Installing and configuring Red Hat Decision Manager in a Red Hat JBoss EAP clustered environment
Abstract

This document describes how to create a Red Hat Decision Manager 7.6 clustered environment on Red Hat JBoss Enterprise Application Platform 7.2.
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PREFACE

As a system engineer, you can create a Red Hat Decision Manager clustered environment to provide high availability and load balancing for your development and runtime environments.

Prerequisites

- You have reviewed the information in *Planning a Red Hat Decision Manager installation*. 
CHAPTER 1. RED HAT DECISION MANAGER CLUSTERS

By clustering two or more computers, you have the benefits of high availability, enhanced collaboration, and load balancing. High availability decreases the chance of a loss of data when a single computer fails. When a computer fails, another computer fills the gap by providing a copy of the data that was on the failed computer. When the failed computer comes online again, it resumes its place in the cluster. Load balancing shares the computing load across the nodes of the cluster. Doing this improves the overall performance.

There are several ways that you can cluster Red Hat Decision Manager components. This document describes how to cluster the following scenarios:

- Chapter 2, *Red Hat Decision Manager clusters in a development (authoring) environment*
- Chapter 3, *Decision Server clusters in a runtime environment*
NOTE

Configuration of Business Central for high availability is currently technology preview.

You can configure Red Hat Decision Manager as a clustered development environment to benefit from high availability. With a clustered environment, if a developer is working on \$node1 and that node fails, that developer’s work is preserved and visible on any other node of the cluster.

Most development environments consist of Business Central and at least one Decision Server.

To create a Red Hat Decision Manager clustered development environment, you must perform the following tasks:

- Configure Red Hat JBoss EAP 7.2 with Red Hat Data Grid 7.3.1 on a machine.
- Configure AMQ Broker, a Java messaging server (JMS) broker, on a machine.
- Configure an NFS file server on a machine.
- Download Red Hat JBoss EAP 7.2 and Red Hat Decision Manager 7.6, then install them on each machine that is to become a cluster node.
- Configure and start Business Central on each cluster node to start the operation of the cluster.

Red Hat Data Grid is built from the Infinispan open-source software project. It is a distributed in-memory key/value data store that has indexing capabilities that enable you to store, search, and analyze high volumes of data quickly and in near-real time. In a Red Hat Decision Manager clustered environment, it enables you to perform complex and efficient searches across cluster nodes.

A JMS broker is a software component that receives messages, stores them locally, and forwards the messages to a recipient. AMQ Broker enables your applications to communicate with any messaging provider. It specifies how components such as message-driven beans, Enterprise JavaBeans, and servlets can send or receive messages.

2.1. INSTALLING AND CONFIGURING RED HAT DATA GRID

Install and configure Red Hat Data Grid for the Red Hat Decision Manager clustered environment for more efficient searching across cluster nodes.

Use the following instructions to configure a simplified, non-high availability environment on a separate machine.

For information about advanced installation and configuration options, and Red Hat Data Grid modules for Red Hat JBoss EAP, see the Red Hat Data Grid User Guide.

NOTE

Do not install Red Hat Data Grid on the same node as Business Central.

Prerequisites
A Java Virtual Machine (JVM) environment compatible with Java 8.0 or later is installed.

A backed-up Red Hat JBoss EAP installation version 7.2 or higher is available. The base directory of the Red Hat JBoss EAP installation is referred to as `EAP_HOME`.

Red Hat Decision Manager is installed and configured.

Sufficient user permissions to complete the installation are granted.

Procedure

1. Navigate to the [Software Downloads](https://www.redhat.com) page in the Red Hat Customer Portal (login required), and select the product and version from the drop-down options:
   - **Product**: Data Grid
   - **Version**: 7.3

2. Download and unzip the [Red Hat JBoss Data Grid 7.3.0 Server](https://www.redhat.com) (`jboss-datagrid-7.3.0-1-server.zip`) installation file to the preferred location on your system. The unzipped directory is referred to as `JDG_HOME`.

3. To run Red Hat Data Grid, navigate to `JDG_HOME/bin` and enter one of the following commands:
   - On Linux or UNIX-based systems:
     ```bash
     $ ./standalone.sh -c clustered.xml
     ```
   - On Windows:
     ```bash
     standalone.bat -c clustered.xml
     ```

2.2. DOWNLOADING AND CONFIGURING AMQ BROKER

AMQ Broker enables your applications to communicate with any messaging provider. It specifies how components such as message-driven beans, Enterprise JavaBeans, and servlets can send or receive messages.

To configure AMQ Broker for a high availability Red Hat Decision Manager clustered environment, see Using AMQ Broker.

You can use the following procedure to configure a simplified, non-high availability environment.

Procedure

1. Navigate to the [Software Downloads](https://www.redhat.com) page in the Red Hat Customer Portal (login required), and select the product and version from the drop-down options:
   - **Product**: AMQ Broker
   - **Version**: 7.2.0

2. Click **Download** next to [Red Hat AMQ Broker 7.2.0](https://www.redhat.com) (`amq-broker-7.2.0-bin.zip`).

3. Extract the `amq-broker-7.2.0-bin.zip` file.
4. Change directory to `amq-broker-7.2.0-bin/amq-broker-7.2.0/bin`.

5. Enter the following command and replace the following placeholders to create the broker and broker user:
   - `<HOST>` is the IP address or host name of the server where you installed AMQ Broker.
   - `<AMQ_USER>` and `<AMQ_PASSWORD>` is a user name and password combination of your choice.
   - `<BROKER_NAME>` is a name for the broker that you are creating.

```
/artemis create --host <HOST> --user <AMQ_USER> --password <AMQ_PASSWORD> --require-login <BROKER_NAME>
```

6. To run AMQ Broker, enter the following command in the `amq-broker-7.2.0-bin/amq-broker-7.2.0/bin` directory:

```
amq-broker-7.2.0/bin/<BROKER_NAME>/bin/artemis run
```

### 2.3. CONFIGURING AN NFS SERVER

A shared file system is required for a Business Central clustered environment and each client node must have access to the shared file system.

You must deploy and configure an NFS version 4 server.

**Procedure**

1. Configure a server to export NFS version 4 shares. For instructions about exporting NFS shares on Red Hat Enterprise Linux, see Exporting NFS shares in Managing file systems. For more information about creating the NFS server, see How to configure NFS in RHEL 7.

2. On the server, create an `/opt/kie/data` share with the `rw,sync,no_root_squash` options by adding the following line to the `/etc/exports` file:

```
/opt/kie/data *(rw,sync,no_root_squash)
```

   In this example, `/opt/kie/data` is the shared folder, `*` are the IP addresses allowed to connect to the NFS server, and `(rw,sync,no_root_squash)` are the minimum options required for NFS. For example:

```
/opt/kie/data 192.268.1.0/24(rw,sync,no_root_squash)
```

**NOTE**

You can use another share name instead of `/opt/kie/data`. In this case, you must use this name when configuring all nodes that run Business Central.

3. On each client node, mount the shared folder in an existing directory:

   ```
   # mount <SERVER_IP>:/opt/kie/data /opt/kie/data/niogit
   ```
4. Add the following properties to the standalone-full-ha.xml file to bind the .niogit and maven-repository directories as nfs shared folders:

```
<property name="org.uberfire.nio.git.dir" value="/opt/kie/data/niogit"/>
<property name="org.guvnor.m2repo.dir" value="/opt/kie/data/maven-repository"/>
```

2.4. DOWNLOADING AND EXTRACTING RED HAT JBOSS EAP 7.2 AND RED HAT DECISION MANAGER

Download and install Red Hat JBoss EAP 7.2 and Red Hat Decision Manager 7.6 on each node of the cluster.

Procedure

1. Download Red Hat JBoss EAP 7.2 on each node of the cluster:
   a. 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: Enterprise Application Platform
      - Version: 7.2
   b. Click Download next to Red Hat JBoss Enterprise Application Platform 7.2.0 (JBEAP-7.2.0/jboss-eap-7.2.0.zip).

2. Extract the jboss-eap-7.2.0.zip file. In the following steps, EAP_HOME is the jboss-eap-7.2/jboss-eap-7.2 directory.

3. Download and apply the latest Red Hat JBoss EAP patch, if available.

4. Download Red Hat Decision Manager on each node of the cluster:
   a. Navigate to the Software Downloads page in the Red Hat Customer Portal, and select the product and version from the drop-down options:
      - Product: Decision Manager
      - Version: 7.6

5. Extract the rhdm-7.6.0-decision-central-eap7-deployable.zip file to a temporary directory. In the following commands this directory is called TEMP_DIR.

6. Copy the contents of TEMP_DIR/rhdm-7.6.0-decision-central-eap7-deployable/jboss-eap-7.2 to EAP_HOME.

7. Download and apply the latest Red Hat Decision Manager patch, if available.

8. Navigate to the EAP_HOME/bin directory.

9. Create a user with the admin role that you will use to log in to Business Central. In the following command, replace <username> and <password> with the user name and password of your choice.
$ ./add-user.sh -a --user <USERNAME> --password <PASSWORD> --role admin

**NOTE**

Make sure that the specified user name is not the same as an existing user, role, or group. For example, do not create a user with the user name **admin**.

The password must have at least eight characters and must contain at least one number and one non-alphanumeric character, but not & (ampersand).

You must use LDAP or RH-SSO for high availability environments. For more information, see the *Red Hat Single Sign-On Server Administration Guide*.

10. Create a user with the **kie-server** role that you will use to log in to Decision Server.

    $ ./add-user.sh -a --user <USERNAME> --password <PASSWORD> --role kie-server

11. Make a note of your user names and passwords.

### 2.5. CONFIGURING AND RUNNING BUSINESS CENTRAL IN A CLUSTER

After you install Red Hat JBoss EAP and Business Central you can use Red Hat Data Grid and the AMQ Broker to configure the cluster. Complete these steps on each node of the cluster.

**NOTE**

These steps describe a basic cluster configuration. For more complex configurations, see the *Red Hat JBoss EAP 7.2 Configuration Guide*.

#### Prerequisites

- Red Hat Data Grid 7.3.1 is installed as described in *Section 2.1, “Installing and configuring Red Hat Data Grid”*.  
- AMQ Broker is installed and configured, as described in *Section 2.2, “Downloading and configuring AMQ Broker”*.  
- Red Hat JBoss EAP and Red Hat Decision Manager are installed on each node of the cluster as described in *Section 2.4, “Downloading and extracting Red Hat JBoss EAP 7.2 and Red Hat Decision Manager”*.  
- An NFS server with a mounted partition is available as described in *Section 2.3, “Configuring an NFS server”*.  

**Procedure**

1. Mount the directory shared over NFS as `/data`. Enter the following commands as the root user:

```
mkdir /data
mount <NFS_SERVER_IP>:<DATA_SHARE> /data
```

Replace `<NFS_SERVER_IP>` with the IP address or hostname of the NFS server machine. Replace `<DATA_SHARE>` with the share name that you configured (for example, `/opt/kie/data`).
2. Open the `EAP_HOME/standalone/configuration/standalone-full.xml` file in a text editor.

3. Edit or add the properties under the `<system-properties>` element and replace the following placeholders:

   - `<AMQ_USER>` and `<AMQ_PASSWORD>` are the credentials that you defined when creating the AMQ Broker.
   - `<AMQ_BROKER_IP_ADDRESS>` is the IP address of the AMQ Broker.
   - `<INFINISPAN_NODE_IP>` is the IP address where Red Hat Data Grid is installed.

```xml
<system-properties>
  <property name="appformer-jms-connection-mode" value="REMOTE"/>
  <property name="appformer-jms-username" value="<AMQ_USER>"/>
  <property name="appformer-jms-password" value="<AMQ_USER_PASSWORD>"/>
  <property name="appformer-jms-url" value="tcp://<AMQ_BROKER_IP_ADDRESS>:61616?ha=true&amp;retryInterval=1000&amp;retryIntervalMultiplier=1.0&amp;reconnectAttempts=-1"/>
  <property name="org.appformer.ext.metadata.infinispan.port" value="11222"/>
  <property name="org.appformer.ext.metadata.infinispan.host" value="<INFINISPAN_NODE_IP>"/>
  <property name="org.appformer.ext.metadata.infinispan.realm" value="ApplicationRealm"/>
  <property name="org.appformer.ext.metadata.infinispan.cluster" value="kie-cluster"/>
  <property name="org.appformer.ext.metadata.infinispan.index" value="infinispan"/>
  <property name="org.uberfire.nio.git.dir" value="/data"/>
  <property name="es.set.netty.runtime.available.processors" value="false"/>
</system-properties>
```

4. Optional: If the Red Hat Data Grid deployment requires authentication, edit or add the properties under the `<system-properties>` element and replace the following placeholders:

   - `<SERVER_NAME>` is the server name specified in your Red Hat Data Grid server configuration.
   - `<SASL_QOP>` is the combination of auth, auth-int and auth-conf values for your Red Hat Data Grid server configuration.

```xml
<property name="org.appformer.ext.metadata.infinispan.server.name" value="<SERVER_NAME>"/>
<property name="org.appformer.ext.metadata.infinispan.sasl.qop" value="<SASL_QOP>"/>
<property name="org.appformer.ext.metadata.infinispan.username" value=""/>
<property name="org.appformer.ext.metadata.infinispan.password" value=""/>
```

5. Save the `standalone-full.xml` file.
6. To start the cluster, navigate to `EAP_HOME/bin` and enter one of the following commands:

   - On Linux or UNIX-based systems:
     
     ```bash
     $ ./standalone.sh -c standalone-full.xml
     ```
   
   - On Windows:
     
     ```bash
     standalone.bat -c standalone-full.xml
     ```

### 2.6. VERIFYING THE RED HAT DECISION MANAGER CLUSTER

After configuring the cluster for Red Hat Decision Manager, create an asset to verify that the installation is working.

**Procedure**

1. In a web browser, enter `<node-IP-address>:8080/decision-central`. Replace `<node-IP-address>` with the IP address of a particular node.

2. Enter the admin user credentials that you created during installation. The Business Central home page appears.

3. Select **Menu → Design → Projects**.

4. Open the **MySpace** space.

5. Click **Try Samples → Mortgages → OK**. The **Assets** window appears.

6. Click **Add Asset → Data Object**.

7. Enter **MyDataObject** in the **Data Object** field and click **OK**.

8. Click **Spaces → MySpace → Mortgages** and confirm that **MyDataObject** is in the list of assets.

9. Enter the following URL in a web browser, where `<node_IP_address>` is the address of a different node of the cluster:

   ```url
   http://<node_IP_address>:8080/decision-central
   ```

10. Enter the same credentials that you used to log in to Business Central on the first node, where you created the **MyDataObject** asset.

11. Select **Menu → Design → Projects**.

12. Open the **MySpace** space.

13. Select the **Mortgages** project.

14. Verify that **MyDataObject** is in the asset list.

15. Delete the **Mortgages** project.
CHAPTER 3. DECISION SERVER CLUSTERS IN A RUNTIME ENVIRONMENT

The primary benefit of clustering a Decision Server runtime environment is load balancing. If activity on one node of the cluster increases, that activity can be shared among the other nodes of the cluster to improve performance.

To create a Decision Server clustered runtime environment, you download and extract Red Hat JBoss EAP 7.2 and Decision Server. Then, you configure Red Hat JBoss EAP 7.2 for a cluster, start the cluster, and install Decision Server on each cluster node.

 Optionally, you can then cluster the headless Decision Manager controller.

3.1. DOWNLOADING AND EXTRACTING RED HAT JBOSS EAP 7.2 AND DECISION SERVER

Complete the steps in this section to download and install Red Hat JBoss EAP 7.2 and Decision Server for installation in a clustered environment.

Procedure

1. Download Red Hat JBoss EAP 7.2 on each node of the cluster:
   a. 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: Red Hat JBoss EAP
      - Version: 7.2
   b. Click Download next to Red Hat JBoss Enterprise Application Platform 7.2.0 (jboss-eap-7.2.0.zip).

2. Extract the jboss-eap-7.2.0.zip file. The jboss-eap-7.2/jboss-eap-7.2 directory is referred to as EAP_HOME.

3. Download and apply the latest Red Hat JBoss EAP patch, if available.

4. Download Decision Server:
   a. Navigate to the Software Downloads page in the Red Hat Customer Portal and select the product and version from the drop-down options:
      - Product: Decision Manager
      - Version: 7.6
   b. Download Red Hat Decision Manager 7.6.0 Decision Server for All Supported EE8 Containers (rhdm-7.6.0-kie-server-ee8.zip).

5. Extract the rhdm-7.6.0-kie-server-ee8.zip archive to a temporary directory. In the following examples this directory is called TEMP_DIR.

7. Copy the contents of the `TEMP_DIR/rhdm-7.6.0-kie-server-ee8/rhdm-7.6.0-kie-server-ee8/SecurityPolicy/` to `EAP_HOME/bin`. When asked to overwrite files, click Replace.

8. In the `EAP_HOME/standalone/deployments/` directory, create an empty file named `kie-server.war.dodeploy`. This file ensures that Decision Server is automatically deployed when the server starts.

9. Download and apply the latest Red Hat Decision Manager patch, if available.

10. Navigate to the `EAP_HOME/bin` directory.

11. Create a user with the `kie-server` role that you will use to log in to Decision Server.

   ```bash
   $ ./add-user.sh -a --user <USERNAME>  --password <PASSWORD> --role kie-server
   ```

12. Make a note of your user names and passwords.

13. To start the cluster, navigate to `EAP_HOME/bin` and enter one of the following commands:

   - On Linux or UNIX-based systems:
     ```bash
     $ ./standalone.sh -c standalone-full.xml
     ```
   - On Windows:
     ```bash
     standalone.bat -c standalone-full.xml
     ```

### 3.2. CLUSTERING DECISION SERVERS WITH THE HEADLESS DECISION MANAGER CONTROLLER

The Decision Manager controller is integrated with Business Central. However, if you do not install Business Central, you can install the headless Decision Manager controller and use the REST API or the Decision Server Java Client API to interact with it.

**Prerequisites**

- A backed-up Red Hat JBoss EAP installation version 7.2 or later is available. The base directory of the Red Hat JBoss EAP installation is referred to as `EAP_HOME`.

- Sufficient user permissions to complete the installation are granted.

- An NFS server with a mounted partition is available as described in Section 2.3, "Configuring an NFS 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: 7.6

2. Download Red Hat Decision Manager 7.6.0 Add Ons (the rhdm-7.6.0-add-ons.zip file).


4. Extract the rhdm-7.6.0-controller-ee7 archive to a temporary directory. In the following examples this directory is called TEMP_DIR.

5. Copy the TEMP_DIR/rhdm-7.6.0-controller-ee7/controller.war directory to EAP_HOME/standalone/deployments/.

6. Copy the contents of the TEMP_DIR/rhdm-7.6.0-controller-ee7/SecurityPolicy/ directory to EAP_HOME/bin. When asked to overwrite files, select Yes.

7. In the EAP_HOME/standalone/deployments/ directory, create an empty file named controller.war.dodeploy. This file ensures that the headless Decision Manager controller is automatically deployed when the server starts.

8. Open the EAP_HOME/standalone/configuration/standalone.xml file in a text editor.

9. Add the following properties to the <system-properties> element and replace <NFS_STORAGE> with the absolute path to the NFS storage where the template configuration is stored:

   ```xml
   <system-properties>
   <property name="org.kie.server.controller.templatefile.watcher.enabled" value="true"/>
   <property name="org.kie.server.controller.templatefile" value="<NFS_STORAGE>"/>
   </system-properties>
   ```

   Template files contain default configurations for specific deployment scenarios.

   If the value of the org.kie.server.controller.templatefile.watcher.enabled property is set to true, a separate thread is started to watch for modifications of the template file. The default interval for these checks is 30000 milliseconds and can be further controlled by the org.kie.server.controller.templatefile.watcher.interval system property. If the value of this property is set to false, changes to the template file are detected only when the server restarts.
10. To start the headless Decision Manager controller, navigate to \texttt{EAP\_HOME/bin} and enter the following command:

- On Linux or UNIX-based systems:
  
  \$ ./standalone.sh

- On Windows:
  
  standalone.bat
CHAPTER 4. ADDITIONAL RESOURCES

- Installing and configuring Red Hat Decision Manager on Red Hat JBoss EAP 7.2
- Planning a Red Hat Decision Manager installation
- Deploying a Red Hat Decision Manager immutable server environment on Red Hat OpenShift Container Platform
- Deploying a Red Hat Decision Manager authoring or managed server environment on Red Hat OpenShift Container Platform
- Deploying a Red Hat Decision Manager environment on Red Hat OpenShift Container Platform using Operators
APPENDIX A. VERSIONING INFORMATION

Documentation last updated on Friday, May 22, 2020.