single Sign-On Authentication for OpenShift Deployment.

Procedure

Use the following steps to automatically migrate the database schema:

1. Identify the deployment config used to deploy the containers, running previous version of the Red Hat Single Sign-On for OpenShift image.

```
$ oc get dc -o name --selector=application=sso
deploymentconfig/sso
deploymentconfig/sso-postgresql
```

2. Stop all pods running the previous version of the Red Hat Single Sign-On for OpenShift image in the current namespace. They cannot run concurrently against the same database.

```
$ oc scale --replicas=0 dc/sso
deploymentconfig "sso" scaled
```

3. Update the image change trigger in the existing deployment config to reference the Red Hat Single Sign-On 7.6.9 image.

```
$ oc patch dc/sso --type=json -p '[{"op": "replace", "path":
"/spec/triggers/0/imageChangeParams/from/name", "value": "sso76-openshift-rhel8:7.6"}]'
"sso" patched
```

4. Start rollout of the new Red Hat Single Sign-On 7.6.9 images based on the latest image defined in the image change triggers.

```
$ oc rollout latest dc/sso
deploymentconfig "sso" rolled out
```

5. Deploy Red Hat Single Sign-On 7.6.9 containers using the modified deployment config.

```
$ oc scale --replicas=1 dc/sso
deploymentconfig "sso" scaled
```

6. (Optional) Verify the database has been successfully updated.

```
$ oc get pods --selector=application=sso
NAME                     READY     STATUS    RESTARTS   AGE
sso-4-vg21r              1/1       Running   0          1h
sso-postgresql-1-t871r   1/1       Running   0          2h
```

```
$ oc logs sso-4-vg21r | grep 'Updating'
11:23:45,160 INFO
[org.keycloak.connections.jpa.updater.liquibase.LiquibaseJpaUpdaterProvider]
(ServerService Thread Pool -- 58) Updating database. Using changelog META-INF/jpa-
changelog-master.xml
```

4.1.3. Manual database migration

The database migration process updates the data schema and performs manipulation of the data. This process also stops all pods running the previous version of the Red Hat Single Sign-On for OpenShift image before dynamic generation of the SQL migration file.

NOTE

This process assumes that you are running a previous version of the Red Hat Single Sign-On for OpenShift image that is backed by a PostgreSQL database (deployed in ephemeral or persistent mode) and is running on a separate pod.

Procedure

Prepare your environment for script generation.

1. Configure Red Hat Single Sign-On 7.6.9 with the correct datasource,

2. Set the following configuration options in the **standalone-openshift.xml** file:

   a. **initializeEmpty=false**,

   b. **migrationStrategy=manual**, and

   c. **migrationExport** to the location on the file system of the pod, where the output SQL migration file should be stored (for example, **migrationExport="${jboss.home.dir}/keycloak-database-update.sql"**).

Additional resources

- Database configuration

Procedure

Perform the following to generate the SQL migration file for the database:

1. Prepare template of OpenShift database migration job to generate the SQL file.

```
$ cat job-to-migrate-db-to-sso76.yaml.orig
apiVersion: batch/v1
kind: Job
metadata:
  name: job-to-migrate-db-to-sso76
spec:
  autoSelector: true
  parallelism: 0
  completions: 1
  template:
    metadata:
      name: job-to-migrate-db-to-sso76
    spec:
      containers:
      - env:
        - name: DB_SERVICE_PREFIX_MAPPING
          value: <<DB_SERVICE_PREFIX_MAPPING_VALUE>>
        - name: <<PREFIX>>_JNDI
          value: <<PREFIX_JNDI_VALUE>>
        - name: <<PREFIX>>_USERNAME
```

```
            value: <<PREFIX_USERNAME_VALUE>>
          - name: <<PREFIX>>_PASSWORD
            value: <<PREFIX_PASSWORD_VALUE>>
          - name: <<PREFIX>>_DATABASE
            value: <<PREFIX_DATABASE_VALUE>>
          - name: TX_DATABASE_PREFIX_MAPPING
            value: <<TX_DATABASE_PREFIX_MAPPING_VALUE>>
          - name: <<SERVICE_HOST>>
            value: <<SERVICE_HOST_VALUE>>
          - name: <<SERVICE_PORT>>
            value: <<SERVICE_PORT_VALUE>>
          image: <<SSO_IMAGE_VALUE>>
          imagePullPolicy: Always
          name: job-to-migrate-db-to-sso76
          # Keep the pod running after the SQL migration
          # file was generated, so we can retrieve it
          command:
            - "/bin/bash"
            - "-c"
            - "/opt/eap/bin/openshift-launch.sh || sleep 600"
        restartPolicy: Never
```

```
$ cp job-to-migrate-db-to-sso76.yaml.orig \
    job-to-migrate-db-to-sso76.yaml
```

2. From deployment config used to run the previous version of the Red Hat Single Sign-On for OpenShift image, copy the datasource definition and database access credentials to appropriate places of the template of the database migration job.
   Use the following script to copy **DB_SERVICE_PREFIX_MAPPING** and **TX_DATABASE_PREFIX_MAPPING** variable values, together with values of environment variables specific to particular datasource (**<PREFIX>_JNDI**, **<PREFIX>_USERNAME**, **<PREFIX>_PASSWORD**, and **<PREFIX>_DATABASE**) from the deployment config named **sso** to the database job migration template named **job-to-migrate-db-to-sso76.yaml**.

NOTE

Although the **DB_SERVICE_PREFIX_MAPPING** environment variable allows a comma-separated list of **<name>-<database_type>=<PREFIX>** triplets as its value, this example script accepts only one datasource triplet definition for demonstration purposes. You can modify the script for handling multiple datasource definition triplets.

```
$ cat mirror_sso_dc_db_vars.sh
#!/bin/bash

# IMPORTANT:
#
# If the name of the SSO deployment config differs from 'sso'
# or if the file name of the YAML definition of the migration
# job is different, update the following two variables
SSO_DC_NAME="sso"
JOB_MIGRATION_YAML="job-to-migrate-db-to-sso76.yaml"

# Get existing variables of the $SSO_DC_NAME deployment config
# in an array
declare -a SSO_DC_VARS=( \
  $(oc set env dc/${SSO_DC_NAME} --list \
  | sed '/^#/d') \
)

# Get the PREFIX used in the names of environment variables
PREFIX=$( \
  grep -oP 'DB_SERVICE_PREFIX_MAPPING=[^ ]+' \
  <<< "${SSO_DC_VARS[@]}" \
)
PREFIX=${PREFIX##*=}

# Substitute:
# * <<PREFIX>> with actual $PREFIX value and
# * <<PREFIX with "<<$PREFIX" value
# The order in which these replacements are made is important!
sed -i "s#<<PREFIX>>#${PREFIX}#g" ${JOB_MIGRATION_YAML}
sed -i "s#<<PREFIX#<<${PREFIX}#g" ${JOB_MIGRATION_YAML}

# Construct the array of environment variables
# specific to the datasource
declare -a DB_VARS=(JNDI USERNAME PASSWORD DATABASE)

# Prepend $PREFIX to each item of the datasource array
DB_VARS=( "${DB_VARS[@]/#/${PREFIX}_}" )

# Add DB_SERVICE_PREFIX_MAPPING and TX_DATABASE_PREFIX_MAPPING
# variables to datasource array
DB_VARS=( \
  "${DB_VARS[@]}" \
  DB_SERVICE_PREFIX_MAPPING \
  TX_DATABASE_PREFIX_MAPPING \
)

# Construct the SERVICE from DB_SERVICE_PREFIX_MAPPING
SERVICE=$( \
  grep -oP 'DB_SERVICE_PREFIX_MAPPING=[^ ]' \
  <<< "${SSO_DC_VARS[@]}" \
)
SERVICE=${SERVICE#*=}
SERVICE=${SERVICE%=*}
SERVICE=${SERVICE^^}
SERVICE=${SERVICE//-/_}

# If the deployment config contains <<SERVICE>>_SERVICE_HOST
# and <<SERVICE>>_SERVICE_PORT variables, add them to the
# datasource array. Their values also need to be propagated into
# yaml definition of the migration job.
HOST_PATTERN="${SERVICE}_SERVICE_HOST=[^ ]"
PORT_PATTERN="${SERVICE}_SERVICE_PORT=[^ ]"
if
  grep -Pq "${HOST_PATTERN}" <<< "${SSO_DC_VARS[@]}" &&
  grep -Pq "${PORT_PATTERN}" <<< "${SSO_DC_VARS[@]}"
then
  DB_VARS=( \
    "${DB_VARS[@]}" \
    "${SERVICE}_SERVICE_HOST" \
    "${SERVICE}_SERVICE_PORT" \
  )
# If they are not defined, delete their placeholder rows in
# yaml definition file (since if not defined they are not
# expanded which make the yaml definition invalid).
else
  for KEY in "HOST" "PORT"
  do
    sed -i "/SERVICE_${KEY}/d" ${JOB_MIGRATION_YAML}
  done
fi

# Substitute:
# * <<SERVICE_HOST>> with ${SERVICE}_SERVICE_HOST and
# * <<SERVICE_HOST_VALUE>> with <<${SERVICE}_SERVICE_HOST_VALUE>>
# The order in which replacements are made is important!
# Do this for both "HOST" and "PORT"
for KEY in "HOST" "PORT"
do
  PATTERN_1="<<SERVICE_${KEY}>>"
  REPL_1="${SERVICE}_SERVICE_${KEY}"
  sed -i "s#${PATTERN_1}#${REPL_1}#g" ${JOB_MIGRATION_YAML}
  PATTERN_2="<<SERVICE_${KEY}_VALUE>>"
  REPL_2="<<${SERVICE}_SERVICE_${KEY}_VALUE>>"
  sed -i "s#${PATTERN_2}#${REPL_2}#g" ${JOB_MIGRATION_YAML}
done

# Propagate the values of the datasource array items into
# yaml definition of the migration job
for VAR in "${SSO_DC_VARS[@]}"
do
  IFS=$'=' read KEY VALUE <<< $VAR
  if grep -q $KEY <<< ${DB_VARS[@]}
  then
    KEY+="_VALUE"
    # Enwrap integer port value with double quotes
    if [[ ${KEY} =~ ${SERVICE}_SERVICE_PORT_VALUE ]]
    then
      sed -i "s#<<${KEY}>>#\"${VALUE}\"#g" ${JOB_MIGRATION_YAML}
    # Character values do not need quotes
    else
      sed -i "s#<<${KEY}>>#${VALUE}#g" ${JOB_MIGRATION_YAML}
    fi
    # Verify that the value has been successfully propagated.
    if
      grep -q '(JNDI|USERNAME|PASSWORD|DATABASE)' <<< "${KEY}" &&
      grep -q "<<PREFIX${KEY#${PREFIX}}" ${JOB_MIGRATION_YAML} ||
      grep -q "<<${KEY}>>" ${JOB_MIGRATION_YAML}
    then
      echo "Failed to update value of ${KEY%_VALUE}! Aborting."
      exit 1
    else
      printf '%-60s%-40s\n' \
           "Successfully updated ${KEY%_VALUE} to:" \
              "$VALUE"
    fi
  fi
done
```

Run the script.

```
$ chmod +x ./mirror_sso_dc_db_vars.sh
$ ./mirror_sso_dc_db_vars.sh
Successfully updated DB_SERVICE_PREFIX_MAPPING to:        sso-postgresql=DB
Successfully updated DB_JNDI to:                          java:jboss/datasources/KeycloakDS
Successfully updated DB_USERNAME to:                      userxOp
Successfully updated DB_PASSWORD to:                      tsWNhQHK
Successfully updated DB_DATABASE to:                      root
Successfully updated TX_DATABASE_PREFIX_MAPPING to:       sso-postgresql=DB
```

3. Build the Red Hat Single Sign-On 7.6.9 database migration image using the pre-configured source and wait for the build to finish.

```
$ oc get is -n openshift | grep sso76 | cut -d ' ' -f1
sso76-openshift-rhel8
```

```
$ oc new-build sso76-openshift-rhel8:7.6~https://github.com/iankko/openshift-
examples.git#KEYCLOAK-8500 \
  --context-dir=sso-manual-db-migration \
  --name=sso76-db-migration-image
--> Found image bf45ac2 (7 days old) in image stream "openshift/sso76-openshift-rhel8"
under tag "7.6" for "sso76-openshift-rhel8:7.6"

    Red Hat SSO 7.6.9
    ---------------
    Platform for running Red Hat SSO

    Tags: sso, sso7, keycloak

    * A source build using source code from https://github.com/iankko/openshift-
examples.git#KEYCLOAK-8500 will be created
      * The resulting image will be pushed to image stream "sso76-db-migration-image:latest"
      * Use 'start-build' to trigger a new build

--> Creating resources with label build=sso76-db-migration-image ...
    imagestream "sso76-db-migration-image" created
    buildconfig "sso76-db-migration-image" created
--> Success
    Build configuration "sso76-db-migration-image" created and build triggered.
    Run 'oc logs -f bc/sso76-db-migration-image' to stream the build progress.
```

```
$ oc logs -f bc/sso76-db-migration-image --follow
Cloning "https://github.com/iankko/openshift-examples.git#KEYCLOAK-8500" ...
...
Push successful
```

4. Update the template of the database migration job (**job-to-migrate-db-to-sso76.yaml**) with reference to the built **sso76-db-migration-image** image.

a. Get the docker pull reference for the image.

```
$ PULL_REF=$(oc get istag -n $(oc project -q) --no-headers | grep sso76-db-migration-image | tr -s ' ' | cut -d ' ' -f 2)
```

b. Replace the <<SSO_IMAGE_VALUE>> field in the job template with the pull specification.

```
$ sed -i "s#<<SSO_IMAGE_VALUE>>#$PULL_REF#g" job-to-migrate-db-to-sso76.yaml
```

c. Verify that the field is updated.

5. Instantiate database migration job from the job template.

```
$ oc create -f job-to-migrate-db-to-sso76.yaml
job "job-to-migrate-db-to-sso76" created
```

IMPORTANT

The database migration process handles the data schema update and performs manipulation of the data, therefore, stop all pods running the previous version of the Red Hat Single Sign-On for OpenShift image before dynamic generation of the SQL migration file.

6. Identify the deployment config used to deploy the containers, running previous version of the Red Hat Single Sign-On for OpenShift image.

```
$ oc get dc -o name --selector=application=sso
deploymentconfig/sso
deploymentconfig/sso-postgresql
```

7. Stop all pods running the previous version of the Red Hat Single Sign-On for OpenShift image in the current namespace.

```
$ oc scale --replicas=0 dc/sso
deploymentconfig "sso" scaled
```

8. Run the database migration job and wait for the pod to be running correctly.

```
$ oc get jobs
NAME                         DESIRED   SUCCESSFUL   AGE
job-to-migrate-db-to-sso76   1         0            3m
```

```
$ oc scale --replicas=1 job/job-to-migrate-db-to-sso76
job "job-to-migrate-db-to-sso76" scaled
```

```
$ oc get pods
NAME                               READY     STATUS      RESTARTS   AGE
sso-postgresql-1-n5p16             1/1       Running     1          19h
job-to-migrate-db-to-sso76-b87bb   1/1       Running     0          1m
sso76-db-migration-image-1-build   0/1       Completed   0          27m
```

NOTE

By default, the database migration job terminates automatically after **600 seconds** after the migration file is generated. You can adjust this time period.

9. Get the dynamically generated SQL database migration file from the pod.

```
$ mkdir -p ./db-update
$ oc rsync job-to-migrate-db-to-sso76-b87bb:/opt/eap/keycloak-database-update.sql ./db-update
receiving incremental file list
keycloak-database-update.sql

sent 30 bytes  received 29,726 bytes  59,512.00 bytes/sec
total size is 29,621  speedup is 1.00
```

10. Inspect the **keycloak-database-update.sql** file for changes to be performed within manual database update to Red Hat Single Sign-On 7.6.9 version.

11. Apply the database update manually.

    - Run the following commands if running some previous version of the Red Hat Single Sign-On for OpenShift image, backed by the PostgreSQL database deployed in ephemeral or persistent mode, running on a separate pod:

        i. Copy the generated SQL migration file to the PostgreSQL pod.

        ```
        $ oc rsync --no-perms=true ./db-update/ sso-postgresql-1-n5p16:/tmp
        sending incremental file list

        sent 77 bytes  received 11 bytes  176.00 bytes/sec
        total size is 26,333  speedup is 299.24
        ```

        ii. Start a shell session to the PostgreSQL pod.

        ```
        $ oc rsh sso-postgresql-1-n5p16
        sh-4.2$
        ```

        iii. Use the **psql** tool to apply database update manually.

        ```
        sh-4.2$ alias psql="/opt/rh/rh-postgresql95/root/bin/psql"
        sh-4.2$ psql --version
        psql (PostgreSQL) 9.5.4
        sh-4.2$ psql -U <PREFIX>_USERNAME -d <PREFIX>_DATABASE -W -f /tmp/keycloak-database-update.sql
        Password for user <PREFIX>_USERNAME:
        INSERT 0 1
        INSERT 0 1
        ...
        ```

IMPORTANT

Replace **<PREFIX>_USERNAME** and **<PREFIX>_DATABASE** with the actual database credentials retrieved in previous section . Also use value of **<PREFIX>_PASSWORD** as the password for the database, when prompted.

iv. Close the shell session to the PostgreSQL pod. Continue with updating image change trigger step.

12. Update the image change trigger in the existing deployment config to reference the Red Hat Single Sign-On 7.6.9 image.

```
$ oc patch dc/sso --type=json -p '[{"op": "replace", "path":
"/spec/triggers/0/imageChangeParams/from/name", "value": "sso76-openshift-rhel8:7.6"}]'
"sso" patched
```

13. Start rollout of the new Red Hat Single Sign-On 7.6.9 images based on the latest image defined in the image change triggers.

```
$ oc rollout latest dc/sso
deploymentconfig "sso" rolled out
```

14. Deploy the Red Hat Single Sign-On 7.6.9 containers using the modified deployment config.

```
$ oc scale --replicas=1 dc/sso
deploymentconfig "sso" scaled
```

4.2. MIGRATING THE RED HAT SINGLE SIGN-ON SERVER'S DATABASE ACROSS ENVIRONMENTS

This tutorial focuses on migrating the Red Hat Single Sign-On server database from one environment to another or migrating to a different database.

Export and import of Red Hat Single Sign-On 7.6.9 database is triggered at Red Hat Single Sign-On server boot time and its parameters are passed in via Java system properties. This means during one Red Hat Single Sign-On server boot, only one of the possible migration actions, ***export*** or ***import***, is performed.

4.2.1. Deploying the Red Hat Single Sign-On PostgreSQL application template

Prerequisites

- The steps described in the Preparing Red Hat Single Sign-On Authentication for OpenShift Deployment section have been performed already.

Procedure

1. Log in to the OpenShift web console and select the **sso-app-demo** project space.

2. Click **Add to project** to list the default image streams and templates.

3. Use the **Filter by keyword** search bar to limit the list to those that match *sso*. You may need to click **See all** to show the desired application template.

4. Select ***sso76-ocp4-postgresql*** Red Hat Single Sign-On application template. When deploying the template ensure to **keep the *SSO_REALM* variable unset** (default value).

   > **WARNING**
   >
   > When the ***SSO_REALM*** configuration variable is set on the Red Hat Single Sign-On for OpenShift image, a database import is performed in order to create the Red Hat Single Sign-On server realm requested in the variable. For the database export to be performed correctly, the ***SSO_REALM*** configuration variable cannot be simultaneously defined on such image.

5. Click **Create** to deploy the application template and start pod deployment. This may take a couple of minutes.
   Then access the Red Hat Single Sign-On web console at **https://secure-sso-*<sso-app-demo>*.*<openshift32.example.com>*/auth/admin** using the administrator account.

   > **NOTE**
   >
   > This example workflow uses a self-generated CA to provide an end-to-end workflow for demonstration purposes. Accessing the Red Hat Single Sign-On web console will prompt an insecure connection warning.
   > For production environments, Red Hat recommends that you use an SSL certificate purchased from a verified Certificate Authority.

Additional resources

- Importing and exporting the database

4.2.2. (Optional) Creating additional realms and users to be exported

When performing Red Hat Single Sign-On 7.6.9 server database export, only realms and users currently in the database are exported. If the exported JSON file should include also additional Red Hat Single Sign-On realms and users, these need to be created. Use these procedures.

1. Create a realm

2. Create a user

Upon their creation, the database can be exported.

Additional resources

- Importing and exporting the database

4.2.3. Export the Red Hat Single Sign-On database as a JSON file on the OpenShift pod

Prerequisites

- New realms and users are created.

Procedure

1. Get the Red Hat Single Sign-On deployment config and scale it down to zero.

```
$ oc get dc -o name
deploymentconfig/sso
deploymentconfig/sso-postgresql

$ oc scale --replicas=0 dc sso
deploymentconfig "sso" scaled
```

2. Instruct the Red Hat Single Sign-On 7.6.9 server deployed on Red Hat Single Sign-On for OpenShift image to perform database export at Red Hat Single Sign-On server boot time.

```
$ oc set env dc/sso \
  -e "JAVA_OPTS_APPEND= \
    -Dkeycloak.migration.action=export \
    -Dkeycloak.migration.provider=singleFile \
    -Dkeycloak.migration.file=/tmp/demorealm-export.json"
```

3. Scale the Red Hat Single Sign-On deployment config back up. This will start the Red Hat Single Sign-On server and export its database.

```
$ oc scale --replicas=1 dc sso
deploymentconfig "sso" scaled
```

4. (Optional) Verify that the export was successful.

```
$ oc get pods
NAME                    READY     STATUS    RESTARTS   AGE
sso-4-ejr0k             1/1       Running   0          27m
sso-postgresql-1-ozzl0  1/1       Running   0          4h

$ oc logs sso-4-ejr0k | grep 'Export'
09:24:59,503 INFO  [org.keycloak.exportimport.singlefile.SingleFileExportProvider]
(ServerService Thread Pool -- 57) Exporting model into file /tmp/demorealm-export.json
09:24:59,998 INFO  [org.keycloak.services] (ServerService Thread Pool -- 57) KC-
SERVICES0035: Export finished successfully
```

4.2.4. Retrieve and import the exported JSON file

Procedure

1. Retrieve the JSON file of the Red Hat Single Sign-On database from the pod.

```
$ oc get pods
NAME                    READY     STATUS    RESTARTS   AGE
sso-4-ejr0k             1/1       Running   0          2m
```

```
sso-postgresql-1-ozzl0   1/1       Running   0          4h

$ oc rsync sso-4-ejr0k:/tmp/demorealm-export.json .
```

2. (Optional) Import the JSON file of the Red Hat Single Sign-On database into an Red Hat Single Sign-On server running in another environment.

   NOTE

   For importing into an Red Hat Single Sign-On server not running on OpenShift, see the Importing and exporting the database.

   When the Red Hat Single Sign-On server is running as a Red Hat Single Sign-On 7.6.9 container on OpenShift, use the Admin Console Export/Import function to import the resources from a previously exported JSON file into the Red Hat Single Sign-On server's database.

   a. Log into the **master** realm's Admin Console of the Red Hat Single Sign-On server using the credentials used to create the administrator user. In the browser, navigate to **http://sso-<project-name>.<hostname>/auth/admin** for the Red Hat Single Sign-On web server, or to **https://secure-sso-<project-name>.<hostname>/auth/admin** for the encrypted Red Hat Single Sign-On web server.

   b. At the top of the sidebar choose the name of the Red Hat Single Sign-On realm, the users, clients, realm roles, and client roles should be imported to. This example uses **master** realm.

   c. Click the **Import** link under **Manage** section at the bottom of the sidebar.

   d. In the page that opens, click **Select file** and then specify the location of the exported **demorealm-export.json** JSON file on the local file system.

   e. From the **Import from realm** drop-down menu, select the name of the Red Hat Single Sign-On realm from which the data should be imported. This example uses **master** realm.

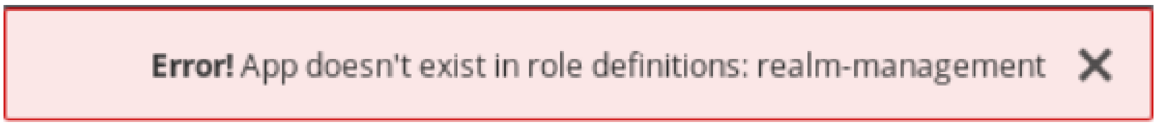
   f. Choose which of users, clients, realm roles, and client roles should be imported (all of them are imported by default).

   g. Choose a strategy to perform, when a resource already exists (one of **Fail**, **Skip**, or **Overwrite**).

      NOTE

      The attempt to import an object (user, client, realm role, or client role) fails if object with the same identifier already exists in the current database. Use **Skip** strategy to import the objects that are present in the **demorealm-export.json** file, but do not exist in current database.

   h. Click **Import** to perform the import.
      When importing objects from a non-master realm to **master** realm or vice versa, after clicking the **Import** button, it is sometimes possible to encounter an error like the following one:



Error! App doesn't exist in role definitions: realm-management ✕

In such cases, it is necessary first to create the missing clients, having the **Access Type** set to **bearer-only**. These clients can be created by manual copy of their characteristics from the source Red Hat Single Sign-On server, on which the export JSON file was created, to the target Red Hat Single Sign-On server, where the JSON file is imported. After creation of the necessary clients, click the **Import** button again.

To suppress the above error message, it is needed to create the missing **realm-management** client, of the **bearer-only Access Type**, and click the **Import** button again.

For **Skip** import strategy, the newly added objects are marked as **ADDED** and the object which were skipped are marked as **SKIPPED**, in the **Action** column on the import result page.

The Admin Console import allows you to **overwrite** resources if you choose (**Overwrite** strategy). On a production system use this feature with caution.

4.3. CONFIGURING OPENSHIFT 3.11 TO USE RED HAT SINGLE SIGN-ON FOR AUTHENTICATION

Configure OpenShift 3.11 to use the Red Hat Single Sign-On deployment as the authorization gateway for OpenShift.

This example adds Red Hat Single Sign-On as an authentication method alongside the identity providers configured during the installation of the OpenShift Container Platform cluster. Once configured, the Red Hat Single Sign-On method will be also available (together with the configured identity providers) for the user login to your OpenShift web console.

Additional resources

- Identity providers
- Installation of the OpenShift Container Platform cluster

4.3.1. Configuring Red Hat Single Sign-On Credentials

Prerequisites

- The steps described in the Preparing Red Hat Single Sign-On Authentication for OpenShift Deployment section have been performed already.

Procedure

Log in to the encrypted Red Hat Single Sign-On web server at **https://secure-sso-sso-app-*demo.openshift32.example.com*/auth/admin** using the xref:sso-administrator-setup[administrator account created during the Red Hat Single Sign-On deployment.

Create a Realm

1. Hover your cursor over the realm namespace (default is **Master**) at the top of the sidebar and click **Add Realm**.
2. Enter a realm name (this example uses *OpenShift*) and click **Create**.

Create a User

Create a test user that can be used to demonstrate the Red Hat Single Sign-On-enabled OpenShift login:

1. Click **Users** in the **Manage** sidebar to view the user information for the realm.
2. Click **Add User**.
3. Enter a valid **Username** (this example uses *testuser*) and any additional optional information and click **Save**.
4. Edit the user configuration:
   a. Click the **Credentials** tab in the user space and enter a password for the user.
   b. Ensure the **Temporary Password** option is set to **Off** so that it does not prompt for a password change later on, and click **Reset Password** to set the user password. A pop-up window prompts for additional confirmation.

Create and Configure an OpenID-Connect Client

1. Click **Clients** in the **Manage** sidebar and click **Create**.
2. Enter the **Client ID**. This example uses *openshift-demo*.
3. Select a **Client Protocol** from the drop-down menu (this example uses **openid-connect**) and click **Save**. You will be taken to the configuration **Settings** page of the *openshift-demo* client.
4. From the **Access Type** drop-down menu, select **confidential**. This is the access type for server-side applications.
5. In the **Valid Redirect URIs** dialog, enter the URI for the OpenShift web console, which is *https://openshift.example.com:8443/** in this example.

The client **Secret** is needed to configure OpenID-Connect on the OpenShift master in the next section. You can copy it now from under the **Credentials** tab. The secret is *<7b0384a2-b832-16c5-9d73-2957842e89h7>* for this example.

Additional resources

- Managing OpenID Connect and SAML Clients

4.3.2. Configuring OpenShift Master for Red Hat Single Sign-On authentication

Log in to the OpenShift master CLI.

Prerequisites

You must have the permissions to edit the **/etc/origin/master/master-config.yaml** file.

Procedure

1. Edit the **/etc/origin/master/master-config.yaml** file and find the **identityProviders** section. For example, in the case the OpenShift master is configured with the HTPassword identity provider, the **identityProviders** section will look similar to the following one:

```
identityProviders:
- challenge: true
```

```
  login: true
  name: htpasswd_auth
  provider:
    apiVersion: v1
    file: /etc/origin/openshift-passwd
    kind: HTPasswdPasswordIdentityProvider
```

Add Red Hat Single Sign-On as a secondary identity provider with content similar to the following snippet:

```
- name: rh_sso
  challenge: false
  login: true
  mappingMethod: add
  provider:
    apiVersion: v1
    kind: OpenIDIdentityProvider
    clientID: openshift-demo
    clientSecret: 7b0384a2-b832-16c5-9d73-2957842e89h7
    ca: xpaas.crt
    urls:
      authorize: https://secure-sso-sso-app-
demo.openshift32.example.com/auth/realms/OpenShift/protocol/openid-connect/auth
      token: https://secure-sso-sso-app-
demo.openshift32.example.com/auth/realms/OpenShift/protocol/openid-connect/token
      userInfo: https://secure-sso-sso-app-
demo.openshift32.example.com/auth/realms/OpenShift/protocol/openid-connect/userinfo
    claims:
      id:
      - sub
      preferredUsername:
      - preferred_username
      name:
      - name
      email:
      - email
```

a. The Red Hat Single Sign-On **Secret** hash for the **clientSecret** can be found in the Red Hat Single Sign-On web console: **Clients → *openshift-demo* → Credentials**

b. The endpoints for the **urls** can be found by making a request with the Red Hat Single Sign-On application. For example:

```
<curl -k https://secure-sso-sso-app-
demo.openshift32.example.com/auth/realms/OpenShift/.well-known/openid-configuration
| python -m json.tool>
```

The response includes the **authorization_endpoint**, **token_endpoint**, and **userinfo_endpoint**.

c. This example workflow uses a self-generated CA to provide an end-to-end workflow for demonstration purposes. For this reason, the **ca** is provided as < *ca: xpaas.crt*>. This CA certificate must also be copied into the **/etc/origin/master** folder. This is not necessary if using a certificate purchased from a verified Certificate Authority.

2. Save the configuration and restart the OpenShift master:

```
$ systemctl restart atomic-openshift-master
```

4.3.3. Logging in to OpenShift

Procedure

1. Navigate to the OpenShift web console, which in this example is *https://openshift.example.com:8443/console*.
   The OpenShift login page now offers the options to log in either using **htpasswd_auth** or **rh-sso** identity providers? The former is still available because it is present in the **/etc/origin/master/master-config.yaml**.

2. Select **rh-sso** and log in to OpenShift with the *testuser* user created earlier in Red Hat Single Sign-On.
   No projects are visible to *testuser* until they are added in the OpenShift CLI. This is the only way to provide user privileges in OpenShift because it currently does not accept external role mapping.

3. To provide *testuser* **view** privileges for the **sso-app-demo**, use the OpenShift CLI:

   ```
   $ oc adm policy add-role-to-user view testuser -n sso-app-demo
   ```

4.4. CREATING AN OPENSHIFT APPLICATION FROM MAVEN BINARIES AND SECURING IT USING RED HAT SINGLE SIGN-ON

To deploy existing applications on OpenShift, you can use the binary source capability.

4.4.1. Deploy Binary Build of EAP 6.4 / 7.1 JSP Service Invocation Application and Secure it Using Red Hat Single Sign-On

The following example uses both app-jee-jsp and service-jee-jaxrs quickstarts to deploy EAP 6.4 / 7.1 JSP service application that authenticates using the Red Hat Single Sign-On.

Prerequisites

- The Red Hat Single Sign-On for OpenShift image has been previously deployed using one of the following templates:
- *sso76-ocp3-postgresql*
- *sso76-ocp3-postgresql-persistent*
- *sso76-ocp3-x509-postgresql-persistent*
- *sso76-ocp4-postgresql*
- *sso76-ocp4-postgresql-persistent*
- *sso76-ocp4-x509-postgresql-persistent*

4.4.1.1. Create Red Hat Single Sign-On Realm, Roles, and User for the EAP 6.4 / 7.1 JSP Application

The EAP 6.4 / 7.1 JSP service application requires dedicated Red Hat Single Sign-On realm, username, and password to be able to authenticate using Red Hat Single Sign-On. Perform the following steps after the Red Hat Single Sign-On for OpenShift image has been deployed:

Create the Red Hat Single Sign-On Realm

1. Login to the Admin Console of the Red Hat Single Sign-On server.
   https://secure-sso-sso-app-demo.openshift.example.com/auth/admin

   Use the credentials of the Red Hat Single Sign-On administrator user .

2. Hover your cursor over the realm namespace (default is **Master**) at the top of the sidebar and click **Add Realm**.

3. Enter a realm name (this example uses **demo**) and click **Create**.

Copy the Public Key

In the newly created **demo** realm, click the **Keys** tab, then select **Active** tab, and copy the public key of type **RSA** that has been generated.

NOTE

The Red Hat Single Sign-On for OpenShift image version 7.6.9 generates multiple keys by default, for example **HS256**, **RS256**, or **AES**. To copy the public key information for the Red Hat Single Sign-On for OpenShift 7.6.9 image, click the **Keys** tab, then select **Active** tab, and click the **Public key** button of that row in the keys table, where type of the key matches **RSA**. Then select and copy the content of the pop-up window that appears.

The information about the public key is necessary later to deploy the Red Hat Single Sign-On-enabled EAP 6.4 / 7.1 JSP application.

Create Red Hat Single Sign-On Roles

The service-jee-jaxrs quickstart exposes three endpoints by the service:

- **public** - Requires no authentication.
- **secured** - Can be invoked by users with the **user** role.
- **admin** - Can be invoked by users with the **admin** role.

Create **user** and **admin** roles in Red Hat Single Sign-On. These roles will be assigned to an Red Hat Single Sign-On application user to authenticate access to user applications.

1. Click **Roles** in the **Configure** sidebar to list the roles for this realm.

   NOTE

   This is a new realm, so there should only be the default (**offline_access** and **uma_authorization**) roles.

2. Click **Add Role**.

3. Enter the role name (**user**) and click **Save**.

Repeat these steps for the **admin** role.

Create the Red Hat Single Sign-On Realm Management User

1. Click **Users** in the **Manage** sidebar to view the user information for the realm.
2. Click **Add User.**
3. Enter a valid **Username** (this example uses the user **appuser**) and click **Save**.
4. Edit the user configuration:
   a. Click the **Credentials** tab in the user space and enter a password for the user (this example uses the password **apppassword**).
   b. Ensure the **Temporary Password** option is set to **Off** so that it does not prompt for a password change later on, and click **Reset Password** to set the user password. A pop-up window will prompt you to confirm.

4.4.1.2. Assign the user role to the realm management user

Perform the following steps to tie the previously created **appuser** with the **user** Red Hat Single Sign-On role:

1. Click **Role Mappings** to list the realm and client role configuration. In **Available Roles**, select the **user** role created earlier, and click **Add selected>**.
2. Click **Client Roles**, select **realm-management** entry from the list, select each record in the **Available Roles** list.

   NOTE

   You can select multiple items at once by holding the **Ctrl** key and simultaneously clicking the first **impersonation** entry. While keeping the **Ctrl** key and the left mouse button pressed, move to the end of the list to the **view-clients** entry and ensure each record is selected.

3. Click **Add selected>** to assign the roles to the client.

4.4.1.3. Prepare Red Hat Single Sign-On Authentication for OpenShift Deployment of the EAP 6.4 / 7.1 JSP Application

Procedure

1. Create a new project for the EAP 6.4 / 7.1 JSP application.

```
$ oc new-project eap-app-demo
```

2. Add the **view** role to the **default** service account. This enables the service account to view all the resources in the **eap-app-demo** namespace, which is necessary for managing the cluster.

```
$ oc policy add-role-to-user view system:serviceaccount:$(oc project -q):default
```

3. The EAP template requires an SSL keystore and a JGroups keystore. This example uses **keytool**, a package included with the Java Development Kit, to generate self-signed certificates for these keystores.

   a. Generate a secure key for the SSL keystore (this example uses **password** as password for the keystore).

   ```
   $ keytool -genkeypair \
   -dname "CN=secure-eap-app-eap-app-demo.openshift.example.com" \
   -alias https \
   -storetype JKS \
   -keystore eapkeystore.jks
   ```

   b. Generate a secure key for the JGroups keystore (this example uses **password** as password for the keystore).

   ```
   $ keytool -genseckey \
   -alias jgroups \
   -storetype JCEKS \
   -keystore eapjgroups.jceks
   ```

   c. Generate the EAP 6.4 / 7.1 for OpenShift secrets with the SSL and JGroup keystore files.

   ```
   $ oc create secret generic eap-ssl-secret --from-file=eapkeystore.jks
   ```

   ```
   $ oc create secret generic eap-jgroup-secret --from-file=eapjgroups.jceks
   ```

   d. Add the EAP application secret to the **default** service account.

   ```
   $ oc secrets link default eap-ssl-secret eap-jgroup-secret
   ```

4.4.1.4. Deploy binary build of the EAP 6.4 / 7.1 JSP application

Procedure

1. Clone the source code.

   ```
   $ git clone https://github.com/keycloak/keycloak-quickstarts.git
   ```

   Configure the Red Hat JBoss Middleware Maven repository

2. Build both the service-jee-jaxrs and app-jee-jsp applications.

   a. Build the **service-jee-jaxrs** application.

   ```
   $ cd keycloak-quickstarts/service-jee-jaxrs/
   ```

   ```
   $ mvn clean package -DskipTests
   [INFO] Scanning for projects...
   [INFO]
   [INFO] ------------------------------------------------------------------------
   [INFO] Building Keycloak Quickstart: service-jee-jaxrs 3.1.0.Final
   [INFO] ------------------------------------------------------------------------
   ```

```
...
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 2.153 s
[INFO] Finished at: 2017-06-26T12:06:12+02:00
[INFO] Final Memory: 25M/241M
[INFO] ------------------------------------------------------------------------
```

b. **Comment out** the **app-jee-jsp/config/keycloak.json** requirement of the **maven-enforcer-plugin** plugin and build the **app-jee-jsp** application.

```
service-jee-jaxrs]$ cd ../app-jee-jsp/
```

```
app-jee-jsp]$ sed -i /\<executions\>/s/^/\<\!--/ pom.xml
```

```
app-jee-jsp]$ sed -i '/\(<\/executions>\)/a\-->' pom.xml
```

```
app-jee-jsp]$ mvn clean package -DskipTests
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building Keycloak Quickstart: app-jee-jsp 3.1.0.Final
[INFO] ------------------------------------------------------------------------
...
[INFO] Building war: /tmp/github/keycloak-quickstarts/app-jee-jsp/target/app-jsp.war
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 3.018 s
[INFO] Finished at: 2017-06-26T12:22:25+02:00
[INFO] Final Memory: 35M/310M
[INFO] ------------------------------------------------------------------------
```

IMPORTANT

The app-jee-jsp quickstart requires you to configure the adapter, and that the adapter configuration file (**keycloak.json**) is present in the **config/** directory in the root of the quickstart to successfully build the quickstart. But since this example configures the adapter later via selected environment variables available for the EAP 6.4 / 7.1 for OpenShift image, it is not necessary to specify the form of **keycloak.json** adapter configuration file at this moment.

4. Prepare the directory structure on the local file system.
   Application archives in the **deployments/** subdirectory of the main binary build directory are copied directly to the standard deployments directory of the image being built on OpenShift. For the application to deploy, the directory hierarchy containing the web application data must be correctly structured.

   Create the main directory for the binary build on the local file system and **deployments/** subdirectory within it. Copy the previously built WAR archives of both the **service-jee-jaxrs** and **app-jee-jsp** quickstarts to the **deployments/** subdirectory:

```
app-jee-jsp]$ ls
config  pom.xml  README.md  src  target
```

```
app-jee-jsp]$ mkdir -p sso-eap7-bin-demo/deployments
```

```
app-jee-jsp]$ cp target/app-jsp.war sso-eap7-bin-demo/deployments/
```

```
app-jee-jsp]$ cp ../service-jee-jaxrs/target/service.war sso-eap7-bin-demo/deployments/
```

```
app-jee-jsp]$ tree sso-eap7-bin-demo/
sso-eap7-bin-demo/
|__ deployments
    |__ app-jsp.war
    |__ service.war

1 directory, 2 files
```

NOTE

The location of the standard deployments directory depends on the underlying base image, that was used to deploy the application. See the following table:

Table 4.1. Standard Location of the Deployments Directory

Name of the Underlying Base Image(s)	Standard Location of the Deployments Directory
EAP for OpenShift 6.4 and 7.1	***$JBOSS_HOME/standalone/deployments***
Java S2I for OpenShift	***/deployments***
JWS for OpenShift	***$JWS_HOME/webapps***

5. Identify the image stream for EAP 6.4 / 7.1 image.

```
$ oc get is -n openshift | grep eap | cut -d ' ' -f 1
jboss-eap64-openshift
jboss-eap71-openshift
```

6. Create new binary build, specifying image stream and application name.

NOTE

Replace **--image-stream=jboss-eap71-openshift** parameter with the **--image-stream=jboss-eap64-openshift** one in the following oc command to deploy the JSP application on top of JBoss EAP 6.4 for OpenShift image.

```
$ oc new-build --binary=true \
--image-stream=jboss-eap71-openshift \
--name=eap-app
--> Found image 31895a4 (3 months old) in image stream "openshift/jboss-eap71-openshift"
under tag "latest" for "jboss-eap71-openshift"

    JBoss EAP 7.4
    -------------
    Platform for building and running Jakarta EE applications on JBoss EAP 7.4

    Tags: builder, javaee, eap, eap7

    * A source build using binary input will be created
      * The resulting image will be pushed to image stream "eap-app:latest"
      * A binary build was created, use 'start-build --from-dir' to trigger a new build

--> Creating resources with label build=eap-app ...
    imagestream "eap-app" created
    buildconfig "eap-app" created
--> Success
```

7. Start the binary build. Instruct **oc** executable to use main directory of the binary build we created in previous step as the directory containing binary input for the OpenShift build. In the working directory of **app-jee-jsp** issue the following command.

```
app-jee-jsp]$ oc start-build eap-app \
--from-dir=./sso-eap7-bin-demo/ \
--follow
Uploading directory "sso-eap7-bin-demo" as binary input for the build ...
build "eap-app-1" started
Receiving source from STDIN as archive ...
Copying all war artifacts from /home/jboss/source/. directory into
/opt/eap/standalone/deployments for later deployment...
Copying all ear artifacts from /home/jboss/source/. directory into
/opt/eap/standalone/deployments for later deployment...
Copying all rar artifacts from /home/jboss/source/. directory into
/opt/eap/standalone/deployments for later deployment...
Copying all jar artifacts from /home/jboss/source/. directory into
/opt/eap/standalone/deployments for later deployment...
Copying all war artifacts from /home/jboss/source/deployments directory into
/opt/eap/standalone/deployments for later deployment...
'/home/jboss/source/deployments/app-jsp.war' -> '/opt/eap/standalone/deployments/app-
jsp.war'
'/home/jboss/source/deployments/service.war' ->
'/opt/eap/standalone/deployments/service.war'
Copying all ear artifacts from /home/jboss/source/deployments directory into
/opt/eap/standalone/deployments for later deployment...
Copying all rar artifacts from /home/jboss/source/deployments directory into
/opt/eap/standalone/deployments for later deployment...
Copying all jar artifacts from /home/jboss/source/deployments directory into
/opt/eap/standalone/deployments for later deployment...
Pushing image 172.30.82.129:5000/eap-app-demo/eap-app:latest ...
Pushed 6/7 layers, 86% complete
Pushed 7/7 layers, 100% complete
Push successful
```

8. Create a new OpenShift application based on the build.

```
$ oc new-app eap-app
--> Found image 6b13d36 (2 minutes old) in image stream "eap-app-demo/eap-app" under
tag "latest" for "eap-app"

    eap-app-demo/eap-app-1:aa2574d9
    -------------------------------
    Platform for building and running Jakarta EE applications on JBoss EAP 7.4

    Tags: builder, javaee, eap, eap7

    * This image will be deployed in deployment config "eap-app"
    * Ports 8080/tcp, 8443/tcp, 8778/tcp will be load balanced by service "eap-app"
      * Other containers can access this service through the hostname "eap-app"

--> Creating resources ...
    deploymentconfig "eap-app" created
    service "eap-app" created
--> Success
    Run 'oc status' to view your app.
```

9. Stop all running containers of the EAP 6.4 / 7.1 JSP application in the current namespace.

```
$ oc get dc -o name
deploymentconfig/eap-app
```

```
$ oc scale dc/eap-app --replicas=0
deploymentconfig "eap-app" scaled
```

10. Further configure the EAP 6.4 / 7.1 JSP application prior the deployment.

    a. Configure the application with proper details about the Red Hat Single Sign-On server instance.

WARNING

Ensure to replace the value of ***SSO_PUBLIC_KEY*** variable below with the actual content of the RSA public key for the **demo** realm, that has been copied.

```
$ oc set env dc/eap-app \
-e HOSTNAME_HTTP="eap-app-eap-app-demo.openshift.example.com" \
-e HOSTNAME_HTTPS="secure-eap-app-eap-app-demo.openshift.example.com" \
-e SSO_DISABLE_SSL_CERTIFICATE_VALIDATION="true" \
-e SSO_USERNAME="appuser" \
-e SSO_PASSWORD="apppassword" \
-e SSO_REALM="demo" \
-e SSO_URL="https://secure-sso-sso-app-demo.openshift.example.com/auth" \
-e
SSO_PUBLIC_KEY="MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAkdhXyK
x97oIoO6HwnV/MiX2EHO55Sn+ydsPzbjJevI5F31UvUco9uA8dGl6oM8HrnaWWv+i8Pvmla
RMhhl6Xs68vJTEc6d0soP+6A+aExw0coNRp2PDwvzsXVWPvPQg3+iytStxu3Icndx+gC0Z
nxoRqL7rY7zKcQBScGEr78Nw6vZDwfe6d/PQ6W4xVErNytX9KyLFVAE1VvhXALyqEM/E
qYGLmpjw5bMGVKRXnhmVo9E88CkFDH8E+aPiApb/gFul1GJOv+G8ySLoR1c8Y3L29F7
C81odkVBp2yMm3RVFIGSPTjHqjO/nOtqYIfY4Wyw9mRIoY5SyW7044dZXRwIDAQAB"
\
-e SSO_SECRET="0bb8c399-2501-4fcd-a183-68ac5132868d"
deploymentconfig "eap-app" updated
```

b. Configure the application with details about both the SSL and JGroups keystore.

```
$ oc set env dc/eap-app \
-e HTTPS_KEYSTORE_DIR="/etc/eap-secret-volume" \
-e HTTPS_KEYSTORE="eapkeystore.jks" \
-e HTTPS_PASSWORD="password" \
-e JGROUPS_ENCRYPT_SECRET="eap-jgroup-secret" \
-e JGROUPS_ENCRYPT_KEYSTORE_DIR="/etc/jgroups-encrypt-secret-volume" \
-e JGROUPS_ENCRYPT_KEYSTORE="eapjgroups.jceks" \
-e JGROUPS_ENCRYPT_PASSWORD="password"
deploymentconfig "eap-app" updated
```

c. Define OpenShift volumes for both the SSL and JGroups secrets created earlier.

```
$ oc volume dc/eap-app --add \
--name="eap-keystore-volume" \
--type=secret \
--secret-name="eap-ssl-secret" \
--mount-path="/etc/eap-secret-volume"
deploymentconfig "eap-app" updated
```

```
$ oc volume dc/eap-app --add \
--name="eap-jgroups-keystore-volume" \
--type=secret \
--secret-name="eap-jgroup-secret" \
--mount-path="/etc/jgroups-encrypt-secret-volume"
deploymentconfig "eap-app" updated
```

d. Configure the deployment config of the application to run application pods under the **default** OpenShift service account (default setting).

```
$ oc patch dc/eap-app --type=json \
-p '[{"op": "add", "path": "/spec/template/spec/serviceAccountName", "value": "default"}]'
"eap-app" patched
```

11. Deploy container of the EAP 6.4 / 7.1 JSP application using the modified deployment config.

```
$ oc scale dc/eap-app --replicas=1
deploymentconfig "eap-app" scaled
```

12. Expose the service as route.

```
$ oc get svc -o name
service/eap-app
```

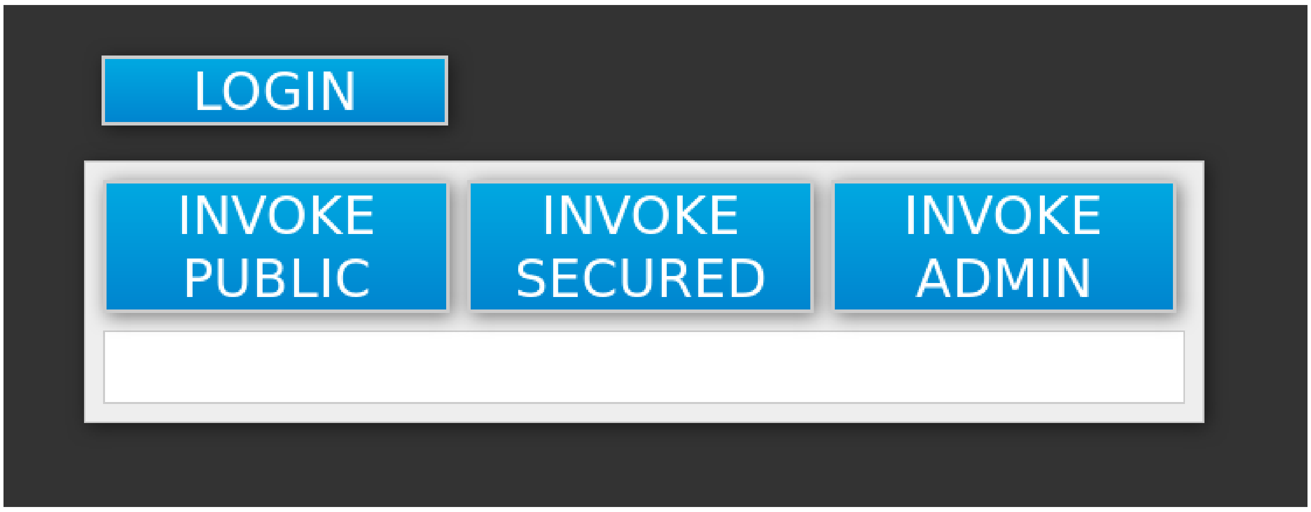
```
$ oc get route
No resources found.
```

```
$ oc expose svc/eap-app
route "eap-app" exposed
```

```
$ oc get route
NAME      HOST/PORT                                PATH      SERVICES   PORT
TERMINATION   WILDCARD
eap-app   eap-app-eap-app-demo.openshift.example.com           eap-app    8080-tcp
None
```

4.4.1.5. Access the application

Access the application in your browser using the URL **http://eap-app-eap-app-demo.openshift.example.com/app-jsp**. You should see output like on the following image:

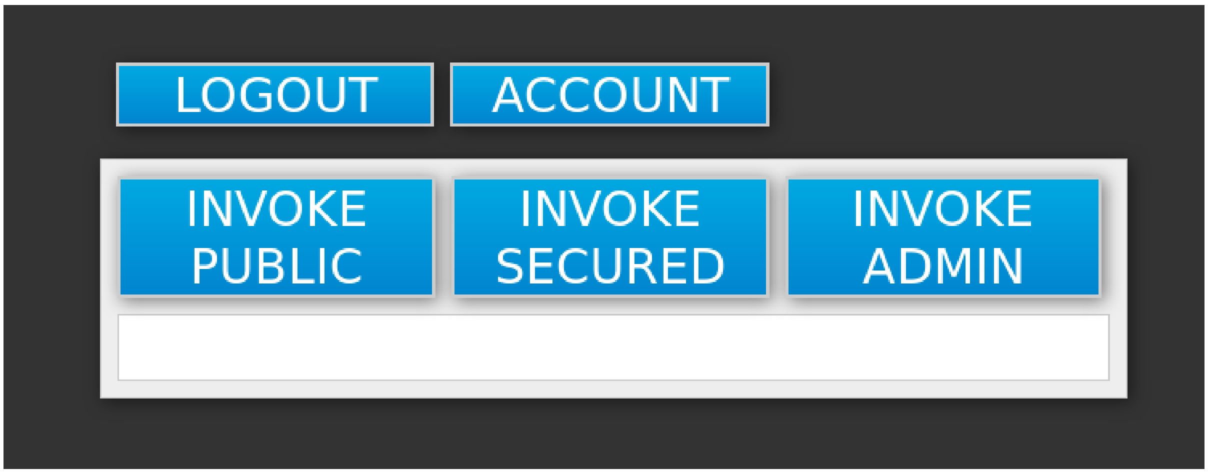


Procedure

Perform the following to test the application:

1. Click the **INVOKE PUBLIC** button to access the **public** endpoint that doesn't require authentication.
   You should see the **Message: public** output.

2. Click the **LOGIN** button to be redirected for user authentication to the Red Hat Single Sign-On server instance against the **demo** realm.
   Specify the username and password of the Red Hat Single Sign-On user configured earlier (**appuser** / **apppassword**). Click **Log in**. The look of the application changes as detailed in the following image:



3. Click the **INVOKE SECURED** button to access the **secured** endpoint.
   You should see the **Message: secured** output.

4. Click the **INVOKE ADMIN** button to access the **admin** endpoint.
   You should see **403 Forbidden** output.

> **NOTE**
>
> The **admin** endpoint requires users with **admin** Red Hat Single Sign-On role to invoke properly. Access for the **appuser** is forbidden because they only have **user** role privilege, which allows them to access the **secured** endpoint.

Procedure

Perform the following steps to add the **appuser** to the **admin** Red Hat Single Sign-On role:

1. Access the Admin Console of the Red Hat Single Sign-On server's instance.
   https://secure-sso-sso-app-demo.openshift.example.com/auth/admin.

   Use the credentials of the Red Hat Single Sign-On administrator user .

2. Click **Users** in the **Manage** sidebar to view the user information for the **demo** realm.

3. Click **View all users** button.

4. Click the ID link for the **appuser** or alternatively click the **Edit** button in the **Actions** column.

5. Click the **Role Mappings** tab.

6. Select **admin** entry from the **Available Roles** list in the **Realm Roles** row.

7. Click **Add selected>** button to add the **admin** role to the user.

8. Return to EAP 6.4 / 7.1 JSP service application.
   http://eap-app-eap-app-demo.openshift.example.com/app-jsp.

9. Click the **LOGOUT** button to reload role mappings for the **appuser**.

10. Click the **LOGIN** button again and provider **appuser** credentials.

11. Click the **INVOKE ADMIN** button again.
    You should see the **Message: admin** output already.

4.5. AUTOMATICALLY REGISTERING AN EAP APPLICATION IN RED HAT SINGLE SIGN-ON WITH AN OPENID-CONNECT CLIENT

This example prepares Red Hat Single Sign-On realm, role, and user credentials for an EAP project using an OpenID-Connect client adapter. These credentials are then provided in the EAP for OpenShift template for automatic Red Hat Single Sign-On client registration. Once deployed, the Red Hat Single Sign-On user can be used to authenticate and access JBoss EAP.

NOTE

This example uses a OpenID-Connect client but an SAML client could also be used. See Red Hat Single Sign-On Clients and Automatic and Manual Red Hat Single Sign-On Client Registration Methods for more information on the differences between OpenID-Connect and SAML clients.

Prerequisites

- The steps described in the Preparing Red Hat Single Sign-On Authentication for OpenShift Deployment section have been performed already.

4.5.1. Preparing Red Hat Single Sign-On authentication for OpenShift deployment

Log in to the OpenShift CLI with a user that holds the *cluster:admin* role.

1. Create a new project:

```
$ oc new-project eap-app-demo
```

2. Add the **view** role to the **default** service account. This enables the service account to view all the resources in the **eap-app-demo** namespace, which is necessary for managing the cluster.

```
$ oc policy add-role-to-user view system:serviceaccount:$(oc project -q):default
```

3. The EAP template requires an SSL keystore and a JGroups keystore.
This example uses **keytool**, a package included with the Java Development Kit, to generate self-signed certificates for these keystores. The following commands will prompt for passwords.

   a. Generate a secure key for the SSL keystore:

   ```
   $ keytool -genkeypair -alias https -storetype JKS -keystore eapkeystore.jks
   ```

   b. Generate a secure key for the JGroups keystore:

   ```
   $ keytool -genseckey -alias jgroups -storetype JCEKS -keystore eapjgroups.jceks
   ```

4. Generate the EAP for OpenShift secrets with the SSL and JGroup keystore files:

```
$ oc create secret generic eap-ssl-secret --from-file=eapkeystore.jks
$ oc create secret generic eap-jgroup-secret --from-file=eapjgroups.jceks
```

5. Add the EAP secret to the **default** service account:

```
$ oc secrets link default eap-ssl-secret eap-jgroup-secret
```

-

4.5.2. Preparing the Red Hat Single Sign-On credentials

Log in to the encrypted Red Hat Single Sign-On web server at **https://secure-sso-*<project-name>*.*<hostname>*/auth/admin** using the administrator account created during the Red Hat Single Sign-On deployment.

Procedure

Create a Realm

1. Hover your cursor over the realm namespace at the top of the sidebar and click **Add Realm**.
2. Enter a realm name (this example uses *eap-demo*) and click **Create**.

Copy the Public Key

In the newly created *eap-demo* realm, click the **Keys** tab and copy the generated public key. This example uses the variable *<realm-public-key>* for brevity. This is used later to deploy the Red Hat Single Sign-On-enabled JBoss EAP image.

Create a Role

Create a role in Red Hat Single Sign-On with a name that corresponds to the JEE role defined in the **web.xml** of the example EAP application. This role is assigned to an Red Hat Single Sign-On *application user* to authenticate access to user applications.

1. Click **Roles** in the **Configure** sidebar to list the roles for this realm. This is a new realm, so there should only be the default *offline_access* role.
2. Click **Add Role**.
3. Enter the role name (this example uses the role *eap-user-role*) and click **Save**.

Create Users and Assign Roles

Create two users: - Assign the *realm management user* the **realm-management** roles to handle automatic Red Hat Single Sign-On client registration in the Red Hat Single Sign-On server. - Assign the *application user* the JEE role, created in the previous step, to authenticate access to user applications.

Create the *realm management user*:

1. Click **Users** in the **Manage** sidebar to view the user information for the realm.
2. Click **Add User**.
3. Enter a valid **Username** (this example uses the user *eap-mgmt-user*) and click **Save**.
4. Edit the user configuration. Click the **Credentials** tab in the user space and enter a password for the user. After the password has been confirmed you can click **Reset Password** to set the user password. A pop-up window prompts for additional confirmation.
5. Click **Role Mappings** to list the realm and client role configuration. In the **Client Roles** drop-down menu, select **realm-management** and add all of the available roles to the user. This provides the user Red Hat Single Sign-On server rights that can be used by the JBoss EAP image to create clients.

Create the *application user*:

1. Click **Users** in the **Manage** sidebar to view the user information for the realm.
2. Click **Add User**.
3. Enter a valid **Username** and any additional optional information for the *application user* and click **Save**.
4. Edit the user configuration. Click the **Credentials** tab in the user space and enter a password for the user. After the password has been confirmed you can click **Reset Password** to set the user password. A pop-up window prompts for additional confirmation.
5. Click **Role Mappings** to list the realm and client role configuration. In **Available Roles**, add the role created earlier.

4.5.3. Deploy the Red Hat Single Sign-On-enabled JBoss EAP image

,Procedure

1. Return to the OpenShift web console and click **Add to project** to list the default image streams and templates.
2. Use the **Filter by keyword** search bar to limit the list to those that match *sso*. You may need to click **See all** to show the desired application template.
3. Select the ***eap71-sso-s2i*** image to list all of the deployment parameters. Include the following Red Hat Single Sign-On parameters to configure the Red Hat Single Sign-On credentials during the EAP build:

Variable	Example Value
APPLICATION_NAME	sso
HOSTNAME_HTTPS	*secure-sample-jsp.eap-app-demo.openshift32.example.com*
HOSTNAME_HTTP	*sample-jsp.eap-app-demo.openshift32.example.com*
SOURCE_REPOSITORY_URL	*https://repository-example.com/developer/application*
SSO_URL	*https://secure-sso-sso-app-demo.openshift32.example.com/auth*
SSO_REALM	*eap-demo*
SSO_USERNAME	*eap-mgmt-user*
SSO_PASSWORD	*password*
SSO_PUBLIC_KEY	*<realm-public-key>*

Variable	Example Value
HTTPS_KEYSTORE	*eapkeystore.jks*
HTTPS_PASSWORD	*password*
HTTPS_SECRET	*eap-ssl-secret*
JGROUPS_ENCRYPT_KEYSTORE	*eapjgroups.jceks*
JGROUPS_ENCRYPT_PASSWORD	*password*
JGROUPS_ENCRYPT_SECRET	*eap-jgroup-secret*

4. Click **Create** to deploy the JBoss EAP image.

It may take several minutes for the JBoss EAP image to deploy.

4.5.4. Log in to the JBoss EAP Server using Red Hat Single Sign-On

Procedure

1. Access the JBoss EAP application server and click **Login**. You are redirected to the Red Hat Single Sign-On login.
2. Log in using the Red Hat Single Sign-On user created in the example. You are authenticated against the Red Hat Single Sign-On server and returned to the JBoss EAP application server.

4.6. MANUALLY REGISTERING EAP APPLICATION IN RED HAT SINGLE SIGN-ON WITH SAML CLIENT

This example prepares Red Hat Single Sign-On realm, role, and user credentials for an EAP project and configures an EAP for OpenShift deployment. Once deployed, the Red Hat Single Sign-On user can be used to authenticate and access JBoss EAP.

NOTE

This example uses a SAML client but an OpenID-Connect client could also be used. See Red Hat Single Sign-On Clients and Automatic and Manual Red Hat Single Sign-On Client Registration Methods for more information on the differences between SAML and OpenID-Connect clients.

Prerequisites

- The steps described in the Preparing Red Hat Single Sign-On Authentication for OpenShift Deployment section have been performed already.

4.6.1. Preparing the Red Hat Single Sign-On credentials

Procedure

Log in to the encrypted Red Hat Single Sign-On web server at **https://secure-sso-*<project-name>*.*<hostname>*/auth/admin** using the administrator account created during the Red Hat Single Sign-On deployment.

Create a Realm

1. Hover your cursor over the realm namespace (default is **Master**) at the top of the sidebar and click **Add Realm**.
2. Enter a realm name (this example uses *saml-demo*) and click **Create**.

Copy the Public Key

In the newly created *saml-demo* realm, click the **Keys** tab and copy the generated public key. This example uses the variable *realm-public-key* for brevity. This is needed later to deploy the Red Hat Single Sign-On-enabled JBoss EAP image.

Create a Role

Create a role in Red Hat Single Sign-On with a name that corresponds to the JEE role defined in the **web.xml** of the example EAP application. This role will be assigned to an Red Hat Single Sign-On *application user* to authenticate access to user applications.

1. Click **Roles** in the **Configure** sidebar to list the roles for this realm. This is a new realm, so there should only be the default *offline_access* role.
2. Click **Add Role**.
3. Enter the role name (this example uses the role *saml-user-role*) and click **Save**.

Create Users and Assign Roles

Create two users: - Assign the *realm management user* the **realm-management** roles to handle automatic Red Hat Single Sign-On client registration in the Red Hat Single Sign-On server. - Assign the *application user* the JEE role, created in the previous step, to authenticate access to user applications.

Create the *realm management user*:

1. Click **Users** in the **Manage** sidebar to view the user information for the realm.
2. Click **Add User**.
3. Enter a valid **Username** (this example uses the user *app-mgmt-user*) and click **Save**.
4. Edit the user configuration. Click the **Credentials** tab in the user space and enter a password for the user. After the password has been confirmed you can click **Reset Password** to set the user password. A pop-up window prompts for additional confirmation.

Create the *application user*:

1. Click **Users** in the **Manage** sidebar to view the user information for the realm.
2. Click **Add User**.
3. Enter a valid **Username** and any additional optional information for the *application user* and click **Save**.

4. Edit the user configuration. Click the **Credentials** tab in the user space and enter a password for the user. After the password has been confirmed you can click **Reset Password** to set the user password. A pop-up window prompts for additional confirmation.

5. Click **Role Mappings** to list the realm and client role configuration. In **Available Roles**, add the role created earlier.

Create and Configure a SAML Client

Clients are Red Hat Single Sign-On entities that request user authentication. This example configures a SAML client to handle authentication for the EAP application. This section saves two files, **keystore.jks** and **keycloak-saml-subsystem.xml** that are needed later in the procedure.

Create the SAML Client:

1. Click **Clients** in the **Configure** sidebar to list the clients in the realm. Click **Create**.

2. Enter a valid **Client ID**. This example uses *sso-saml-demo*.

3. In the **Client Protocol** drop-down menu, select **saml**.

4. Enter the **Root URL** for the application. This example uses *https://demoapp-eap-app-demo.openshift32.example.com*.

5. Click **Save**.

Configure the SAML Client:

In the **Settings** tab, set the **Root URL** and the **Valid Redirect URLs** for the new ***sso-saml-demo*** client:

1. For the **Root URL**, enter the same address used when creating the client. This example uses *https://demoapp-eap-app-demo.openshift32.example.com*.

2. For the **Valid Redirect URLs**, enter an address for users to be redirected to at when they log in or out. This example uses a redirect address relative to the root *https://demoapp-eap-app-demo.openshift32.example.com/**.

Export the SAML Keys:

1. Click the **SAML Keys** tab in the *sso-saml-demo* client space and click **Export**.

2. For this example, leave the **Archive Format** as **JKS**. This example uses the default **Key Alias** of *sso-saml-demo* and default **Realm Certificate Alias** of *saml-demo*.

3. Enter the **Key Password** and the **Store Password**. This example uses *password* for both.

4. Click **Download** and save the **keystore-saml.jks** file for use later.

5. Click the ***sso-saml-demo*** client to return to the client space ready for the next step.

Download the Client Adapter:

1. Click **Installation**.

2. Use the **Format Option** drop-down menu to select a format. This example uses **Keycloak SAML Wildfly/JBoss Subsystem**.

3. Click **Download** and save the file **keycloak-saml-subsystem.xml**.

The **keystore-saml.jks** will be used with the other EAP keystores in the next section to create an OpenShift secret for the EAP application project. Copy the **keystore-saml.jks** file to an OpenShift node.
The **keycloak-saml-subsystem.xml** will be modified and used in the application deployment. Copy it into the **/configuration** folder of the application as **secure-saml-deployments**.

4.6.2. Preparing Red Hat Single Sign-On authentication for OpenShift deployment

Log in to the OpenShift CLI with a user that holds the *cluster:admin* role.

Procedure

1. Create a new project:

   ```
   $ oc new-project eap-app-demo
   ```

2. Add the **view** role to the **default** service account. This enables the service account to view all the resources in the **eap-app-demo** namespace, which is necessary for managing the cluster.

   ```
   $ oc policy add-role-to-user view system:serviceaccount:$(oc project -q):default
   ```

3. The EAP template requires an SSL keystore and a JGroups keystore.
   This example uses **keytool**, a package included with the Java Development Kit, to generate self-signed certificates for these keystores. The following commands will prompt for passwords.

   a. Generate a secure key for the SSL keystore:

      ```
      $ keytool -genkeypair -alias https -storetype JKS -keystore eapkeystore.jks
      ```

   b. Generate a secure key for the JGroups keystore:

      ```
      $ keytool -genseckey -alias jgroups -storetype JCEKS -keystore eapjgroups.jceks
      ```

4. Generate the EAP for OpenShift secrets with the SSL and JGroup keystore files:

   ```
   $ oc create secret generic eap-ssl-secret --from-file=eapkeystore.jks
   $ oc create secret generic eap-jgroup-secret --from-file=eapjgroups.jceks
   ```

5. Add the EAP application secret to the EAP service account created earlier:

   ```
   $ oc secrets link default eap-ssl-secret eap-jgroup-secret
   ```

4.6.3. Modifying the secure-saml-deployments file

Prerequisites

- The **keycloak-saml-subsystem.xml**, exported from the Red Hat Single Sign-On client in a previous section, should have been copied into the **/configuration** folder of the application and renamed **secure-saml-deployments**. EAP searches for this file when it starts and copies it to the **standalone-openshift.xml** file inside the Red Hat Single Sign-On SAML adapter configuration.

Procedure

1. Open the **/configuration/secure-saml-deployments** file in a text editor.
2. Replace the **YOUR-WAR.war** value of the **secure-deployment name** tag with the application **.war** file. This example uses *sso-saml-demo.war*.
3. Replace the **SPECIFY YOUR LOGOUT PAGE!** value of the **logout page** tag with the url to redirect users when they log out of the application. This example uses **/index.jsp**.
4. Delete the **<PrivateKeyPem>** and **<CertificatePem>** tags and keys and replace it with keystore information:

   ```
   ...
   <Keys>
     <Key signing="true">
       <KeyStore file= "/etc/eap-secret-volume/keystore-saml.jks" password="password">
         <PrivateKey alias="sso-saml-demo" password="password"/>
         <Certificate alias="sso-saml-demo"/>
       </KeyStore>
     </Key>
   </Keys>
   ```

   The mount path of the **keystore-saml.jks** (in this example ***/etc/eap-secret-volume/keystore-saml.jks***) can be specified in the application template with the parameter **EAP_HTTPS_KEYSTORE_DIR**.
   The aliases and passwords for the **PrivateKey** and the **Certificate** were configured when the SAML Keys were exported from the Red Hat Single Sign-On client.
5. Delete the second **<CertificatePem>** tag and key and replace it with the the realm certificate information:

   ```
   ...
   <Keys>
     <Key signing="true">
       <KeyStore file="/etc/eap-secret-volume/keystore-saml.jks" password="password">
         <Certificate alias="saml-demo"/>
       </KeyStore>
     </Key>
   </Keys>
   ...
   ```

   The certificate alias and password were configured when the SAML Keys were exported from the Red Hat Single Sign-On client.
6. Save and close the **/configuration/secure-saml-deployments** file.

4.6.4. Configuring SAML Client Registration in the application web.xml

The client type must also be specified by the **<auth-method>** key in the application **web.xml**. This file is read by the image at deployment.

Open the application **web.xml** file and ensure it includes the following:

```
...
<login-config>
```

```
  <auth-method>KEYCLOAK-SAML</auth-method>
</login-config>
...
```

4.6.5. Deploying the application

You do not need to include any Red Hat Single Sign-On configuration for the image because that has been configured in the application itself. Navigating to the application login page redirects you to the Red Hat Single Sign-On login. Log in to the application through Red Hat Single Sign-On using the *application user* user created earlier.

CHAPTER 5. REFERENCE

5.1. ARTIFACT REPOSITORY MIRRORS

A repository in Maven holds build artifacts and dependencies of various types (all the project jars, library jar, plugins or any other project specific artifacts). It also specifies locations from where to download artifacts from, while performing the S2I build. Besides using central repositories, it is a common practice for organizations to deploy a local custom repository (mirror).

Benefits of using a mirror are:

- Availability of a synchronized mirror, which is geographically closer and faster.
- Ability to have greater control over the repository content.
- Possibility to share artifacts across different teams (developers, CI), without the need to rely on public servers and repositories.
- Improved build times.

Often, a repository manager can serve as local cache to a mirror. Assuming that the repository manager is already deployed and reachable externally at ***http://10.0.0.1:8080/repository/internal/***, the S2I build can then use this manager by supplying the **MAVEN_MIRROR_URL** environment variable to the build configuration of the application using the following procedure:

Procedure

1. Identify the name of the build configuration to apply **MAVEN_MIRROR_URL** variable against.

```
$ oc get bc -o name
buildconfig/sso
```

2. Update build configuration of **sso** with a **MAVEN_MIRROR_URL** environment variable.

```
$ oc set env bc/sso \
  -e MAVEN_MIRROR_URL="http://10.0.0.1:8080/repository/internal/"
buildconfig "sso" updated
```

3. Verify the setting.

```
$ oc set env bc/sso --list
# buildconfigs sso
MAVEN_MIRROR_URL=http://10.0.0.1:8080/repository/internal/
```

4. Schedule new build of the application.

NOTE

During application build, you will notice that Maven dependencies are pulled from the repository manager, instead of the default public repositories. Also, after the build is finished, you will see that the mirror is filled with all the dependencies that were retrieved and used during the build.

5.2. ENVIRONMENT VARIABLES

5.2.1. Information environment variables

The following information environment variables are designed to convey information about the image and should not be modified by the user:

Table 5.1. Information Environment Variables

Variable Name	Description	Example Value
AB_JOLOKIA_AUTH_OPENSHIFT	-	*true*
AB_JOLOKIA_HTTPS	-	*true*
AB_JOLOKIA_PASSWORD_RANDOM	-	*true*
JBOSS_IMAGE_NAME	Image name, same as "name" label.	*rh-sso-7/sso76-openshift-rhel8*
JBOSS_IMAGE_VERSION	Image version, same as "version" label.	*7.6*
JBOSS_MODULES_SYSTEM_PKGS	-	*org.jboss.logmanager,jdk.nashorn.api*

5.2.2. Configuration environment variables

Configuration environment variables are designed to conveniently adjust the image without requiring a rebuild, and should be set by the user as desired.

Table 5.2. Configuration Environment Variables

Variable Name	Description	Example Value
AB_JOLOKIA_AUTH_OPENSHIFT	Switch on client authentication for OpenShift TLS communication. The value of this parameter can be a relative distinguished name which must be contained in a presented client’s certificate. Enabling this parameter will automatically switch Jolokia into https communication mode. The default CA cert is set to **/var/run/secrets/kubernetes.io/serviceaccount/ca.crt**.	*true*

Variable Name	Description	Example Value
AB_JOLOKIA_CONFIG	If set uses this file (including path) as Jolokia JVM agent properties (as described in Jolokia's reference manual). If not set, the **/opt/jolokia/etc/jolokia.properties** file will be created using the settings as defined in this document, otherwise the rest of the settings in this document are ignored.	*/opt/jolokia/custom.properties*
AB_JOLOKIA_DISCOVERY_ENABLED	Enable Jolokia discovery. Defaults to *false*.	*true*
AB_JOLOKIA_HOST	Host address to bind to. Defaults to *0.0.0.0*.	*127.0.0.1*
AB_JOLOKIA_HTTPS	Switch on secure communication with https. By default self-signed server certificates are generated if no serverCert configuration is given in *AB_JOLOKIA_OPTS*. *NOTE: If the values is set to an empty string, https is turned* ***off****. If the value is set to a non empty string, https is turned* ***on****.*	*true*
AB_JOLOKIA_ID	Agent ID to use ($HOSTNAME by default, which is the container id).	*openjdk-app-1-xqlsj*
AB_JOLOKIA_OFF	If set disables activation of Jolokia (i.e. echos an empty value). By default, Jolokia is enabled. *NOTE: If the values is set to an empty string, https is turned* ***off****. If the value is set to a non empty string, https is turned* ***on****.*	*true*
AB_JOLOKIA_OPTS	Additional options to be appended to the agent configuration. They should be given in the format **"key=value, key=value, …<200b> "**	*backlog=20*
AB_JOLOKIA_PASSWORD	Password for basic authentication. By default authentication is switched off.	*mypassword*

Variable Name	Description	Example Value
AB_JOLOKIA_PASSWORD_RANDOM	If set, a random value is generated for ***AB_JOLOKIA_PASSWORD***, and it is saved in the ***/opt/jolokia/etc/jolokia.pw*** file.	*true*
AB_JOLOKIA_PORT	Port to use (Default: *8778*).	*5432*
AB_JOLOKIA_USER	User for basic authentication. Defaults to ***jolokia***.	*myusername*
CONTAINER_CORE_LIMIT	A calculated core limit as described in CFS Bandwidth Control.	*2*
GC_ADAPTIVE_SIZE_POLICY_WEIGHT	The weighting given to the current Garbage Collection (GC) time versus previous GC times.	*90*
GC_MAX_HEAP_FREE_RATIO	Maximum percentage of heap free after GC to avoid shrinking.	*40*
GC_MAX_METASPACE_SIZE	The maximum metaspace size.	*100*
GC_TIME_RATIO_MIN_HEAP_FREE_RATIO	Minimum percentage of heap free after GC to avoid expansion.	*20*
GC_TIME_RATIO	Specifies the ratio of the time spent outside the garbage collection (for example, the time spent for application execution) to the time spent in the garbage collection.	*4*
JAVA_DIAGNOSTICS	Set this to get some diagnostics information to standard out when things are happening.	*true*
JAVA_INITIAL_MEM_RATIO	This is used to calculate a default initial heap memory based the maximal heap memory. The default is 100 which means 100% of the maximal heap is used for the initial heap size. You can skip this mechanism by setting this value to 0 in which case no **-Xms** option is added.	*100*

Variable Name	Description	Example Value
JAVA_MAX_MEM_RATIO	It is used to calculate a default maximal heap memory based on a containers restriction. If used in a Docker container without any memory constraints for the container then this option has no effect. If there is a memory constraint then **-Xmx** is set to a ratio of the container available memory as set here. The default is 50 which means 50% of the available memory is used as an upper boundary. You can skip this mechanism by setting this value to 0 in which case no **-Xmx** option is added.	*40*
JAVA_OPTS_APPEND	Server startup options.	*-Dkeycloak.migration.action=export -Dkeycloak.migration.provider=dir -Dkeycloak.migration.dir=/tmp*
MQ_SIMPLE_DEFAULT_PHYSICAL_DESTINATION	For backwards compatability, set to true to use **MyQueue** and **MyTopic** as physical destination name defaults instead of **queue/MyQueue** and **topic/MyTopic**.	*false*
OPENSHIFT_KUBE_PING_LABELS	Clustering labels selector.	*app=sso-app*
OPENSHIFT_KUBE_PING_NAMESPACE	Clustering project namespace.	*myproject*
SCRIPT_DEBUG	If set to **true**, ensurses that the bash scripts are executed with the **-x** option, printing the commands and their arguments as they are executed.	*true*
SSO_ADMIN_PASSWORD	Password of the administrator account for the **master** realm of the Red Hat Single Sign-On server. **Required.** If no value is specified, it is auto generated and displayed as an OpenShift Instructional message when the template is instantiated.	*adm-password*

Variable Name	Description	Example Value
SSO_ADMIN_USERNAME	Username of the administrator account for the **master** realm of the Red Hat Single Sign-On server. **Required.** If no value is specified, it is auto generated and displayed as an OpenShift Instructional message when the template is instantiated.	*admin*
SSO_HOSTNAME	Custom hostname for the Red Hat Single Sign-On server. **Not set by default**. If not set, the **request** hostname SPI provider, which uses the request headers to determine the hostname of the Red Hat Single Sign-On server is used. If set, the **fixed** hostname SPI provider, with the hostname of the Red Hat Single Sign-On server set to the provided variable value, is used. See dedicated Customizing Hostname for the Red Hat Single Sign-On Server section for additional steps to be performed, when *SSO_HOSTNAME* variable is set.	*rh-sso-server.openshift.example.com*
SSO_REALM	Name of the realm to be created in the Red Hat Single Sign-On server if this environment variable is provided.	*demo*
SSO_SERVICE_PASSWORD	The password for the Red Hat Single Sign-On service user.	*mgmt-password*
SSO_SERVICE_USERNAME	The username used to access the Red Hat Single Sign-On service. This is used by clients to create the application client(s) within the specified Red Hat Single Sign-On realm. This user is created if this environment variable is provided.	*sso-mgmtuser*
SSO_TRUSTSTORE	The name of the truststore file within the secret.	*truststore.jks*
SSO_TRUSTSTORE_DIR	Truststore directory.	*/etc/sso-secret-volume*
SSO_TRUSTSTORE_PASSWORD	The password for the truststore and certificate.	*mykeystorepass*

Variable Name	Description	Example Value
SSO_TRUSTSTORE_SECRET	The name of the secret containing the truststore file. Used for *sso-truststore-volume* volume.	***truststore-secret***

Available application templates for Red Hat Single Sign-On for OpenShift can combine the aforementioned configuration variables with common OpenShift variables (for example ***APPLICATION_NAME*** or ***SOURCE_REPOSITORY_URL***), product specific variables (e.g. ***HORNETQ_CLUSTER_PASSWORD***), or configuration variables typical to database images (e.g. ***POSTGRESQL_MAX_CONNECTIONS***) yet. All of these different types of configuration variables can be adjusted as desired to achieve the deployed Red Hat Single Sign-On-enabled application will align with the intended use case as much as possible. The list of configuration variables, available for each category of application templates for Red Hat Single Sign-On-enabled applications, is described below.

5.2.3. Template variables for all Red Hat Single Sign-On images

Table 5.3. Configuration Variables Available For All Red Hat Single Sign-On Images

Variable	Description
APPLICATION_NAME	The name for the application.
DB_MAX_POOL_SIZE	Sets xa-pool/max-pool-size for the configured datasource.
DB_TX_ISOLATION	Sets transaction-isolation for the configured datasource.
DB_USERNAME	Database user name.
HOSTNAME_HTTP	Custom hostname for http service route. Leave blank for default hostname, e.g.: *<application-name>.<project>.<default-domain-suffix>*.
HOSTNAME_HTTPS	Custom hostname for https service route. Leave blank for default hostname, e.g.: *<application-name>.<project>.<default-domain-suffix>*.
HTTPS_KEYSTORE	The name of the keystore file within the secret. If defined along with ***HTTPS_PASSWORD*** and ***HTTPS_NAME***, enable HTTPS and set the SSL certificate key file to a relative path under *$JBOSS_HOME/standalone/configuration*.
HTTPS_KEYSTORE_TYPE	The type of the keystore file (JKS or JCEKS).

Variable	Description
HTTPS_NAME	The name associated with the server certificate (e.g. *jboss*). If defined along with***HTTPS_PASSWORD*** and ***HTTPS_KEYSTORE***, enable HTTPS and set the SSL name.
HTTPS_PASSWORD	The password for the keystore and certificate (e.g. *mykeystorepass*). If defined along with ***HTTPS_NAME*** and ***HTTPS_KEYSTORE***, enable HTTPS and set the SSL key password.
HTTPS_SECRET	The name of the secret containing the keystore file.
IMAGE_STREAM_NAMESPACE	Namespace in which the ImageStreams for Red Hat Middleware images are installed. These ImageStreams are normally installed in the *openshift* namespace. You should only need to modify this if you've installed the ImageStreams in a different namespace/project.
JGROUPS_CLUSTER_PASSWORD	JGroups cluster password.
JGROUPS_ENCRYPT_KEYSTORE	The name of the keystore file within the secret.
JGROUPS_ENCRYPT_NAME	The name associated with the server certificate (e.g. *secret-key*).
JGROUPS_ENCRYPT_PASSWORD	The password for the keystore and certificate (e.g. *password*).
JGROUPS_ENCRYPT_SECRET	The name of the secret containing the keystore file.
SSO_ADMIN_USERNAME	Username of the administrator account for the **master** realm of the Red Hat Single Sign-On server. **Required.** If no value is specified, it is auto generated and displayed as an OpenShift instructional message when the template is instantiated.
SSO_ADMIN_PASSWORD	Password of the administrator account for the **master** realm of the Red Hat Single Sign-On server. **Required.** If no value is specified, it is auto generated and displayed as an OpenShift instructional message when the template is instantiated.
SSO_REALM	Name of the realm to be created in the Red Hat Single Sign-On server if this environment variable is provided.

Variable	Description
SSO_SERVICE_USERNAME	The username used to access the Red Hat Single Sign-On service. This is used by clients to create the application client(s) within the specified Red Hat Single Sign-On realm. This user is created if this environment variable is provided.
SSO_SERVICE_PASSWORD	The password for the Red Hat Single Sign-On service user.
SSO_TRUSTSTORE	The name of the truststore file within the secret.
SSO_TRUSTSTORE_SECRET	The name of the secret containing the truststore file. Used for ***sso-truststore-volume*** volume.
SSO_TRUSTSTORE_PASSWORD	The password for the truststore and certificate.

5.2.4. Template variables specific to *sso76-ocp3-postgresql*, *sso76-ocp4-postgresql*, *sso76-ocp3-postgresql-persistent*, *sso76-ocp4-postgresql-persistent*, *sso76-ocp3-x509-postgresql-persistent*, and *sso76-ocp4-x509-postgresql-persistent*

Table 5.4. Configuration Variables Specific To Red Hat Single Sign-On-enabled PostgreSQL Applications With Ephemeral Or Persistent Storage

Variable	Description
DB_USERNAME	Database user name.
DB_PASSWORD	Database user password.
DB_JNDI	Database JNDI name used by application to resolve the datasource, e.g. *java:/jboss/datasources/postgresql*
POSTGRESQL_MAX_CONNECTIONS	The maximum number of client connections allowed. This also sets the maximum number of prepared transactions.
POSTGRESQL_SHARED_BUFFERS	Configures how much memory is dedicated to PostgreSQL for caching data.

5.2.5. Template variables for general eap64 and eap71 S2I images

Table 5.5. Configuration Variables For EAP 6.4 and EAP 7 Applications Built Via S2I

Variable	Description
APPLICATION_NAME	The name for the application.
ARTIFACT_DIR	Artifacts directory.
AUTO_DEPLOY_EXPLODED	Controls whether exploded deployment content should be automatically deployed.
CONTEXT_DIR	Path within Git project to build; empty for root project directory.
GENERIC_WEBHOOK_SECRET	Generic build trigger secret.
GITHUB_WEBHOOK_SECRET	GitHub trigger secret.
HORNETQ_CLUSTER_PASSWORD	HornetQ cluster administrator password.
HORNETQ_QUEUES	Queue names.
HORNETQ_TOPICS	Topic names.
HOSTNAME_HTTP	Custom host name for http service route. Leave blank for default host name, e.g.: *<application-name>.<project>.<default-domain-suffix>*.
HOSTNAME_HTTPS	Custom host name for https service route. Leave blank for default host name, e.g.: *<application-name>.<project>.<default-domain-suffix>*.
HTTPS_KEYSTORE_TYPE	The type of the keystore file (JKS or JCEKS).
HTTPS_KEYSTORE	The name of the keystore file within the secret. If defined along with ***HTTPS_PASSWORD*** and ***HTTPS_NAME***, enable HTTPS and set the SSL certificate key file to a relative path under *$JBOSS_HOME/standalone/configuration*.
HTTPS_NAME	The name associated with the server certificate (e.g. *jboss*). If defined along with***HTTPS_PASSWORD*** and ***HTTPS_KEYSTORE***, enable HTTPS and set the SSL name.
HTTPS_PASSWORD	The password for the keystore and certificate (e.g. *mykeystorepass*). If defined along with ***HTTPS_NAME*** and ***HTTPS_KEYSTORE***, enable HTTPS and set the SSL key password.
HTTPS_SECRET	The name of the secret containing the keystore file.

Variable	Description
IMAGE_STREAM_NAMESPACE	Namespace in which the ImageStreams for Red Hat Middleware images are installed. These ImageStreams are normally installed in the *openshift* namespace. You should only need to modify this if you've installed the ImageStreams in a different namespace/project.
JGROUPS_CLUSTER_PASSWORD	JGroups cluster password.
JGROUPS_ENCRYPT_KEYSTORE	The name of the keystore file within the secret.
JGROUPS_ENCRYPT_NAME	The name associated with the server certificate (e.g. *secret-key*).
JGROUPS_ENCRYPT_PASSWORD	The password for the keystore and certificate (e.g. *password*).
JGROUPS_ENCRYPT_SECRET	The name of the secret containing the keystore file.
SOURCE_REPOSITORY_REF	Git branch/tag reference.
SOURCE_REPOSITORY_URL	Git source URI for application.

5.2.6. Template variables specific to *eap64-sso-s2i* and *eap71-sso-s2i* for automatic client registration

Table 5.6. Configuration Variables For EAP 6.4 and EAP 7 Red Hat Single Sign-On-enabled Applications Built Via S2I

Variable	Description
SSO_URL	Red Hat Single Sign-On server location.
SSO_REALM	Name of the realm to be created in the Red Hat Single Sign-On server if this environment variable is provided.
SSO_USERNAME	The username used to access the Red Hat Single Sign-On service. This is used to create the application client(s) within the specified Red Hat Single Sign-On realm. This should match the ***SSO_SERVICE_USERNAME*** specified through one of the **sso76-** templates.
SSO_PASSWORD	The password for the Red Hat Single Sign-On service user.

Variable	Description
SSO_PUBLIC_KEY	Red Hat Single Sign-On public key. Public key is recommended to be passed into the template to avoid man-in-the-middle security attacks.
SSO_SECRET	The Red Hat Single Sign-On client secret for confidential access.
SSO_SERVICE_URL	Red Hat Single Sign-On service location.
SSO_TRUSTSTORE_SECRET	The name of the secret containing the truststore file. Used for ***sso-truststore-volume*** volume.
SSO_TRUSTSTORE	The name of the truststore file within the secret.
SSO_TRUSTSTORE_PASSWORD	The password for the truststore and certificate.
SSO_BEARER_ONLY	Red Hat Single Sign-On client access type.
SSO_DISABLE_SSL_CERTIFICATE_VALIDATION	If true SSL communication between EAP and the Red Hat Single Sign-On Server is insecure (i.e. certificate validation is disabled with curl)
SSO_ENABLE_CORS	Enable CORS for Red Hat Single Sign-On applications.

5.2.7. Template variables specific to *eap64-sso-s2i* and *eap71-sso-s2i* for automatic client registration with SAML clients

Table 5.7. Configuration Variables For EAP 6.4 and EAP 7 Red Hat Single Sign-On-enabled Applications Built Via S2I Using SAML Protocol

Variable	Description
SSO_SAML_CERTIFICATE_NAME	The name associated with the server certificate.
SSO_SAML_KEYSTORE_PASSWORD	The password for the keystore and certificate.
SSO_SAML_KEYSTORE	The name of the keystore file within the secret.
SSO_SAML_KEYSTORE_SECRET	The name of the secret containing the keystore file.
SSO_SAML_LOGOUT_PAGE	Red Hat Single Sign-On logout page for SAML applications.

5.3. EXPOSED PORTS

Port Number	Description
8443	HTTPS
8778	Jolokia monitoring