Red Hat Single Sign-On 7.2

Red Hat Single Sign-On for OpenShift

Using Red Hat Single Sign-On for OpenShift

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Legal Notice

Abstract

Guide to using Red Hat Single Sign-On for OpenShift

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CHAPTER 1. INTRODUCTION

1.1. WHAT IS RED HAT SINGLE SIGN-ON?

Red Hat Single Sign-On (RH-SSO) 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 offers multiple OpenShift application templates utilizing the RH-SSO for OpenShift image version number 7.2. These define the resources needed to develop Red Hat Single Sign-On 7.2 server based deployment and can be split into the following two categories:

- Templates using HTTPS and JGroups keystores and a truststore for the RH-SSO server, all prepared beforehand. These secure the TLS communication using passthrough TLS termination:
  - ***sso72-https***: RH-SSO 7.2 backed by internal H2 database on the same pod.
  - ***sso72-mysql***: RH-SSO 7.2 backed by ephemeral MySQL database on a separate pod.
  - ***sso72-mysql-persistent***: RH-SSO 7.2 backed by persistent MySQL database on a separate pod.
  - ***sso72-postgresql***: RH-SSO 7.2 backed by ephemeral PostgreSQL database on a separate pod.
  - ***sso72-postgresql-persistent***: RH-SSO 7.2 backed by persistent PostgreSQL database on a separate pod.
- Templates using OpenShift's internal service serving x509 certificate secretsto automatically create the HTTPS keystore used for serving secure content. The JGroups cluster traffic is authenticated using the **`AUTH`** protocol. The RH-SSO server truststore is also created automatically, containing the **/var/run/secrets/kubernetes.io/serviceaccount/service-ca.crt** CA certificate file, which is used to create these cluster certificates. Moreover, the truststore for the RH-SSO server is pre-populated with the all known, trusted CA certificate files found in the Java system path. These are securing the TLS communication using re-encryption TLS termination:
  - ***sso72-x509-https***: RH-SSO 7.2 with auto-generated HTTPS keystore and RH-SSO truststore, backed by internal H2 database.
  - ***sso72-x509-mysql-persistent***: RH-SSO 7.2 with auto-generated HTTPS keystore and RH-SSO truststore, backed by persistent MySQL database.
  - ***sso72-x509-postgresql-persistent***: RH-SSO 7.2 with auto-generated HTTPS keystore and RH-SSO truststore, backed by persistent PostgreSQL database.

Other templates that integrate with RH-SSO are also available:

- ***eap64-sso-s2i***: RH-SSO-enabled Red Hat JBoss Enterprise Application Platform 6.4.
- ***eap70-sso-s2i***: RH-SSO-enabled Red Hat JBoss Enterprise Application Platform 7.0.

- ***eap71-sso-s2i***: RH-SSO enabled Red Hat JBoss Enterprise Application Platform 7.1.
- ***datavirt63-secure-s2i***: RH-SSO-enabled Red Hat JBoss Data Virtualization 6.3.

These templates contain environment variables specific to RH-SSO that enable automatic RH-SSO client registration when deployed.

See Automatic and Manual RH-SSO Client Registration Methods for more information.

CHAPTER 2. BEFORE YOU BEGIN

2.1. COMPARISON: RH-SSO FOR OPENSHIFT IMAGE AND RED HAT SINGLE SIGN-ON

The RH-SSO for OpenShift image version number 7.2 is based on Red Hat Single Sign-On 7.2. There are some differences in functionality between the RH-SSO for OpenShift image and Red Hat Single Sign-On:

- The RH-SSO for OpenShift image includes all of the functionality of Red Hat Single Sign-On. In addition, the RH-SSO-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.

2.2. VERSION COMPATIBILITY AND SUPPORT

See the xPaaS part of the OpenShift and Atomic Platform Tested Integrations pagefor details about OpenShift image version compatibility.

2.3. DEPRECATED IMAGE STREAMS AND APPLICATION TEMPLATES FOR RH-SSO FOR OPENSHIFT

IMPORTANT

The RH-SSO for OpenShift image version number 7.0 and 7.1 are deprecated and they will no longer receive updates of image and application templates.

To deploy new applications, it is recommended to use the version 7.2 of the RH-SSO for OpenShift image along with the application templates specific to that version.

2.4. INITIAL SETUP

The Tutorials in this guide follow on from and assume an OpenShift instance similar to that created in the OpenShift Primer.

IMPORTANT

For information related to updating the existing database when migrating RH-SSO for OpenShift image from RH-SSO 7.0 to RH-SSO 7.1, or from RH-SSO 7.1 to RH-SSO 7.2, see the Updating Existing Database when Migrating RH-SSO for OpenShift Image to a new version section.

CHAPTER 3. GETTING STARTED

3.1. USING THE RH-SSO FOR OPENSHIFT IMAGE STREAMS AND APPLICATION TEMPLATES

Red Hat JBoss Middleware for OpenShift images are pulled on demand from the Red Hat Registry: registry.access.redhat.com. To update to the latest RH-SSO for OpenShift images, run the following commands:

1. On your master host(s), ensure that you are logged in as a cluster administrator or a user with project administrator access to the global **openshift** project.

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

2. Run the following commands to update the core set of RH-SSO 7.2 resources for OpenShift in the **openshift** project:

```
$ for resource in sso72-image-stream.json \
  sso72-https.json \
  sso72-mysql.json \
  sso72-mysql-persistent.json \
  sso72-postgresql.json \
  sso72-postgresql-persistent.json \
  sso72-x509-https.json \
  sso72-x509-mysql-persistent.json \
  sso72-x509-postgresql-persistent.json
do
  oc replace -n openshift --force -f \
  https://raw.githubusercontent.com/jboss-openshift/application-
templates/ose-v1.4.11/sso/${resource}
done
```

3. Run the following command to install the RH-SSO 7.2 OpenShift image streams in the **openshift** project:

```
$ oc -n openshift import-image redhat-sso72-openshift:1.1
```

3.2. DEPLOYING THE RH-SSO FOR OPENSHIFT IMAGE

3.2.1. Preparing the Deployment

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

1. Create a new project:

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

2. 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
```

3.2.2. Deploying the RH-SSO for OpenShift Image using Application Template

3.2.2.1. Deploying the Template via OpenShift CLI

1. List the available RH-SSO application templates:

```
$ oc get templates -n openshift -o name | grep -o 'sso72.\+'
sso72-https
sso72-mysql
sso72-mysql-persistent
sso72-postgresql
sso72-postgresql-persistent
sso72-x509-https
sso72-x509-mysql-persistent
sso72-x509-postgresql-persistent
```

2. Deploy the selected one:

```
$ oc new-app --template=sso72-x509-https
--> Deploying template "openshift/sso72-x509-https" to project sso-
app-demo

     Red Hat Single Sign-On 7.2 (Ephemeral)
     ---------
     An example RH-SSO 7 application. For more information about
using this template, see https://github.com/jboss-
openshift/application-templates.

     A new RH-SSO service has been created in your project. The
admin username/password for accessing the master realm via the RH-
SSO 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 RH-SSO requests were automatically created via 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
        * RH-SSO Administrator Username=IACfQO8v # generated
        * RH-SSO Administrator
Password=nR7llVSVb4Dye3TNRbXoXhRpAKTmiCRc # generated
        * RH-SSO Realm=
        * RH-SSO Service Username=
        * RH-SSO 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.
```

3.2.2.2. Deploying the Template via OpenShift Web Console

Alternatively, perform the following steps to deploy the RH-SSO template via OpenShift web console:

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 RH-SSO application template. This example uses ***Red Hat Single Sign-On 7.2 (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.

3.2.3. Accessing the Administrator Console of the RH-SSO Pod

After the template got deployed, identify the available routes:

```
$ oc get routes
```

NAME	HOST/PORT	PATH	SERVICES	PORT	TERMINATION	WILDCARD

NAME	HOST/PORT	PATH	SERVICES	PORT	TERMINATION	WILDCARD
secure-sso	secure-sso-sso-app-demo.openshift.example.com		secure-sso	<all>	reencrypt	None
sso	sso-sso-app-demo.openshift.example.com		sso	<all>		None

and access the RH-SSO administrator console at:

- **https://secure-sso-sso-app-demo.openshift.example.com/auth/admin**
- **http://sso-sso-app-demo.openshift.example.com/auth/admin**

using the administrator account.

CHAPTER 4. ADVANCED CONCEPTS

These cover additional configuration topics, such as seting up keystores and a truststore for the RH-SSO server, creating an administrator account, an overview of available RH-SSO client registration methods, and guidance on configuring clustering.

4.1. REQUIREMENTS AND DEPLOYING PASSTHROUGH TLS TERMINATION RH-SSO TEMPLATES

4.1.1. Preparing the Deployment

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

1. Create a new project:

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

2. 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.

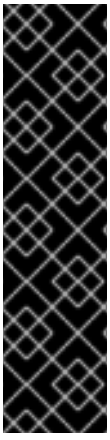
```
$ oc policy add-role-to-user view system:serviceaccount:$(oc project
-q):default
```

4.1.2. Creating HTTPS and JGroups Keystores, and Truststore for the RH-SSO Server

The RH-SSO application templates using passthrough TLS termination require:

- An HTTPS keystore used for encryption of https traffic,
- The JGroups keystore used for encryption of JGroups communications between nodes in the cluster, and
- RH-SSO server truststore used for securing the RH-SSO requests

the RH-SSO for OpenShift image to be deployed properly.



IMPORTANT

The RH-SSO application templates using re-encryption TLS termination do not **require** or **expect** the aforementioned HTTPS and JGroups keystores and RH-SSO server truststore to be prepared beforehand. The templates use OpenShift's internal service serving x509 certificate secretsto automatically create the HTTPS and JGroups keystores. The RH-SSO server truststore is also created automatically, containing the **/var/run/secrets/kubernetes.io/serviceaccount/service-ca.crt** CA certificate file, which is used to create these cluster certificates. Moreover, the truststore for the RH-SSO server is pre-populated with the all known, trusted CA certificate files found in the Java system path.

The ***openssl*** toolkit is used in the following example to generate a CA certificate to sign the HTTPS keystore, and create a truststore for the RH-SSO server. ***keytool***, a package

included with the Java Development Kit, is then utilized to the generate self-signed certificates for these keystores.

WARNING

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:

a. 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"
```

b. Generate a CA certificate 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
```

c. 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
```

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

```
$ openssl x509 -req -CA xpaas.crt -CAkey xpaas.key -in sso.csr -out
sso.crt -days 365 -CAcreateserial
```

e. 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
```

f. 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 RH-SSO 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
```

4.1.3. Secrets

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

1. Create the secrets for the HTTPS and JGroups keystores, and RH-SSO server truststore, generated in the previous section.

   ```
   $ oc secret new sso-app-secret keystore.jks jgroups.jceks
   truststore.jks
   ```

2. Link these secrets to the default service account, which is used to run RH-SSO pods.

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

4.1.4. Deploying the Chosen RH-SSO Passthrough TLS Template via OpenShift CLI

After the aforementioned keystores and secrets are created, deploy some of the available passthrough TLS termination as follows:

WARNING

For simplicity, the values of ***SSO_ADMIN_USERNAME***, ***SSO_ADMIN_PASSWORD***, ***HTTPS_PASSWORD***, ***JGROUPS_ENCRYPT_PASSWORD***, and ***SSO_TRUSTSTORE_PASSWORD*** variables in the following command have been chosen to match the default values of the respective parameters of the ***sso72-https*** RH-SSO application template.

For production environments, Red Hat recommends that you consult the on-site policy, specific to your organization for guidance on how to generate sufficiently strong user name and password for the administrator user account of the RH-SSO server, and passwords for the HTTPS and JGroups keystores, and the truststore of the RH-SSO server.

Be aware that **the passwords provided when provisioning the template need to match the passwords provided when creating the keystores**. If using different username and passwords, modify the values of respective template parameters as appropriate for your environment.

NOTE

The following commands using the ***keytool***, a package **included with the Java Development Kit**, can be used to determine the names associated with the certificate:

```
$ 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
```

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

```
$ oc new-app --template=sso72-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/sso72-https" to project sso-app-demo

     Red Hat Single Sign-On 7.2 (Ephemeral with passthrough TLS)
     ---------
     An example RH-SSO 7 application. For more information about using
this template, see https://github.com/jboss-openshift/application-
templates.

     A new RH-SSO service has been created in your project. The admin
username/password for accessing the master realm via the RH-SSO 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 RH-SSO 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
        * RH-SSO Administrator Username=admin
        * RH-SSO Administrator Password=redhat
        * RH-SSO Realm=demorealm
        * RH-SSO Service Username=
        * RH-SSO Service Password=
        * RH-SSO Trust Store=truststore.jks
        * RH-SSO Trust Store Password=mykeystorepass
        * RH-SSO 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
```

```
    deployment config "sso" created
--> Success
    Run 'oc status' to view your app.
```

4.1.5. Accessing the Administrator Console of the RH-SSO Pod

After the template got deployed, identify the available routes:

```
$ oc get routes
```

NAME	HOST/PORT	PATH	SERVICES	PORT	TERMINATION	WILDCARD
secure-sso	secure-sso-sso-app-demo.openshift.example.com		secure-sso	<all>	passthrough	None
sso	sso-sso-app-demo.openshift.example.com		sso	<all>		None

and access the RH-SSO administrator console at:

- **https://secure-sso-sso-app-demo.openshift.example.com/auth/admin**
- **http://sso-sso-app-demo.openshift.example.com/auth/admin**

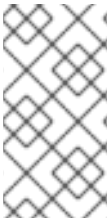
using the administrator account.

4.2. CREATING 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 perform 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 RH-SSO application template, or
- By a remote shell session to particular RH-SSO pod, if the RH-SSO for OpenShift image is deployed without an application template.

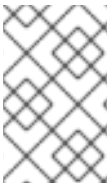


NOTE

Red Hat Single Sign-On allows an initial administrator account to be created via 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 RH-SSO for OpenShift image.

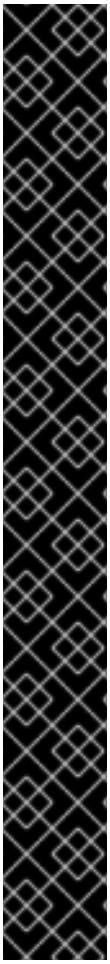
4.2.1. Creating RH-SSO Administrator Account via Template Parameters

When deploying RH-SSO application template, ***SSO_ADMIN_USERNAME*** and ***SSO_ADMIN_PASSWORD*** parameters denote the username and password of the RH-SSO server's administrator account to be created for the **`master`** realm.



NOTE

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.



IMPORTANT

The lifespan of the RH-SSO server's administrator account depends upon the the storage type used to store the RH-SSO server's database:

- For an in-memory database mode (***sso72-https*** and ***sso72-x509-https*** templates) the account exists throughout the lifecycle of the particular RH-SSO pod (stored account data is lost upon pod destruction),
- For an ephemeral database mode (***sso72-mysql*** and ***sso72-postgresql*** templates) the account exists throughout the lifecycle of the database pod (even if the RH-SSO pod is destructed, the stored account data is preserved under the assumption that the database pod is still running),
- For persistent database mode (***sso72-mysql-persistent***, ***sso72-x509-mysql-persistent***, ***sso72-postgresql-persistent***, and ***sso72-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 RH-SSO and the database pods are destructed.

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

WARNING

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 RH-SSO applications.

IMPORTANT

Run the following commands to prepare the previously created deployment config of the RH-SSO application for reuse after the administrator account has been created:

1. Identify the deployment config of the RH-SSO application.

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

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

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

4.2.2. Creating RH-SSO Administrator Account via Remote Shell Session to RH-SSO Pod

Run following commands to create an administrator account for the **master** realm of the RH-SSO server, when deploying the RH-SSO for OpenShift image directly from the image stream (without the template), after the RH-SSO application pod has been started:

1. Identify the RH-SSO application pod.

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

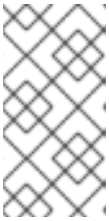
2. Open a remote shell session to the RH-SSO for OpenShift container.

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

3. Create the RH-SSO 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 RH-SSO container, and not the whole container. This is because restarting the whole container will recreate it from scratch, without the RH-SSO server administration account for the **master** realm.

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

4.3. DEPLOYMENT PROCESS

Once deployed, the ***sso72-https*** and ***sso72-x509-https*** templates create a single pod that contains both the database and the RH-SSO servers. The ***sso72-mysql***, ***sso72-mysql-persistent***, ***sso72-x509-mysql-persistent***, ***sso72-postgresql***, ***sso72-postgresql-persistent***, and ***sso72-x509-postgresql-persistent*** templates create two pods, one for the database server and one for the RH-SSO web server.

After the RH-SSO web server pod has started, it can be accessed from its custom configured hostnames, or from the default hostnames:

- **http://sso-<*project-name*>.<*hostname*>/auth/admin**: for the RH-SSO web server, and

- **https://secure-sso-<*project-name*>.<*hostname*>/auth/admin**: for the encrypted RH-SSO web server.

Use the administrator user credentials to log in into the **master** realm's administration console.

4.4. RH-SSO CLIENTS

Clients are RH-SSO entities that request user authentication. A client can be an application requesting RH-SSO to provide user authentication, or it can make 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.

RH-SSO provides OpenID-Connect and SAML client protocols.
OpenID-Connect is the preferred protocol and utilizes 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>
...
```

4.4.1. Automatic and Manual RH-SSO Client Registration Methods

A client application can be automatically registered to an RH-SSO realm by using credentials passed in variables specific to the ***eap64-sso-s2i***, ***eap70-sso-s2i***, ***eap71-sso-s2i***, and ***datavirt63-secure-s2i*** templates.

Alternatively, you can manually register the client application by configuring and exporting the RH-SSO client adapter and including it in the client application configuration.

4.4.1.1. Automatic RH-SSO Client Registration

Automatic RH-SSO client registration is determined by RH-SSO environment variables specific to the ***eap64-sso-s2i***, ***eap70-sso-s2i***, ***eap71-sso-s2i***, and ***datavirt63-secure-s2i*** templates. The RH-SSO credentials supplied in the template are then used to register

the client to the RH-SSO realm during deployment of the client application.

The RH-SSO environment variables included in the ***eap64-sso-s2i***, ***eap70-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 RH-SSO web server authentication address: https://secure-sso-<*project-name*>.<*hostname*>/auth
SSO_REALM	The RH-SSO 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 RH-SSO 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 RH-SSO adapter enables Cross-Origin Resource Sharing (CORS).

If the RH-SSO 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*.

Variable	Description
SSO_SAML_CERTIFICATE_NAME	Alias for keys/certificate to use for SAML. The default is *jboss*.

See Example Workflow: Automatically Registering EAP Application in RH-SSO with OpenID-Connect Client for an end-to-end example of the automatic client registration method using an OpenID-Connect client.

4.4.1.2. Manual RH-SSO Client Registration

Manual RH-SSO 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 RH-SSO 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 RH-SSO adapter configuration section in the *standalone-openshift.xml* at when the application is deployed.

There are two methods for passing the RH-SSO adapter configuration to the client application:

- Modify the deployment file to contain the RH-SSO 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 RH-SSO Authentication, Using SAML Client for an end-to-end example of the manual RH-SSO client registration method using a SAML client.

4.5. LIMITATIONS

OpenShift does not currently accept OpenShift role mapping from external providers. If RH-SSO is used as an authentication gateway for OpenShift, users created in RH-SSO must have the roles added using the OpenShift Administrator **`oadm policy`** command.

For example, to allow an RH-SSO-created user to view a project namespace in OpenShift:

```
oadm policy add-role-to-user view <user-name> -n <project-name>
```

CHAPTER 5. TUTORIALS

5.1. EXAMPLE WORKFLOW: CREATING OPENSHIFT APPLICATION FROM EXISTING MAVEN BINARIES AND SECURING IT USING RED HAT SINGLE SING-ON

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

5.1.1. Deploy Binary Build of EAP 6.4 / 7.0 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 / 7.0 JSP service application that authenticates using the Red Hat Single Sign-On.

Prerequisite:

IMPORTANT

This guide assumes the RH-SSO for OpenShift image has been previously deployed using one of the following templates:

- ***sso72-mysql***
- ***sso72-mysql-persistent***
- ***sso72-postgresql***
- ***sso72-postgresql-persistent***
- ***sso72-x509-mysql-persistent***
- ***sso72-x509-postgresql-persistent***

5.1.1.1. Create RH-SSO Realm, Roles, and User for the EAP 6.4 / 7.0 JSP Application

The EAP 6.4 / 7.0 JSP service application requires dedicated RH-SSO realm, username, and password to be able to authenticate using Red Hat Single Sign-On. Perform the following steps after the RH-SSO for OpenShift image has been deployed:

Create the RH-SSO Realm

1. Login to the administration console of the RH-SSO server.
   https://secure-sso-sso-app-demo.openshift.example.com/auth/admin

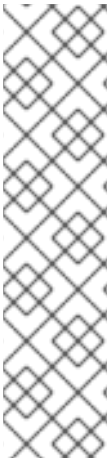
   Use the credentials of the RH-SSO administrator user.

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 and copy the public key that has been generated.



NOTE

The RH-SSO 7.2 image generates three keys by default:

- RSA key,
- HMAC key, and
- AES key

To copy the public key information for the RH-SSO 7.2 image, click the **Public key** button of the **RSA** row of the keys table. 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 RH-SSO-enabled EAP 6.4 / 7.0 JSP application.

Create RH-SSO Roles

NOTE

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 RH-SSO. These roles will be assigned to an RH-SSO 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 roles:

- **offline_access** and **uma_authorization** role for the RH-SSO 7.2 image.

2. Click **Add Role**.
3. Enter the role name (**user**) and click **Save**.

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

Create the RH-SSO 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 prompts for additional confirmation.

5.1.1.2. Assign `user` RH-SSO Role to the Realm Management User

Perform the following steps to tie the previously created **appuser** with the **user** RH-SSO 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.

5.1.1.3. Prepare RH-SSO Authentication for OpenShift Deployment of the EAP 6.4 / 7.0 JSP Application

1. Create a new project for the EAP 6.4 / 7.0 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 / 7.0 for OpenShift secrets with the SSL and JGroup keystore files.

```
$ oc secret new eap-ssl-secret eapkeystore.jks
```

```
$ oc secret new eap-jgroup-secret eapjgroups.jceks
```

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

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

5.1.1.4. Deploy Binary Build of the EAP 6.4 / 7.0 JSP Application

1. Clone the source code.

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

2. Configure the Red Hat JBoss Middleware Maven repository.

3. 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] ------------------------------------------------------------
----------------
```

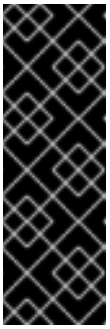
b. **Comment out** the **app-jee-jsp/config/keycloak.json** requirement of the **maven-enforcer-plugin** plugin and build the **app-jee-jsp** application.

```
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 to configure the adapter, and adapter configuration file (**keycloak.json**) to be present at 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 / 7.0 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 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

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

Table 5.1. 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 7.0	***$JBOSS_HOME/standalone/deployments***
Java S2I for OpenShift	***/deployments***
JWS for OpenShift	***$JWS_HOME/webapps***

5. Identify the image stream for EAP 6.4 / 7.0 image.

```
$ oc get is -n openshift | grep eap | cut -d ' ' -f 1
jboss-eap64-openshift
jboss-eap70-openshift
jboss-eap71-openshift
```

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

NOTE

Replace **--image-stream=jboss-eap70-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-eap70-openshift \
--name=eap-app
--> Found image 31895a4 (3 months old) in image stream
"openshift/jboss-eap70-openshift" under tag "latest" for "jboss-
eap70-openshift"

    JBoss EAP 7.0
    -------------
    Platform for building and running JavaEE applications on JBoss
EAP 7.0

    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 JavaEE applications on JBoss
EAP 7.0

    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 / 7.0 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 / 7.0 JSP application prior the deployment.

    a. Configure the application with proper details about the RH-SSO 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 beencopied.

```
$ 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="MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAkdhXy
Kx97oIoO6HwnV/MiX2EHO55Sn+ydsPzbjJevI5F31UvUco9uA8dGl6oM8HrnaWWv+
i8PvmlaRMhhl6Xs68vJTEc6d0soP+6A+aExw0coNRp2PDwvzsXVWPvPQg3+iytStx
u3Icndx+gC0ZYnxoRqL7rY7zKcQBScGEr78Nw6vZDwfe6d/PQ6W4xVErNytX9KyLF
VAE1VvhXALyqEM/EqYGLmpjw5bMGVKRXnhmVo9E88CkFDH8E+aPiApb/gFul1GJOv
+G8ySLoR1c8Y3L29F7C81odkVBp2yMm3RVFIGSPTjHqjO/nOtqYIfY4Wyw9mRIoY5
SyW7044dZXRwIDAQAB" \
-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 / 7.0 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
```

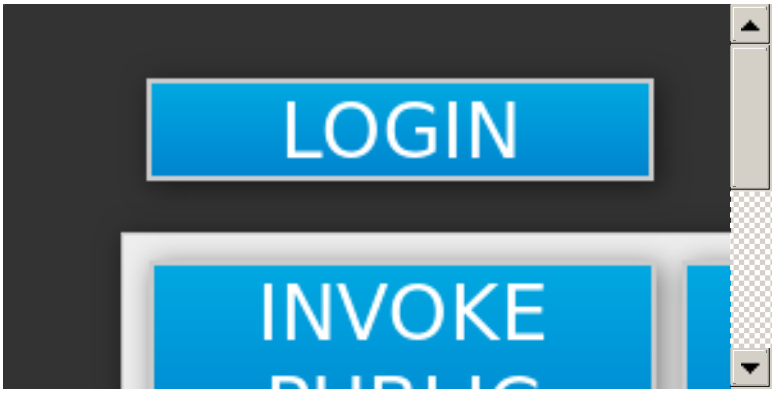
```
$ oc get route
No resources found.
```

```
$ 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
```

5.1.1.5. 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 similar to what you see in the following image:



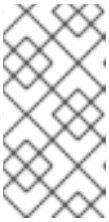
Perform the following to test the application:

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

- Click the **LOGIN** button to be redirected for user authentication to the RH-SSO server instance against the **`demo`** realm.
  Specify username and password of the RH-SSO user configured earlier (**`appuser`** / **`apppassword`**). Click **Log in**. The look of the application changes as shown in the following image:

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

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



NOTE

To invoke properly, the **`admin`** endpoint requires users with the **`admin`** RH-SSO role. Access for the **`appuser`** is forbidden because they only have the **`user`** role privilege, which allows them to access the **`secured`** endpoint.

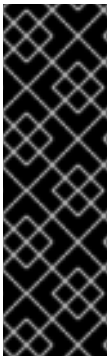
Perform the following steps to add the **`appuser`** to the **`admin`** RH-SSO role:

1. Access the administration console of the RH-SSO server's instance.
   https://secure-sso-sso-app-demo.openshift.example.com/auth/admin.

   Use the credentials of the RH-SSO 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 / 7.0 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.

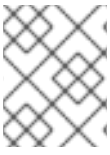
5.2. EXAMPLE WORKFLOW: UPDATING EXISTING DATABASE WHEN MIGRATING RH-SSO FOR OPENSHIFT IMAGE TO A NEW VERSION



IMPORTANT

- Rolling updates from RH-SSO for OpenShift 7.0 / 7.1 to 7.2 are not supported as databases and caches are not backward compatible.
- Stop all RH-SSO for OpenShift 7.0 / 7.1 instances before upgrading, they cannot run concurrently against the same database.
- Pre-generated scripts are not available, they are generated dynamically depending on the database.

Red Hat Single Sign-On 7.2 can automatically migrate the database schema, or you can choose to do it manually.



NOTE

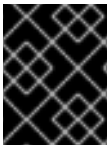
By default the database is automatically migrated when you start RH-SSO 7.2 for the first time.

5.2.1. Automatic Database Migration

This process assumes that you are running RH-SSO 7.1 image deployed using one of the following templates:

- ***sso71-mysql***

- ***sso71-postgresql***
- ***sso71-mysql-persistent***
- ***sso71-postgresql-persistent***



IMPORTANT

Stop all RH-SSO 7.1 pods before upgrading to RH-SSO 7.2, as they cannot run concurrently against the same database.

Use the following steps to automatically migrate the database schema:

1. Identify existing deployment config for RH-SSO 7.1 containers.

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

2. Stop all RH-SSO 7.1 containers in the current namespace.

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

3. Update the image change trigger in the existing deployment config to reference the RH-SSO 7.2 image.

```
$ oc patch dc/sso --type=json -p '[{"op": "replace", "path":
"/spec/triggers/0/imageChangeParams/from/name", "value": "redhat-
sso72-openshift:1.1"}]'
"sso" patched
```

4. Start rollout of the new RH-SSO 7.2 images based on the latest image defined in the image change triggers.

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

5. Deploy RH-SSO 7.2 containers using the modified deployment config.

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

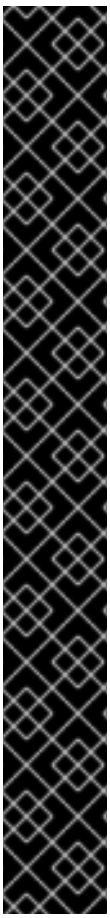
6. (Optional) Verify the database has been successfully updated.

```
$ 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.LiquibaseJpaUpdaterP
```

```
rovider] (ServerService Thread Pool -- 58) Updating database. Using
changelog META-INF/jpa-changelog-master.xml
```

5.2.2. Manual Database Migration



IMPORTANT

Pre-generated scripts are not available. They are generated dynamically depending on the database. With RH-SSO 7.2 one can generate and export these to an SQL file that can be manually applied to the database afterwards. To dynamically generate the SQL migration file for the database:

1. Configure RH-SSO 7.2 with the correct datasource,
2. Set 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 (e.g. **`migrationExport="${jboss.home.dir}/keycloak-database-update.sql"`**).

See database configuration of RH-SSO 7.2 for further details.

The database migration process handles the data schema update and performs manipulation of the data, therefore, stop all RH-SSO 7.1 instances before dynamic generation of the SQL migration file.

This guide assumes the RH-SSO 7.1 for OpenShift image has been previously deployed using one of the following templates:

- ***sso71-mysql***
- ***sso71-postgresql***
- ***sso71-mysql-persistent***
- ***sso71-postgresql-persistent***

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

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

```
$ cat sso71-to-sso72-db-migrate-job.yaml.orig
apiVersion: batch/v1
kind: Job
metadata:
  name: sso71-to-sso72-db-migrate-job
spec:
  autoSelector: true
  parallelism: 0
  completions: 1
```

```
  template:
    metadata:
      name: sso71-to-sso72-db-migrate-job
    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: sso71-to-sso72-db-migrate-job
        # Keep the pod running after SQL migration file has been
generated,
        # so we can retrieve it
        command: ["/bin/bash", "-c", "/opt/eap/bin/openshift-
launch.sh || sleep 600"]
      restartPolicy: Never
```

```
$ cp sso71-to-sso72-db-migrate-job.yaml.orig sso71-to-sso72-db-
migrate-job.yaml
```

2. Copy the datasource definition and database access credentials from RH-SSO 7.1 deployment config to appropriate places in database job migration template. 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**sso71-to-sso72-db-migrate-job.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="sso71-to-sso72-db-migrate-job.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 (the order in which replacements are made is
important):
# * <<PREFIX>> with actual $PREFIX value and
# * <<PREFIX with "<<$PREFIX" value
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.
if grep -Pq "${SERVICE}_SERVICE_HOST=[^ ]+" <<< "${SSO_DC_VARS[@]}"
&&
   grep -Pq "${SERVICE}_SERVICE_PORT=[^ ]+" <<< "${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 (the order in which replacements are made is
important):
# * <<SERVICE_HOST>> with ${SERVICE}_SERVICE_HOST and
# * <<SERVICE_HOST_VALUE>> with "<<${SERVICE}_SERVICE_HOST_VALUE>>"
# Do this for both "HOST" and "PORT"
for KEY in "HOST" "PORT"
do
  sed -i "s#<<SERVICE_${KEY}>>#${SERVICE}_SERVICE_${KEY}#g"
${JOB_MIGRATION_YAML}
  sed -i "s#<<SERVICE_${KEY}_VALUE>>#
<<${SERVICE}_SERVICE_${KEY}_VALUE>>#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 RH-SSO 7.2 database migration image using the pre-configured source and wait for the build to finish.

```
$ oc get is -n openshift | grep sso72 | cut -d ' ' -f1
redhat-sso72-openshift
```

```
$ oc new-build redhat-sso72-openshift:1.1~https://github.com/jboss-
openshift/openshift-examples --context-dir=sso-manual-db-migration -
-name=sso72-db-migration-image
--> Found image bf45ac2 (7 days old) in image stream
"openshift/redhat-sso72-openshift" under tag "1.1" for "redhat-
sso72-openshift:1.1"

    Red Hat SSO 7.2
    ---------------
    Platform for running Red Hat SSO

    Tags: sso, sso7, keycloak

    * A source build using source code from
https://github.com/jboss-openshift/openshift-examples will be
created
      * The resulting image will be pushed to image stream "sso72-
db-migration-image:latest"
      * Use 'start-build' to trigger a new build

--> Creating resources with label build=sso72-db-migration-image ...
    imagestream "sso72-db-migration-image" created
    buildconfig "sso72-db-migration-image" created
--> Success
    Build configuration "sso72-db-migration-image" created and build
triggered.
    Run 'oc logs -f bc/sso72-db-migration-image' to stream the build
progress.
```

```
$ oc logs -f bc/sso72-db-migration-image --follow
Cloning "https://github.com/iankko/openshift-examples.git" ...
...
Push successful
```

4. Update the template of the database migration job (**sso71-to-sso72-db-migrate-job.yaml**) with reference to the built**sso72-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
   sso72-db-migration-image | tr -s ' ' | cut -d ' ' -f 2)
   ```

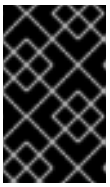
   b. Replace the <<SSO_IMAGE_VALUE>> field in the job template with the pull specification.

   ```
   $ sed -i "s#<<SSO_IMAGE_VALUE>>#$PULL_REF#g" sso71-to-sso72-db-
   migrate-job.yaml
   ```

   c. Verify that the field is updated.

5. Instantiate database migration job from the job template.

```
$ oc create -f sso71-to-sso72-db-migrate-job.yaml
job "sso71-to-sso72-db-migrate-job" created
```



IMPORTANT

The database migration process handles the data schema update and performs manipulation of the data, therefore, stop all RH-SSO 7.1 instances before dynamic generation of the SQL migration file.

6. Identify existing deployment config for RH-SSO 7.1 containers.

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

7. Stop all RH-SSO 7.1 containers 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
sso71-to-sso72-db-migrate-job   1         0            3m
```

```
$ oc scale --replicas=1 job/sso71-to-sso72-db-migrate-job
job "sso71-to-sso72-db-migrate-job" scaled
```

```
$ oc get pods
NAME                                    READY     STATUS
RESTARTS   AGE
sso-postgresql-1-n5p16                  1/1       Running     1
19h
sso71-to-sso72-db-migrate-job-b87bb     1/1       Running     0
1m
sso72-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 sso71-to-sso72-db-migrate-job-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 RH-SSO 7.2 database update.

11. Apply the database update manually.

- Run the following commands for ***sso71-postgresql*** and ***sso71-postgresql-persistent*** templates (PostgreSQL database):

  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
```

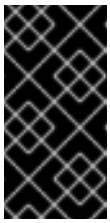
  ii. Start a shell session to the PostgreSQL pod.

```
$ 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.

- Run the following commands for ***sso71-mysql*** and ***sso71-mysql-persistent*** templates (MySQL database):

i. Given pod situation similar to the following:

```
$ oc get pods
NAME                                READY     STATUS
RESTARTS   AGE
sso-mysql-1-zvhk3                   1/1       Running
0          1h
sso71-to-sso72-db-migrate-job-m202t   1/1       Running     0
11m
sso72-db-migration-image-1-build      0/1       Completed   0
13m
```

ii. Copy the generated SQL migration file to the MySQL pod.

```
$ oc rsync --no-perms=true ./db-update/ sso-mysql-1-zvhk3:/tmp
sending incremental file list
keycloak-database-update.sql

sent 24,718 bytes  received 34 bytes  49,504.00 bytes/sec
total size is 24,594  speedup is 0.99
```

iii. Start a shell session to the MySQL pod.

```
$ oc rsh sso-mysql-1-zvhk3
sh-4.2$
```

iv. Use the **mysql** tool to apply database update manually.

```
sh-4.2$ alias mysql="/opt/rh/rh-mysql57/root/bin/mysql"
sh-4.2$ mysql --version
/opt/rh/rh-mysql57/root/bin/mysql  Ver 14.14 Distrib 5.7.16,
for Linux (x86_64) using  EditLine wrapper
sh-4.2$ mysql -D <PREFIX>_DATABASE -u <PREFIX>_USERNAME -p <
/tmp/keycloak-database-update.sql
```

```
Enter password:
sh-4.2$ echo $?
0
```

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.

v. Close the shell session to the MySQL pod. Continue with updating image change trigger step.

12. Update image change trigger in the existing deployment config of RH-SSO 7.1 to reference the RH-SSO 7.2 image.

```
$ oc patch dc/sso --type=json -p '[{"op": "replace", "path":
"/spec/triggers/0/imageChangeParams/from/name", "value": "redhat-
sso72-openshift:1.1"}]'
"sso" patched
```

13. Start rollout of the new RH-SSO 7.2 images based on the latest image defined in the image change triggers.

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

14. Deploy RH-SSO 7.2 containers using the modified deployment config.

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

5.3. EXAMPLE WORKFLOW: MIGRATING ENTIRE RH-SSO SERVER DATABASE ACROSS THE 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. It assumes steps described in Preparing RH-SSO Authentication for OpenShift Deployment section have been performed already.

5.3.1. Deploying the RH-SSO MySQL Application Template

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 ***sso72-mysql*** RH-SSO application template. When deploying the template ensure to **keep the *SSO_REALM* variable unset** (default value).

IMPORTANT

Export and import of Red Hat Single Sign-On 7.2 database is triggered at RH-SSO server boot time and its paramaters are passed in via Java system properties. This means during one RH-SSO server boot only one of the possible migration actions (either ***export***, or ***import***) can be performed.

WARNING

When the ***SSO_REALM*** configuration variable is set on the RH-SSO for OpenShift image, a database import is performed in order to create the RH-SSO 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 RH-SSO 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 RH-SSO 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.

5.3.2. (Optional) Creating additional RH-SSO realm and users to be also exported

When performing Red Hat Single Sign-On 7.2 server database exportonly RH-SSO realms and users currently present in the database will be exported. If the exported JSON file should include also additional RH-SSO realms and users, these need to be created first:

1. Create a new realm
2. Create new users

Upon their creation the database can be exported.

5.3.3. Export the RH-SSO database as a JSON file on the OpenShift pod

1. Get the RH-SSO deployment config and scale it down to zero.

```
$ oc get dc -o name
```

```
deploymentconfig/sso
deploymentconfig/sso-mysql

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

2. Instruct the RH-SSO 7.2 server deployed on RH-SSO for OpenShift image to perform database export at RH-SSO server boot time.

```
oc 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 RH-SSO deployment config back up. This will start the RH-SSO 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-mysql-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
```

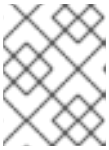
5.3.4. Retrieve and import the exported JSON file

1. Retrieve the JSON file of the RH-SSO database from the pod.

```
$ oc get pods
NAME                READY     STATUS    RESTARTS   AGE
sso-4-ejr0k         1/1       Running   0          2m
sso-mysql-1-ozzl0   1/1       Running   0          4h

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

2. (Optional) Import the JSON file of the RH-SSO database into an RH-SSO server running in another environment.



NOTE

For importing into an RH-SSO server not running on OpenShift, see the Export and Import section of the RH SSO Server Administration Guide.

Use the administration console of the RH-SSO server to import the resources from previously exported JSON file into the RH-SSO server's database, when the RH-SSO server is running as a Red Hat Single Sign-On 7.2 container on OpenShift:

a. Log into the **`master`** realm's administration console of the RH-SSO server using the credentials used to create the administrator user. In the browser, navigate to **http://sso-<project-name>.<hostname>/auth/admin** for the RH-SSO web server, or to **https://secure-sso-<project-name>.<hostname>/auth/admin** for the encrypted RH-SSO web server.

b. At the top of the sidebar choose the name of the RH-SSO 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 RH-SSO realm from which the data should be imported. This example uses **`master`** realm.

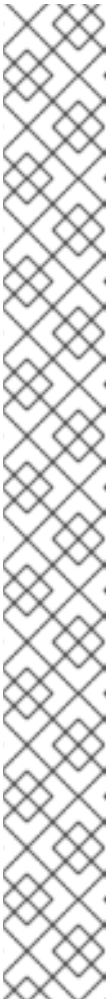
f. Choose which of users, clients, realm roles, and client roles should be imported (all of them are imported by default).

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

NOTE

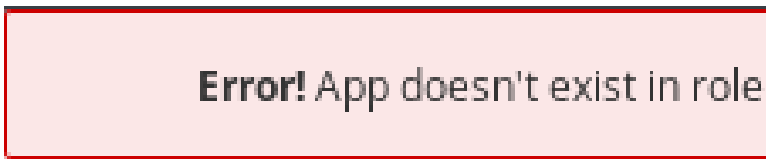
The attempt to import an object (user, client, realm role, or client role) fails if object with the same identifier already exists in the current database. Use **Skip** strategy to import the objects that are present in the **`demorealm-export.json`** file, but do not exist in current database.

h. Click **Import** to perform the import.



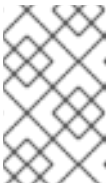
NOTE

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:



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 RH-SSO server, on which the export JSON file was created, to the target RH-SSO 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.



NOTE

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.

IMPORTANT

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

5.4. EXAMPLE WORKFLOW: CONFIGURING OPENSHIFT TO USE RH-SSO FOR AUTHENTICATION

Configure OpenShift to use the RH-SSO deployment as the authorization gateway for OpenShift. This follows on from Example Workflow: Preparing and Deploying the RH-SSO for OpenShift image, in which RH-SSO was deployed on OpenShift.

This example adds RH-SSO as an authentication method alongside the HTPasswd method configured in the OpenShift Primer. Once configured, both methods will be available for user login to your OpenShift web console.

5.4.1. Configuring RH-SSO Credentials

Log in to the encrypted RH-SSO web server at **https://secure-sso-*sso-app-demo.openshift32.example.com*/auth/admin** using the administrator account created during the RH-SSO 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 RH-SSO-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

See the Managing Clients chapter of the Red Hat Single Sign-On Server Administration Guide for more information.

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.

5.4.2. Configuring OpenShift Master for Red Hat Single Sign-On Authentication

Log in to the OpenShift master CLI. You must have the required permissions to edit the **/etc/origin/master/master-config.yaml** file.

1. Edit the **/etc/origin/master/master-config.yaml** file and find the **identityProviders**. The OpenShift master, which was deployed using the OpenShift Primer, is configured with HTPassword and shows the following:

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

Add RH-SSO as a secondary identity provider with content similar to the following snippet:

```
- name: rh_sso
  challenge: false
  login: true
  mappingInfo: 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 RH-SSO **Secret** hash for the **clientSecret** can be found in the RH-SSO web console: **Clients** → ***openshift-demo*** → **Credentials**

b. The endpoints for the **urls** can be found by making a request with the RH-SSO 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
```

5.4.3. Logging in to OpenShift

Navigate to the OpenShift web console, which in this example is *https://openshift.example.com:8443/console*. The OpenShift login page now has the option to use either **htpasswd_auth** or **rh-sso**. The former is still available because it is present in the **/etc/origin/master/master-config.yaml**.

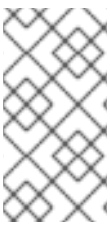
Select **rh-sso** and log in to OpenShift with the *testuser* user created earlier in RH-SSO. No projects are visible to *testuser* until they are added in the OpenShift CLI. This is the only way to provide user privileges in OpenShift because it currently does not accept external role mapping.

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

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

5.5. EXAMPLE WORKFLOW: AUTOMATICALLY REGISTERING EAP APPLICATION IN RH-SSO WITH OPENID-CONNECT CLIENT

This follows on from Example Workflow: Preparing and Deploying the RH-SSO for OpenShift image, in which RH-SSO was deployed on OpenShift. This example prepares RH-SSO 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 RH-SSO client registration. Once deployed, the RH-SSO 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 RH-SSO Clients and Automatic and Manual RH-SSO Client Registration Methods for more information on the differences between OpenID-Connect and SAML clients.

5.5.1. Preparing RH-SSO 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 secret new eap-ssl-secret eapkeystore.jks
$ oc secret new eap-jgroup-secret eapjgroups.jceks
```

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

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

5.5.2. Preparing the RH-SSO Credentials

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

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 RH-SSO-enabled JBoss EAP image.

Create a Role

Create a role in RH-SSO 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 RH-SSO *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 RH-SSO client registration in the RH-SSO 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 RH-SSO 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.

5.5.3. Deploy the RH-SSO-enabled JBoss EAP Image

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 RH-SSO parameters to configure the RH-SSO 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>*
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.

5.5.4. Log in to the JBoss EAP Server Using RH-SSO

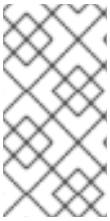
1. Access the JBoss EAP application server and click **Login**. You are redirected to the RH-SSO login.

2. Log in using the RH-SSO user created in the example. You are authenticated against the RH-SSO server and returned to the JBoss EAP application server.

5.6. EXAMPLE WORKFLOW: MANUALLY REGISTERING EAP APPLICATION IN RH-SSO WITH SAML CLIENT

This follows on from Example Workflow: Preparing and Deploying the RH-SSO for OpenShift image, in which RH-SSO was deployed on OpenShift.

This example prepares RH-SSO realm, role, and user credentials for an EAP project and configures an EAP for OpenShift deployment. Once deployed, the RH-SSO 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 RH-SSO Clients and Automatic and Manual RH-SSO Client Registration Methods for more information on the differences between SAML and OpenID-Connect clients.

5.6.1. Preparing the RH-SSO Credentials

Log in to the encrypted RH-SSO web server at **https://secure-sso-<*project-name*>.<*hostname*>/auth/admin** using the administrator account created during the RH-SSO 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 RH-SSO-enabled JBoss EAP image.

Create a Role

Create a role in RH-SSO 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 RH-SSO *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 RH-SSO client registration in the RH-SSO 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 RH-SSO 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**.

5.6.2. Preparing RH-SSO 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 secret new eap-ssl-secret eapkeystore.jks
   $ oc secret new eap-jgroup-secret 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
   ```

5.6.3. Modifying the secure-saml-deployments File

The **keycloak-saml-subsystem.xml**, exported from the RH-SSO 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 RH-SSO SAML adapter configuration.

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 RH-SSO 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 RH-SSO client.

6. Save and close the **/configuration/secure-saml-deployments** file.

5.6.4. 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>
...
```

5.6.5. Deploying the Application

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

CHAPTER 6. REFERENCE

6.1. 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 as follows:

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

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

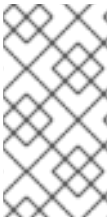
2. Update build configuration of **sso** with a **MAVEN_MIRROR_URL** environment variable

```
oc env bc/sso
MAVEN_MIRROR_URL="http://10.0.0.1:8080/repository/internal/"
buildconfig "sso" updated
```

3. Verify the setting

```
oc 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.

6.2. ENVIRONMENT VARIABLES

6.2.1. 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 6.1. 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.	***redhat-sso-7/sso72-openshift***
JBOSS_IMAGE_RELEASE	Image release, same as Release label.	***dev***
JBOSS_IMAGE_VERSION	Image version, same as Version label.	***1.1***
JBOSS_MODULES_SYSTEM_PKGS	-	***org.jboss.logmanager,jdk.nashorn.api***
STI_BUILDER	Provides OpenShift S2I support for jee project types.	***jee***

6.2.2. 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 6.2. Configuration Environment Variables

Variable Name	Description	Example Value

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***
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***

Variable Name	Description	Example Value
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***
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***

Variable Name	Description	Example Value
GC_MAX_METASPACE_SIZE	The maximum metaspace size.	***100***
GGC_TIME_RATIOC_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***
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***

Variable Name	Description	Example Value
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 RH-SSO 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***
SSO_ADMIN_USERNAME	Username of the administrator account for the **`master`** realm of the RH-SSO server. **Required.** If no value is specified, it is auto generated and displayed as an OpenShift Instructional message when the template is instantiated.	***admin***

Variable Name	Description	Example Value
SSO_REALM	Name of the realm to be created in the RH-SSO server if this environment variable is provided.	***demo***
SSO_SERVICE_PASSWORD	The password for the RH-SSO service user.	***mgmt-password***
SSO_SERVICE_USERNAME	The username used to access the RH-SSO service. This is used by clients to create the application client(s) within the specified RH-SSO 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***
SSO_TRUSTSTORE_SECRET	The name of the secret containing the truststore file. Used for *sso-truststore-volume* volume.	***truststore-secret***

Available application templates for RH-SSO for OpenShift can combine theaforementioned 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. ***MYSQL_FT_MAX_WORD_LEN***) yet. All of these different types of configuration variables can be adjusted as desired to achieve the deployed RH-SSO-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 RH-SSO-enabled applications, is described below.

6.2.3. Template variables for all RH-SSO images

Table 6.3. Configuration Variables Available For All RH-SSO Images

Variable	Description
APPLICATION_NAME	The name for the application.

Variable	Description
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).
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.

Variable	Description
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 RH-SSO 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 RH-SSO 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 RH-SSO server if this environment variable is provided.
SSO_SERVICE_USERNAME	The username used to access the RH-SSO service. This is used by clients to create the application client(s) within the specified RH-SSO realm. This user is created if this environment variable is provided.
SSO_SERVICE_PASSWORD	The password for the RH-SSO 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.

Variable	Description
SSO_TRUSTSTORE_PASSWORD	The password for the truststore and certificate.

6.2.4. Template variables specific to *sso72-mysql*, *sso72-mysql-persistent*, and *sso72-x509-mysql-persistent*

Table 6.4. Configuration Variables Specific To RH-SSO-enabled MySQL 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/mysql*.
MYSQL_AIO	Controls the *innodb_use_native_aio* setting value if the native AIO is broken.
MYSQL_FT_MAX_WORD_LEN	The maximum length of the word to be included in a FULLTEXT index.
MYSQL_FT_MIN_WORD_LEN	The minimum length of the word to be included in a FULLTEXT index.
MYSQL_LOWER_CASE_TABLE_NAMES	Sets how the table names are stored and compared.
MYSQL_MAX_CONNECTIONS	The maximum permitted number of simultaneous client connections.

6.2.5. Template variables specific to *sso72-postgresql*, *sso72-postgresql-persistent*, and *sso72-x509-postgresql-persistent*

Table 6.5. Configuration Variables Specific To RH-SSO-enabled PostgreSQL Applications With Ephemeral Or Persistent Storage

Variable	Description
DB_USERNAME	Database user name.
DB_PASSWORD	Database user password.

Variable	Description
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.

6.2.6. Template variables specific to *sso72-mysql-persistent*, *sso72-x509-mysql-persistent*, *sso72-postgresql-persistent*, and *sso72-x509-postgresql-persistent*

Table 6.6. Configuration Variables Specific To RH-SSO-enabled MySQL / PostgreSQL Applications With Persistent Storage

Variable	Description
VOLUME_CAPACITY	Size of persistent storage for database volume.

6.2.7. Template variables for general eap64, eap70, and eap71 S2I images

Table 6.7. 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.

Variable	Description
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.
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.

Variable	Description
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.

6.2.8. Template variables specific to *eap64-sso-s2i*, *eap70-sso-s2i*, and *eap71-sso-s2i* for automatic client registration

Table 6.8. Configuration Variables For EAP 6.4 and EAP 7 RH-SSO-enabled Applications Built Via S2I

Variable	Description
SSO_URL	RH-SSO server location.
SSO_REALM	Name of the realm to be created in the RH-SSO server if this environment variable is provided.
SSO_USERNAME	The username used to access the RH-SSO service. This is used to create the application client(s) within the specified RH-SSO realm. This should match the ***SSO_SERVICE_USERNAME*** specified through one of the **sso72-** templates.
SSO_PASSWORD	The password for the RH-SSO service user.
SSO_PUBLIC_KEY	RH-SSO public key. Public key is recommended to be passed into the template to avoid man-in-the-middle security attacks.
SSO_SECRET	The RH-SSO client secret for confidential access.
SSO_SERVICE_URL	RH-SSO service location.

Variable	Description
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	RH-SSO client access type.
SSO_DISABLE_SSL_CERTIFICATE_VALIDATION	If true SSL communication between EAP and the RH-SSO Server is insecure (i.e. certificate validation is disabled with curl)
SSO_ENABLE_CORS	Enable CORS for RH-SSO applications.

6.2.9. Template variables specific to *eap64-sso-s2i*, *eap70-sso-s2i*, and *eap71-sso-s2i* for automatic client registration with SAML clients

Table 6.9. Configuration Variables For EAP 6.4 and EAP 7 RH-SSO-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	RH-SSO logout page for SAML applications.

6.3. EXPOSED PORTS

Port Number	Description
8443	HTTPS

Port Number	Description
8778	Jolokia monitoring