



Red Hat JBoss Enterprise Application Platform 7.3

Deploying JBoss EAP on Amazon Web Services

Instructions for using Red Hat JBoss Enterprise Application Platform on Amazon Web Services, including configuring high availability.

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Abstract

This document provides information about deploying Red Hat JBoss Enterprise Application Platform on Amazon EC2.

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CHAPTER 1. ABOUT AMAZON EC2

Amazon Elastic Compute Cloud (Amazon EC2), a service operated by amazon.com, provides customers with a customizable virtual computing environment. With this service, an Amazon Machine Image (AMI) can be booted to create a virtual machine or instance. Users can install the software they require on an instance and are charged according to the capacity used. Amazon EC2 is designed to be flexible and allows users to quickly scale their deployed applications.

See the [Amazon Web Services](#) website for more information.

About Amazon Machine Images

An Amazon Machine Image (AMI) is a template for an EC2 virtual machine instance. Users create EC2 instances by selecting an appropriate AMI to create the instance from. The primary component of an AMI is a read-only filesystem that contains an installed operating system as well as other software. Each AMI has different software installed for different use cases. Amazon EC2 includes many AMIs that both [Amazon Web Services](#) and third parties provide. Users can also create their own custom AMIs.

About Red Hat Cloud Access

Red Hat Cloud Access is a Red Hat subscription feature that provides support for JBoss EAP on Red Hat certified cloud infrastructure providers, such as Amazon EC2 and Microsoft Azure. Red Hat Cloud Access allows you to move your subscriptions between traditional servers and public cloud-based resources in a simple and cost-effective manner.

You can find more information about [Red Hat Cloud Access on the Customer Portal](#) .

Red Hat Cloud Access Features

Membership in the Red Hat Cloud Access program provides access to supported private Amazon Machine Images (AMIs) created by Red Hat.

The Red Hat AMIs have the following software pre-installed and fully supported by Red Hat:

- Red Hat Enterprise Linux
- JBoss EAP
- Product updates with RPMs using Red Hat Update Infrastructure

Each of the Red Hat AMIs is only a starting point, requiring further configuration to the requirements of your application.



IMPORTANT

Red Hat Cloud Access does not currently provide support for the **full-ha** profile, in either standalone instances or a managed domain.



NOTE

For information about installing Red Hat JBoss Operations Network, see the Red Hat JBoss Operations Network [Installation Guide](#).

For information about configuring Red Hat JBoss Operations Network, see [Configuring JBoss ON Servers, Agents, and Storage Nodes](#).

Supported Amazon EC2 Instance Types

Red Hat Cloud Access supports the following Amazon EC2 instance types. See [Amazon Elastic Compute Cloud User Guide for Linux Instances](#) for more information about each instance.

Table 1.1. Supported Amazon EC2 Instance Types

Instance Type	Description
Standard Instance	Standard Instances are general purpose environments with a balanced memory-to-CPU ratio. The smallest instance types available, which are capable of handling JBoss EAP, are t2.small and m3.medium .
High Memory Instance	High Memory Instances have more memory allocated to them than Standard Instances. High Memory Instances are suited for high throughput applications such as databases or memory caching applications. Smallest available and supported instance type is r3.large .
High CPU Instance	High CPU Instances have more CPU resources allocated than memory and are suited for relatively low throughput but CPU intensive applications. Smallest available and supported instance types are c3.large and c4.large .



IMPORTANT

The instance types Micro (**t2.micro**) and Nano (**t2.nano**) are not suitable for deployment of JBoss EAP. JBoss EAP 7.3 AMIs are built from a snapshot, which requires a volume of at least 10 GB. This can be set in EC2 console when creating the instance. If the volume assigned is too small, the instance creation will fail.

Supported Red Hat AMIs

The supported Red Hat AMIs can be identified by their names. JBoss EAP AMIs are named using the following syntax:

RHEL-osversion-_HVM_GA-JBEAP-version-creationdate-arch-1-Access2-GP2

- **version** is the version number of JBoss EAP installed in the AMI. Example **6.3**.
- **osversion** is the version number of Red Hat Enterprise Linux installed in the AMI. Example **6.2**.
- **arch** is the architecture of the AMI. This will be **x86_64** or **i386**.
- **creationdate** is the date that the AMI was created in the format of YYYYMMDD. Example **20160315**.

Example AMI name: **RHEL-7.3_HVM_GA-JBEAP-7.1.0_-20170703-x86_64-1-Access2-GP2**.

CHAPTER 2. LAUNCHING A JBOSS EAP INSTANCE ON AMAZON EC2 CONSOLE

You can launch a JBoss EAP instance on Amazon EC2 using the EC2 console.

You can also launch an instance using the AWS Command Line Interface. See [AWS CLI](#) for more information about AWS CLI.

1. Open the [Amazon EC2 console](#).
2. From the Amazon EC2 console, click **AMIs**.
3. Search for **jbeap** AMI in **Private images** and select the AMI. For example, **RHEL-7.3_HVM_GA-JBEAP-7.1.0_-20170703-x86_64-1-Access2-GP2**.
4. Choose an instance type. See [Supported Amazon EC2 Instance Types](#) for more information on supported Amazon EC2 instance types.
5. In the **Configure Instance Details** section, configure the instance settings.
6. In the **Advanced Details** section, **User data** box, you can paste the sample script to run JBoss EAP when the instance is launched. See [Launching JBoss EAP on Amazon EC2 Using Script](#) for information about the sample script.



NOTE

If required, you can specify the storage, tag the instance, and configure the security group details.

7. Click **Review and Launch**. This takes you directly to the Review Instance Launch page.
8. Click **Launch** to choose a key pair and launch the instance.



NOTE

If you have not selected a key pair, you need to specify a key pair before you launch an instance.

CHAPTER 3. LAUNCHING A NON-CLUSTERED JBOSS EAP INSTANCE

This chapter lists the steps to launch a non-clustered instance of JBoss EAP on a Red Hat Amazon Machine Image (AMI).

Prerequisites

- A suitable Red Hat AMI. See [Supported Red Hat AMIs](#) for more information.
- A pre-configured Security Group that allows incoming requests on at least ports 22, 8080, and 9990.

Launch a Non-Clustered JBoss EAP Instance



NOTE

You can connect to an EC2 instance through **ssh** as the **ec2-user** user. If you need administrative privileges, you can change to **root** user later. For example,

```
$ ssh -l ec2-user ${INSTANCE_PUBLIC_IP}
...
$ sudo su -
```

- Launch the Red Hat AMI instance.
A non-clustered instance of JBoss EAP has been configured and launched on a Red Hat AMI.
- To configure JBoss EAP, you can pass arguments to the service directly. Some arguments may not be handled in this way. The location of the service configuration files is:
 - RHEL 6: **/etc/sysconfig/eap7-standalone**
 - RHEL 7: **/etc/opt/rh/eap7/wildfly/eap7-standalone.conf**

See [System Paths](#) for more details about system paths.



NOTE

- For complex configuration, you can either use the **standalone.conf** file in the JBoss EAP **bin** directory: **/opt/rh/eap7/root/usr/share/wildfly/bin/**, or you can start the JBoss EAP service and configure the server using CLI. The script can be found in the **bin** directory. Then, reload the configuration.
- You must regularly run the **yum -y update** to apply security fixes and enhancements.

- To start JBoss EAP on RHEL 6, run the following command:

```
$ service eap7-standalone start
```

To start JBoss EAP on RHEL 7, run the following command:

```
$ systemctl start eap7-standalone
```

- To stop JBoss EAP on RHEL 6, run the following command:

```
$ service eap7-standalone stop
```

To stop JBoss EAP on RHEL 7, run the following command:

```
$ systemctl stop eap7-standalone
```



NOTE

The **systemctl** command is relevant to only RHEL 7.



NOTE

If you want to bind JBoss EAP to a different IP address, add the following line in the **/etc/opt/rh/eap7/wildfly/eap7-standalone.conf** file on RHEL 7. The internal IP address is translated into a public IP address by EC2.

```
WILDFLY_BIND=$YOUR_PRIVATE_IP_ADDRESS
```

CHAPTER 4. LAUNCHING NON-CLUSTERED MANAGED DOMAIN

4.1. LAUNCH AN INSTANCE TO SERVE AS A DOMAIN CONTROLLER

This topic lists the steps to launch a non-clustered JBoss EAP managed domain on a Red Hat Amazon Machine Image (AMI).

Prerequisite

- A suitable Red Hat AMI. See [Supported Red Hat AMIs](#) for more information.

Launch a Non-Clustered JBoss EAP Instance



NOTE

You can connect to an EC2 instance through **ssh** as the **ec2-user** user. If you need administrative privileges, you can change to **root** user later. For example,

```
$ ssh -l ec2-user ${INSTANCE_PUBLIC_IP}
...
$ sudo su -
```

- Launch the Red Hat AMI instance.
A non-clustered instance of JBoss EAP has been configured and launched on a Red Hat AMI.
- To configure JBoss EAP, you can pass arguments to the service directly. Some arguments may not be handled in this way. The location of the service configuration files is:
 - RHEL 6: **/etc/sysconfig/eap7-domain**
 - RHEL 7: **/etc/opt/rh/eap7/wildfly/eap7-domain.conf**

See [System Paths](#) for more details about system paths.

See [Configuring JBoss EAP Subsystems to Work on Cloud Platforms](#) for information about configuring JBoss EAP subsystems for Amazon EC2.



NOTE

- For complex configuration, you can either use the **domain.conf** file in the JBoss EAP **bin** directory: **/opt/rh/eap7/root/usr/share/wildfly/bin/**, or you can start the JBoss EAP service and configure the server using the management CLI. The script can be found in the **bin** directory. Then, reload the configuration.
- You must regularly run the **yum -y update** to apply security fixes and enhancements.

- To start JBoss EAP on RHEL 6, run the following command:

```
$ service eap7-domain start
```

To start JBoss EAP on RHEL 7, run the following command:

```
$ systemctl start eap7-domain
```

- To stop JBoss EAP on RHEL 6, run the following command:

```
$ service eap7-domain stop
```

To stop JBoss EAP on RHEL 7, run the following command:

```
$ systemctl stop eap7-domain
```



NOTE

The **systemctl** command is relevant to only RHEL 7.



NOTE

If you want to bind JBoss EAP to a different IP address, add the following line in the **/etc/opt/rh/eap7/wildfly/eap7-domain.conf** file on RHEL 7. The internal IP address is translated into a public IP address by EC2.

```
WILDFLY_BIND=$YOUR_PRIVATE_IP_ADDRESS
```

4.2. LAUNCH ONE OR MORE INSTANCES TO SERVE AS HOST CONTROLLERS

This topic lists the steps to launch one or more instances of JBoss EAP to serve as non-clustered host controllers on a Red Hat AMI.

Configure and launch the non-clustered domain controller. Refer to [Launch an Instance to Serve as a Domain Controller](#).

See [System Paths](#) for more details about system paths.

See [Configuring JBoss EAP Subsystems to Work on Cloud Platforms](#) for information about configuring JBoss EAP subsystems for Amazon EC2.

For Domain Controller Instance

For a managed domain running on Amazon EC2, in addition to static domain controller discovery, host controllers can dynamically discover a domain controller using the Amazon Simple Storage (Amazon S3) system. In particular, host controllers and the domain controller can be configured with information needed to access an Amazon S3 bucket.

Using this configuration, when a domain controller is started, it writes its contact information to an S3 file in the bucket. Whenever a host controller attempts to contact the domain controller, it gets the domain controller's contact information from the **S3** file.

For example, it is common for an Amazon EC2 instance's IP address to change when it is stopped and started. In this scenario, if the domain controller's contact information changes, the host controllers need not be reconfigured. The host controllers are able to get the domain controller's new contact information from the **S3** file.

See [Example User Data for Clustered JBoss EAP Instances](#) for more information about sample script for user data.

The manual domain controller discovery configuration is specified using the following properties:

- **access-key**: The Amazon AWS user account access key.
 - **secret-access-key**: The Amazon AWS user account secret access key.
 - **location**: The Amazon S3 bucket to be used.
1. Copy the **domain-ec2.xml** file from `/opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs` to the JBoss EAP configuration directory.
 2. Set the following variables in the appropriate service configuration file:

```
WILDFLY_SERVER_CONFIG=domain-ec2.xml
WILDFLY_HOST_CONFIG=host-master.xml
```

3. Add the S3 domain controller discovery configuration to the **domain-ec2.xml** file:

```
<local>
  <discovery-options>
    <discovery-option name="s3-discovery" module="org.jboss.as.host-controller"
code="org.jboss.as.host.controller.discovery.S3Discovery">
      <property name="access-key" value="S3_ACCESS_KEY"/>
      <property name="secret-access-key" value="S3_SECRET_ACCESS_KEY"/>
      <property name="location" value="S3_BUCKET_NAME"/>
    </discovery-option>
  </discovery-options>
</local>
```

CHAPTER 5. LAUNCHING CLUSTERED JBOSS EAP

5.1. LAUNCH CLUSTERED JBOSS EAP AMIS (WITHOUT MOD_CLUSTER AND VPC)

This topic lists the steps to launch clustered JBoss EAP AMIs without `mod_cluster` and VPC.



NOTE

- You can use the example configuration scripts that are provided with the image.

See [System Paths](#) for more details about system paths.

See [Configuring JBoss EAP Subsystems to Work on Cloud Platforms](#) for information about configuring JBoss EAP subsystems for Amazon EC2.

To start clustered JBoss EAP AMI on a standalone server instance, you can use the example `/opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/standalone-ec2-ha.xml` file that contains a preconfigured `S3_PING` JGroups stack. For more information, see `S3_PING` in the *Reliable group communication with JGroups* document. This `standalone-ec2-ha.xml` profile file must be copied from `/opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/` to the JBoss EAP configuration directory `/opt/rh/eap7/root/usr/share/wildfly/standalone/configuration/`. Then, you have to add the following line to the JBoss EAP service configuration file:

```
WILDFLY_SERVER_CONFIG=standalone-ec2-ha.xml
```

A unique **instance-id** needs to be set for each standalone server instance in the **undertow** subsystem. A value for the **instance-id** can be set manually by editing the `standalone-ec2-ha.xml` file or by using the management CLI. For example, you can set the **instance-id** using the management CLI as follows:

```
/subsystem=undertow:write-attribute(name=instance-id,value=${jboss.jvmRoute})
```

A value for **jboss.jvmRoute** can then be specified in `standalone.conf` using the **JAVA_OPTS** variable.

The **jgroups** subsystem in the EC2 configuration file requires some **S3_PING** specific properties to discover cluster members. You must specify access key to S3, secret access key, and the S3 bucket to use for discovery. These properties can either be specified as Java options or put directly into the XML file by editing it or using CLI.

You need to create an S3 bucket for discovery. See [Amazon Simple Storage Service Documentation](#) for more information. You may also have to configure the required permissions. The JGroups stack needs to be bound to an IP address, which is used to communicate with other nodes. This can be done by adding Java options, along with S3 Java options to the `/opt/rh/eap7/root/usr/share/wildfly/bin/standalone.conf` file. For example, if the private IP address was `10.10.10.10`, then you would add the following line to the `standalone.conf` file:

```
JAVA_OPTS="$JAVA_OPTS -Djboss.bind.address.private=10.10.10.10"
```

You can deploy a sample application: `/opt/rh/eap7/root/usr/share/java/eap7-jboss-ec2-eap-samples/cluster-demo.war` and observe the logs in `/opt/rh/eap7/root/usr/share/wildfly/standalone/log/server.log` to see that the JBoss EAP servers have created a cluster.

For Domain Controller Instance

1. Copy the **domain-ec2.xml** file from `/opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs` to the JBoss EAP configuration directory.
2. Set the following variables in the appropriate service configuration file:

```
WILDFLY_SERVER_CONFIG=domain-ec2.xml
WILDFLY_HOST_CONFIG=host-master.xml
```

3. Add S3 domain controller discovery configuration to the **host-master.xml** file:

```
<local>
  <discovery-options>
    <discovery-option name="s3-discovery" module="org.jboss.as.host-controller"
code="org.jboss.as.host.controller.discovery.S3Discovery">
      <property name="access-key" value="S3_ACCESS_KEY"/>
      <property name="secret-access-key" value="S3_SECRET_ACCESS_KEY"/>
      <property name="location" value="S3_BUCKET_NAME"/>
    </discovery-option>
  </discovery-options>
</local>
```

4. Configure users and add the secret values for users to the host controller instances. For more information, see [Create a Managed Domain on Two Machines](#) in the *JBoss EAP Configuration Guide*.

For Host Controller Instance

1. Set the following variable in the appropriate service configuration file:

```
WILDFLY_HOST_CONFIG=host-slave.xml
```

2. Add S3 domain controller discovery configuration to the **host-slave.xml** file:

```
<remote security-realm="ManagementRealm">
  <discovery-options>
    <discovery-option name="s3-discovery" module="org.jboss.as.host-controller"
code="org.jboss.as.host.controller.discovery.S3Discovery">
      <property name="access-key" value="S3_ACCESS_KEY"/>
      <property name="secret-access-key" value="S3_SECRET_ACCESS_KEY"/>
      <property name="location" value="S3_BUCKET_NAME"/>
    </discovery-option>
  </discovery-options>
</remote>
```



NOTE

For information about S3 domain controller discovery, see [Launch One or More Instances to Serve as Host Controllers](#).

**WARNING**

Running a JBoss EAP cluster in a subnet with network mask smaller than 24-bits or spanning multiple subnets complicates acquiring a unique server peer ID for each cluster member.

**IMPORTANT**

The auto-scaling Amazon EC2 feature can be used with JBoss EAP cluster nodes. However, ensure it is tested before deployment. You should ensure that your particular workloads scale to the required number of nodes, and that the performance meets your needs for the instance type you are planning to use, different instance types receive a different share of the EC2 cloud resources.

Furthermore, instance locality and current network/storage/host machine/RDS utilization may affect cluster performance. Test with your expected real-life loads and try to account for unexpected conditions.

**WARNING**

The Amazon EC2 *scale-down* action terminates the nodes without any chance to gracefully shut down and as some transactions might be interrupted, other cluster nodes and load balancers need time to fail over. This is likely to impact your application users' experience.

It is recommended that you either scale down the application cluster manually by disabling the server from the `mod_cluster` management interface until processed sessions are completed, or shut down the JBoss EAP instance gracefully using SSH access to the instance or Red Hat JBoss Operations Network.

Test your procedure for scaling down does not lead to adverse effects on your users' experience. Additional measures might be required for particular workloads, load balancers, and setups.

5.2. LAUNCH CLUSTERED JBOSS EAP AMIS (WITH MOD_CLUSTER AND VPC)

This topic lists the steps to launch an Apache HTTP server instance to serve as a **mod_cluster** proxy and a NAT instance for the Virtual Private Cloud (VPC).

See [System Paths](#) for more details about system paths.

See [Configuring JBoss EAP Subsystems to Work on Cloud Platforms](#) for information about configuring JBoss EAP subsystems for Amazon EC2.

**NOTE**

- You can use the example configuration scripts that are provided with the image.

An Amazon Virtual Private Cloud (Amazon VPC) is a feature of Amazon Web Services (AWS) that allows you to isolate a set of AWS resources in a private network. The topology and configuration of this private network can be customized to your needs.

See [Amazon Virtual Private Cloud](#) for more information about Amazon VPC.

**NOTE**

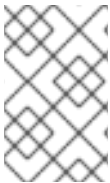
If you start a cluster with a **mod_cluster** load balancer inside a VPC, the JBoss EAP servers are inaccessible to public. The **mod_cluster** load balancer can be the only endpoint that is connected to the Internet.

See [Launch an Instance to Serve as a Domain Controller](#) for setting up domain controller instance.

See [Launch One or More Instances to Serve as Host Controllers](#) for setting up host controller instance.

See [Launch One or More Instances to Serve as Host Controllers](#) for information about S3 domain controller discovery.

5.2.1. To launch clustered AMIs with VPC and mod_cluster

**NOTE**

Configuring the VPC is optional. See the [Detecting Your Supported Platforms and Whether You Have a Default VPC](#) section in the Amazon VPC user guide for more information.

1. Install **jbcs-httpd24-mod_cluster-native** package and all of its dependencies. The **mod_cluster** configuration file is installed in `/opt/rh/jbcs-httpd24/root/etc/httpd/conf.d/mod_cluster.conf`.

See the [Apache HTTP Server Installation Guide](#) for more information about installation of Red Hat JBoss Core Services Apache HTTP Server.

1. Disable advertising for **mod_cluster**. Add the following to **VirtualHost** in the `/opt/rh/jbcs-httpd24/root/etc/httpd/conf.d/mod_cluster.conf` configuration file.

```
ServerAdvertise Off
EnableMCPMRReceive
# AdvertiseFrequency # comment out AdvertiseFrequency if present
```

2. Allow ports in **SELinux**. If required, configure the **iptables**. Ports can be allowed in SELinux by using the **semanage port -a -t http_port_t -p tcp \$PORT_NR** command.
3. Configure JBoss EAP to look for **mod_cluster** proxy on the address that **mod_cluster** listens on.



NOTE

An `/opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/standalone-ec2-ha.xml` example configuration file is provided. You need to configure a list of **proxies** in the **modcluster** subsystem.

You can define a list of **proxies** using one of the following methods:

- Define an **outbound-socket-binding** called **mod-cluster-proxy1** with an appropriate host and port:

```
<outbound-socket-binding name="mod-cluster-proxy1">
  <remote-destination host="{jboss.modcluster.proxy1.host}"
    port="{jboss.modcluster.proxy1.port}"/>
</outbound-socket-binding>
```

- Set the **proxies** attribute in the **modcluster** subsystem to **mod-cluster-proxy1** with an appropriate host and port:

```
/socket-binding-group=standard-sockets/remote-destination-outbound-
socket-binding=mod-cluster-proxy1:add(host=
{jboss.modcluster.proxy1.host}, port={jboss.modcluster.proxy1.port})
```

CHAPTER 6. TROUBLESHOOTING

6.1. ABOUT TROUBLESHOOTING AMAZON EC2

EC2 provides an Alarm Status for each instance, indicating severe instance malfunction but the absence of such an alarm is no guarantee that the instance has started correctly and services are running properly. It is possible to use Amazon CloudWatch with its custom metric functionality to monitor instance services' health but use of an enterprise management solution is recommended.

6.2. DIAGNOSTIC INFORMATION

In case of a problem being detected by the JBoss Operations Network, Amazon CloudWatch or manual inspection, common sources of diagnostic information are:

- **/var/log** also contains all the logs collected from machine startup, JBoss EAP, httpd and most other services.

JBoss EAP log files can be found in **/opt/rh/eap7/root/usr/share/wildfly/**.

Access to these files is only available using an SSH session.

See [Getting Started with Amazon EC2 Linux Instances](#) for more information about how to configure and establish an SSH session with an Amazon EC2 instance.

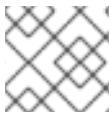
APPENDIX A. REFERENCE MATERIAL

A.1. AMAZON EC2 AMIS FOR RED HAT CLOUD ACCESS PROGRAM

AMIs are a basic RPM install of JBoss EAP + JDK in the Red Hat Enterprise Linux image, with potentially an Amazon EC2 example configuration. Advanced scripting is no longer available, however regular bash scripts can be used.

AMIs for Platform/JDK Combinations:

- RHEL 6 + Open JDK 8 (1 image)
- RHEL 7 + Open JDK 8 (1 image)



NOTE

Both platforms should be of 64-bit architecture.

Maintenance of AMIs

yum update should be run regularly, to apply z releases (patches) on EC2. New AMIs for the y releases (minor releases) will be provided by Red Hat.

Scenario 1 (Supported)

1. Sign up for EC2.
2. Sign up for Red Hat Cloud Access.
3. Select the Red Hat AMI from the list of available AMIs.
4. (Optional) Customize JBoss EAP configuration using user scripts or **ssh**.
5. Maintenance: **yum update** for z releases, new AMI for the y releases.

A.2. EXAMPLE CONFIGURATION FILES AND DEPLOYMENTS

The following package adds example deployments for RHEL 7 AMI version:

```
$ rpm -ql eap7-jboss-ec2-eap-samples
/opt/rh/eap7/root/usr/share/java/eap7-jboss-ec2-eap-samples/cluster-demo.war
/opt/rh/eap7/root/usr/share/java/eap7-jboss-ec2-eap-samples/hello.war
/opt/rh/eap7/root/usr/share/java/eap7-jboss-ec2-eap-samples/jboss-as-helloworld-mdb-7.0.0.ER5-redhat-1.war
```

The JBoss EAP example configuration files contain a JGroups stack set up for the **S3_PING** protocol that can be used for creating clusters across EC2. For the exact location of the example configuration files, see [System Paths](#).

Both the configuration files contain the **modcluster** subsystem to use proxy mod_cluster discovery instead of advertising, because multicast is disabled on EC2.

A.3. SYSTEM PATHS

Service Configuration Files:

- RHEL 6: /etc/sysconfig/*
- RHEL 7: /etc/opt/rh/eap7/wildfly/*

JBoss EAP Home:

- /opt/rh/eap7/root/usr/share/wildfly/

JBoss EAP Configuration Locations:**Standalone instance**

- /opt/rh/eap7/root/usr/share/wildfly/standalone/configuration
- /opt/rh/eap7/root/usr/share/wildfly/bin/standalone.conf

Managed domain

- /opt/rh/eap7/root/usr/share/wildfly/bin/domain.conf
- /opt/rh/eap7/root/usr/share/wildfly/domain/configuration

JBoss EAP Example Configuration Locations:

- /opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/standalone-ec2-ha.xml
- /opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/standalone-ec2-full-ha.xml

A.4. LAUNCHING JBOSS EAP ON AMAZON EC2 USING A SCRIPT

The following sample script can be used to start JBoss EAP bound to a public IP address when you launch a JBoss EAP instance on Amazon EC2.

```
#!/bin/bash

# platform dependent variables
if [[ "`cat /etc/redhat-release`" = *"release 7"* ]]; then
    SERVICE_CONF_FILE=/etc/opt/rh/eap7/wildfly/eap7-standalone.conf
    START_COMMAND="systemctl start eap7-standalone"
else
    SERVICE_CONF_FILE=/etc/sysconfig/eap7-standalone
    START_COMMAND="service eap7-standalone start"
fi

# set up addresses
INTERNAL_IP_ADDRESS=`ip addr show | grep eth0 -A 2 | head -n 3 | tail -n 1 | awk '{ print $2 }' |
sed "s-/24--g" | cut -d/ -f1`
echo "JAVA_OPTS=\"$JAVA_OPTS -Djboss.bind.address=$INTERNAL_IP_ADDRESS -
Djboss.bind.address.private=$INTERNAL_IP_ADDRESS -
Djboss.bind.address.management=$INTERNAL_IP_ADDRESS\"" >>
/opt/rh/eap7/root/usr/share/wildfly/bin/standalone.conf

# start EAP
$START_COMMAND
```

A.5. CONFIGURING JBOSS EAP SUBSYSTEMS TO WORK ON CLOUD PLATFORMS

Some JBoss EAP subsystems must be configured to work properly on cloud platforms, such as Amazon EC2 and Microsoft Azure. This is required because a JBoss EAP server is usually bound to a cloud virtual machine's private IP address, for example: **10.x.x.x**, which is only visible from within the cloud platform. For certain subsystems, this address must also be mapped to a server's public IP address, which is visible from outside the cloud.

A.5.1. Web Services

When a client makes a web service request using **Service.create(wsdlURL, serviceName)**, the user connects to the server public IP address, but is subsequently redirected to an address defined in the server configuration files in the **webservices** subsystem. By default, this address is **\${jboss.bind.address:127.0.0.1}**, which means that on a cloud platform, the caller will be redirected to the server's private IP address and will be unable to resolve the request. The server's public IP address has to be configured in the **wsdl-host** element, using the following command:

```
/subsystem=webservices:write-attribute(name=wsdl-host,value=PUBLIC_IP_ADDRESS)
```

A.5.2. Messaging

When using messaging on a cloud platform, the connection factory that the client uses must have a connector pointing to the server's public IP address.

For this reason a new connector and socket binding must be created for JBoss EAP servers running a **full** profile.

1. The referenced **http-public** socket binding must be created within the **socket-binding-group**:

```
/socket-binding-group=standard-sockets/remote-destination-outbound-socket-binding=http-public:add(host=PUBLIC_IP_ADDRESS,port=${jboss.http.port:8080})
```

2. Create the new **http-connector** element in the **messaging** subsystem:

```
/subsystem=messaging-activemq/server=default/http-connector=http-public-connector:add(endpoint=http-acceptor, socket-binding=http-public)
```

3. Set the **connectors** in the **connection-factory**, which will be used by clients. For example, configuration of **RemoteConnectionFactory** as the default connection will be:

```
/subsystem=messaging-activemq/server=default/connection-factory=RemoteConnectionFactory:write-attribute(name=connectors, value=["http-public-connector"])
```

A.5.3. Remoting Configuration for High Availability

If you are using JBoss EAP HA features with clustered EJBs on a cloud platform, some extra configuration for the **remoting** subsystem is required to ensure EJB clients can receive cluster view updates.

This is done by configuring **client-mappings** for the **remoting** subsystem socket binding:

```
/socket-binding-group=standard-sockets/socket-binding=http:write-attribute(name=client-mappings,value=[{ "destination-address" => "PUBLIC_IP_ADDRESS", "destination-port" => "8080" }])
```

A.6. EXAMPLE USER DATA FOR CLUSTERED JBOSS EAP INSTANCES

The following examples show user data configured for several different server configurations.

Example: File for Standalone Mode on RHEL6/7

```
#!/usr/bin/env bash

# This is a sample script for the user data field for EC2, which demonstrates how to launch a
# standalone instance using the ec2-ha profile
# This file is for RHEL 6/7, standalone mode only
#### This script makes use of the following four Bash variables for clustering setup,
#### be sure to add in your own values for these variables here when copy/pasting this
#### script into the EC2 user data field

ACCESS_KEY_ID=<your AWS access key>
SECRET_ACCESS_KEY=<your AWS secret access key>
S3_PING_BUCKET=<your bucket name>
NODE_NAME=<your node name>

##### No further modifications should be needed below to run this example #####
# Set the location of JBoss EAP
JBOSS_HOME=/opt/rh/eap7/root/usr/share/wildfly

# Set the internal IP address of this EC2 instance which is mapped to a public address
INTERNAL_IP_ADDRESS=`ip addr show | grep eth0 -A 2 | head -n 3 | tail -n 1 | awk '{ print $2 }' |
sed "s-/24--g" | cut -d'/' -f1`

# Set the location of the standalone.conf file and set the command used to start EAP in standalone
mode
if [[ "`cat /etc/redhat-release`" = *"release 7"* ]]; then
    SERVICE_CONF_FILE=/etc/opt/rh/eap7/wildfly/eap7-standalone.conf
    START_COMMAND="systemctl start eap7-standalone"
else
    SERVICE_CONF_FILE=/etc/sysconfig/eap7-standalone
    START_COMMAND="service eap7-standalone start"
fi

# Configure JBoss EAP to use the ec2-ha profile
cp /opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/standalone-ec2-ha.xml
$JBOSS_HOME/standalone/configuration/standalone-ec2-ha.xml
echo "WILDFLY_SERVER_CONFIG=standalone-ec2-ha.xml" >> $SERVICE_CONF_FILE
echo "WILDFLY_BIND=$INTERNAL_IP_ADDRESS" >> $SERVICE_CONF_FILE
echo "JAVA_OPTS=\"\$JAVA_OPTS -Djboss.jgroups.s3_ping.access_key='$ACCESS_KEY_ID' -
Djboss.jgroups.s3_ping.secret_access_key='$SECRET_ACCESS_KEY' -
Djboss.jgroups.s3_ping.bucket='$S3_PING_BUCKET' -Djboss.jvmRoute=$NODE_NAME\"" >>
$JBOSS_HOME/bin/standalone.conf
echo "JAVA_OPTS=\"\$JAVA_OPTS -Djboss.bind.address=$INTERNAL_IP_ADDRESS -
Djboss.bind.address.private=$INTERNAL_IP_ADDRESS\"" >> $JBOSS_HOME/bin/standalone.conf
```



```
# Deploy the sample application from the local filesystem
cp /opt/rh/eap7/root/usr/share/java/eap7-jboss-ec2-eap-samples/cluster-demo.war
$JBOSS_HOME/standalone/deployments/

# Start JBoss EAP, note that RHEL 7 does not wait for JBoss EAP to start before returning from the
service start. In some cases, there could be a delay of more than 90 seconds.

$START_COMMAND
```

Example: File for Starting a Clustered Domain Instance (Domain Controller)

```
#!/usr/bin/env bash

# This is a sample script for the user data field for EC2, which demonstrates how to launch a domain
controller with clustering enabled
# This file is for RHEL 6/7, domain controller, domain mode only
### This script makes use of the following Bash variables for clustering and domain
### controller discovery setup, be sure to add in your own values for these variables here
### when copy/pasting this script into the EC2 user data field

ACCESS_KEY_ID=<your access key id>
SECRET_ACCESS_KEY=<your secret access key>
S3_PING_BUCKET=<your s3 ping bucket>

#### No further modifications should be needed below to run this example ####
# Set the location of JBoss EAP
JBOSS_HOME=/opt/rh/eap7/root/usr/share/wildfly
CONF_FILE=/opt/rh/eap7/root/usr/share/wildfly/docs/examples/configs/domain-ec2.xml

# Set the internal IP address of this EC2 instance which is mapped to a public address

INTERNAL_IP_ADDRESS=`ip addr show | grep eth0 -A 2 | head -n 3 | tail -n 1 | awk '{ print $2 }' |
sed "s-/24--g" | cut -d/ -f1`

# Set the location of the domain.conf file and set the command used to start EAP in domain mode
if [[ "`cat /etc/redhat-release`" = *"release 7"* ]]; then
    SERVICE_CONF_FILE=/etc/opt/rh/eap7/wildfly/eap7-domain.conf
    START_COMMAND="systemctl start eap7-domain"
else
    SERVICE_CONF_FILE=/etc/sysconfig/eap7-domain
    START_COMMAND="service eap7-domain start"
fi

# Configure JBoss EAP to use the domain-ec2.xml and host-master.xml configuration files
cp ${CONF_FILE} $JBOSS_HOME/domain/configuration/domain-ec2.xml

echo "WILDFLY_SERVER_CONFIG=domain-ec2.xml" >> $SERVICE_CONF_FILE
echo "WILDFLY_HOST_CONFIG=host-master.xml" >> $SERVICE_CONF_FILE
echo "WILDFLY_BIND=$INTERNAL_IP_ADDRESS" >> $SERVICE_CONF_FILE
echo "JAVA_OPTS=\"\$JAVA_OPTS -Djboss.jgroups.s3_ping.access_key='$ACCESS_KEY_ID' -
Djboss.jgroups.s3_ping.secret_access_key='$SECRET_ACCESS_KEY' -
Djboss.jgroups.s3_ping.bucket='$S3_PING_BUCKET'\"" >> $JBOSS_HOME/bin/domain.conf

echo "JAVA_OPTS=\"\$JAVA_OPTS -Djboss.bind.address=$INTERNAL_IP_ADDRESS -
```

```

Djboss.bind.address.private=$INTERNAL_IP_ADDRESS -
Djboss.bind.address.management=$INTERNAL_IP_ADDRESS\ "" >>
$JBOSS_HOME/bin/domain.conf

echo 'HOST_CONTROLLER_JAVA_OPTS="$HOST_CONTROLLER_JAVA_OPTS $JAVA_OPTS"'
>> $JBOSS_HOME/bin/domain.conf

# Add a management user with the following credentials:
# User name: admin
# Password: secret_Passw0rd
$JBOSS_HOME/bin/add-user.sh -u admin -p secret_Passw0rd -e -g Management

# Update the main-server-group in domain-ec2.xml to use the ec2-ha profile
$JBOSS_HOME/bin/jboss-cli.sh --commands="embed-host-controller --domain-config=domain-ec2.xml, /server-group=main-server-group:write-attribute(name=profile, value=ha)"

# Need to modify permissions since this script is executed as the root user
chgrp jboss $JBOSS_HOME/domain/configuration/domain_xml_history/
chgrp jboss $JBOSS_HOME/domain/configuration/host_xml_history/
chgrp jboss $JBOSS_HOME/domain/configuration/domain-ec2.xml
chgrp jboss $JBOSS_HOME/domain/log/audit.log
chgrp jboss $JBOSS_HOME/domain/log/host-controller.log
chown jboss $JBOSS_HOME/domain/configuration/domain_xml_history/
chown jboss $JBOSS_HOME/domain/configuration/host_xml_history/
chown jboss $JBOSS_HOME/domain/configuration/domain-ec2.xml
chown jboss $JBOSS_HOME/domain/log/audit.log
chown jboss $JBOSS_HOME/domain/log/host-controller.log

# Configure S3 domain controller discovery
yum install patch -y
cd $JBOSS_HOME/domain/configuration
echo "--- host-master.xml 2016-03-18 17:34:26.000000000 -0400
+++ host-master2.xml 2016-04-11 08:28:02.771000191 -0400
@@ -54,7 +54,15 @@
     </management-interfaces>
   </management>
   <domain-controller>
-     <local/>
+<local>
+   <discovery-options>
+     <discovery-option name="\s3-discovery\" module="org.jboss.as.host-controller\"
code="org.jboss.as.host.controller.discovery.S3Discovery">
+       <property name="access-key\" value="\$ACCESS_KEY_ID"/>
+       <property name="secret-access-key\" value="\$SECRET_ACCESS_KEY"/>
+       <property name="location\" value="\$S3_PING_BUCKET"/>
+     </discovery-option>
+   </discovery-options>
+</local>
     </domain-controller>
     <interfaces>
       <interface name="\management\">
" | patch host-master.xml

cd -

# Start JBoss EAP, do not forget that RHEL 7 does not wait for JBoss EAP to start before returning

```

from the service start. In some cases, there could be a delay of more than 90 seconds.

```
$START_COMMAND
sleep 20
# Set up EC2 HA socket bindings for main server group
$JBOSS_HOME/bin/jboss-cli.sh -c --controller=$INTERNAL_IP_ADDRESS:9990 --timeout=120000 -
-command='!server-group=main-server-group:write-attribute(name=socket-binding-group,value=ha-
sockets)'

# Deploy the sample application from the local filesystem to the main-server-group
$JBOSS_HOME/bin/jboss-cli.sh -c --controller=$INTERNAL_IP_ADDRESS:9990 --timeout=120000 -
-command='!deploy /opt/rh/eap7/root/usr/share/java/eap7-jboss-ec2-eap-samples/cluster-demo.war --
server-groups=main-server-group'
```

Example: File for Starting a Clustered Domain Instance (Host Controller)

```
#!/usr/bin/env bash

# This is a sample script for the user data field for EC2, which demonstrates how to launch a host
controller with clustering enabled
# This file is for RHEL 6/7, host controller, domain mode only
#### This script makes use of the following Bash variables for clustering and domain
#### controller discovery setup, be sure to add in your own values for these variables here
#### when copy/pasting this script into the EC2 user data field

ACCESS_KEY_ID=<your access key id>
SECRET_ACCESS_KEY=<your secret access key>
S3_PING_BUCKET=<your s3 ping bucket>

#### No further modifications should be needed below to run this example ####
# Set the location of EAP
JBOSS_HOME=/opt/rh/eap7/root/usr/share/wildfly

# Set the internal IP address of this EC2 instance which is mapped to a public address
INTERNAL_IP_ADDRESS=`ip addr show | grep eth0 -A 2 | head -n 3 | tail -n 1 | awk '{ print $2 }' |
sed "s-/24--g" | cut -d'/' -f1`

# Set the location of the domain.conf file and set the command used to start EAP in domain mode
if [[ "`cat /etc/redhat-release`" = *"release 7"* ]]; then
    SERVICE_CONF_FILE=/etc/opt/rh/eap7/wildfly/eap7-domain.conf
    START_COMMAND="systemctl start eap7-domain"
else
    SERVICE_CONF_FILE=/etc/sysconfig/eap7-domain
    START_COMMAND="service eap7-domain start"
fi

# Configure variables needed by JBoss EAP
echo "WILDFLY_BIND=$INTERNAL_IP_ADDRESS" >> $SERVICE_CONF_FILE
echo "WILDFLY_HOST_CONFIG=host-slave.xml" >> $SERVICE_CONF_FILE
echo "JAVA_OPTS=\"$JAVA_OPTS -Djboss.jgroups.s3_ping.access_key=$ACCESS_KEY_ID' -
Djboss.jgroups.s3_ping.secret_access_key=$SECRET_ACCESS_KEY' -
Djboss.jgroups.s3_ping.bucket=$S3_PING_BUCKET\"" >> $JBOSS_HOME/bin/domain.conf
echo "JAVA_OPTS=\"$JAVA_OPTS -Djboss.bind.address=$INTERNAL_IP_ADDRESS -
Djboss.bind.address.private=$INTERNAL_IP_ADDRESS -
Djboss.bind.address.management=$INTERNAL_IP_ADDRESS\"" >>
$JBOSS_HOME/bin/domain.conf
```

```

echo 'HOST_CONTROLLER_JAVA_OPTS="$HOST_CONTROLLER_JAVA_OPTS $JAVA_OPTS"'
>> $JBOSS_HOME/bin/domain.conf

# Configure S3 domain controller discovery
yum install patch -y
cd $JBOSS_HOME/domain/configuration

echo "--- host-slave.xml.orig 2016-06-07 09:55:27.183390617 +0200
+++ host-slave.xml 2016-06-07 09:56:52.540170784 +0200
@@ -57,7 +57,11 @@
  <domain-controller>
    <remote security-realm="ManagementRealm">
      <discovery-options>
-       <static-discovery name="primary" protocol="\${jboss.domain.master.protocol:remote}"
host="\${jboss.domain.master.address}" port="\${jboss.domain.master.port:9990}"/>
+       <discovery-option name="s3-discovery" module="org.jboss.as.host-controller"
code="org.jboss.as.host.controller.discovery.S3Discovery">
+         <property name="access-key" value="\${ACCESS_KEY_ID}"/>
+         <property name="secret-access-key" value="\${SECRET_ACCESS_KEY}"/>
+         <property name="location" value="\${S3_PING_BUCKET}"/>
+       </discovery-option>
      </discovery-options>
    </remote>
  </domain-controller>
" | patch host-slave.xml

sed -i 's/<!-. *-->/g' host-slave.xml # remove nasty '!' signs which break bash
sed -i '/^[ ]*$/' host-slave.xml # remove nasty lines with ' ' whitespaces which break the patch

EAP_HOST_NAME=`$JBOSS_HOME/bin/jboss-cli.sh --commands="embed-host-controller --host-
config=host-slave.xml, :read-resource" | grep "host" | cut -d\ " -f4`
$JBOSS_HOME/bin/jboss-cli.sh --commands="embed-host-controller --host-config=host-slave.xml,
/host=$EAP_HOST_NAME/core-service=management/security-realm=ManagementRealm/server-
identity=secret:write-attribute(name=value,value=c2VjcmV0X1Bhc3N3MHJk)"

sed -i 's/<host xmlns="urn:jboss:domain:8.0"/><host xmlns="urn:jboss:domain:8.0" name="admin"/>/'
host-slave.xml
sed -i 's/other-server-group/main-server-group/' host-slave.xml

cd -

# Need to modify permissions since this script is executed as the root user
chgrp jboss $JBOSS_HOME/domain/configuration/domain_xml_history/
chgrp jboss $JBOSS_HOME/domain/configuration/host_xml_history/
chgrp jboss $JBOSS_HOME/domain/configuration/domain-ec2.xml
chgrp jboss $JBOSS_HOME/domain/log/audit.log
chgrp jboss $JBOSS_HOME/domain/log/host-controller.log
chown jboss $JBOSS_HOME/domain/configuration/domain_xml_history/
chown jboss $JBOSS_HOME/domain/configuration/host_xml_history/
chown jboss $JBOSS_HOME/domain/configuration/domain-ec2.xml
chown jboss $JBOSS_HOME/domain/log/audit.log
chown jboss $JBOSS_HOME/domain/log/host-controller.log

# Start JBoss EAP, do not forget that RHEL 7 does not wait for JBoss EAP to start before returning
from the service start. In some cases, there could be a delay of more than 90 seconds.
$START_COMMAND

```

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