Red Hat Decision Manager 7.7

Installing and configuring KIE Server on IBM WebSphere Application Server
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Abstract

This document describes how to configure IBM WebSphere Application Server for KIE Server and how to install KIE Server on that IBM server instance.
As a system administrator, you can configure your IBM WebSphere Application Server for Red Hat KIE Server and install KIE Server on that IBM server instance.

**Prerequisites**

- An IBM WebSphere Application Server instance version 9.0 or later is installed. For complete installation instructions, see the IBM WebSphere Application Server product page.

- You have access to the WebSphere Integrated Solutions Console, usually at http://<HOST>:9060/ibm/console.
CHAPTER 1. KIE SERVER

KIE Server is the server where the rules and other artifacts for Red Hat Decision Manager are stored and run. KIE Server is a standalone built-in component that can be used to instantiate and execute rules through interfaces available for REST, Java Message Service (JMS), or Java client-side applications, and Red Hat Business Optimizer functionality through solvers.

Created as a web deployable WAR file, KIE Server can be deployed on any web container. The current version of the KIE Server is included with default extensions for both Red Hat Decision Manager and Red Hat Process Automation Manager.

KIE Server has a low footprint with minimal memory consumption and therefore can be deployed easily on a cloud instance. Each instance of this server can open and instantiate multiple containers, which enables you to execute multiple rule services in parallel.

KIE Server can be integrated with other application servers, such as Oracle WebLogic Server or IBM WebSphere Application Server, to streamline Red Hat Decision Manager application management.
CHAPTER 2. IBM WEBSPHERE APPLICATION SERVER

IBM WebSphere Application Server is a flexible and secure web application server that hosts Java-based web applications and provides Java EE-certified run time environments. IBM WebSphere 9.0 supports Java SE 8 and is fully compliant with Java EE 7.
CHAPTER 3. INSTALLING AND RUNNING IBM WEBSHERE APPLICATION SERVER

IBM WebSphere Application Server must be installed and running for you to apply many of the configurations that accommodate KIE Server. This section describes how to install and start IBM WebSphere.

For the most up-to-date and detailed installation instructions, see the IBM Knowledge Center.

Procedure

1. Download IBM Installation Manager version 1.8.5 or later from the IBM Installation Manager and Packaging Utility download links page. IBM Installation Manager is required for installing IBM WebSphere.

2. Extract the downloaded archive and run the following command as the root user in the new directory:

```
sudo ./install
```

The IBM Installation Manager opens.

3. Go to File → Preferences and click Add Repository.

4. In the Add Repository window, enter the repository URL for IBM WebSphere 9.0. You can find all the repository URLs in the Online product repositories for IBM WebSphere Application Server offerings page of the IBM Knowledge Center.

5. In your command terminal, navigate to the IBM WebSphere Application Server folder location that you specified during the installation.

6. Change to the /bin directory and run a command similar to the following example to create an IBM WebSphere profile, user name, and password. A profile defines the run time environment. The profile includes all the files that the server processes in the runtime environment and that you can change. The user is required for login.

```
sudo ./manageprofiles.sh -create -profileName testprofile -profilePath /profiles/testprofile -adminUserName websphere -adminPassword password123
```

7. In your command terminal, navigate to the bin directory within the profile that you created (for example, /profiles/testprofile/bin) and run the following command to start the IBM WebSphere Application Server instance:

```
sudo ./startServer.sh <SERVER_NAME>
```

<SERVER_NAME> is the IBM WebSphere Application Server name defined in Servers → Server Types → IBM WebSphere Application Servers of the WebSphere Integrated Solutions Console.

8. Open the following URL in a web browser:

```
http://<HOST>:9060/ibm/console
```

<HOST> is the system name or IP address of the target server.
For example, to start the WebSphere Integrated Solutions Console for a local instance of IBM WebSphere running on your system, enter the following URL in a web browser:

http://localhost:9060/ibm/console

9. When the login page of the WebSphere Integrated Solutions Console appears, enter your administrative credentials.
CHAPTER 4. CONFIGURING IBM WEBSPHERE APPLICATION SERVER FOR KIE SERVER

Before you deploy KIE Server with IBM WebSphere Application Server, you must configure system properties, security settings, JMS requirements, and other properties on IBM WebSphere. These configurations promote an optimal integration with KIE Server.

Prerequisites

- IBM WebSphere Application Server is installed and running.
- You are logged in to the WebSphere Integrated Solutions Console.

4.1. ENABLING ADMINISTRATIVE SECURITY

You must enable administrative security in the WebSphere Integrated Solutions Console so that you have the required permissions to create users and groups.

Procedure

1. In the WebSphere Integrated Solutions Console, click Security → Global Security and ensure that the option Enable Application Security is selected. This may already be selected and overridden at the server level.

2. Click Security Configuration Wizard and click Next.

3. Select the repository that contains the user information. For example, select Federated repositories for local configurations.

4. Click Next

5. Enter the Primary administrative user name and Password.

6. Click Next and then click Finish.

7. Click Save in the Messages window to save your changes to the master configuration.

Figure 4.1. Save security changes

8. In your command terminal, navigate to the IBM WebSphere Application Server /bin directory location that you specified during installation, and run the following commands to stop and restart IBM WebSphere to apply the security changes:

```
sudo ./stopServer.sh <SERVER_NAME>
```
### 4.2. CONFIGURING JAVA MESSAGE SERVICE (JMS)

The Java Message Service (JMS) is a Java API that KIE Server uses to exchange messages with other application servers such as Oracle WebLogic Server and IBM WebSphere Application Server. You must configure your application server to send and receive JMS messages through KIE Server to ensure proper collaboration between the two servers.

#### 4.2.1. Create a service bus and add IBM WebSphere

You must create a service bus and add the IBM WebSphere Application Server as a member of it in order to use JMS.

**Procedure**

1. In the WebSphere Integrated Solutions Console, navigate to **Service Integration → Buses → New**.
2. Enter a new bus name and clear the **Bus Security** option.
3. Click **Next** and then **Finish** to create the service bus.
4. Select the service bus that you have created.
5. Under **Topology**, click **Bus Members → Add**.
6. In the **Add a New Bus Member** wizard, choose the IBM WebSphere Application Server and the type of message store for persistence. You can also specify the properties of the message store.
7. Click **Finish** to add the new bus member.

#### 4.2.2. Create JMS connection factories

To enable messaging with KIE Server, you must create certain JMS connection factories for sending and receiving messages.

**Prerequisites**

- You have created a service bus for IBM WebSphere Application Server.

**Procedure**

1. In the WebSphere Integrated Solutions Console, navigate to **Resources → JMS → Connection Factories**.
2. Select the correct scope and click **New**.
3. Select the **Default Messaging Provider** option and click **OK**.
4. For each of the following required connection factories, enter the name of the connection factory (for example, KIE.SERVER.REQUEST) and the JNDI name (for example, jms/cf/KIE.SERVER.REQUEST), and then select the service bus from the Bus Name drop-down list. Leave the default values for the remaining options.

5. Click Apply and Save to save the changes to the master configuration, and repeat for each required factory.

4.2.2.1. JMS connection factories for KIE Server

The following are the required Java Message Service (JMS) connection factories that enable JMS messaging with KIE Server:

<table>
<thead>
<tr>
<th>Name</th>
<th>Default value</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIE.SERVER.REQUEST</td>
<td>jms/cf/KIE.SERVER.REQUEST</td>
<td>Sending all requests to KIE Server</td>
</tr>
<tr>
<td>KIE.SERVER.RESPONSE</td>
<td>jms/cf/KIE.SERVER.RESPONSE</td>
<td>Receiving all responses produced by KIE Server</td>
</tr>
</tbody>
</table>

4.2.3. Create JMS queues

JMS queues are the destination end points for point-to-point messaging. You must create certain JMS queues to enable JMS messaging with KIE Server.

Prerequisites

- You have created a service bus for IBM WebSphere Application Server.

Procedure

1. In the WebSphere Integrated Solutions Console, navigate to Resources → JMS → Queues.

2. Select the correct scope and click New.

3. Select the Default Messaging Provider option and click OK.

4. For each of the following required queues, enter the name of the queue (for example, KIE.SERVER.REQUEST) and the JNDI name (for example, jms/KIE.SERVER.REQUEST), and then select the service bus from the Bus Name drop-down list.

5. From the Queue Name drop-down list, select the Create Service Integration Bus Destination, enter a unique identifier, and select the bus member that you created previously.

6. Click Apply and Save to save the changes to the master configuration, and repeat for each required queue.

4.2.3.1. JMS queues for KIE Server

The following are the required Java Message Service (JMS) queues that enable JMS messaging with KIE Server:
Table 4.2. Required JMS queues for KIE Server

<table>
<thead>
<tr>
<th>Name</th>
<th>Default value</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIE.SERVER.REQUEST</td>
<td>jms/KIE.SERVER.REQUEST</td>
<td>Sending all requests to KIE Server</td>
</tr>
<tr>
<td>KIE.SERVER.RESPONSE</td>
<td>jms/KIE.SERVER.RESPONSE</td>
<td>Receiving all responses produced by KIE Server</td>
</tr>
</tbody>
</table>

4.2.4. Create JMS activation specifications

A JMS activation specification is required in order to bridge the queue and the message-driven bean that enables JMS.

Prerequisites

- You have created a service bus for IBM WebSphere Application Server.
- You have created JMS queues.

Procedure

1. In the WebSphere Integrated Solutions Console, navigate to Resources → JMS → Activation Specifications.
2. Select the correct scope and click New.
3. Select the Default Messaging Provider option and click OK.
4. For each of the following required activation specifications, enter the name of the activation specification (for example, KIE.SERVER.REQUEST) and the JNDI name (for example, jms/activation/KIE.SERVER.REQUEST), and then select the service bus from the Bus Name drop-down list.
5. From the Destination Type drop-down list, select Queue and enter the name of the corresponding queue as a Destination lookup (for example, jms/KIE.SERVER.REQUEST).
6. Click Apply and Save to save the changes to the master configuration, and repeat for each required activation specification.

4.2.4.1. JMS activation specifications for KIE Server

The following are the required Java Message Service (JMS) activation specifications that enable JMS messaging with KIE Server:

Table 4.3. Required JMS activation specifications for KIE Server

<table>
<thead>
<tr>
<th>Name</th>
<th>Default value</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIE.SERVER.REQUEST</td>
<td>jms/activation/KIE.SERVER.REQUEST</td>
<td>Sending all requests to KIE Server</td>
</tr>
</tbody>
</table>
4.3. SETTING SYSTEM PROPERTIES IN IBM WEBSPHERE APPLICATION SERVER

Set the system properties listed in this section on your IBM WebSphere Application Server before you deploy KIE Server.

Procedure

1. In the WebSphere Integrated Solutions Console, navigate to Servers → Server Types → IBM WebSphere Application Servers.

2. In the list of application servers, choose the server on which you are going to deploy KIE Server.


![WebSphere configuration page](image-url)
4. Under **Additional Properties**, click **Java Virtual Machine**

**Figure 4.3. Process definition configuration page**

This opens the configuration properties for the JVM that is used to start IBM WebSphere.

5. Set both the **Initial heap size** and **Maximum heap size** to **2048** and click **Apply** to increase the Java Virtual Machine (JVM) memory size. KIE Server has been tested with these values. If you do not increase the JVM memory size, IBM WebSphere Application Server freezes or causes deployment errors when deploying KIE Server.

6. Under **Additional Properties**, click **Custom Properties**.

7. Click **New → Custom JVM Properties** and add the following properties to IBM WebSphere:

   **Table 4.4. System properties for KIE Server**

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>kie.server.jms.queues.response</td>
<td>jms/KIE.SERVER.RESPONSE</td>
<td>The JNDI name of JMS queue for responses used by KIE Server.</td>
</tr>
<tr>
<td>Name</td>
<td>Value</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>org.kie.server.domain</td>
<td>WSLogin</td>
<td>JAAS LoginContext domain used to authenticate users when using JMS.</td>
</tr>
<tr>
<td>org.jbpm.server.ext.disabled</td>
<td>true</td>
<td>Disables Business Central features, which are not supported in RHDM. If not set, KIE Server will work, but will show error messages during start up.</td>
</tr>
<tr>
<td>org.jbpm.ui.server.ext.disabled</td>
<td>true</td>
<td>Disables Business Central features, which are not supported in RHDM. If not set, KIE Server will work, but will show error messages during start up.</td>
</tr>
<tr>
<td>org.jbpm.case.server.ext.disabled</td>
<td>true</td>
<td>Disables Business Central features, which are not supported in RHDM. If not set, KIE Server will work, but will show error messages during start up.</td>
</tr>
<tr>
<td>org.jboss.logging.provider</td>
<td>jdk</td>
<td>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.</td>
</tr>
</tbody>
</table>

8. Click Save to save the changes to the master configuration.

### 4.4. STOPPING AND RESTARTING IBM WEBSPHERE APPLICATION SERVER

After you have configured all required system properties in IBM WebSphere Application Server, stop and restart the IBM server to ensure that the configurations are applied.

**Procedure**
In your command terminal, navigate to the IBM WebSphere Application Server /bin directory location that you specified during installation, and run the following commands to stop and restart IBM WebSphere to apply the configuration changes:

```bash
sudo ./stopServer.sh <SERVER_NAME>

sudo ./startServer.sh <SERVER_NAME>
```

<SERVER_NAME> is the IBM WebSphere Application Server name defined in Servers → Server Types → IBM WebSphere Application Servers of the WebSphere Integrated Solutions Console.
CHAPTER 5. INSTALLING AND RUNNING KIE SERVER WITH IBM WEBSHHERE APPLICATION SERVER

After you have configured all required system properties in IBM WebSphere Application Server, you can install KIE Server with IBM WebSphere to streamline Red Hat Decision Manager application management.

Prerequisites

- An IBM WebSphere Application Server instance is configured as described in Chapter 4, Configuring IBM WebSphere Application Server for KIE Server.

Procedure

1. Navigate to the Software Downloads page in the Red Hat Customer Portal (login required), and select the product and version from the drop-down options:
   - **Product:** Decision Manager
   - **Version:** 7.7

2. Download Red Hat Decision Manager 7.7.0 KIE Server for All Supported EE7 Containers

3. Extract the `rhdm-7.7.0-kie-server-ee7.zip` archive to a temporary directory. In the following examples this directory is called `TEMP_DIR`.

4. Repackage the `kie-server.war` directory:
   a. Navigate to the `TEMP_DIR/rhdm-7.7.0-kie-server-ee7/kie-server.war` directory.
   b. Select the contents of the `TEMP_DIR/rhdm-7.7.0-kie-server-ee7/kie-server.war` directory and create the `kie-server.zip` file.
   c. Rename `kie-server.zip` to `kie-server.war`. This is the file that you will use to deploy KIE Server.
   d. Optionally, copy the new `kie-server.war` file to a location that is more convenient to deploy from.

5. In the WebSphere Integrated Solutions Console, navigate to Applications → Application Types → WebSphere Enterprise Applications.

6. Click Install.

7. Navigate to the `kie-server.war` file that you repackaged and select it to upload.

8. Select Fast Path and click Next. The Install New Application wizard opens.

9. Change the Application Name to `kie-server` and click Next.

10. Map the KIE Server modules to servers according to your specific requirements and click Next.

11. For Bind Listeners for Message-Driven Beans, select Activation Specification for both beans, enter `jms/activation/KIE.SERVER.REQUEST` in the Target Resource JNDI Name field, and enter the `jms/cf/KIE.SERVER.REQUEST` JNDI name for the Red Hat Decision Manager 7.7 Installing and configuring KIE Server on IBM WebSphere Application Server.
KIE.SERVER.REQUEST connection factory.

12. In the Map Virtual Hosts for Web Modules section, keep the default values and click Next.

13. Set the context root to kie-server.

14. In the Metadata for Modules section, keep the default values and click Next.

15. Click Finish to install KIE Server and click Save to save the changes to the master configuration.

5.1. CREATING THE KIE SERVER GROUP AND ROLE

After KIE Server is installed, you must create the kie-server group and a user.

Prerequisites

- KIE Server is installed on the IBM WebSphere Application Server instance.

Procedure

1. In the WebSphere Integrated Solutions Console, click Users and Groups → Manage Groups.
2. In the Manage Groups screen, click Create.
3. In the Create a Group screen, enter kie-server in the Group name box, then click Create.
4. To create a user to add to the kie-server group, click Users and Groups → Manage Users.
5. In the Create a User screen, complete the required information.
6. Click Group Membership.
7. In the Group Membership screen, click kie-server, move it to Mapped To, and click Close.
8. On the Create a User screen click Create.

5.2. MAPPING THE KIE SERVER GROUP AND ROLE

After KIE Server is installed, you must map the kie-server role to the kie-server group in the WebSphere Integrated Solutions Console to run KIE Server.

Prerequisites

- KIE Server is installed on the IBM WebSphere Application Server instance.
- IBM WebSphere Application Server has the kie-server group with at least one user.

Procedure

1. In the WebSphere Integrated Solutions Console, navigate to Applications → Application Types → WebSphere Enterprise Applications and select the newly installed kie-server application.
2. Under Detail Properties, click Security Role to User/Group Mapping
3. Select the kie-server role and click Map Groups to search for the kie-server group.

4. Move the kie-server group from the Available list to the Selected list and click OK. This mapping gives users in the IBM WebSphere Application Server kie-server group access to KIE Server.

5. Click Save to complete the mapping.

5.3. CONFIGURING CLASS LOADING FOR KIE SERVER

After KIE Server is installed, you must configure class loading to set parent classes to load last.

Procedure

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.

5.4. VERIFYING THE INSTALLATION

After you install KIE Server and define the KIE Server group mapping, verify that the server is running.

Prerequisites

- KIE Server is installed on the IBM WebSphere Application Server instance.
- You have set all required system properties for the headless Decision Manager controller.
- You have defined the KIE Server group mapping in IBM WebSphere Application Server.

Procedure

Navigate to the KIE Server URL http://<HOST>:<PORT>/kie-server to verify that the server is running, or send a GET request to http://<HOST>:<PORT>/kie-server/services/rest/server to check whether the KIE Server REST API responds.

<HOST> is the ID or name of the KIE Server host, for example, localhost or 192.7.8.9.

<PORT> is the port of the KIE Server host, for example, 9060.

If KIE Server is not running, stop and restart the IBM WebSphere Application Server instance and try again to access the KIE Server URL or API.
CHAPTER 6. INSTALLING AND RUNNING THE HEADLESS DECISION MANAGER CONTROLLER WITH IBM WEBSPHERE APPLICATION SERVER

To use the KIE Server REST API or Java Client API to interact with KIE Server, install the headless Decision Manager controller with IBM WebSphere Application Server. The headless Decision Manager controller manages KIE Server configuration in a centralized way so that you can use the headless Decision Manager controller to create and maintain containers and perform other server-level tasks.

NOTE
For optimal results, install KIE Server and the headless Decision Manager controller on different servers in production environments. In development environments, you can install KIE Server and the headless Decision Manager controller on the same server.

Prerequisites

- The IBM WebSphere Application Server instance is configured as described in Chapter 4, Configuring IBM WebSphere Application Server for KIE Server.
- KIE Server is installed on the IBM WebSphere Application Server instance.
- You have sufficient user permissions to complete the installation.

Procedure

1. Navigate to the Software Downloads page in the Red Hat Customer Portal (login required), and select the product and version from the drop-down options:
   - Product: Decision Manager
   - Version: 7.7

2. Download Red Hat Decision Manager 7.7.0 Add-Ons

3. Extract the downloaded rhdm-7.7.0-add-ons.zip file to a temporary directory.

4. Extract the rhdm-7.7.0-add-ons.zip file to a temporary directory. In the following examples this directory is called TEMP_DIR.


6. Repackage the controller.war directory:
   a. Navigate to the TEMP_DIR/rhdm-7.7.0-add-ons/rhdm-7.7.0-controller-ee7/controller.war directory.
   b. Select the contents of the TEMP_DIR/rhdm-7.7.0-add-ons/rhdm-7.7.0-controller-ee7/controller.war directory and create the controller.zip file.
   c. Rename controller.zip to controller.war. This is the file that you will use to deploy the headless Decision Manager controller.
   d. Optionally, copy the new controller.war file to a location that is more convenient to deploy from.
7. In the WebSphere Integrated Solutions Console, navigate to **Applications → Application Types → WebSphere Enterprise Applications**.

8. Click **Install**.

9. Navigate to the **controller.war** file that you repackaged and select it to upload.

10. Select **Fast Path** and click **Next**.
    The **Install New Application** wizard opens.

11. Change the **Application Name** to **controller** and click **Next**.

12. Map the headless Decision Manager controller modules to servers according to your specific requirements and click **Next**.

13. For **Bind Listeners for Message-Driven Beans**, select **Activation Specification** for both beans, enter `jms/activation/KIE.SERVER.REQUEST` in the **Target Resource JNDI Name** field, and enter the `jms/cf/KIE.SERVER.REQUEST` JNDI name for the **KIE.SERVER.REQUEST** connection factory.

14. In the **Map Virtual Hosts for Web Modules** section, keep the default values and click **Next**.

15. Set the context root to **controller**.

16. In the **Metadata for Modules** section, keep the default values and click **Next**.

17. Click **Finish** to install the headless Decision Manager controller and click **Save** to save the changes to the master configuration.

### 6.1. CONFIGURING CLASS LOADING FOR THE HEADLESS DECISION MANAGER CONTROLLER

After the headless Decision Manager controller is installed, you must configure KIE Server class loading to set parent classes to load last.

**Procedure**

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.

### 6.2. SETTING SYSTEM PROPERTIES FOR THE HEADLESS DECISION MANAGER CONTROLLER

After you install the headless Decision Manager controller, set the system properties listed in this section on your application server or servers to enable proper interaction with the headless Decision Manager controller.
NOTE

For optimal results, install KIE Server and the headless Decision Manager controller on different servers in production environments. In development environments, you can install KIE Server and the headless Decision Manager controller on the same server. In either case, be sure to make these property changes on all application servers where the headless Decision Manager controller is installed.

Prerequisites

- KIE Server and the headless Decision Manager controller are installed on the application server instance.

Procedure

1. Specify the following JVM property values on the application server instance where the headless Decision Manager controller is installed:

   Table 6.1. Required properties for the headless Decision Manager controller

<table>
<thead>
<tr>
<th>Name</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.kie.server.user</td>
<td>A user with the kie-server role</td>
</tr>
<tr>
<td>org.kie.server.pwd</td>
<td>The password for the user specified in the</td>
</tr>
<tr>
<td></td>
<td>org.kie.server.user property</td>
</tr>
</tbody>
</table>

2. Specify the following JVM property values on the application server instance where KIE Server is installed:

   Table 6.2. Required properties for KIE Server when headless Decision Manager controller is installed

<table>
<thead>
<tr>
<th>Name</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.kie.server.controller.user</td>
<td>A user with the kie-server role</td>
</tr>
<tr>
<td>org.kie.server.controller.pwd</td>
<td>The password for the user specified for the</td>
</tr>
<tr>
<td></td>
<td>org.kie.server.controller.user property</td>
</tr>
<tr>
<td>org.kie.server.id</td>
<td>The ID or name of the KIE Server installation, such as</td>
</tr>
<tr>
<td></td>
<td>rhdm700-decision-server-1</td>
</tr>
<tr>
<td>org.kie.server.controller</td>
<td>The URL of the headless Decision Manager controller,</td>
</tr>
<tr>
<td></td>
<td>http://&lt;HOST&gt;:&lt;PORT&gt;/controller/rest/controller</td>
</tr>
</tbody>
</table>

<HOST> is the ID or name of the KIE Server host, for example, localhost or 192.7.8.9.
6.3. MAPPING THE HEADLESS DECISION MANAGER CONTROLLER GROUP AND ROLE

After the headless Decision Manager controller is installed, in the WebSphere Integrated Solutions Console, you must create the `kie-server` group and then map the `kie-server` role to the `kie-server` group.

**Prerequisites**

- The headless Decision Manager controller is installed on the IBM WebSphere Application Server instance.

**Procedure**

1. In the WebSphere Integrated Solutions Console, create the `kie-server` group and a user for that group, as described in Creating the KIE Server group and role.

2. Navigate to Applications → Application Types → WebSphere Enterprise Applications and select the newly installed headless Decision Manager controller.


4. Select the `kie-server` role and click Map Groups to search for the `kie-server` group.

5. Move the `kie-server` group from the Available list to the Selected list and click OK. This mapping gives the previously created administrator user access to Decision Manager.

6. Click Save to complete the mapping.

6.4. VERIFYING THE INSTALLATION

After you install the headless Decision Manager controller and define the required system properties and role requirements on the application server, verify that the headless Decision Manager controller works correctly.

**Prerequisites**

- KIE Server and the headless Decision Manager controller are installed on the application server instance.

- You have set all required system properties and role requirements for the headless Decision Manager controller on the application server.

**Procedure**

In your command terminal, enter the following command to verify that the headless Decision Manager controller is working:

```
```

<HOST> is the ID or name of the KIE Server host, for example, localhost or 192.7.8.9.
<PORT> is the port of the KIE Server host, for example, 7001.

<CONTROLLER> and <CONTROLLER_PWD> are the user credentials that you created in this section.

The command should return information about the KIE Server instance.

**NOTE**

Alternatively, you can use the KIE Server Java API Client to access the headless Decision Manager controller.

If the headless Decision Manager controller is not running, stop and restart the application server instance and try again to access the headless Decision Manager controller URL or API.
CHAPTER 7. CONFIGURING AN EMBEDDED DECISION ENGINE IN IBM WEBSHERE APPLICATION SERVER

A decision engine is a light-weight rule engine that enables you to execute your decisions and business processes. A decision engine can be part of a Red Hat Decision Manager application or it can be deployed as a service through OpenShift, Kubernetes, and Docker. You can embed a decision engine in a Red Hat Decision Manager application through the API or as a set of contexts and dependency injection (CDI) services.

If you intend to use an embedded engine with your Red Hat Decision Manager application, you must add Maven dependencies to your project by adding the Red Hat Business Automation bill of materials (BOM) files to the project’s pom.xml file. The Red Hat Business Automation BOM applies to a Red Hat Decision Manager. For more information about the Red Hat Business Automation BOM, see What is the mapping between Red Hat Decision Manager and the Maven library version?

Procedure

1. Declare the Red Hat Business Automation BOM in the pom.xml file:

   ```xml
   <dependencyManagement>
   <dependencies>
     <dependency>
       <groupId>com.redhat.ba</groupId>
       <artifactId>ba-platform-bom</artifactId>
       <version>7.7.0.redhat-00002</version>
       <type>pom</type>
       <scope>import</scope>
     </dependency>
   </dependencies>
   </dependencyManagement>
   <dependencies>
     <!-- Your dependencies -->
   </dependencies>
   </dependencyManagement>
   
   <dependency>
     <groupId>org.drools</groupId>
     <artifactId>drools-compiler</artifactId>
   </dependency>
   
   <!-- Dependency for persistence support. -->
   <dependency>
     <groupId>org.drools</groupId>
     <artifactId>drools-persistence-jpa</artifactId>
   </dependency>
   
2. Declare dependencies required for your project in the <dependencies> tag. After you import the product BOM into your project, the versions of the user-facing product dependencies are defined so you do not need to specify the <version> sub-element of these <dependency> elements. However, you must use the <dependency> element to declare dependencies which you want to use in your project.

   - For a basic Red Hat Decision Manager project, declare the following dependencies, depending on the features that you want to use:

   **Embedded decision engine dependencies**

   ```xml
   <dependency>
     <groupId>org.drools</groupId>
     <artifactId>drools-compiler</artifactId>
   </dependency>
   
   <!-- Dependency for persistence support. -->
   <dependency>
     <groupId>org.drools</groupId>
     <artifactId>drools-persistence-jpa</artifactId>
   </dependency>
   ```
To use the KIE Server, declare the following dependencies:

Client application KIE Server dependencies

- To create a remote client for Red Hat Decision Manager, declare the following dependency:

Client dependency

- When creating a JAR file that includes assets, such as rules and process definitions, specify the packaging type for your Maven project as kjar and use org.kie:kie-maven-plugin to process the kjar packaging type located under the <project> element. In the following example, ${kie.version} is the Maven library version listed in What is the mapping between Red Hat Decision Manager and the Maven library version?:

```xml
<packaging>kjar</packaging>
<build>
  <plugins>
    <plugin>
      <groupId>org.kie</groupId>
      <artifactId>kie-maven-plugin</artifactId>
      <version>${kie.version}</version>
      <extensions>true</extensions>
    </plugin>
  </plugins>
</build>
```
3. If you use a decision engine with persistence support in your project, you must declare the following hibernate dependencies in the `dependencyManagement` section of your `pom.xml` file by copying the `version.org.hibernate-4ee7` property from the Red Hat Business Automation BOM file:

**Hibernate dependencies in decision engine with persistence**

```xml
<dependencyManagement>
  <dependencies>
    <dependency>
      <groupId>org.hibernate</groupId>
      <artifactId>hibernate-entitymanager</artifactId>
      <version>${version.org.hibernate-4ee7}</version>
    </dependency>
    <dependency>
      <groupId>org.hibernate</groupId>
      <artifactId>hibernate-core</artifactId>
      <version>${version.org.hibernate-4ee7}</version>
    </dependency>
  </dependencies>
</dependencyManagement>
```
CHAPTER 8. SECURING PASSWORDS WITH A KEYSTORE

You can use a keystore to encrypt passwords that are used for communication between Business Central and KIE Server. You should encrypt both controller and KIE Server passwords. If Business Central and KIE Server are deployed to different application servers, then both application servers should use the keystore.

Use Java Cryptography Extension KeyStore (JCEKS) for your keystore because it supports symmetric keys.

NOTE
If KIE Server is not configured with JCEKS, KIE Server passwords are stored in system properties in plain text form.

Prerequisites

- KIE Server is installed in IBM WebSphere Application Server.
- A KIE Server user with the kie-server role has been created, as described in Section 5.1, “Creating the KIE Server group and role”.
- Java 8 or higher is installed.

Procedure

1. Create a JCEKS keystore.
2. When prompted, enter the password for the KIE Server user that you created.
3. Set the system properties listed in the following table:

<table>
<thead>
<tr>
<th>System property</th>
<th>Placeholder</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>kie.keystore.keyStoreURL</td>
<td>&lt;KEYSTORE_URL&gt;</td>
<td>URL for the JCEKS that you want to use, for example file:///home/kie/keystores/keystore.jceks</td>
</tr>
<tr>
<td>kie.keystore.keyStorePwd</td>
<td>&lt;KEYSTORE_PWD&gt;</td>
<td>Password for the JCEKS</td>
</tr>
<tr>
<td>kie.keystore.key.server.alias</td>
<td>&lt;KEY_SERVER_ALIAS&gt;</td>
<td>Alias of the key for REST services where the password is stored</td>
</tr>
<tr>
<td>kie.keystore.key.server.pwd</td>
<td>&lt;KEY_SERVER_PWD&gt;</td>
<td>Password of the alias for REST services with the stored password</td>
</tr>
<tr>
<td>kie.keystore.key.ctrl.alias</td>
<td>&lt;KEY_CONTROL_ALIAS&gt;</td>
<td>Alias of the key for default REST Process Automation Controller where the password is stored</td>
</tr>
<tr>
<td>System property</td>
<td>Placeholder</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>kie.keystore.key.ctrl.pwd</td>
<td>&lt;KEY_CONTROL_PWD&gt;</td>
<td>Password of the alias for default REST Process Automation Controller with the stored password</td>
</tr>
</tbody>
</table>

4. Start KIE Server to verify the configuration.
CHAPTER 9. NEXT STEPS

- Getting started with decision services
- Designing a decision service using guided decision tables
APPENDIX A. VERSIONING INFORMATION

Documentation last updated on Wednesday, March 18, 2020.