Red Hat JBoss Fuse 6.1

Cloud Deployment Guide

Use JBoss Fuse for xPaaS to deploy Fuse containers in an OpenShift Enterprise cloud

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Abstract

This guide describes how to use the Fuse Fabric cloud APIs to provision, configure, and deploy applications into cloud environments.

Table of Contents

CHAPTER 1. OPENSHIFT ENTERPRISE

Abstract

This section explains how to get started in the cloud with OpenShift Enterprise and Red Hat JBoss Fuse.

1.1. OVERVIEW

Basic technologies

This OpenShift Enterprise tutorial is based on the following technology stack:

- *OpenShift Platform as a Service (PaaS)* Red Hat's OpenShift PaaS provides developers with the capability to develop, host, and scale applications in a cloud environment. You can choose a public, private, or hybrid cloud environment. In this tutorial we use OpenShift Enterprise to deploy JBoss Fuse.
- *Red Hat JBoss Fuse 6.1* In this tutorial we use version 6.1 of JBoss Fuse.

OpenShift applications

OpenShift is an open source PaaS that enables you to develop, deploy and host applications in a cloud environment. Before you build an application, you create a cartridge that hosts your application code and dependencies. You can choose a QuickStart cartridge, upload your own source code, or link to source code from a public repository.

The default JBoss Fuse cartridge hosts the JBoss Fuse application and runs the Fuse Management Console container. Each additional container that you create in JBoss Fuse appears as an application on the OpenShift **`Applications`** page.

Fuse Management Console

After you create the JBoss Fuse cartridge, you receive a URL based on the OpenShift application information that you provided. Use this URL to open the Fuse Management Console. The management console shows information about all containers, fabrics, and dependencies for the JBoss Fuse cartridge.

1.2. MINIMUM GEAR REQUIREMENTS

This section describes the resource requirements for the JBoss Fuse cartridge. When you install new OpenShift nodes, you can choose the preconfigured xPaaS gear profile. If you configure existing nodes, you use the xPaaS gear profile from the file that OpenShift provides.

To view the full property descriptions and additional information about the xPaaS gear profile, see the following file: **`/etc/openshift/resource_limits.conf.xpaas.m3.xlarge`**

For general information about how to configure gears on OpenShift Enterprise, see the section Gear Profiles in the OpenShift Enterprise documentation.

Basic gear properties

The following table lists a summary of the basic gear properties and values to set when you want to use an xPaaS cartridge:

Property	Value
node_profile	xpaas
quota_blocks	5242880
max_active_gears	50
no_overcommit_active	false
limits_noproc	2142
cpu_shares	128
cpu_cfs_quota_us	200000
memory_limits_in_bytes	1073741824
memory_memsw_limit_in_bytes	1610612736
memory_move_charge_at_immigrate	1
memory_oom_control	1
max_active_gears	50

Additional gear properties

The following table lists additional properties and alternate values for some of the gear properties to use when the gear is throttled, frozen, thawed, or boosted:

Template	Property	Value
Throttle	cpu_shares	128
	cpu_cfs_quota_us	100000
	apply_period	120
	apply_percent	30
	restore_percent	70
Freeze	freezer_state	FROZEN

Template	Property	Value
Thaw	freezer_state	THAWED
Boost	cpu_shares	256
	cpu_cfs_quota_us	400000

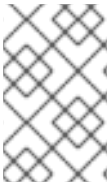
1.3. GETTING STARTED

This section describes how to configure your OpenShift Enterprise environment and install JBoss Fuse.

1.3.1. Install the xPaaS Gear Profile on OpenShift Enterprise Nodes

This section describes how to configure OpenShift Enterprise nodes to support JBoss Fuse gear profiles after you install each node.

Alternatively, you can specify the xPaaS profile when you install each new node to configure the new node with the required gear properties.



NOTE

You must install the xPaaS gear profile on each node where you intend to deploy the JBoss Fuse cartridge. The nodes cannot be associated with districts or contain other gears.

1. Edit the **`/etc/openshift/resource_limits.conf`** file.
   - Replace the contents of the file with the contents of the **`/etc/openshift/resource_limits.conf.xpaas.m3.xlarge`** file.
   - To prevent memory overcommit, set the maximum number of gears in the **`max_active_gears`** property to the number of gears that the node can support. The number of active gears needs to reflect the available RAM and disk space of the node.
2. Edit the **`/etc/openshift/node.conf`** file.
   - Add the following property: **`PORTS_PER_USER=15`**
   - Add the following value to the **`OPENSHIFT_FRONTEND_HTTP_PLUGINS`** property:

     ```
     openshift-origin-frontend-haproxy-sni-proxy
     ```
3. In the **`/etc/openshift/node-plugins.d/openshift-origin-frontend-haproxy-sni-proxy.conf`** file, update the list of the **`PROXY_PORTS`** property to include ten ports. For example:

   ```
   PROXY_PORTS="2303,2304,2305,2306,2307,2308,2309,2310,2311,2312"
   ```

4. Configure your firewall to allow TCP/SSL traffic through the ports that you specified in the **PROXY_PORTS** property.

   For example, if you use the **/etc/sysconfig/iptables** to manage your firewall configuration, add the following line before the last instance of the **-A INPUT** rule:

   ```
   -A INPUT -m state --state NEW -m tcp -p tcp --dport <port_number>:
   <port_number> -j ACCEPT
   ```

   The following example shows the port configuration for the ports numbered 2303 to 2313:

   ```
   -A INPUT -m state --state NEW -m tcp -p tcp --dport 2303:2312 -j
   ACCEPT
   ```

   After you edit this file, run the **service iptables reload** command to apply the change.

5. Restart the **openshift-sni-proxy** service.

1.3.2. Install the JBoss Fuse Cartridge on OpenShift Enterprise

This section describes how to install the JBoss Fuse cartridge on OpenShift Enterprise. You must install the cartridge on each node in your OpenShift Enterprise domain, regardless of whether you intend to deploy JBoss Fuse applications on that node.

The JBoss Fuse cartridges is shipped as an RPM package in an erratum that you apply in the same way that you apply asynchronous errata updates to OpenShift Enterprise.

For general information about OpenShift errata updates, see the Asynchronous Errata Updates section of the OpenShift Enterprise documentation.

1. Download the advisory that contains the JBoss Fuse cartridge. See the OpenShift Enterprise 2 General Advisories page on the Red Hat Customer Portal for a list of all OpenShift Enterprise 2 errata.

2. On each node, install the cartridge RPM package with **yum** in the same way you install other OpenShift Enterprise components.

3. Restart each node with the following command:

   ```
   service ruby193-mcollective restart
   ```

1.3.3. Configure the OpenShift Enterprise Broker to Support xPaaS Gears

This section describes how to add the xPaaS gear profiles to the OpenShift Enterprise broker and how to create a district for the gear size.

For general information on districts in the OpenShift Enterprise broker, see the Managing Districts section in the OpenShift Enterprise Deployment Guide and Capacity Planning and Districts section in the OpenShift Enterprise Administration Guide.

1. On the OpenShift Enterprise broker, import the installed cartridges with the following command:

   ```
   oo-admin-ctl-cartridge -c import-profile --activate
   ```

2. Edit the **/etc/openshift/broker.conf** file.

   - Add the value **xpaas** to the VALID_GEAR_SIZES property.
   - Add the value **xpaas** to the DEFAULT_GEAR_CAPABILITIES property.

   You must restart the **openshift-broker** service after you edit this file.

3. Run the following commands:

   oo-admin-ctl-user -c -l <user_name> --addgearsize xpaas
   Grants existing OpenShift Enterprise users permissions to create xPaaS gears.

   oo-admin-ctl-district -c create -n <district_name> -p xpaas
   Creates a district for the xPaaS nodes.

   oo-admin-ctl-district -c remove-capacity -n <district_name> -s 4000
   Sets the district capacity to a maximum of 2,000 gears.

   oo-admin-ctl-district -c add-node -n <district_name> -i <node_hostname>
   Adds the xPaaS nodes to the district.

1.3.4. Create the JBoss Fuse Application

You create the JBoss Fuse application from the OpenShift Enterprise management console or from the command line, in the same way that you create other applications on the node.

For general information on how to create applications in OpenShift Enterprise, see the Creating an Application section in the OpenShift Enterprise documentation.

Choosing the xPaaS gear profile

When you create the JBoss Fuse application, make sure to specify the xPaaS gear profile:

- If you create the application from the command line, include the **-g xpaas** option in the command. For example:

```
rhc create-app <app_name> fuse-6.1.1 -g xpaas
```

- If you create the application from the OpenShift Enterprise management console, choose **xPaaS** from the **Gear Size** drop-down list.

1.3.5. Deploy Quickstarts

This section describes how to deploy a JBoss Fuse quickstart to run in the OpenShift Enterprise domain. Normally, you run the **mvn clean install** command to build the quickstart. However, in the OpenShift Enterprise domain you must run the command with additional options to ensure that the quickstart builds with the correct configuration.

For general information about each quickstart, see the readme file located in the directory of each quickstart.

1. In the OpenShift Enterprise server, run the command to build the quickstart in the following format:

```
mvn clean deploy -Dfuse-server=http://${user}:${password}@${fuse-server-host}
```

The following example shows the command with the user name, password, and host properties:

```
mvn clean deploy -Dfuse-server=http://admin:bU-zZTWSHscl@fuse-demo.openshift.example.com
```

2. Start the JBoss Fuse application and run the following command in the JBoss Fuse console:

```
osgi:install -s mvn:org.jboss.quickstarts.fuse/cbr/6.1.1.redhat-412
```

1.4. PORT CONFIGURATION

This section describes how to configure, map, and assign ports when you want to connect to the JBoss Fuse application.

1.4.1. Choosing SSL or Non-SSL Ports

When you deploy your JBoss Fuse application you can choose to use an SSL connection or non-SSL connection.

SSL connection

This connection uses static predefined ports to connect to the JBoss Fuse application. SSL connections are slower than non-SSL connections due to processing overhead at run-time, but you can determine the port number to use at run-time when you first install the application.

Non-SSL connection

This connection uses a dynamic port number that OpenShift Enterprise allocates based on the available ports when you install the JBoss Fuse application. After you install the application, you must determine which port numbers the clients need to use to connect to the application.

Configuring an SSL connection

1. In the ActiveMQ JMS client, specify the SSL port number in the **`ActiveMQConnectionFactory`** property. By default, the following port numbers are available for SSL connections:

`Openwire`

2303

`STOMP`

2304

`AMQP 1.0`

2305

```
MQTT 3.1
   2306
```

2. Copy the contents of the self-signed public server certificate to a file named **server.crt** and store the file in your local machine. You can access the certificate with the URL that appears when you first install the JBoss Fuse application, or from the default profile directory in the Wiki tab of the Fuse Management Console.

3. Run the following command to create a Java keystore that imports the certificate:

```
$ keytool -importcert -keystore my.jks -storepass password \
    -file server.crt -noprompt
```

4. Configure the JVM to use the keystore when the client connects to the application:

```
$ java -Djavax.net.ssl.trustStore=my.jks ...
```

Configuring a non-SSL connection

1. After you install the JBoss Fuse cartridge, run one of the following commands:

```
$echo    ${OPENSHIFT_FUSE_OPENWIRE_PROXY_PORT}
$echo    ${OPENSHIFT_FUSE_MQTT_PROXY_PORT}
$echo    ${OPENSHIFT_FUSE_AMQP_PROXY_PORT}
$echo    ${OPENSHIFT_FUSE_STOMP_PROXY_PORT}
```

2. Specify the port number that the broker returns in the connection URL. For example:

```
tcp://amq-demo.openshift.example.com:63373
```

1.4.2. Port Binding

Some Camel components and CXF endpoints must bind to specific ports to enable client connections. When you configure the JBoss Fuse cartridge you must bind components such as camel-netty to these ports.

You can use the following system properties variables to bind components to private ports:

- **app1.port**
- **app2.port**
- **app3.port**

NOTE

If you deploy an ActiveMQ container, the **app1.port** system property is reserved for the container.

You specify the port system property in the connection properties with the following format:

```
${bind.address}:${system_property}
```

To bind a component to a public port, you use the following connection address format:

```
${publichostname}:${app1.public.port}
```

1.4.3. Public Port Mapping

The JBoss Fuse cartridge includes the PublicPortMapper tool that translates private ports in CXF endpoint addresses to public ports. This tool ensures that users can connect to the JBoss Fuse application from outside the OpenShift Enterprise domain without exposing the private ports that CXF requires to run.

The following CXF components use the PublicPortMapper tool:

`io.fabric8.cxf.registry.FabricCxfRegistrationHandler`

This handler uses the PublicPortMapper tool to translate CXF endpoint addresses. The tool maps the port for each endpoint based on the **`address`** property of the **`jaxws:server`** element:

```
<jaxws:server id="service1" serviceClass="io.fabric8.demo.cxf.Hello"
          address="http://$[bind.address]:$[app1.port]/server/server1">
```

The following example shows the source address of a CXF endpoint:

```
http://127.2.123.129:3001/server/server1
```

The following example shows the translated external URL:

```
http://app-domain.openshift.com:47106/server/server1
```

The tool writes the translated address to one of the following ZooKeeper paths:

- **`/fabric/registry/clusters/apis/rest/{name}/{version}/{container}`**
- **`/fabric/registry/clusters/apis/ws/{name}/{version}/{container}`**

`io.fabric8.cxf.FabricLoadBalancerFeature`

This feature uses the PublicPortMapper tool to translate the addresses of all endpoints in the cluster. The tool maps the ports based on the list of addresses in the **`group`** array property of the feature.

Each time the **`jaxws:server`** component starts, the **`io.fabric8.cxf.FabricServerListener`** service retrieves the addresses from all active endpoints and stores the addresses in the group property. The feature then invokes the PublicPortMapper tool to translate the addresses to external connection URLs.

The tool writes the addresses to the following ZooKeeper path:

```
/fabric/cxf/endpoints/<path-configured-for-FabricLoadBalancerFeature>
```

`io.fabric8.camel.FabricPublisherEndpoint`

This endpoint uses the PublicPortMapper tool to translate the address of the listener based on the **`from uri`** property of the **`io.fabric8.camel.FabricComponent`** route.

The following example shows the source address of a Jetty listener:

```
<from uri="fabric-camel:cluster:jetty:http://0.0.0.0:[[port]]/fabric"/>
```

The tool writes the translated address to the following ZooKeeper path:

```
/fabric/clusters/fabric/registry/camel/endpoints/cluster/<cluster_instan
ce_number>
```

The following example shows the translated address:

```
http://fuse0-test.openshift.example.com:40257/fabric
```

1.5. FUSE BUILDER CARTRIDGE

Overview

The Fuse Builder cartridge builds the Maven repository of a JBoss Fuse application, and rebuilds the repository each time you update any of the repository artifacts.

This cartridge provides an HTTP connection to the repository that you can use to connect to the repository from all nodes that run JBoss Fuse applications.

When you deploy JBoss Fuse applications in a high availability configuration, you can specify this cartridge as the remote Maven repository to ensure that the master and slave nodes can always access the Maven artifacts.

Installing the cartridge

The Fuse Builder cartridge is shipped as an RPM package. You install the cartridge in the same way that you install the JBoss Fuse cartridge.

When you install this cartridge, note the following guidelines:

- You must deploy at least one JBoss Fuse cartridge in the OpenShift Enterprise domain before you install and deploy this cartridge.
- You must install this cartridge on every node in the OpenShift Enterprise domain.
- You can install this cartridge with any gear profile.

Configuring security

Before you begin to use the Fuse Builder cartridge, you must specify which users can download the artifacts from the Maven repository.

1. Clone the cartridge Git repository to your development machine.
2. In the **`.openshift/config`** directory of the cloned repository, open the **`httpd.conf`** file and uncomment the security section.
3. Run the following command to create a password file in the **`.openshift/config`** directory:

```
htpasswd -cb passwords <USERNAME> <PASSWORD>
```

4. Commit and push the new password file and the edited **`httpd.conf`** file to the remote repository.

Adding the Maven repository to the JBoss Fuse application

In each JBoss Fuse application that you want to connect with the Maven repository, add the repository address to the default profile.

If you use the Fuse Management Console, you access the default profile with the following path:

```
/hawtio/index.html#/wiki/branch/<version_number>/view/fabric/profiles/defa
ult.profile/io.fabric8.agent.properties
```

You add the repository URL to the list of Maven repositories in the **`org.ops4j.pax.url.mvn.repositories`** property.

The URL pattern must be in one of the following formats:

- **`http://${app-dns}/repo`**
- **`https://${user}:${password}@${app-dns}`**

Deploying the cartridge in a high availability environment

When you deploy this cartridge in an application cluster, note the following guildelines:

- The Fuse Builder cartridge supports auto-scaling. When you deploy this cartridge in an application cluster, specify auto-scaling to a minimum of 3 gears.
- In case of node failure, you must manually change the Jolokia URL in the **`\fuse-builder\etc\settings.xml`** file to connect to the active node. You specify the URL in the following property:

1.6. FABRIC MANAGEMENT

The JBoss Fuse cartridge deploys and runs applications in a fabric. The fabric runs in the OpenShift Enterprise domain and manages all the applications that you create in that domain.

Make sure to note the following guidelines when you manage applications with fabric in an OpenShift Enterprise domain:

Child containers are not supported

When you create child containers in JBoss Fuse, the containers inherit ports from the parent containers. However, OpenShift Enterprise applications must bind to specific ports. Therefore, you cannot create child containers in the EJBoss Fuse on OpenShift Enterprise.

ZooKeeper server runs only on the first JBoss Fuse application

The first JBoss Fuse application that you create contains the ZooKeeper server instance with which each subsequent authenticates. The ZooKeeper instance includes the user credentials and the environment variables required to run the applications in a fabric.

When you create subsequent applications, make sure to note the following guidelines:

- The primary application in the domain must be running when you create or start subsequent applications.
- The ZooKeeper credentials must be identical in all JBoss Fuse instances that run in the same domain. You define the ZooKeeper password in the **OPENSHIFT_FUSE_ZOOKEEPER_PASSWORD** property of the cartridge.
- If you want to delete the primary application, you must delete all the subsequent applications first.

UDP connections are not supported

Some Camel components require UDP network traffic routing. However, UDP is not supported in the JBoss Fuse cartridge.

Secured shared file systems are not supported

Normally, you can restrict access to shared file systems such as NFS based on user ID. However, when you run JBoss Fuse on OpenShift Enterprise, the user ID is dynamically generated at run-time. Therefore, you cannot configure the shared file system to restrict access based on user ID.

Some profiles are not supported

The following profiles are not supported when you run JBoss Fuse on OpenShift Enterprise:

- controller-jon-server/
- controller-rhq-agent/
- controller-tomcat/
- controller-wildfly
- docker
- gateway-haproxy
- gateway-http
- gateway-mq
- hadoop-base
- hadoop-datanode
- hadoop-namenode
- jboss-brms-controller-tomcat
- jboss-brms-controller-wildfly
- jboss-brms-feature-workbench

- jboss-brms-feature-workbench.openshift
- openshift-aerogear-pushserver
- openshift-jbossews.1
- openshift-jbossews.2

The OpenShift Enterprise Git repository is not used by the JBoss Fuse cartridge

Normally, when you deploy an application, OpneShift Enterprise creates a Git repository with the source code of the application. However, JBoss Fuse with fabric creates a standalone Git repository that stores all of the profiles and configuration files. Therefore, the cartridge does not use the Git repository that OpenShift Enterprise creates for the application.

1.7. HIGH AVAILABILITY

This section describes how to configure a JBoss Fuse application cluster in a single OpenShift Enterprise domain.

How clustering works in the OpenShift Enterprise domain

When you deploy multiple JBoss Fuse instances in a single OpenShift Enterprise domain, the first application that you create acts as the master node of the cluster. Each subsequent application that you create acts as a slave node.

Gear profile configuration

To prevent the master and slave applications from deploying on the same OpenShift Enterprise node, you must assign different a different gear profile to each set of nodes on which you deploy the JBoss Fuse applications.

The gear profile properties do not need to be unique. You can assign the same gear profile to multiple master nodes or multiple slave nodes.

ZooKeeper ensemble server requirements

JBoss Fuse supports management of multiple applications in an ensemble. However, when you deploy the JBoss Fuse applications in OpenShift Enterprise, the ZooKeeper server runs inside the master application. Therefore, you cannot create ensembles of multiple applications.

To manage multiple applications in an ensemble, you must deploy a standalone JBoss Fuse application and create an external ZooKeeper ensemble to manage the JBoss Fuse instances that run in the OpenShift Enterprise domain.

Auto-scaling

OpenShift Enterprise supports auto-scaling of applications based on HTTP traffic. However, the JBoss Fuse cartridge does not use HTTP to process data. Therefore, you cannot configure auto-scaling for the JBoss Fuse cartridge.

1.8. UPGRADING THE JBOSS FUSE CARTRIDGE

You upgrade the JBoss Fuse cartridge in the same way that you apply asynchronous updates to other OpenShift Enterprise components. The JBoss Fuse RPM package includes a ZIP package with the upgraded components.

For general information about OpenShift upgrades, see the Asynchronous Errata Updates section of the OpenShift Enterprise documentation.

1. Install the RPM package on every node in the OpenShift Enterprise domain with the following command:

```
yum update openshift-origin-cartridge-fuse
```

2. Restart each node with the following command:

```
service ruby193-mcollective restart
```

3. On the OpenShift Enterprise broker, import the upgraded cartridge with the following commands:

```
oo-admin-ctl-cartridge -c import-profile --activate
oo-admin-ctl-cartridge -c migrate
```

4. On each xPaaS node that runs JBoss Fuse applications, upgrade the applications with the following commands:

```
oo-admin-upgrade upgrade-node --version <OSE_version_number>
```

   The upgrade process applies the updated bundles to the relevant profiles and restarts all of the containers that run in the fabric.