



# **Red Hat JBoss Core Services 2.4.23**

## **Apache HTTP Server Installation Guide**

For use with Red Hat JBoss middleware products.



# Red Hat JBoss Core Services 2.4.23 Apache HTTP Server Installation Guide

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## Abstract

This book is a guide to the installation of Red Hat JBoss Core Services Apache HTTP Server.

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# CHAPTER 1. INTRODUCTION

## 1.1. ABOUT RED HAT JBOSS CORE SERVICES

Red Hat JBoss Core Services is a set of supplementary software for Red Hat JBoss middleware products. This software, such as Apache HTTP Server, is common to multiple JBoss middleware products, and is packaged under Red Hat JBoss Core Services to allow for faster distribution of updates, and for a more consistent update experience.

## 1.2. ABOUT JBOSS CORE SERVICES APACHE HTTP SERVER

Apache HTTP Server is used in multiple Red Hat JBoss middleware products, and previously Apache HTTP Server was distributed with each JBoss product. Starting from the following product versions, each product will instead use the JBoss Core Services distribution of Apache HTTP Server:

- Red Hat JBoss Core Services (Apache HTTP Server) 7.0 and onwards.



### IMPORTANT

The Apache HTTP Server distribution included as part of Red Hat Enterprise Linux is completely separate from the JBoss Core Services distribution of Apache HTTP Server.

## 1.3. SUPPORTED OPERATING SYSTEMS AND CONFIGURATIONS

For information on supported operating systems and configurations for JBoss Core Services Apache HTTP Server, see <https://access.redhat.com/articles/2258971>.

## 1.4. INSTALLATION METHODS

JBoss Core Services Apache HTTP Server can be installed on supported Red Hat Enterprise Linux, Microsoft Windows, and Solaris systems using ZIP installation files available for each platform. JBoss Core Services Apache HTTP Server can also be installed on supported Red Hat Enterprise Linux systems using RPM packages.

## 1.5. UPGRADING TO THE RED HAT JBOSS CORE SERVICES APACHE HTTP SERVER 2.4.23



### NOTE

Where a Red Hat JBoss Core Services Apache HTTP Server 2.4.6 or earlier was installed from RPMs packages using `yum`, the Apache HTTP Server can be upgraded with `yum upgrade`.

For systems where an earlier version of the Red Hat JBoss Core Services Apache HTTP Server was installed from a .zip archive, upgrading to the Apache HTTP Server 2.4.23 requires:

1. Installing the Apache HTTP Server 2.4.23.
2. Setting up the Apache HTTP Server 2.4.23.
3. Removing the earlier version of Apache HTTP Server.



## Prerequisites

- Root user access (Red Hat Enterprise Linux and Solaris systems)
- Administrative access (Windows Server)
- A system where the Red Hat JBoss Core Services Apache HTTP Server 2.4.6 or earlier was installed from a .zip archive.

## Procedure

For systems using the Red Hat JBoss Core Services Apache HTTP Server 2.4.6, the recommended procedure for upgrading to the Apache HTTP Server 2.4.23 is:

1. Shutdown any running instances of Red Hat JBoss Core Services Apache HTTP Server 2.4.6.
2. Backup the Red Hat JBoss Core Services Apache HTTP Server 2.4.6 installation and configuration files.
3. Install the Red Hat JBoss Core Services Apache HTTP Server 2.4.23 using the .zip installation method for the current system (see [Additional Resources](#) below).
4. Migrate your configuration from the Red Hat JBoss Core Services Apache HTTP Server version 2.4.6 to version 2.4.23.



### NOTE

The Apache HTTP Server configuration files may have changed since the Apache HTTP Server 2.4.6 release. It is recommended that you update the 2.4.23 version configuration files, rather than overwrite them with the configuration files from a different version (such as Apache HTTP Server 2.4.6).

5. Remove the Red Hat JBoss Core Services Apache HTTP Server 2.4.6 root directory.

## Additional Resources

- For installation instructions for Red Hat Enterprise Linux systems, see:
  - [Installing JBoss Core Services Apache HTTP Server on Red Hat Enterprise Linux: Installation using .zip archives.](#)
  - [Installing JBoss Core Services Apache HTTP Server on Red Hat Enterprise Linux: Installation using RPM packages.](#)
- For installation instructions for Microsoft Windows systems, see: [Installing JBoss Core Services Apache HTTP Server on Microsoft Windows.](#)
- For installation instructions for Solaris systems, see: [Installing Apache HTTP Server on Solaris .](#)

# CHAPTER 2. INSTALLING JBOSS CORE SERVICES APACHE HTTP SERVER ON RED HAT ENTERPRISE LINUX

## 2.1. ZIP INSTALLATION

### 2.1.1. Prerequisites

The following packages are required to run Red Hat JBoss Core Services Apache HTTP Server 2.4.23 on Red Hat Enterprise Linux:

- apr
- apr-devel
- apr-util
- apr-util-devel
- apr-util-ldap
- elinks
- krb5-workstation
- mailcap

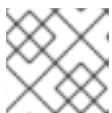
To install these prerequisites on Red Hat Enterprise Linux, issue the following command as the root user:

```
# yum install apr apr-devel apr-util apr-util-devel apr-util-ldap elinks krb5-workstation mailcap
```

### 2.1.2. Download and Extract Apache HTTP Server

To install Apache HTTP Server, download and extract the installation ZIP files. Installation can be performed by non-root users if the user account has write access to the intended installation directory.

1. Open a browser and log in to the Red Hat Customer Portal [JBoss Software Downloads page](#).
2. Select **Apache HTTP Server** in the **Product** drop-down menu.
3. Select the correct JBoss Core Services version from the **Version** drop-down menu.
4. Find **Red Hat JBoss Core Services Apache HTTP Server** in the list, ensuring that you select the correct platform and architecture for your system, and click the **Download** link.
5. Extract the downloaded ZIP file to your installation directory.



#### NOTE

We recommend that you install Apache HTTP Server in the `/opt/` directory.

The `jboss-ht tpd24-2.4/ht tpd` directory created by extracting the ZIP archive is the top-level directory for Apache HTTP Server. This is referred to in this documentation as `HTTPD_HOME`.

### 2.1.3. Configuring the Apache HTTP Server Installation

Some configuration is required before running JBoss Core Services Apache HTTP Server. This section includes the following configuration procedures:

- [Creating an Apache User](#)
- [Disabling/Enabling SSL Support](#)
- [Running the Apache HTTP Server Post-Installation Script](#)

#### Creating an Apache User

Follow this procedure to create the `apache` user and its parent group:

As the root user:

1. On a command line, change directory to `HTTPD_HOME`.
2. Run the following command to create the `apache` user group:

```
# groupadd -g 48 -r apache
```

3. Run the following command to create the `apache` user in the `apache` user group:

```
# useradd -c "Apache" -u 48 -g apache -s /bin/sh -r apache
```

4. From `HTTPD_HOME`, issue the following command to assign the ownership of the Apache directories to the `apache` user to allow the user to run Apache HTTP Server:

```
# chown -R apache:apache *
```

You can use `ls -l` to verify that the `apache` user is the owner of the directory.

#### Disabling/Enabling SSL Support

Apache HTTP Server supports SSL by default, but it can be disabled. Follow this procedure to disable or re-enable SSL support.

1. Go to the `HTTPD_HOME/conf.d/` directory and rename the SSL configuration file:
  - a. To disable SSL, rename `ssl.conf` to `ssl.conf.disabled`.
  - b. To re-enable SSL, rename `ssl.conf.disabled` to `ssl.conf`.

#### Running the Apache HTTP Server Post-Installation Script

1. On a command line, change to the `HTTPD_HOME` directory (root user access not required).
2. Issue the following command:

```
./postinstall
```

## 2.1.4. Starting Apache HTTP Server

To start Apache HTTP Server, on a command line as root user, change to *HTTPD\_HOME/sbin/* and issue the following command:

```
./apachectl start
```

## 2.1.5. Stopping Apache HTTP Server

To stop Apache HTTP Server, on a command line as root user, change to *HTTPD\_HOME/sbin/*, and issue the following command:

```
./apachectl stop
```

## 2.1.6. Running Apache HTTP Server without root access on Red Hat Enterprise Linux (ZIP installation)

To run Apache HTTP Server as a non-root user, such as the `apache` user:

1. Stop all instances of Apache HTTP Server:

```
pkill httpd
```

2. Set the `http` listen port to higher than 1024 in *HTTPD\_HOME/conf/httpd.conf*:

```
Listen 2080
ServerName <hostname>:2080
```

3. Set the `https` listen port to higher than 1024 in *HTTPD\_HOME/conf.d/ssl.conf*:

```
Listen 2443
```

4. Change the ownership of the `logs` directory:

```
chown -R apache:apache HTTPD_HOME/logs/
```

5. Change the ownership of the `run` directory:

```
chown -R apache:apache HTTPD_HOME/var/run/
```

6. Verify that `httpd` is **only** running under the `apache` user, not the `root` and `apache` users:

```
$ ps -eo euser,egroup,comm | grep httpd
apache  apache  httpd
apache  apache  httpd
apache  apache  httpd
...
```



## IMPORTANT

To prevent unauthorized access or modification of files and directories by website users and to prevent unwanted changes to Apache HTTP Server configuration files, limit the file permissions of the `apache` user and enable SELinux.

## 2.2. RPM INSTALLATION

Installing JBoss Core Services Apache HTTP Server from RPM packages installs Apache HTTP Server as a service. The RPM installation option is only available for Red Hat Enterprise Linux 6 and Red Hat Enterprise Linux 7.

### 2.2.1. Installing the Apache HTTP Server from RPM Packages

Before downloading and installing the RPM packages, you must register your system with Red Hat Subscription Management and subscribe to the respective Content Delivery Network (CDN) repositories.

For information on registering Red Hat Enterprise Linux, see [Configuring the Subscription Service for Red Hat Enterprise Linux 6](#) or [The Subscription Manager for Red Hat Enterprise Linux 7](#).

#### Attaching subscriptions to Red Hat Enterprise Linux (if required)

If the system does not have a subscription attached that provides the Apache HTTP Server:

1. Log in to the [Red Hat Subscription Manager](#).
2. Click on the **Systems** tab.
3. Click on the **Name** of the system to add the subscription to.
4. Change from the **Details** tab to the **Subscriptions** tab, then click **Attach Subscriptions**.
5. Select the check box beside the subscription to attach, then click **Attach Subscriptions**.



## NOTE

To verify that a subscription provides the required CDN repositories:

1. Log in to: <https://access.redhat.com/management/subscriptions>.
2. Click the **Subscription Name**.
3. Under **Products Provided**, you require:
  - Red Hat JBoss Core Services.

#### Installing the Apache HTTP Server from RPM packages using YUM

1. On a command line, subscribe to the Apache HTTP Server CDN repositories for your operating system version using `subscription-manager`:

```
# subscription-manager repos --enable <repository>
```

- For Red Hat Enterprise Linux 6:
  - `jb-coreservices-1-for-rhel-6-server-rpms`
- For Red Hat Enterprise Linux 7:
  - `jb-coreservices-1-for-rhel-7-server-rpms`

2. Run the following command as the root user to install the Apache HTTP Server:

```
# yum groupinstall jbcs-httpd24
```

### 2.2.2. Configuring the Apache HTTP Server Installation (RPM Installation)

Before starting an RPM installation of JBoss Core Services Apache HTTP Server, there are some optional configurations you can perform. This section includes the following configuration procedures:

- [Removing SSL Support](#)

#### Removing SSL Support

Apache HTTP Server supports SSL by default, but it can be removed. To remove SSL support, remove the `mod_ssl` package.

1. At a shell prompt, run the following command as the root user:

```
# yum remove jbcs-httpd24-mod_ssl
```

### 2.2.3. Starting Apache HTTP Server

In a shell prompt as the root user, start the Apache HTTP Server service:

- For Red Hat Enterprise Linux 6:

```
# service jbcs-httpd24-httpd start
```

- For Red Hat Enterprise Linux 7:

```
# systemctl start jbcs-httpd24-httpd.service
```

### 2.2.4. Stopping Apache HTTP Server

In a shell prompt as the root user, stop the Apache HTTP Server service:

- For Red Hat Enterprise Linux 6:

```
# service jbcs-httpd24-httpd stop
```

- For Red Hat Enterprise Linux 7:

```
# systemctl stop jbcs-httpd24-httpd.service
```

### 2.2.5. Configuring Apache HTTP Server to Start at Boot

Use the following command to enable the Apache HTTP Server service to start at boot.

- For Red Hat Enterprise Linux 6:

```
# chkconfig jbcs-httpd24-httpd on
```

- For Red Hat Enterprise Linux 7:

```
# systemctl enable jbcs-httpd24-httpd.service
```

## 2.3. SELINUX POLICIES

### 2.3.1. SELinux Policy Information

The Security-Enhanced Linux (SELinux) security model is enforced by the kernel and ensures applications have limited access to resources such as file system locations and ports. This helps ensure that the errant processes (either compromised or poorly configured) are restricted and in some cases prevented from running.

The following table contains information about the SELinux policies provided in the `jbcs-httpd2.4-httpd-selinux` packages.

Table 2.1. RPMs and Default SELinux Policies

Name	Port Information	Policy Information
<code>mod_cluster</code>	Two ports ( <b>6666</b> for <b>TCP</b> and <b>23364</b> for <b>UDP</b> ) are added for <code>httpd_port_t</code> to allow the <code>httpd</code> process to use them.	A post installation script configures the context mapping for <code>/var/cache/mod_cluster</code> to enable the <code>httpd</code> process to write at this location.

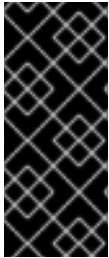
For more information about using SELinux and other Red Hat Enterprise Linux security information, see the *Red Hat Enterprise Linux Security Guide*

### 2.3.2. SELinux Policies for an RPM Installation

SELinux policies for Apache HTTP Server are provided by the `jbcs-httpd2.4-httpd-selinux` package available in the `jb-coreservices-1-for-rhel-7-server-rpms` and `jb-coreservices-1-for-rhel-6-server-rpms` Content Delivery Network (CDN) repositories.

To enable SELinux policies on Apache HTTP Server, install the `jbcs-httpd2.4-httpd-selinux` package for the version of Red Hat Enterprise Linux in use.

### 2.3.3. SELinux Policies for a ZIP Installation



## IMPORTANT

By default, the SELinux policy provided is not active and the Apache HTTP Server processes run in the `unconfined_t` domain. This domain does not confine the processes, and if you chose not to enable the SELinux policy provided, it is recommended that you restrict file access for the `apache` user to the files and directories required by the Apache HTTP Server runtime.

For this release, SELinux policies are provided in the ZIP packages. The `.postinstall.selinux` file is included in root Apache HTTP Server folder. If required, you can run the `.postinstall.selinux` script.

To install the SELinux policies for ZIP installations:

1. Install the `selinux-policy-devel` package:

```
yum install -y selinux-policy-devel
```

2. Execute the `.postinstall.selinux` script:

```
cd <httpd_home>  
sh .postinstall.selinux
```

3. Make and install the SELinux module:

```
cd <httpd_home>/selinux/  
make -f /usr/share/selinux/devel/Makefile  
semodule -i jbcsc-httpd24-httpd.pp
```

4. Apply the SELinux contexts for Apache HTTP Server:

```
restorecon -r <httpd_home>
```

5. Add access permissions to the required ports for Apache HTTP Server:

```
semanage port -a -t http_port_t -p tcp 6666  
semanage port -a -t http_port_t -p udp 23364
```

6. Start the Apache HTTP Server service:

```
<httpd_home>/sbin/apachectl start
```

7. Check the context of the running process expecting `httpd_t`:

```
$ ps -eZ | grep httpd | head -n1  
  
unconfined_u:unconfined_r:httpd_t:s0-s0:c0.c1023 2864 ? 00:00:00  
httpd
```

8. To verify the contexts of the `httpd` directories, for example:

```
ls -lZ <httpd_home>/logs/
```



## CHAPTER 3. INSTALLING JBOSS CORE SERVICES APACHE HTTP SERVER ON MICROSOFT WINDOWS

### 3.1. DOWNLOAD AND EXTRACT APACHE HTTP SERVER

To install Apache HTTP Server, download and extract the installation ZIP files. Installation can be performed by non-root users if the user account has write access to the intended installation directory.

1. Open a browser and log in to the Red Hat Customer Portal [JBoss Software Downloads page](#).
2. Select **Apache HTTP Server** in the **Product** drop-down menu.
3. Select the correct JBoss Core Services version from the **Version** drop-down menu.
4. Find **Red Hat JBoss Core Services Apache HTTP Server** in the list, ensuring that you select the correct platform and architecture for your system, and click the **Download** link.
5. Extract the downloaded ZIP file to your installation directory.



#### NOTE

We recommend that you install Apache HTTP Server in the **C:\Program Files** directory.

The `jbcs-httpd24-2.4` directory created by extracting the ZIP archive is the top-level directory for Apache HTTP Server. This is referred to in this documentation as `HTTPD_HOME`.

### 3.2. CONFIGURING THE APACHE HTTP SERVER INSTALLATION

Some configuration is required before running JBoss Core Services Apache HTTP Server. This section includes the following configuration procedures:

- [Running the Apache HTTP Server Post-Installation Script](#)
- [Installing the Apache HTTP Server Service](#)
- [Configuring Folder Permissions for the Apache HTTP Server Service](#)
- [Disabling/Enabling SSL Support](#)

#### Running the Apache HTTP Server Post-Installation Script

1. At the **Command Prompt** as an administrative user, change to the `HTTPD_HOME\etc` directory.
2. Run the following command:

```
call postinstall.httpd.bat
```

#### Installing the Apache HTTP Server Service



## NOTE

By default, Apache HTTP Server is configured to use port 80. If you have Microsoft IIS installed, ensure that you disable or reconfigure it to avoid port conflicts:

- Stop the **World Wide Web...** service, and change the **Startup Type** to **Manual**.
- Configure IIS to use different ports.

Alternatively, you can edit `httpd.conf` before installing the Apache HTTP Server service and change **Listen** to a port that does not conflict with the IIS ports.

1. At the **Command Prompt** as an administrative user, change to the `HTTPD_HOME\bin` directory.
2. Install the Apache HTTP Server service with the following command:

```
httpd -k install
```

A Firewall security dialog prompt may appear asking for networking access for Apache HTTP Server. Click **Allow** to access this service from the network.

## Configuring Folder Permissions for the Apache HTTP Server Service

Follow this procedure to ensure that the account used to run the service has full control over the `HTTPD_HOME` folder and all of its subfolders:

1. Right-click the `HTTPD_HOME` folder and click **Properties**.
2. Select the **Security** tab.
3. Click the **Edit** button.
4. Click the **Add** button.
5. In the text box, enter `LOCAL SERVICE`.
6. Select the **Full Control** check box for the `LOCAL SERVICE` account.
7. Click **OK**.
8. Click the **Advanced** button.
9. Inside the **Advanced Security Settings** dialog, select `LOCAL SERVICE` and click **Edit**.
10. Select the check box next to the **Replace all existing inheritable permissions on all descendants with inheritable permissions from this object** option.
11. Click **OK** through all the open folder property windows to apply the settings.

## Disabling/Enabling SSL Support

Apache HTTP Server supports SSL by default, but it can be disabled. Follow this procedure to disable or re-enable SSL support.

1. Go to the `HTTPD_HOME\conf.d\` directory and rename the SSL configuration file:
  - a. To disable SSL, rename `ssl.conf` to `ssl.conf.disabled`.

a. To disable SSL, rename `ssl.conf.disabled` to `ssl.conf.disabled`.

b. To re-enable SSL, rename `ssl.conf.disabled` to `ssl.conf`.

### 3.3. STARTING APACHE HTTP SERVER

You can start the Apache HTTP Server service from the Command Prompt, or with the Computer Management tool.

#### Starting Apache HTTP Server Using the Command Prompt

1. At the **Command Prompt** as an administrative user, start the Apache HTTP Server service with the following command:

```
net start Apache2.4
```

#### Starting Apache HTTP Server Using the Computer Management Tool

1. Go to **Start** → **Administrative Tools** → **Services**.
2. In the **Services** list, right-click the `httpd` service and click **Start**.

### 3.4. STOPPING APACHE HTTP SERVER

You can stop the Apache HTTP Server service from the Command Prompt, or with the Computer Management tool.

#### Stopping Apache HTTP Server Using the Command Prompt

1. At the **Command Prompt** as an administrative user, stop the Apache HTTP Server service with the following command:

```
net stop Apache2.4
```

#### Stopping Apache HTTP Server Using the Computer Management Tool

1. Go to **Start** → **Administrative Tools** → **Services**.
2. In the **Services** list, right-click the `httpd` service and click **Stop**.

## CHAPTER 4. INSTALLING APACHE HTTP SERVER ON SOLARIS

### 4.1. DOWNLOAD AND EXTRACT APACHE HTTP SERVER

To install Apache HTTP Server, download and extract the installation ZIP files. Installation can be performed by non-root users if the user account has write access to the intended installation directory.

1. Open a browser and log in to the Red Hat Customer Portal [JBoss Software Downloads page](#).
2. Select **Apache HTTP Server** in the **Product** drop-down menu.
3. Select the correct JBoss Core Services version from the **Version** drop-down menu.
4. Find **Red Hat JBoss Core Services Apache HTTP Server** in the list, ensuring that you select the correct platform and architecture for your system, and click the **Download** link.
5. Extract the downloaded ZIP file to your installation directory.



#### NOTE

We recommend that you install Apache HTTP Server in the `/opt/` directory.

The `jbcs-httpd24-2.4` directory created by extracting the ZIP archive is the top-level directory for Apache HTTP Server. This is referred to in this documentation as `HTTPD_HOME`.

### 4.2. CONFIGURING THE APACHE HTTP SERVER INSTALLATION

Some configuration is required before running JBoss Core Services Apache HTTP Server. This section includes the following configuration procedures:

- [Running the Apache HTTP Server Post-Installation Script](#)
- [Disabling/Enabling SSL Support](#)

#### Running the Apache HTTP Server Post-Installation Script

1. On a command line as the root user, change to the `HTTPD_HOME/etc` directory.
2. Run the following command:

```
# sh .postinstall.httpd
```

The post-installation script creates the Apache user and group.

#### Disabling/Enabling SSL Support

Apache HTTP Server supports SSL by default, but it can be disabled. Follow this procedure to disable or re-enable SSL support.

1. Go to the `HTTPD_HOME/conf.d/` directory and rename the SSL configuration file:
  - a. To disable SSL, rename `ssl.conf` to `ssl.conf.disabled`.

- b. To re-enable SSL, rename `ssl.conf.disabled` to `ssl.conf`.

### 4.3. STARTING APACHE HTTP SERVER

To start Apache HTTP Server, on a command line as root user, change to `HTTPD_HOME/sbin/` and issue the following command:

```
./apachectl start
```

### 4.4. STOPPING APACHE HTTP SERVER

To stop Apache HTTP Server, on a command line as root user, change to `HTTPD_HOME/sbin/`, and issue the following command:

```
./apachectl stop
```

### 4.5. RUNNING APACHE HTTP SERVER WITHOUT ROOT ACCESS ON SOLARIS (ZIP INSTALLATION)

To run Apache HTTP Server as a non-root user, such as the `apache` user:

1. Stop all instances of Apache HTTP Server:

```
pkill httpd
```

2. Set the `http` listen port to higher than 1024 in `HTTPD_HOME/conf/httpd.conf`:

```
Listen 2080
ServerName <hostname>:2080
```

3. Set the `https` listen port to higher than 1024 in `HTTPD_HOME/conf.d/ssl.conf`:

```
Listen 2443
```

4. Change the ownership of the `logs` directory:

```
chown -R apache:apache HTTPD_HOME/logs/
```

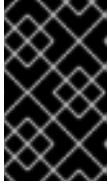
5. Change the ownership of the `run` directory:

```
chown -R apache:apache HTTPD_HOME/var/run/
```

6. Verify that `httpd` is **only** running under the `apache` user, not the `root` and `apache` users:

```
$ ps -eo euser,egroup,comm | grep httpd
```

```
apache  apache  httpd
apache  apache  httpd
apache  apache  httpd
...
```



## IMPORTANT

To prevent unauthorized access or modification of files and directories by website users and to prevent unwanted changes to Apache HTTP Server configuration files, limit the file permissions of the **apache** user .

## CHAPTER 5. ENABLING HTTP/2 FOR THE JBOSS CORE SERVICES HTTP SERVER

The Hypertext Transfer Protocols are standard methods of transmitting data between applications (such as servers and browsers) over the internet. HTTP/2 improves on HTTP/1.1 by providing enhancements such as:

- header compression - reducing the size of the header transmitted by omitting implied information, and
- multiple requests and responses over a single connection - using binary framing to break down response messages, as opposed to textual framing.

Using HTTP/2 with the Red Hat JBoss Core Services Apache HTTP Server:

- **is supported** for encrypted connections using Transport Layer Security (TLS) (`SSLEnabled="true"`), indicated by the `h2` keyword when enabled.
- **is not supported** for unencrypted connections using the Transmission Control Protocol (TCP) indicated by the `h2c` keyword when enabled.



### NOTE

HTTP/2 is not available for web servers using the Multi-Processing Module prefork `modules/mod_mpm_prefork.so`

### Prerequisites

- Root user access (Red Hat Enterprise Linux and Solaris systems)
- Administrative access (Windows Server)
- Red Hat JBoss Core Services Apache HTTP Server 2.4.23 or higher
- Modules required:
  - `ssl_module modules/mod_ssl.so`
  - `http2_module modules/mod_http2.so`

### Procedure

Enable HTTP/2 for a Apache HTTP Server:

1. Add the `http2_module` to `HTTP_HOME/conf.modules.d/00-base.conf`:

```
...
LoadModule http2_module modules/mod_http2.so
```

2. Add the `h2` protocol in `HTTP_HOME/conf/httpd.conf`.
  - To enable HTTP/2 support for a virtual host, add the `h2` protocol to the virtual host configuration,
  - To enable HTTP/2 support for all server connections, add the `h2` protocol to the 'Main' server configuration section of `httpd.conf`.

For example:

```
<IfModule http2_module>
  Protocols h2 http/1.1
  ProtocolsHonorOrder on
</IfModule>
```

3. Update the Secure Socket Layer (SSL) configuration in `HTTP_HOME/conf.d/ssl.conf`.

- a. Ensure the **SSLEngine** directive is set to enabled (the SSL Engine is enabled by default):

```
SSLEngine on
```

- b. Update the **SSLProtocol** directive to disable the **SSLv2** and **SSLv3** protocols, forcing connections to use the Transport Layer Security (TLS) Protocols:

```
SSLProtocol all -SSLv2 -SSLv3
```

- c. Update the **SSLCipherSuite** directive to specify which SSL ciphers can with the Apache HTTP Server.

For example:

```
SSLCipherSuite ECDHE-RSA-AES128-GCM-SHA256:ECDHE-ECDSA-AES128-
GCM-SHA256:ECDHE-RSA-AES256-GCM-SHA384:ECDHE-ECDSA-AES256-GCM-
SHA384:DHE-RSA-AES128-GCM-SHA256:DHE-DSS-AES128-GCM-
SHA256:kEDH+AESGCM:ECDHE-RSA-AES128-SHA256:ECDHE-ECDSA-AES128-
SHA256:ECDHE-RSA-AES128-SHA:ECDHE-ECDSA-AES128-SHA:ECDHE-RSA-
AES256-SHA384:ECDHE-ECDSA-AES256-SHA384:ECDHE-RSA-AES256-
SHA:ECDHE-ECDSA-AES256-SHA:DHE-RSA-AES128-SHA256:DHE-RSA-AES128-
SHA:DHE-DSS-AES128-SHA256:DHE-RSA-AES256-SHA256:DHE-DSS-AES256-
SHA:DHE-RSA-AES256-
SHA:!aNULL:!eNULL:!EXPORT:!DES:!RC4:!3DES:!MD5:!PSK
```



#### NOTE

For information on the SSL module and the supported directives, see: [Apache HTTP Server Documentation Version 2.4 - Modules: Apache Module mod\\_ssl](#).

4. Restart the Red Hat JBoss Core Services Apache HTTP Server as the root user, to apply the changed configuration.

- a. For SysV (Red Hat Enterprise Linux 6) users:

```
# service jbcS-httpd24-httpd restart
```

- b. For systemd (Red Hat Enterprise Linux 7) users:

```
# systemctl restart jbcS-httpd24-httpd.service
```

- c. For Red Hat Enterprise Linux users running Red Hat JBoss Core Services using apachectl:

```
# HTTP_HOME/sbin/apachectl restart
```



d. For Solaris users:

```
# HTTP_HOME/sbin/apachectl restart
```

e. For Windows Server users:

```
# net restart Apache2.4
```

## Next Steps

Verify that HTTP/2 is enabled by reviewing the Apache HTTP Server logs or by using the `curl` command:

- Access the server from a browser or using `curl`, then check the SSL/TLS access or request logs (`HTTP_HOME/logs/ssl_access_log` or `HTTP_HOME/logs/ssl_request_log`) to verify that the connection is configured to support HTTP/2:

```
$ grep 'HTTP/2' HTTP_HOME/logs/ssl_request_log

[26/Apr/2018:06:44:45 +0000] 172.17.0.1 TLSv1.2 AES128-SHA "HEAD
/html-single/index.html HTTP/2" -

$ grep 'HTTP/2' HTTP_HOME/logs/ssl_access_log

172.17.0.1 - - [26/Apr/2018:06:44:45 +0000] "HEAD /html-
single/index.html HTTP/2" 200 -
```

- Or verify using `curl` (for versions of `curl` that support HTTP2):



### NOTE

The `curl` package provided with Red Hat Enterprise Linux 7 or earlier does not support HTTP/2. To check `curl` for HTTP/2 support:

```
$ curl -V

curl 7.55.1 (x86_64-redhat-linux-gnu) ...
Release-Date: 2017-08-14
Protocols: dict file ftp ftps gopher http https ...
Features: AsynchDNS IDN IPv6 Largefile GSS-API Kerberos
SPNEGO NTLM NTLM_WB SSL libz TLS-SRP HTTP2 UnixSockets
HTTPS-proxy Metalink PSL
```

- For example, when the HTTP/2 protocol is inactive:

```
$ curl -I http://<JBOS_httpd_server>:80/<test.html>

HTTP/1.1 200
...
```

- But if the HTTP/2 protocol is active, `curl` returns:

```
$ curl -I https://<JBOS_httpd_server>:443/<test.html>  
HTTP/2 200  
...
```

- o Where:
  - `<JBOS_httpd_server>` is the URI of the server (such as `example.com`),
  - the port number is dependent on your configuration,
  - `<test.html>` is any html page for testing the configuration (not provided), and

## Additional Resources

- For additional information on using HTTP/2, see: [Apache HTTP Server Documentation Version 2.4 - How-To / Tutorials: HTTP/2 guide](#).
- For information on SSL configuration, see: [Apache HTTP Server Documentation Version 2.4 - SSL/TLS Strong Encryption: How-To](#).
- For information on the HTTP/2 module and the supported directives, see: [Apache HTTP Server Documentation Version 2.4 - Modules: Apache Module mod\\_http2](#).
- For information on the SSL module and the supported directives, see: [Apache HTTP Server Documentation Version 2.4 - Modules: Apache Module mod\\_ssl](#).
- The proposed internet standard for HTTP/2: [IETF: RFC 7540 - Hypertext Transfer Protocol Version 2 \(HTTP/2\)](#).

## CHAPTER 6. MONITORING APACHE HTTP SERVER WITH JBOSS OPERATIONS NETWORK (ON)

To allow JBoss ON to monitor JBoss Core Services Apache HTTP Server, you must enable the `mod_bmx` modules.

1. As the `apache` user, enable the `mod_bmx` modules by creating `HTTPD_HOME/conf.d/mod_bmx.conf` with the following contents:

```
LoadModule bmx_module modules/mod_bmx.so
LoadModule bmx_status_module modules/mod_bmx_status.so
LoadModule bmx_vhost_module modules/mod_bmx_vhost.so
```

2. In `HTTPD_HOME/conf/httpd.conf`, add a handler for `mod_bmx` by appending your handler definition. For example:

```
<Location /bmx>
  SetHandler bmx-handler
</Location>
```

You may want to restrict access to this URL to a specific virtual host or use password authentication.

3. Restart the Apache HTTP Server. You can access [http://SERVER\\_ADDRESS:PORT/bmx](http://SERVER_ADDRESS:PORT/bmx) in a web browser to verify that `mod_bmx` is working correctly.
4. Apache HTTP Server will now be discoverable for JBoss ON. In JBoss ON, you can import it from the Discovery Queue.  
Consult the JBoss ON documentation for further details on monitoring and managing Apache HTTP Server.

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