Red Hat JBoss BRMS 6.4

IBM WebSphere Installation and Configuration Guide

For Red Hat JBoss BRMS

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Abstract

A guide to installing and configuring Red Hat JBoss BRMS on IBM WebSphere Application Server.

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CHAPTER 1. INTRODUCTION

1.1. ABOUT RED HAT JBOSS BRMS

Red Hat JBoss BRMS is an open source decision management platform that combines Business Rules Management and Complex Event Processing. It automates business decisions and makes that logic available to the entire business.

Red Hat JBoss BRMS use a centralized repository where all resources are stored. This ensures consistency, transparency, and the ability to audit across the business. Business users can modify business logic without requiring assistance from IT personnel.

Business Resource Planner is included with this release.

Red Hat JBoss BRMS is supported for use with Red Hat Enterprise Linux 7 (RHEL7).

1.2. SUPPORTED PLATFORMS

Red Hat JBoss BPM Suite and Red Hat JBoss BRMS are fully supported and tested on the following platforms:

- Red Hat JBoss Enterprise Application Platform 6.4.7
- Red Hat JBoss Web Server 2.1, 3.0
- IBM WebSphere Application Server 8.5.5
- Oracle WebLogic Server 12.1.3 (12c)
- Red Hat JBoss Fuse 6.2.*x*

1.3. ABOUT IBM WEBSPHERE APPLICATION SERVER

IBM WebSphere Application Server (hereinafter referred to as WAS) is a flexible and secure web application server that hosts Java-based web applications and provides Java EE-certified runtime environments. WAS 8.5.5 supports Java SE 8 and is fully compliant with Java EE 7 since version 8.5.5.6.

1.3.1. Getting Started with IBM WebSphere Application Server

Downloading and Installing WAS
In order to install IBM WebSphere Application Server, you need to download and install IBM Installation Manager first.

1. Download IBM Installation Manager version 1.8.5 or later from the IBM Installation Manager and Packaging Utility download links page.
2. Extract the downloaded archive, change to root, and run the following command in the new directory:

   ```
   ./install
   ```

   IBM Installation Manager opens. The installer will guide you through the entire process of installing the manager.

3. Open the installed manager, go to **File → Preferences** and click **Add Repository**.
   The **Add Repository** dialog window opens.

4. Enter the repository URL for IBM WebSphere Application Server 8.5. You can find all the repository URLs in the Online product repositories for WebSphere Application Server offerings page of the *IBM Knowledge Center*. For example:

   ```
   http://www.ibm.com/software/repositorymanager/com.ibm.websphere.APPCLIENT.v85
   ```

5. Enter your IBM id credentials when prompted and after the **Connection** status turns green, click **OK**.

6. Click **Install**.

7. Choose the packages you want to install and click **Next**. If asked, install all the recommended fixes as well.

Creating Users and Installation Verification

1. In the **WebSphere Customization Toolbox 8.5**, open the **Profile Management Tool**.

2. Click **Create...** and create a user for the **Application Server** environment.

3. In the **WebSphere Application Server - First Steps**window that opens, click **Installation Verification** and verify that your server was installed properly.

Starting Server

1. Change into the **bin** directory of the installed application server (by default at **/opt/IBM/WebSphere/AppServer**).

2. Change to root and run **./startServer.sh *APPLICATION_SERVER_NAME***, for example:

   ```
   ./startServer.sh server1
   ```

3. Navigate to **http://*TARGET_SERVER*:9060/ibm/console** in your web browser and log in with the user credentials created in the previous procedure.
   The **Integrated Solutions Console** opens.

NOTE

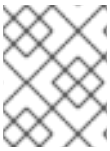
Do not forget to stop the server after you are no longer using it. Log out of the console and run **./stopServer.sh *APPLICATION_SERVER_NAME*** as root. For example:

```
./stopServer.sh server1
```

For further information, see WebSphere Application Server, version 8.5.5 documentation .

1.4. ABOUT RED HAT JBOSS BRMS FOR IBM WEBSPHERE APPLICATION SERVER

Red Hat JBoss BRMS for IBM WebSphere Application Server is provided as two deployable web application archives: **business-central.war** and **kie-server.war**. It is then deployed and configured as any other web application.



NOTE

Red Hat JBoss BRMS 6.4 is supported on the version 8.5.5 of IBM WebSphere Application Server.

Installation of Red Hat JBoss BRMS on IBM WebSphere Application Server is supported since version 6.0.2 of Red Hat JBoss BRMS. This guide covers the installation and configuration of Red Hat JBoss BRMS on a full profile version of IBM WebSphere Application Server 8.5.5.

Before installation, several configuration steps need to be performed to enable a successful setup. Follow the procedures in this guide to configure the server.

Before you proceed, ensure you have root access to IBM WebSphere Application Server and that you are able to successfully access the IBM WebSphere's administrative console using a web browser (usually at **http://*TARGET_SERVER*:9060/ibm/console**).

CHAPTER 2. DOWNLOAD AND EXTRACT

Follow the steps outlined in this chapter to download and extract Red Hat JBoss BRMS for IBM WebSphere Application Server.

2.1. DOWNLOADING RED HAT JBOSS BRMS FOR IBM WEBSPHERE APPLICATION SERVER

To download the deployable Red Hat JBoss BRMS package file for IBM WebSphere Application Server from the Red Hat Customer Portal:

1. Go to the Red Hat Customer Portal and log in.
2. Click **DOWNLOADS** at the top of the page.
3. In the **Product Downloads** page that opens, click **Red Hat JBoss BRMS**.
4. From the **Version** drop-down menu, select **6.4**.
5. Navigate to **Red Hat JBoss BRMS 6.4.0 Deployable for WebSphere 8.5** and click **Download**.

2.2. EXTRACTING RED HAT JBOSS BRMS FOR IBM WEBSPHERE APPLICATION SERVER

The downloaded installation ZIP file for Red Hat JBoss BRMS (**jboss-brms-6.4.0.GA-deployable-was8.zip**) contains the Business Central WAR deployable archive (**business-central.war**) and the Realtime Decision Server WAR deployable archive (**kie-server.war**) in an unextracted format.

Extract the downloaded ZIP file so that you have access to the deployable WAR files:

```
unzip jboss-brms-VERSION-deployable-was8.zip
```

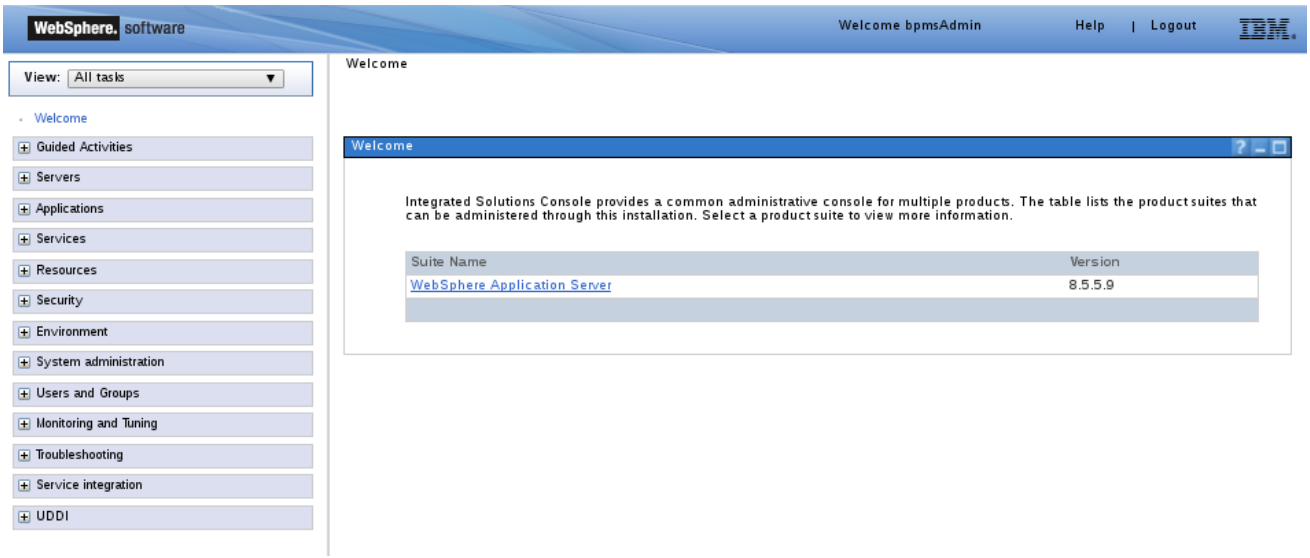
CHAPTER 3. CONFIGURE

Before you can deploy Red Hat JBoss BRMS as a web archive on IBM WebSphere Application Server, configure the server to accept the deployable WAR files. Follow the steps outlined in this section to deploy Red Hat JBoss BRMS on IBM WebSphere Application Server.

Log in to your IBM WebSphere console using an administrative login before performing any of these steps. The usual login URL is **http://*TARGET_SERVER*:9060/ibm/console** (for example **http://localhost:9060/ibm/console**).

The **IBM Integrated Solutions Console** with the welcome screen opens. The main menu on the left side of the console contains all the links necessary for setting the application server.

Figure 3.1. IBM Integrated Solutions Console

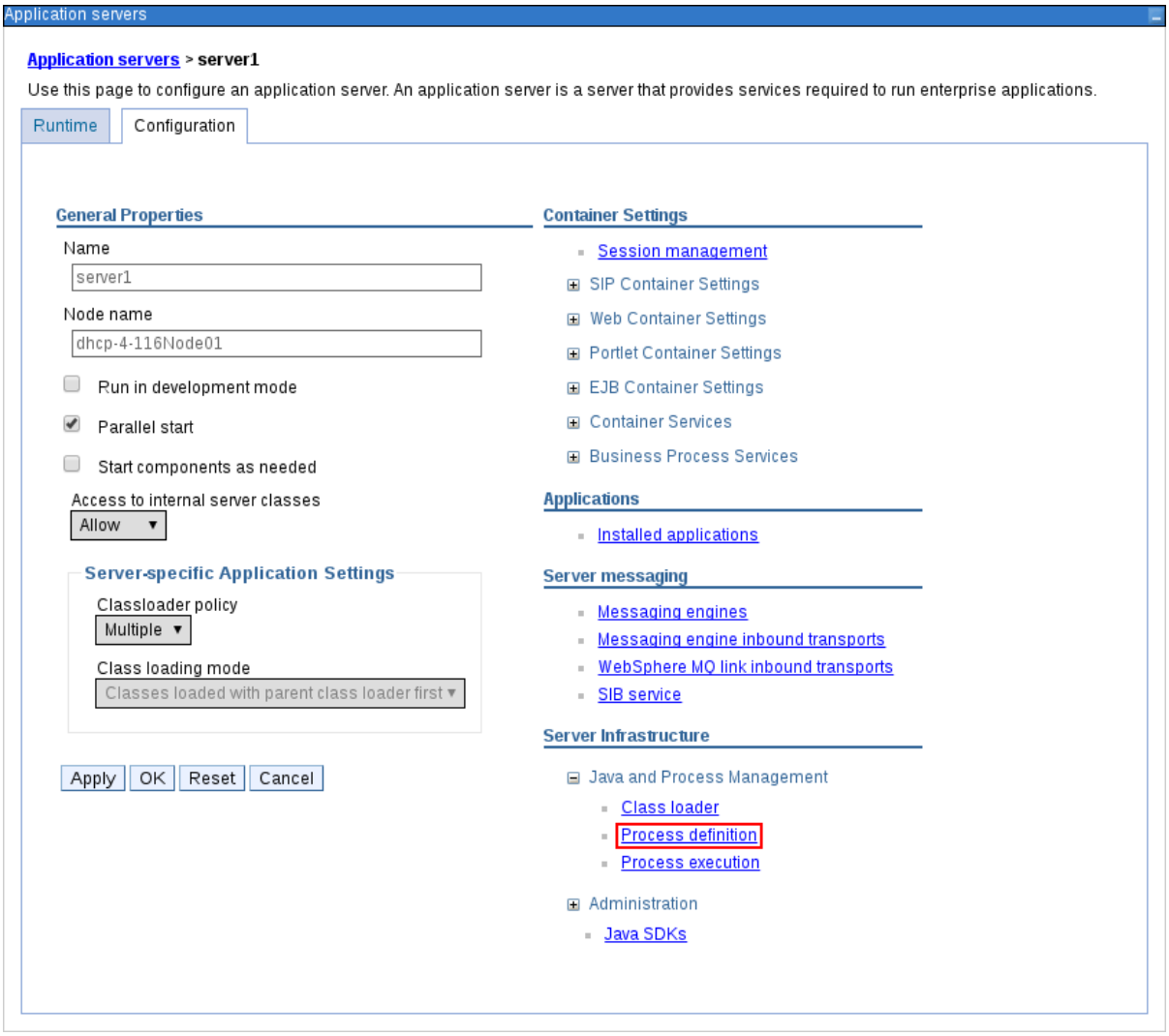


3.1. INCREASING JVM HEAP SIZE

With the default JVM heap size, the IBM WebSphere Application Server freezes or causes deployment errors when deploying Business Central. To increase the heap size:

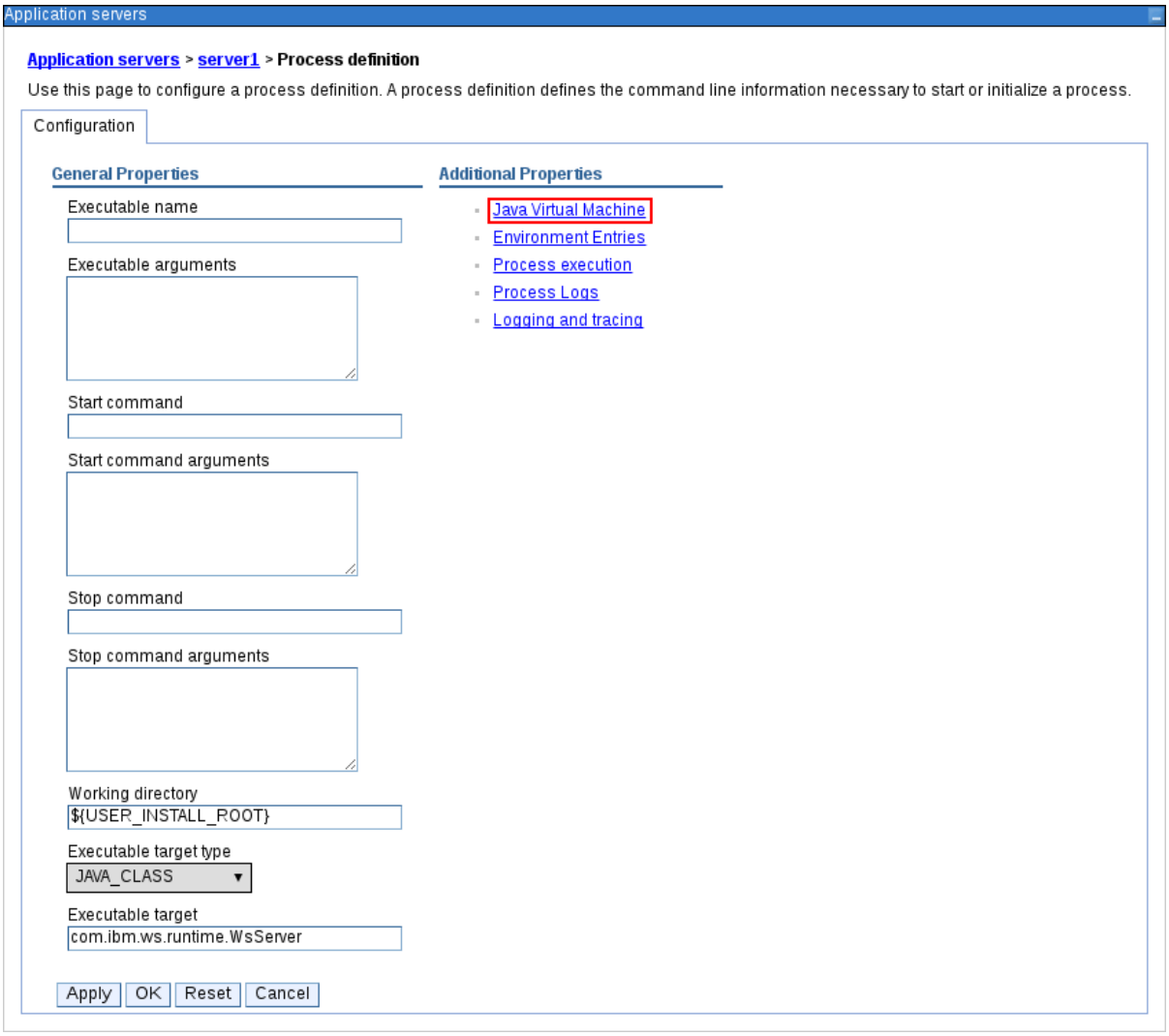
1. In the **Integrated Solutions Console**, go to **Servers → Server Types → WebSphere Application Servers**.
2. In the list of application servers, click on the server on which you are going to deploy Business Central. For example **server1**.
   The configuration page for that server opens.
3. Under **Server Infrastructure** heading on the right side, click **Java and Process Management → Process Definition**.

Figure 3.2. Application Server Configuration Page



4. Click **Java Virtual Machine** under the **Additional Properties** heading on the right.

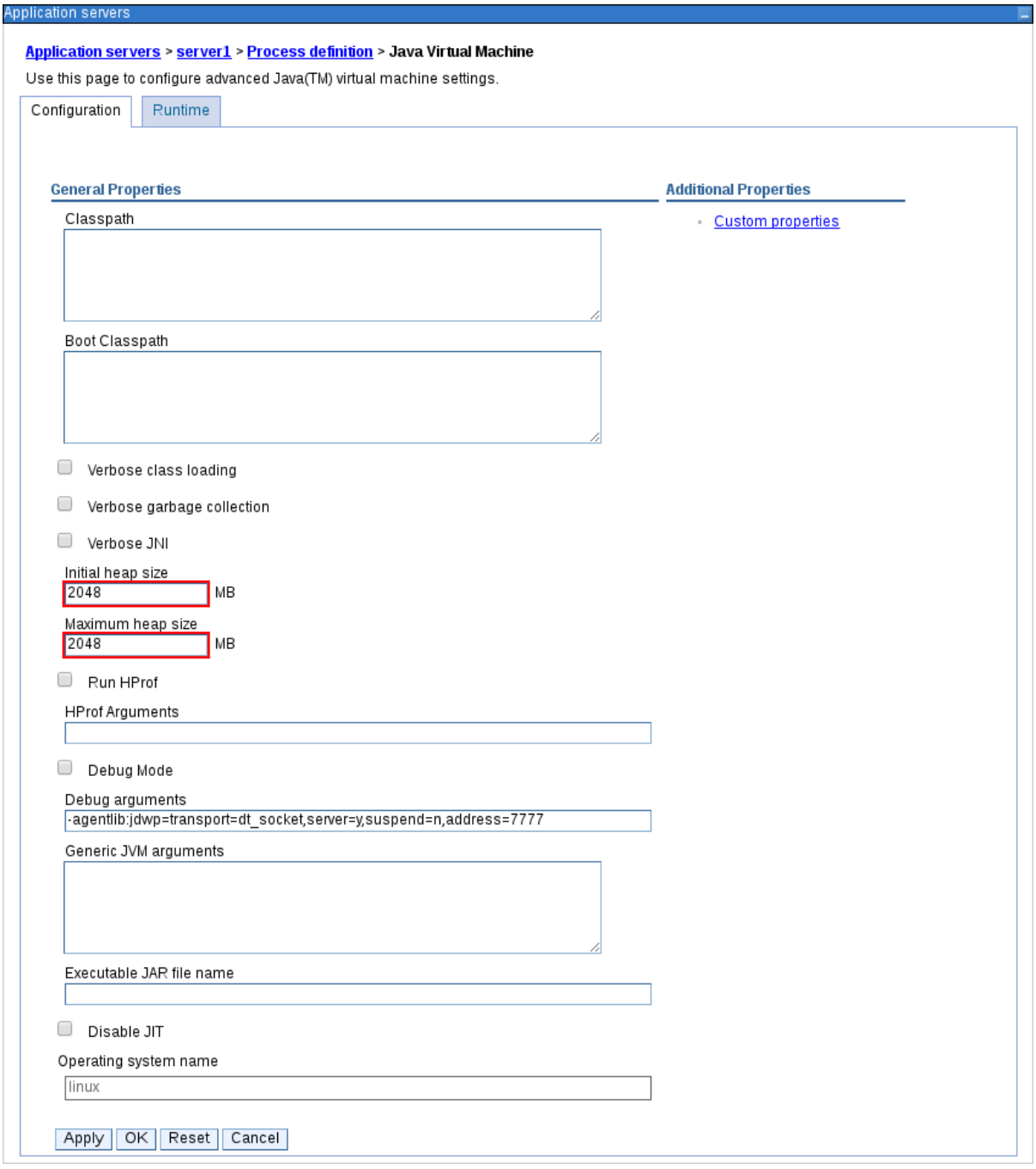
Figure 3.3. Process Definition Configuration Page



This will open up the configuration properties for the JVM that is used to start the server.

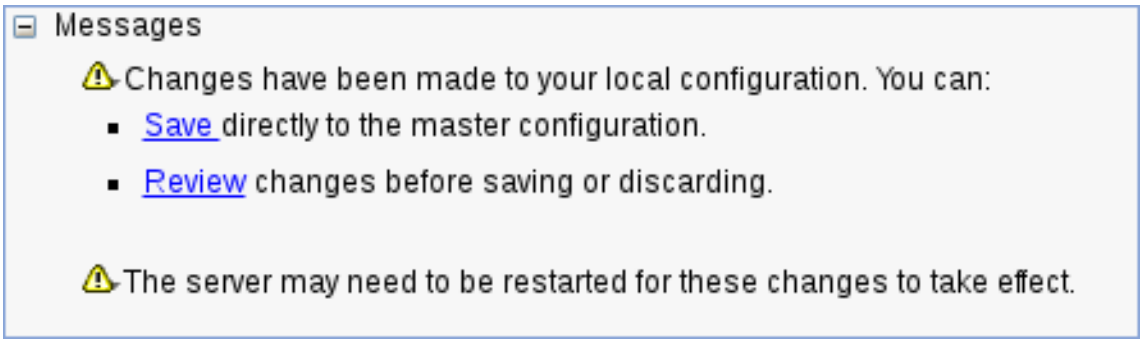
5. Change both the **Initial Heap Size** and **Maximum Heap Size** to **2048**. This is the configuration Red Hat JBoss BRMS is tested with.

Figure 3.4. JVM Configuration Page



6. Click **Apply** at the bottom.
Messages pop-up window appears at the top of the **Application Servers** configuration page. You can choose to save these configuration settings to the master configuration at this stage.

Figure 3.5. Messages Pop-up



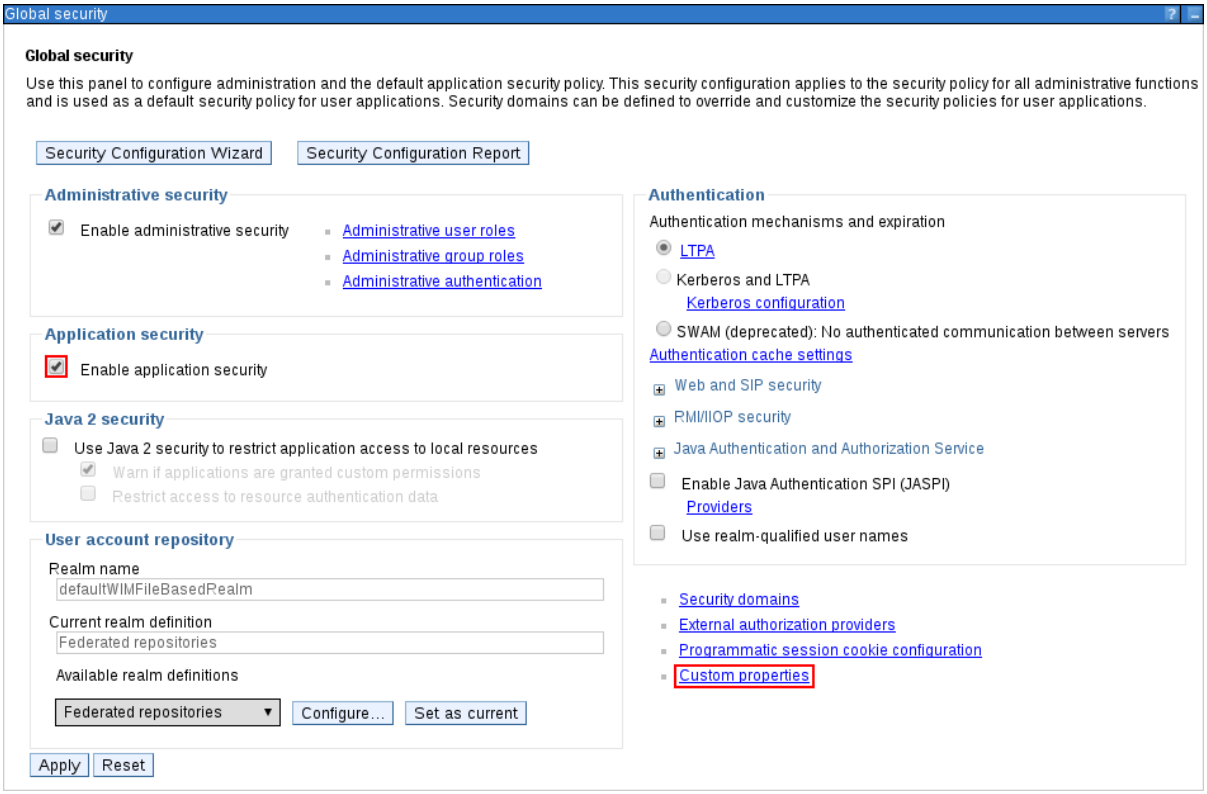
7. Restart the server at this point or wait till other configuration changes have been made.

3.2. MODIFYING SECURITY SETTINGS

For the Business Central application to work, you need to modify several security settings on IBM WebSphere Application Server. To enable the container-managed authentication mechanisms provided by the server:

1. In the main menu, click **Security → Global Security**. Ensure that the option **Enable Application Security** is checked. This may already be checked and overridden at the server level.

Figure 3.6. Global Security Configuration Page



2. Click **Custom Properties** on the right side and then **New...** to enter a new custom property with the following details:

   - Name: **com.ibm.ws.security.web.logoutOnHTTPSessionExpire**
   - Value: **true**

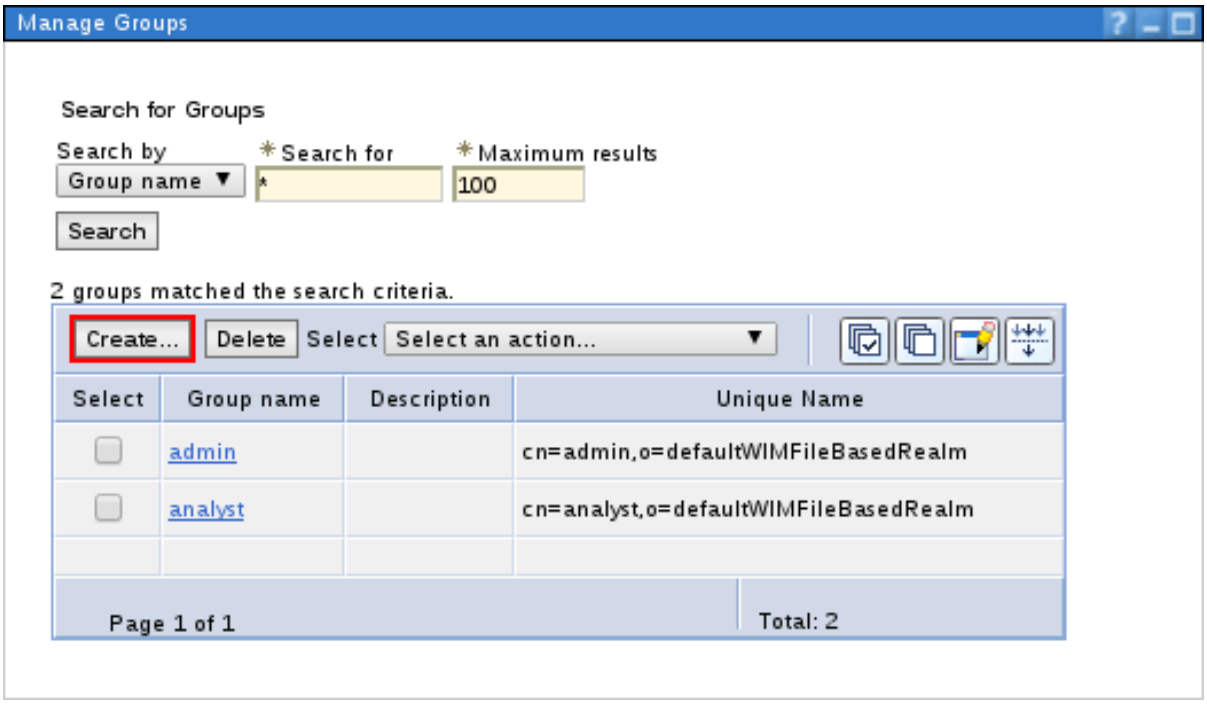
   This property instructs the server to invalidate LTPA tokens on session invalidation, which makes the logout process consistent across multiple users using the same browser.

3. Click **Apply** and then **OK**.

3.3. CREATING USERS AND GROUPS

1. In the main menu on the left, click **Users and Groups → Manage Groups**.
2. Create two new groups: **admin** and **analyst** by clicking **Create...**.

Figure 3.7. Created Groups



NOTE

Add the **kie-server** group as well if you are going to install the Realtime Decision Server. Also add the REST API groups if you are going to use the API. For further information about API roles, see chapter Remote API of *Red Hat JBoss BPM Suite Development Guide*.

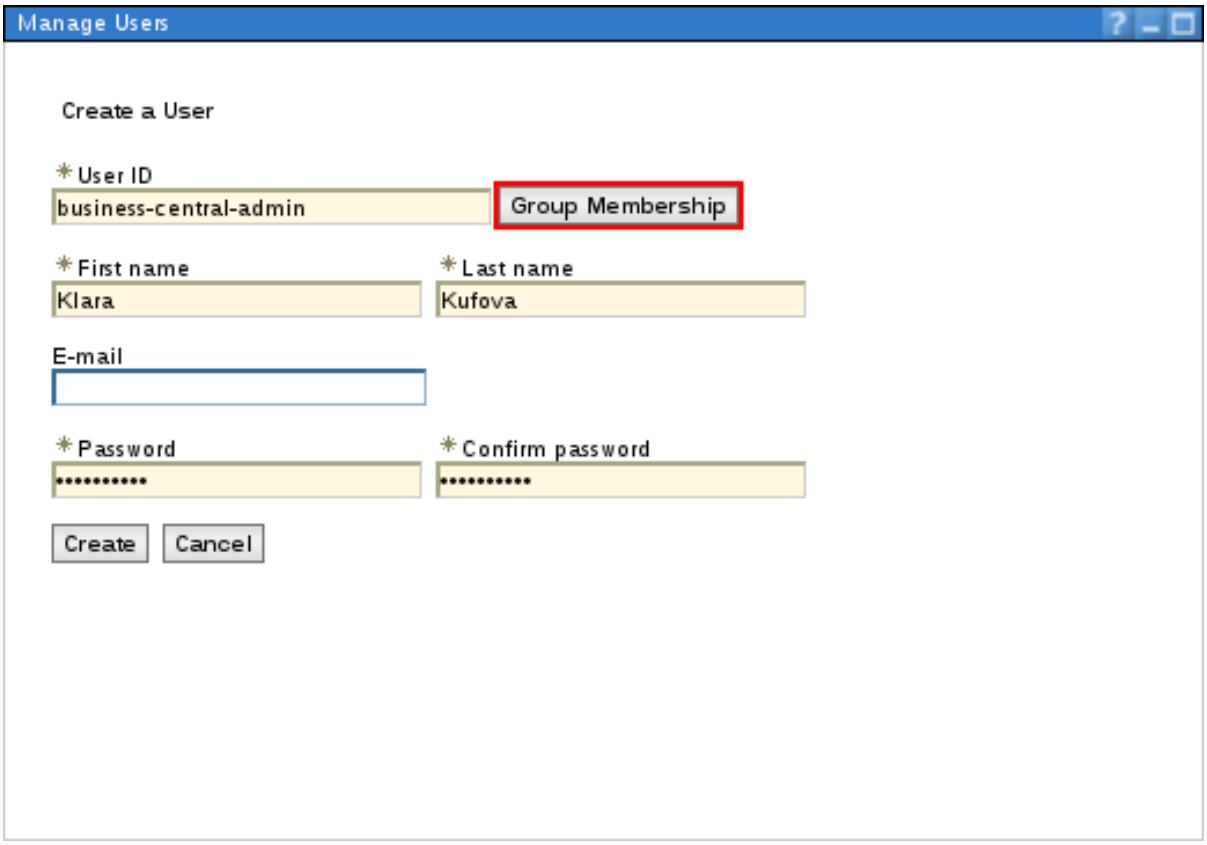
3. In the main menu on the left, click **Users and Groups → Manage Users**.
4. Click **Create...** and fill in the user credentials.

IMPORTANT

Make sure that the selected **User ID** does *not* conflict with any known title of a role or a group.

For example, if there is a role called **admin**, you should *not* create a user with the user name **admin**.

Figure 3.8. Create User Dialog Window



5. Click **Group Membership** and assign the user to the **admin** group that you created previously.

NOTE

You may assign this user to any of the groups you have just created. In the production systems, you are likely to create separate users for separate groups that align with business roles. The **admin** group is all encompassing and is therefore useful for the purposes of this setup.

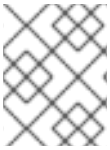
6. Click **Create**.

3.4. SESSION MANAGEMENT CUSTOM SETTINGS

1. In the main menu on the left, go to **Servers → Server Types → WebSphere Application Servers** and select the server on which you are deploying Business Central.
2. Click **Session Management** under the **Container Settings** heading on the right.
3. In the **Additional Properties** section on the right, click **Custom Properties** and then **New...**.
4. Fill in the required information:
   - Name: **InvalidateOnUnauthorizedSessionRequestException**
   - Value: **true**
5. Click **Apply** and then **OK**.

3.5. SETTING UP DATA SOURCE

The Business Central application requires a data source which must be created prior to the deployment of the actual WAR file. This means that you must have access to an underlying database to which the data source connects. Whatever your underlying database, make sure you have the data source ready. Follow the steps below to set the data source.



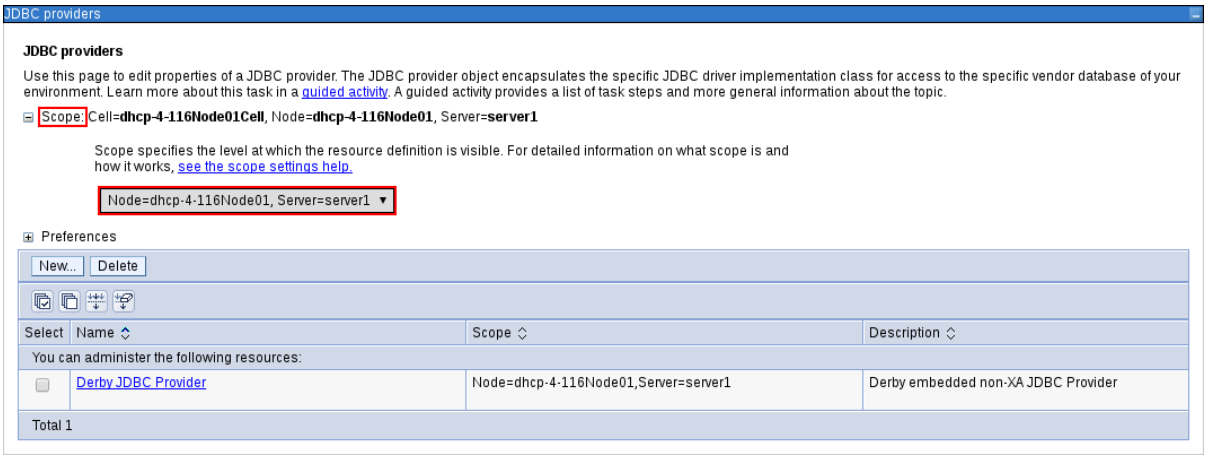
NOTE

In the following procedure, the data source setup is demonstrated on the Oracle Database 12c.

Creating JDBC Providers

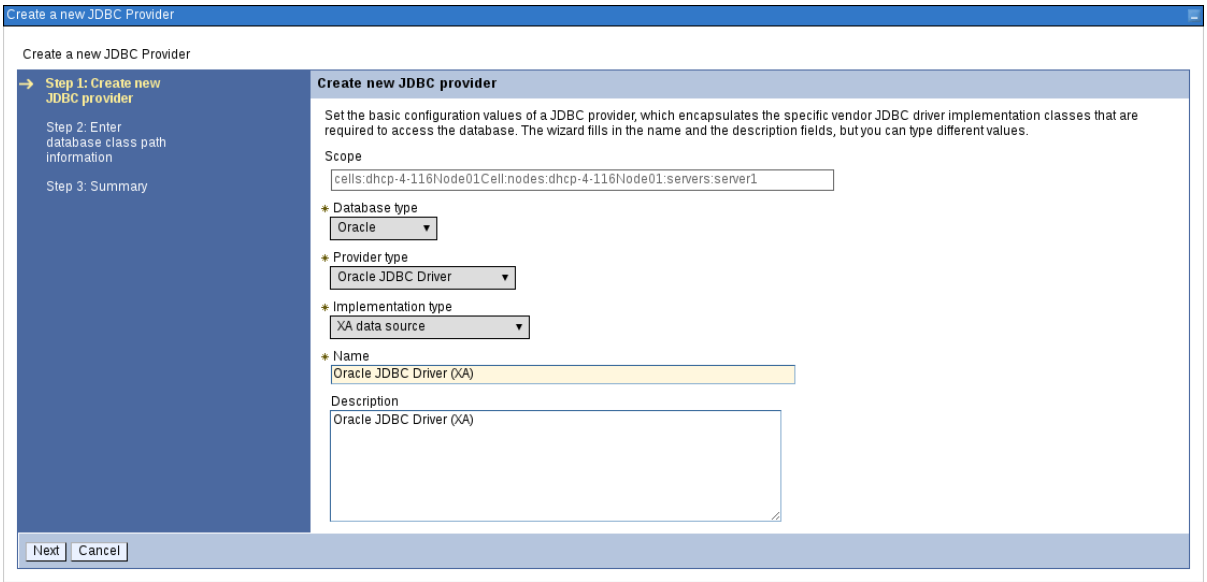
1. Open up the **JDBC Providers** page by clicking **Resources → JDBC → JDBC Providers**.
2. At the top of the **JDBC Providers** page, click **Scope**. Select the scope of this JDBC provider to include your server and node. Note that it *cannot* be **All scopes**.

Figure 3.9. Selecting Scope of JDBC Provider



3. Click **New...**.
   The **Create a New JDBC Provider**page opens.
4. Fill in the form based on the database driver that you have available.

Figure 3.10. First Step of Creating New JDBC Provider



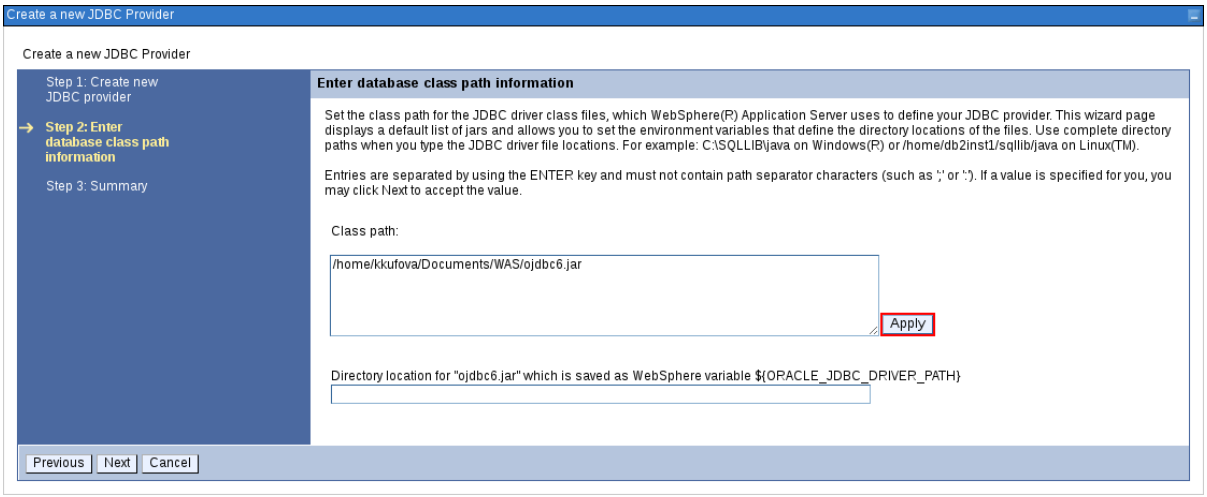
If your database is not listed, select the **User-Defined** option from the **Database Type** selection box and provide the implementation class name.

For example, for H2, PostgreSQL, or MySQL, the implementation class name will be **org.h2.jdbcx.JdbcDataSource**, **org.postgresql.xa.PGXADataSource**, and **com.mysql.jdbc.jdbc2.optional.MysqlXADataSource** respectively.

5. Give the JDBC Provider a descriptive name and click **Next**.

6. Provide the class path information for the JDBC driver class files you defined. Click **Apply**.

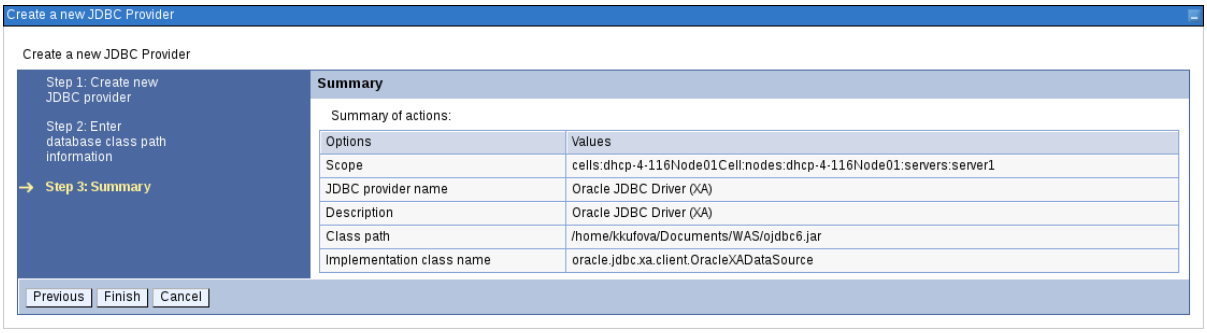
Figure 3.11. Defining Database Class Path



7. Click **Next**.

8. Click **Finish** to accept and add this new JDBC provider.

Figure 3.12. JDBC Provider Summary Page



Using this new JDBC provider, you will now need to set up the actual data source for Business Central.

Before you create the data source, open the **persistence.xml** file located in the **WEB-INF/classes/META-INF** directory of the Business Central WAR file (**business-central.war**) that you have downloaded. You will need to know the JNDI name of the data source defined within the **<jta-data-source>** tag. For Business Central, it is **jdbc/jbpm**.

Also change the **hibernate.dialect** property to suit your database. For example, if your underlying database is Oracle Database 12c, change the property value to **org.hibernate.dialect.Oracle10gDialect**.

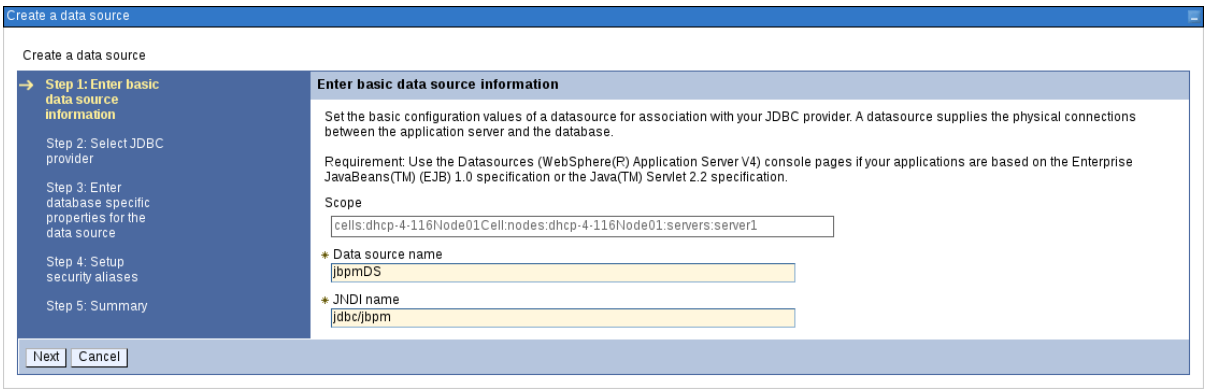
Setting up Data Source

1. Open the **Data Sources** page by clicking **Resources → JDBC → Data Sources** in the main menu on the left and make sure that the appropriate scope has been selected.

2. Click **New...**.

3. Enter a unique **Data Source Name** by which you will refer to this data source and the JNDI name that you found in the **persistence.xml** file.

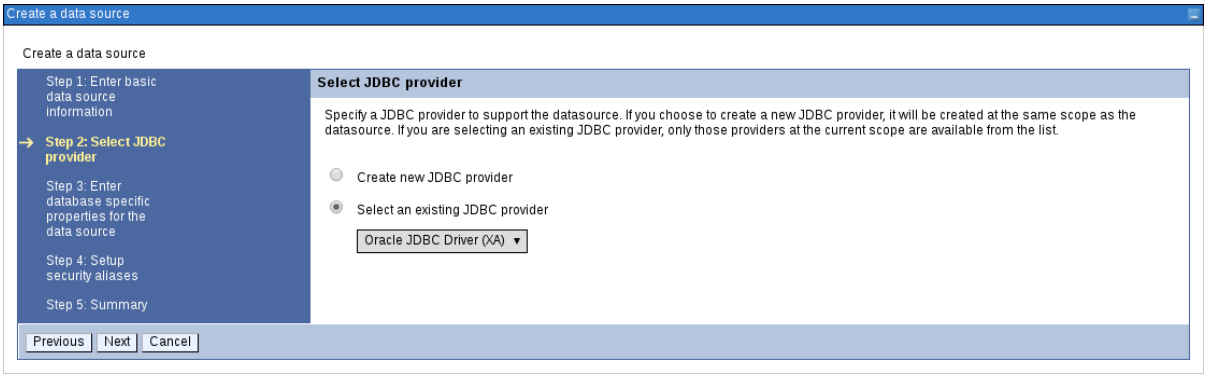
Figure 3.13. First Step of Creating New Data Source



Click **Next**.

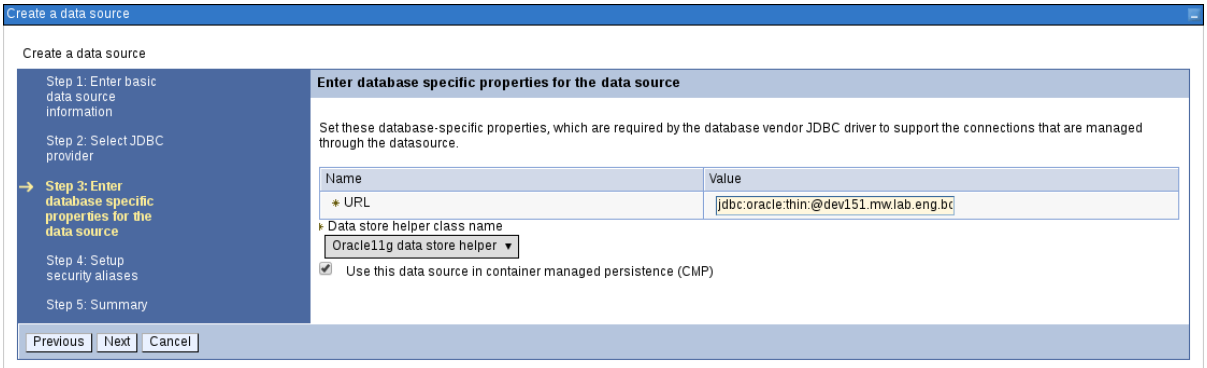
4. From the **Select an Existing JDBC Provider** drop-down menu, select the JDBC provider created earlier and click **Next**.

Figure 3.14. Selecting JDBC Provider



5. In the **Enter Database Specific Properties for the Data Source** step, enter the database JDBC URL and click **Next**.

Figure 3.15. Enter Database Specific Properties for Data Source Screen

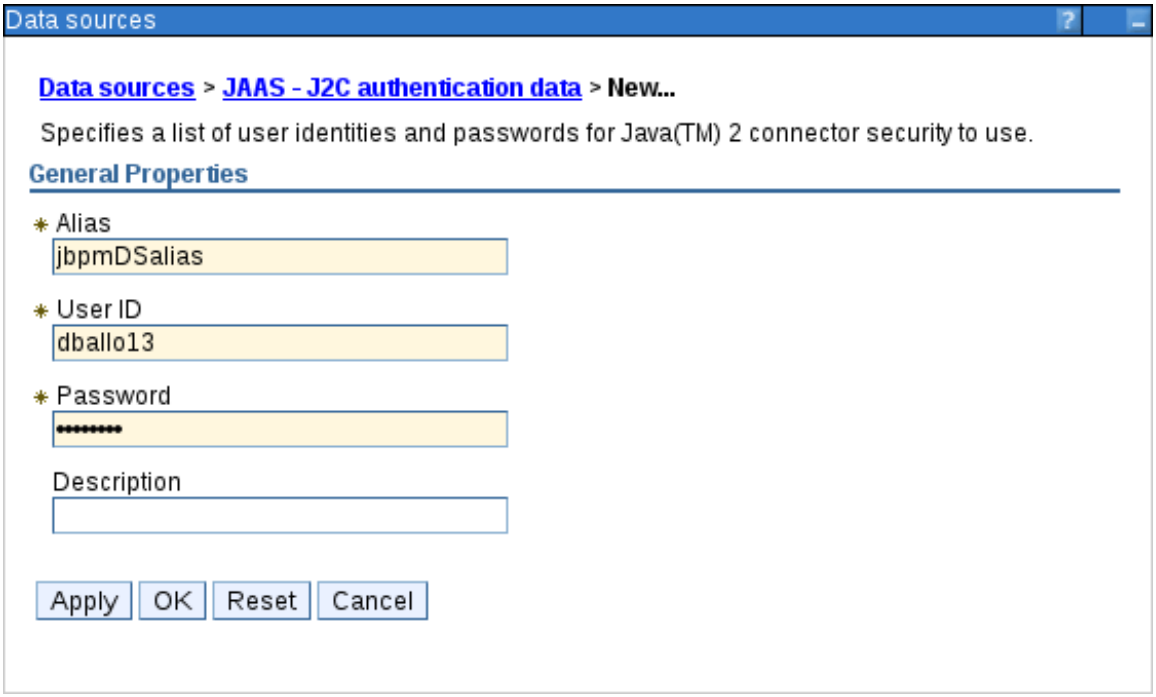


6. In the **Setup Security Aliases** screen, set the authentication values for connecting to this data source. If the aliases are not yet created, click **Global J2C Authentication Alias** at the bottom. Note that in this case, the **Create a Data Source** wizard will be canceled.

   a. Click **New...**.

b. Fill in the **Alias**, **User ID**, and **Password**.

Figure 3.16. Creating New Security Alias

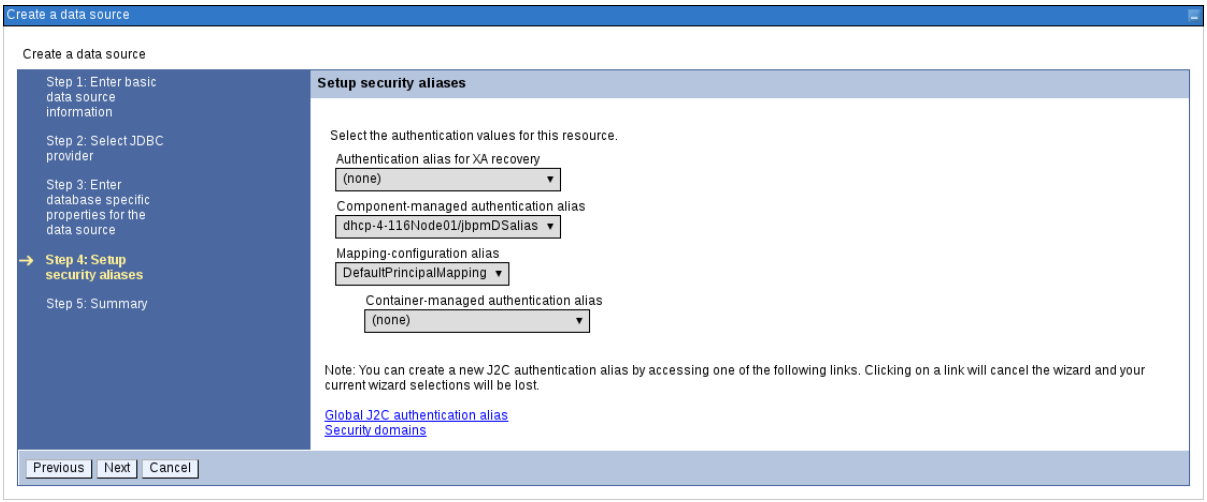


c. Click **OK**.

Go back to the **Setup Security Aliases** screen and set the **Component-Managed Authentication Alias** to the newly created alias and the **Mapping-Configuration Alias** to **DefaultPrincipalMapping**.

You can also create and set a different alias for XA recovery. If the **Authentication Alias for XA Recovery** is set to **(none)**, the component-managed authentication alias is used by default.

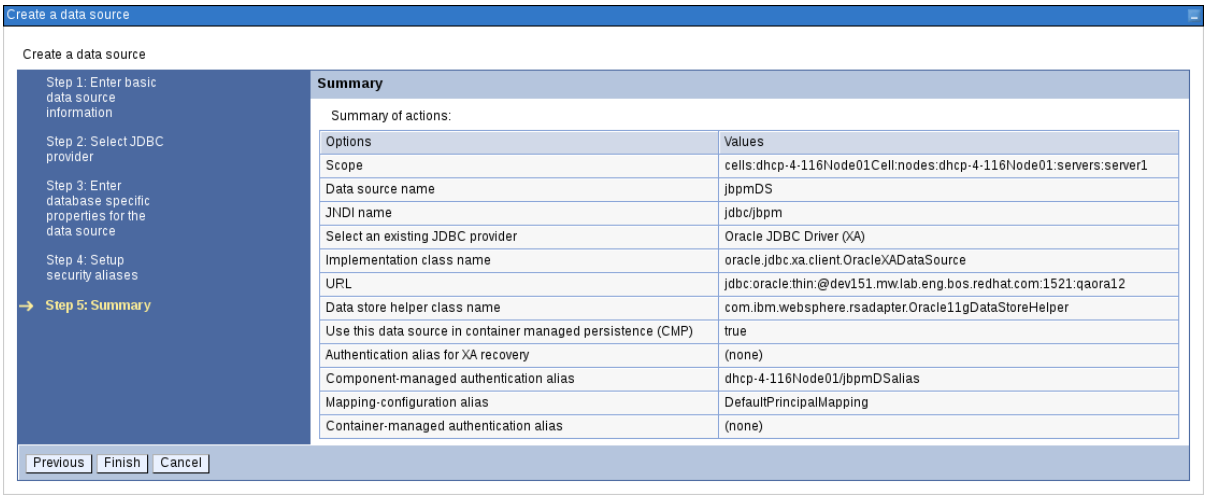
Figure 3.17. Setting Security Aliases



Click **Next**.

7. In the **Summary** screen, check the values and click **Finish**. Choose to save the changes to the master configuration as well.

Figure 3.18. Creating Data Source Summary Screen



8. Choose the created data source from a list of all data sources to provide the basic meta properties.

9. Click **Custom Properties** under the **Additional Properties** section on the right. Properties like **serverName**, **databaseName**, **userName**, and **password** must now be defined and vary for different databases. Some example database properties are shown below.

Table 3.1. Custom Properties for Different Databases

Database	Properties
H2	**URL**, **user**, **password**
MySQL	**serverName**, **databaseName**, **port**, **user**, **password**
PostgreSQL	**serverName**, **databaseName**, **portNumber**, **user**, **password**
Oracle	**jdbcURL**

Once all the connection properties have been defined, click **Test Connection** to ensure the validity of the data source. If the connection was successful, the following message appears at the top of the screen:

> The test connection operation for data source DATA_SOURCE_NAME on server SERVER_NAME at node NODE_NAME was successful.

3.6. SETTING UP JMS RESOURCES

IBM WebSphere Application Server must be configured to send and receive JMS messages through Red Hat JBoss BRMS. However, before you do this, a service bus must be present. Follow the steps below to create a service bus if one does not already exist.

Setting up Buses

Creating Service Bus

1. In the main menu on the left, click **Service Integration → Buses**.

2. Click **New...**.
3. Enter the name and make sure that the **Bus Security** option is *unchecked*.
4. Click **Next** and then **Finish** to create the service bus.

Adding Bus Member
Before you continue, add a new bus member. A bus member is a server or a cluster that has been added to this service bus.

1. Go to **Service Integration → Buses** and click on the service bus that you have created.
2. Under the **Topology** heading on the right, click **Bus Members**.
3. Click **Add**.
4. In the **Add a New Bus Member** wizard, choose the server and the type of message store for the persistence in the first two steps. Depending on the previous selection, you can also specify the properties of the message store.
5. Click **Finish** in the last step to add a new bus member.

Creating JMS Connection Factories

To send and receive messages from Red Hat JBoss BRMS, you have to create the JMS connection factories, which are needed for establishing connections used for sending messages into queues.

Red Hat JBoss BRMS needs the Java Messaging Services only for the Realtime Decision Server. Use the procedure below to create the following connection factories: **KIE.SERVER.REQUEST**, **KIE.SERVER.RESPONSE**, and **KIE.SERVER.EXECUTOR**.

NOTE

The factory names shown above are suggestions only and you can change them to suit your needs and company guidelines.

1. In the main menu on the left, go to **Resources → JMS → Connection Factories**.
2. Make sure the correct scope is selected and click **New**.
3. Select the **Default Messaging Provider** option and click **OK**.
4. Enter the name and the JNDI name of the factory. For example:
   - Name: **KIE.SERVER.REQUEST**
   - JNDI name: **jms/conn/KIE.SERVER.REQUEST**

NOTE

The JNDI names for **KIE.SERVER.RESPONSE** and **KIE.SERVER.EXECUTOR** are **jms/conn/KIE.SERVER.RESPONSE** and **jms/conn/KIE.SERVER.EXECUTOR** respectively.

5. From the **Bus Name** drop-down list, select the service bus created earlier.
   The rest of the options are not mandatory and can be left with default values.

6. Click **Apply** and choose to save the changes to the master configuration.

Creating JMS Queues

The next step is to create the JMS queues. These queues are the destination end points for point-to-point messaging.

For Realtime Decision Server, create the following queues: **KIE.SERVER.REQUEST** (for requests), **KIE.SERVER.RESPONSE** (for responses) and **KIE.SERVER.EXECUTOR** (for executor services).

IMPORTANT

To prevent warnings in the log, create **KIE.EXECUTOR** queue as well.

To create these queues:

1. In the main menu, go to **Resources → JMS → Queues**.
2. Make sure the correct scope is selected and click **New**.
3. Select the **Default Messaging Provider** radio button and click **OK**.
4. Enter the name and the JNDI name of the queue, for example:
   - Name: **KIE.SERVER.REQUEST**
   - JNDI name: **jms/KIE.SERVER.REQUEST**

NOTE

All of the JNDI names of other queues follow the same convention as the example above.

5. From the **Bus Name** drop-down list, select the service bus created earlier.
6. From the **Queue Name** drop-down list, make sure to select the **Create Service Integration Bus Destination**.
   This will open up the **Create New Queue** form for creating a new service integration bus. In this form, enter a unique identifier and select the bus member created earlier in this section.
7. Click **Apply** at the bottom and choose to save the changes to the master configuration.

Creating JMS Activation Specifications

A JMS activation specification is required to be the bridge between the queue and the message-driven bean.

For Realtime Decision Server, create the following activation specifications: **KIE.SERVER.REQUEST** (for requests), **KIE.SERVER.RESPONSE** (for responses) and **KIE.SERVER.EXECUTOR** (for executor services).

IMPORTANT

To prevent warnings in the log, create **KIE.EXECUTOR** activation specification as well.

1. In the main menu, go to **Resources → JMS → Activation Specifications**.

2. Make sure the correct scope is selected and click **New**.
3. Check the **Default Messaging Provider** radio button and click **OK**.
4. Enter the name and the JNDI name of the activation specification, for example:
   - Name: **KIE.SERVER.REQUEST**
   - JNDI name: **jms/activation/KIE.SERVER.REQUEST**

NOTE

All of the JNDI names of other activation specifications follow the same convention as the example above.

5. From the **Destination Type** drop-down list, make sure to select **Queue**.
6. Enter the **Destination JNDI Name** (as created in the previous procedure), for example **jms/KIE.SERVER.REQUEST**.
7. From the **Bus Name** drop-down list, choose the service bus created earlier.
8. Click **OK** at the bottom with the rest of the field values as default and choose to save the changes to the master configuration.

You have now successfully completed the JMS configurations required for setting up Red Hat JBoss BRMS on IBM WebSphere Application Server.

3.7. ADDING CUSTOM JVM PROPERTIES

You must add custom properties to the JVM that is used to start IBM WebSphere Application Server. These custom properties take into consideration the configuration changes that have been outlined in previous sections of this guide.

1. In the main menu, go to **Servers → Server Types → WebSphere Application Servers**.
2. In the list of application servers, choose the server on which you are going to deploy Business Central.
3. Under the **Server Infrastructure** heading on the right, click **Java and Process Management → Process Definition**.
4. Click **Java Virtual Machine** under the **Additional Properties** heading.
   This opens up the configuration properties for the JVM that is used to start WebSphere Application Server.
5. Click **Custom Properties** under **Additional Properties**.
6. Create the following properties by clicking **New...**.
   Custom JVM Properties

   Table 3.2. Properties Required for Business Central and Realtime Decision Server

Name	Value	Description
org.jboss.logging.provider	**jdk**	This property is only required where a **CA SiteMinder TAI (SMTAI)** is installed in the environment. Using this property forces Hibernate to use **JDK** instead of **log4j** for logging within Dashbuilder. **CA SiteMinder TAI (SMTAI)** contains an old version of **log4j**, which causes conflicts.
org.apache.wink.jaxbcontextcache	**off**	This property ensures that the IBM WebSphere Apache Wink framework does not cache **JAXBContexts**, which negatively impacts the performance and interferes with the custom-type serialization for the REST API.

Table 3.3. Properties Required for Business Central

Name	Value	Description
jbpm.ut.jndi.lookup	**jta/usertransaction**	Used to look up user transactions from within non-managed threads, such as timers.
org.uberfire.start.method	**ejb**	Defines startable beans for Uberfire. Set this property if following warning message appears in the logs during the deployment of **business-central.war**: > WARNING: Unable to instantiate EJB Asynchronous Bean. Falling back to Executors' CachedThreadPool

NOTE

Red Hat JBoss BRMS uses an embedded version of Git for its artifact versioning. This version of Git uses ports **9418** and **8001** for standard and SSH access (**org.uberfire.nio.git.ssh.port**) respectively.

Ensure that these embedded Git ports are not already in use in your version of IBM WebSphere Application Server.

If these ports are being used and you need to change the default Git ports, they can be changed by setting the **org.uberfire.nio.git.daemon.port** and **org.uberfire.nio.git.ssh.port** properties using the steps described above.

For more information, see section *Configuring LDAP Principal and Role Names Matching Criteria* below.

Table 3.4. Properties Required for Realtime Decision Server

Name	Value	Description
kie.server.jms.queues.response	**jms/conn/KIE.SERVER.RESPONSE**	The JNDI name of connection factory for responses used by the Realtime Decision Server .
org.kie.server.domain	**WSLogin**	JAAS **LoginContext** domain used to authenticate users when using JMS.
org.jbpm.designer.perspective	**ruleflow**	This argument on the command line forces the default perspective in the designer to **RuleFlow** instead of **Full**.
org.jbpm.server.ext.disabled	**true**	When set to true, disables BPM support (for example, processes support). Must be disabled for BRMS.
org.jbpm.ui.server.ext.disabled	**true**	When set to true, disables the Intelligent Process Server UI extension. Must be disabled for BRMS.

7. Save these configuration settings to the master configuration.
8. Restart IBM WebSphere Application Server for these changes to take effect.

3.8. CONFIGURING LDAP PRINCIPAL AND ROLE NAMES MATCHING CRITERIA

The client applications using ssh to interact with the Git server bundled with Business Central are authenticated and authorised to perform git operations using the security API offered by the Uberfire server. If your Red Hat JBoss BRMS application is deployed on WebSphere Application Server (WAS) using an LDAP security realm, the git clients may not be authorized as expected. This is because the distinguished name (DN) for the principal (user or group name) assigned by WAS is the more complex DN associated with that principal by LDAP, which leads to a mismatch of names when the Uberfire server tries to map the roles. To ensure that the role mapping does not fail, use the system property **org.uberfire.ldap.regex.role_mapper** to control the matching criteria of LDAP principal to role names.

The system property **org.uberfire.ldap.regex.role_mapper** is a regex pattern used to map LDAP principal names to application role names. Ensure that this pattern contains the variable **role** as it is substited by the application role name when matching a principal value to the role name. Only after the pattern is matched, the role is added to the user.

For example, if the distinguished name (DN) for the admin group in LDAP is **cn=admin,ou=groups,dc=example,dc=com** and the intended role is **admin**, then setting the following value for property **org.uberfire.ldap.regex.role_mapper** finds a match on **admin** role:

```
cn[\\ ]*=[\\ ]*role
```

CHAPTER 4. INSTALL

Now that the basic configuration is done and IBM WebSphere Application Server is set to deploy Red Hat JBoss BRMS, you can upload the WAR deployables that were extracted earlier.

As noted previously, the Red Hat JBoss BRMS ZIP file for IBM WebSphere Application Server contains the deployable WAR files for both Business Central and Realtime Decision Server.

4.1. INSTALLING BUSINESS CENTRAL

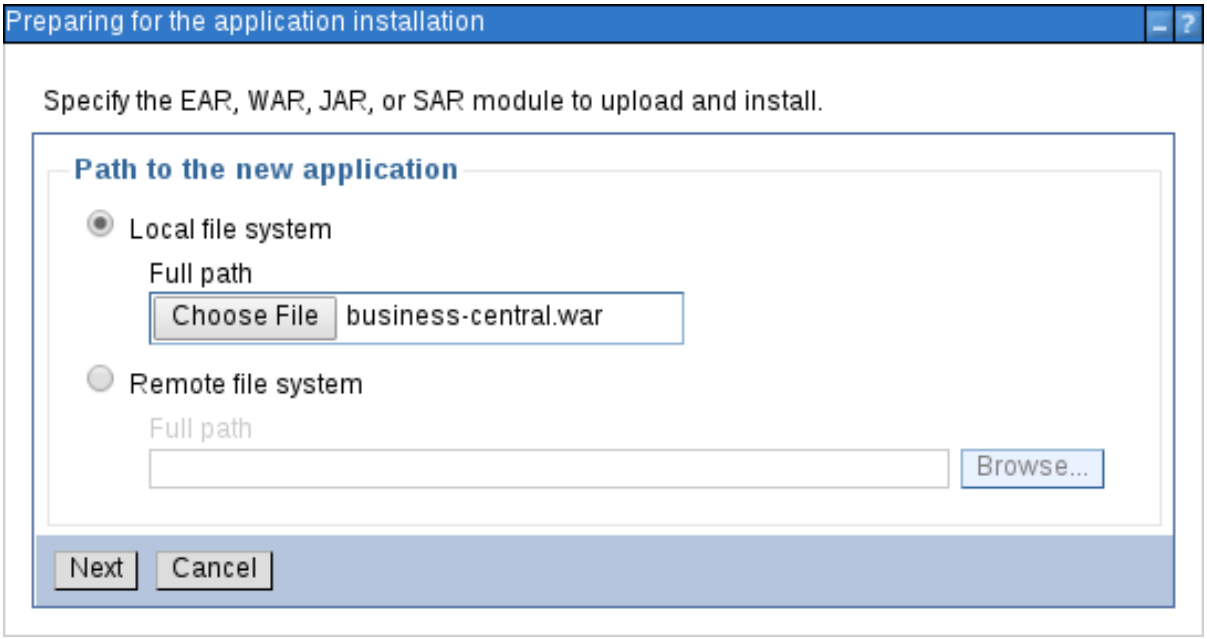
Business Central is uploaded as a web archive and can then be accessed at **http://*TARGET_SERVER:PORT*/business-central**. Start the deployment by installing the Business Central WAR as a WebSphere application.

1. In the main menu, go to **Applications → Application Types → WebSphere Enterprise Applications**.
   This will show you all the existing applications in the system and allow you to install a new one.

2. Click **Install** to start the installation process.

3. Upload the Business Central WAR file (**business-central.war**) from the local file system. See Section 2.2, "Extracting Red Hat JBoss BRMS for IBM WebSphere Application Server" for more information.

   Figure 4.1. Preparing for Application Installation Wizard



4. Click **Next**. This process may take some time.

IMPORTANT

You may encounter an error message similar to the following:

> The EAR file could be corrupt and/or incomplete. Make sure that the application is at a compatible Java(TM) Platform, Enterprise Edition (Java EE) level for the current version of WebSphere(R) Application Server. java.lang.NullPointerException

In that case, run **ulimit -n** in the command line. If the result is **1024**, increase the number of open file descriptors. The recommended value is 100 000.

5. Select the **Fast Path** radio button and click **Next**.
6. Change the **Application Name** to **business-central** in the **Select Installation Options** step and click **Next**.
7. In the **Map Modules to Servers** step, map the Business Central modules to servers according to your requirements.
8. In the **Map Virtual Hosts for Web Modules** step, leave the default values and click **Next**.
9. In the next step, set the context root to **business-central**.
10. In the **Metadata for Modules** step, leave the default values and click **Next**.
11. In the **Summary** page, click **Finish** to install Business Central. This process can take a while. Save the changes to the master configuration at the end of this process.

You will be returned to the **WebSphere Enterprise Applications** page where **business-central** will be listed as a new application. However, it will be stopped at this stage. Before you start the application, you need to map groups to roles, configure class loading, and enable the Bouncy Castle Crypto API.

Mapping Groups to Roles

1. Click on the **business-central** application to open the application configuration page.
2. Click **Security Role to User/Group Mapping** under the **Detail Properties** heading on the left.
3. Select the **admin** role and click **Map Groups...** at the top.
4. Search for the **admin** group (or just click the **Search** button) and move it from the **Available** list to the **Selected** list. Click **OK**.
   This mapping gives the previously created administrator user access to the Business Central application.
5. Follow the same procedure for the **analyst** role as well and save the configuration.

If you have other groups or users that should have access to Business Central, use the same steps to map them to the **admin** or **analyst** roles.

NOTE

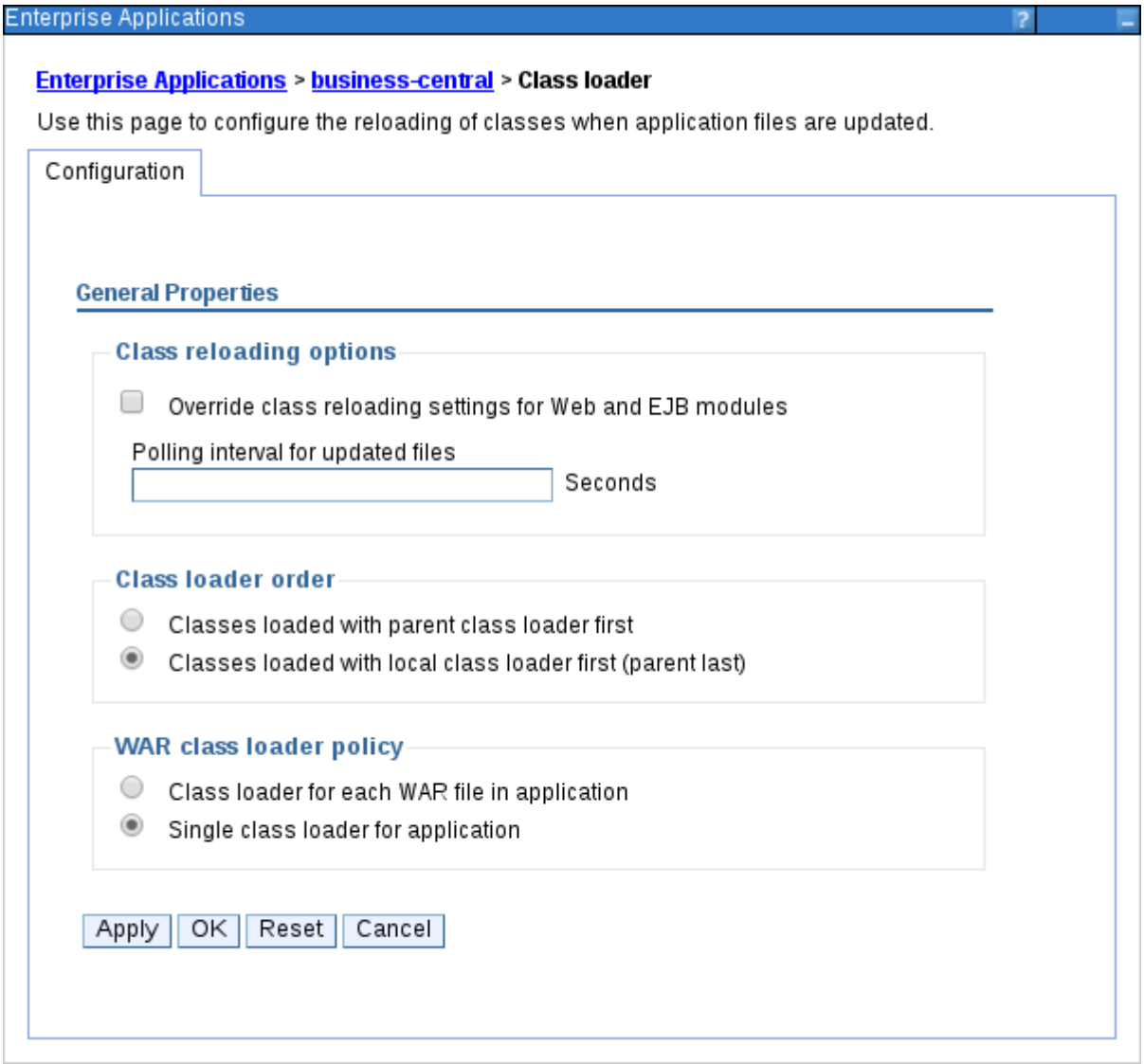
If you are also installing the Realtime Decision Server, give this user access to the **kie-server** role. Additionally, map appropriate REST API roles if you are going to use the REST API. For further information about API roles, see chapter Remote API of *Red Hat JBoss BPM Suite Development Guide*.

Class-Loading Configuration

Ensure correct class-loading configuration by following the steps below.

1. In the main menu, go to **Applications → Application Types → WebSphere Enterprise Applications**.
2. Click **business-central**.
3. Click **Class Loading and Update Detection**under the **Detail Properties** heading on the left.
4. Check the following options:
   - *Class Loader Order* : **Classes loaded with local class loader first (parent last)**
   - *WAR Class Loader Policy* : **Single class loader for application**

Figure 4.2. Configuring Class Loading



5. Click **OK**, save the changes to the master configuration and restart the IBM WebSphere Application Server.

Enabling Bouncy Castle Crypto API

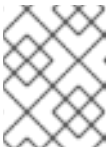
To enable Git SSH repository cloning and **kie-config-cli** from within Business Central, the Bouncy Castle Crypto API must be set up. Enable the API by following the steps below.

1. Set the **org.apache.sshd.registerBouncyCastle** property to **true** and **org.uberfire.domain** property to **WSLogin**. See Section 3.7, "Adding Custom JVM Properties" for detailed instructions on how to set custom properties.

2. Set up the Bouncy Castle API as a shared library referenced from Business Central using the appropriate version of Bouncy Castle:

   i. In the main menu on the left, navigate to **Environment → Shared Libraries**, select the appropriate scope and click **New...** to create a new library.

   ii. Give this library a name and set the class path to the Bouncy Castle library (**bcprov-jdk16-1.46.jar**). Click **OK** and save the configuration.



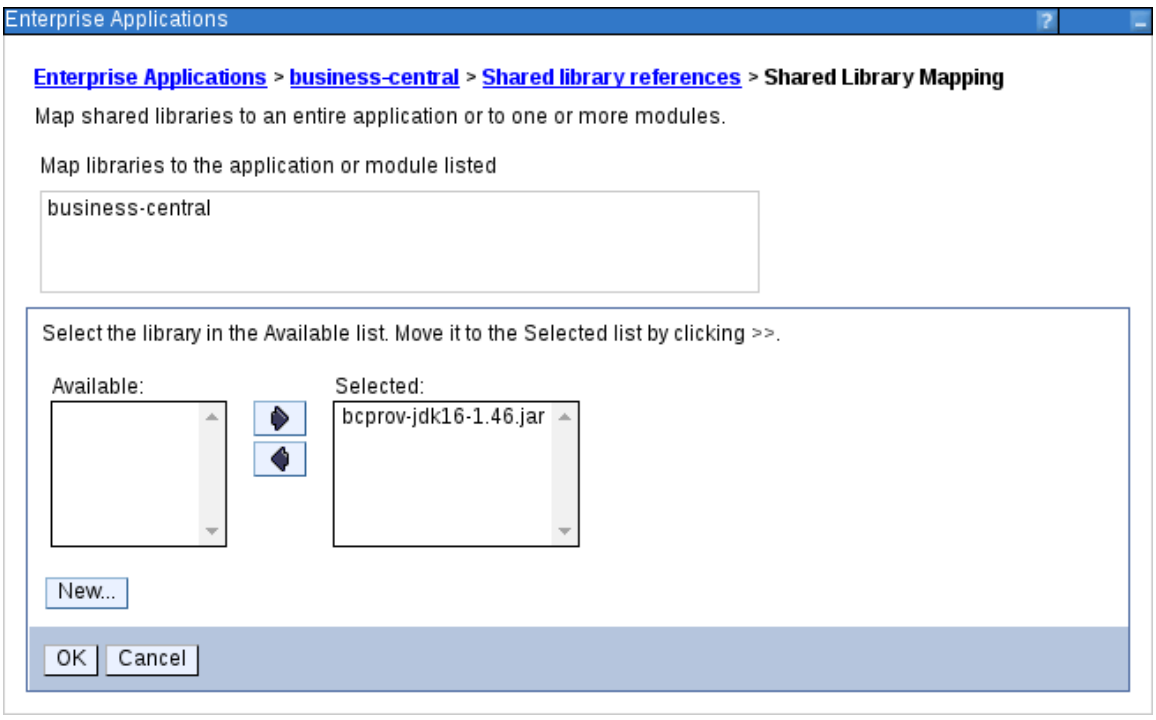
NOTE

For more information about the **bcprov-jdk16-1.46.jar** package, see the Maven Repository – Bouncy Castle Provider page.

   iii. Go to **Applications → Application Types → WebSphere Enterprise Applications** and click **business-central**.

   iv. Click **Shared Library References** under the **References** heading on the left, select the web module, click on **Reference Shared Libraries** and move the Bouncy Castle library created in the previous step from the **Available** to the **Selected** list.

Figure 4.3. Mapping Shared Libraries



   v. Click **OK** and save the configuration.

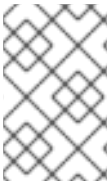
You have now successfully installed Business Central on IBM WebSphere Application Server.

To start the application, go back to **Applications → Application Types → WebSphere Enterprise Applications** page and select the **business-central** checkbox before clicking **Start**.

To access the application, navigate to **http://*TARGET_SERVER:PORT*/business-central** in your web browser.

4.2. INSTALLING REALTIME DECISION SERVER

The Realtime Decision Server is distributed as a web application archive file (**kie-server.war**) and is present in your Red Hat JBoss BRMS 6.4.0 Deployable for WebSphere 8.5 download.



NOTE

It is assumed that you followed the steps described in Section 3.3, "Creating Users and Groups" to create the role **kie-server** required by the Realtime Decision Server. If you have not done so, revisit the respective sections in this guide.

1. In the main menu on the left, go to **Applications → Application Types → WebSphere Enterprise Applications**.
   This will show you all the existing applications in the system and allow you to install a new one.
2. Click **Install** to start the installation process.
3. Upload the Realtime Decision Server WAR file (**kie-server.war**) from the local file system.
4. Select the **Fast Path** radio button and click **Next**.
   The **Install New Application** wizard opens.
5. Change the **Application Name** to **kie-server** in the first step and click **Next**.
6. In the next step, map the Realtime Decision Server modules to servers according to your requirements and click **Next**.
7. In the **Bind Listeners for Message-Driven Beans** step, select the **Activation Specification** radio button for both the beans. Enter **jms/activation/KIE.SERVER.EXECUTOR** as **Target Resource JNDI Name** for the **KieExecutorMDB** bean, and **jms/activation/KIE.SERVER.REQUEST** for the **KieServerMDB** bean.
8. In the next step, map resource references to actual resources. Enter the JNDI name for the **KIE.SERVER.REQUEST** connection factory that you created earlier: **jms/conn/KIE.SERVER.REQUEST**.
9. In the **Map Virtual Hosts for Web Modules** step, leave the default values and click **Next**.
10. In the next screen, set the context root to **kie-server**.
11. In the **Metadata for Modules** step, leave the default values and click **Next**.
12. Click **Finish** to install the Realtime Decision Server. Save the changes to the master configuration at the end of this process.

Class-Loading Configuration
Ensure correct class-loading configuration by following the steps below.

1. Navigate to **Applications → Application Types → WebSphere Enterprise Applications** and click **kie-server**.

2. Click **Class Loading and Update Detection** under the **Detail Properties** heading on the left.

3. In the properties, change *Class Loader Order* to **Classes loaded with local class loader first (parent last)** and *WAR Class Loader Policy* to **Single class loader for application**

4. Save the changes to the master configuration.

Mapping Groups to Roles
If you have already mapped the **kie-server** role to a user or a group, you can ignore this procedure. Otherwise, do the following:

1. Go back to the main configuration page for the newly installed **kie-server** application (**Applications → Application Types → WebSphere Enterprise Applications**). Click **Security Role to User/Group Mapping** under the **Detail Properties** heading on the left.

2. Select the **kie-server** role, click **Map Groups...** and search for the **kie-server** group in the next screen (or just click the **Search** button).

3. Move it from the **Available** list to the **Selected** list. Click **OK**.

This mapping gives the previously created administrator user access to the Realtime Decision Server.

You can now save the changes and start the **kie-server** application.

Check whether the Realtime Decision Server REST API works by sending a GET request at **http://*TARGET_SERVER:PORT*/kie-server/services/rest/server**.

APPENDIX A. VERSIONING INFORMATION

Documentation last updated on: Monday, May 13, 2019.