Red Hat JBoss Enterprise Application Platform 6.4

Security Guide

DEPRECATED. This book covers security concepts and procedures to harden the EAP server instance and to secure web applications.

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Abstract

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PART I. SECURITY FOR RED HAT JBOSS ENTERPRISE APPLICATION PLATFORM 6

CHAPTER 1. INTRODUCTION

1.1. ABOUT RED HAT JBOSS ENTERPRISE APPLICATION PLATFORM 6

Red Hat JBoss Enterprise Application Platform 6 (JBoss EAP 6) is a middleware platform built on open standards and compliant with the Java Enterprise Edition 6 specification. It integrates JBoss Application Server 7 with high-availability clustering, messaging, distributed caching, and other technologies.

JBoss EAP 6 includes a new, modular structure that allows service enabling only when required, improving start-up speed.

The Management Console and Management Command Line Interface make editing XML configuration files unnecessary and add the ability to script and automate tasks.

In addition, JBoss EAP 6 includes APIs and development frameworks for quickly developing secure and scalable Java EE applications.

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1.2. ABOUT SECURING JBOSS EAP 6

Computer security is the all encompassing term given to the field of information technology that deals with securing the virtual environments that power the digital age. This can include data protection and integrity, application security, risk and vulnerability assessment and authentication and authorization protocols.

Computer data is an all important asset for most organizations. Data protection is vital and forms the core of most businesses. JBoss EAP 6 provides a multi-layered approach to security to take care of data at all stages.

Truly secure systems are the ones that are designed from the ground up with security as the main feature. Such systems use the principle of Security by Design. In such systems, malicious attacks and infiltration's are accepted as part and parcel of normal security apparatus and systems are designed to work around them.

Security can be applied at the operating system, middleware and application level. For more information about security at the operating system level as it applies to RHEL, refer to the Red Hat Enterprise Linux Security Guide.

In the coming chapters, you will read about the different levels and layers of security within JBoss EAP 6. These layers provides the infrastructure for all security functionality within the platform.

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PART II. SECURING THE PLATFORM

CHAPTER 2. JAVA SECURITY MANAGER

2.1. ABOUT THE JAVA SECURITY MANAGER

The Java Security Manager is a class that manages the external boundary of the Java Virtual Machine (JVM) sandbox, controlling how code executing within the JVM can interact with resources outside the JVM. When the Java Security Manager is activated, the Java API checks with the security manager for approval before executing a wide range of potentially unsafe operations. The Java Security Manager uses a security policy to determine whether a given action will be allowed or denied.

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2.2. ABOUT JAVA SECURITY POLICIES

A Java Security policy is a set of defined permissions for different classes of code. The Java Security Manager compares actions requested by applications against the security policy. If an action is allowed by the policy, the Security Manager will permit that action to take place. If the action is not allowed by the policy, the Security Manager will deny that action. The security policy can define permissions based on the location of code, on the code's signature, or based on the subject's principals.

You can create a security policy using the **policytool** application, which is included with the Java Development Kit (JDK). A security policy entry consists of the following configuration elements, which are configurable using **policytool**:

CodeBase
: The URL location (excluding the host and domain information) where the code originates from. This parameter is optional.

SignedBy
: The alias used in the keystore to reference the signer whose private key was used to sign the code. This can be a single value or a comma-separated list of values. This parameter is optional. If omitted, presence or lack of a signature has no impact on the Java Security Manager.

Principals
: A list of ***principal_type*/*principal_name*** pairs, which must be present within the executing thread's principal set. The Principals entry is optional. If it is omitted, it signifies that the principals of the executing thread will have no impact on the Java Security Manager.

Permissions
: A permission is the access which is granted to the code. Many permissions are provided as part of the Java Enterprise Edition 6 (Java EE 6) specification.

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2.3. WRITE A JAVA SECURITY POLICY

An application called **policytool** is included with most JDK and JRE distributions, for the purpose of creating and editing Java security policies. Detailed information about **policytool** is linked from http://docs.oracle.com/javase/6/docs/technotes/tools/. Alternatively, you can also write a security policy using a text editor.

Procedure 2.1. Setup a new Java Security Manager Policy

1. **Start policytool.**
   Start the **policytool** tool in one of the following ways.
   - **Red Hat Enterprise Linux**
     From your GUI or a command prompt, run **/usr/bin/policytool**.
   - **Microsoft Windows Server**
     Run **policytool.exe** from your Start menu or from the **bin\** of your Java installation. The location can vary.

2. **Create a policy.**
   To create a policy, select **Add Policy Entry**. Add the parameters you need, then click **Done**.

   NOTE

   Use VFS to specify paths for applications deployed on JBoss EAP. On Linux the path is: **vfs:/content/*application.war***. On Microsoft Windows it is: **vfs:/${user.dir}/content/*application.war*** .

   For example:

   ```
   grant codeBase "vfs:/content/application.war/-" {
   permission java.util.PropertyPermission "*", "read";
   };
   ```

3. **Edit an existing policy**
   Select the policy from the list of existing policies, and select the **Edit Policy Entry** button. Edit the parameters as needed.

4. **Delete an existing policy.**
   Select the policy from the list of existing policies, and select the **Remove Policy Entry** button.

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2.4. RUN JBOSS EAP 6 WITHIN THE JAVA SECURITY MANAGER

From JBoss EAP 6.4 and onwards, running JBoss EAP 6 within the Java Security Manager (JSM) is done using the **secmgr** option.

IMPORTANT

Direct usage of the **-Djava.security.manager** Java system property is no longer possible. This previous method used in older versions of JBoss EAP 6 to enable the Java Security Manager is now only supported as a fallback mechanism in the JBoss EAP startup scripts.

NOTE

From JBoss EAP 6.4 and onwards, custom security managers cannot be used.

The following procedure guides you through the steps of configuring your JBoss EAP 6 instance to run within the Java Security Manager using a specified security policy.

Prerequisites

- Before you follow this procedure, you need to write a security policy using the **policytool** application which is included in the Java Development Kit (JDK). Alternatively, you can write a security policy using a text editor.

  Security policies will be needed for any user deployments that require permissions. This procedure assumes that your policy is located at ***EAP_HOME*/bin/server.policy**.

- The domain or standalone server must be completely stopped before you edit any configuration files.

If you are using JBoss EAP 6 in a Managed Domain, you must perform the following procedure on each physical host or instance in your domain.

Procedure 2.2. Configure the Java Security Manager for JBoss EAP 6

1. **Open the Configuration File**
   Open the configuration file for editing. The configuration file you need to edit depends on whether you use a Managed Domain or standalone server, as well as your operating system.

   - **Managed Domain**

     - For Linux: ***EAP_HOME*/bin/domain.conf**

     - For Windows: ***EAP_HOME*\bin\domain.conf.bat**

   - **Standalone Server**

     - For Linux: ***EAP_HOME*/bin/standalone.conf**

     - For Windows: ***EAP_HOME*\bin\standalone.conf.bat**

2. **Enable the Java Security Manager**
   Use one of the methods below to enable the Java Security Manager:

   - Use the **-secmgr** option with your JBoss EAP 6 server startup script.

   - Uncomment the **SECMGR="true"** line in the configuration file:

     - **On Linux:**

       ```
       # Uncomment this to run with a security manager enabled
       SECMGR="true"
       ```

     - **On Windows:**

       ```
       rem # Uncomment this to run with a security manager enabled
       set "SECMGR=true"
       ```

3. **Specify the Java Security Policy**
   You can use **-Djava.security.policy** to specify the exact location of your security policy. It should go onto one line only, with no line break. Using **==** when setting **-Djava.security.policy** specifies that the security manager will use *only* the specified policy file. Using **=** specifies that the security manager will use the specified policy *combined with* the policy set in the **policy.url** section of ***JAVA_HOME*/lib/security/java.security**.

In your relevant JBoss EAP 6 configuration file, add your security policy Java options. If you are using a Managed Domain, ensure that this is inserted before where **PROCESS_CONTROLLER_JAVA_OPTS** and **HOST_CONTROLLER_JAVA_OPTS** are set.

- **On Linux:**

```
JAVA_OPTS="$JAVA_OPTS -Djava.security.policy==$JBOSS_HOME/bin/server.policy -
Djboss.home.dir=$JBOSS_HOME"
```

- **On Windows:**

```
set "JAVA_OPTS=%JAVA_OPTS% -
Djava.security.policy==%JBOSS_HOME%\bin\server.policy -
Djboss.home.dir=%JBOSS_HOME%"
```

4. **Start the Domain or Server**
   Start the domain or server as normal.

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2.5. IBM JDK AND THE JAVA SECURITY MANAGER

Some versions of the IBM JDK use a default policy provider which does not work correctly with a JBoss EAP security policy. If you are having problems using an IBM JDK to host JBoss EAP with the Java Security Manager enabled, you must change the JRE configuration to use the standard policy provider.

To modify the JRE configuration for the IBM JDK, edit the **JAVA_HOME/jre/lib/security/java.security** file, and set the **policy.provider** value to **sun.security.provider.PolicyFile**.

```
policy.provider=sun.security.provider.PolicyFile
```

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2.6. DEBUG SECURITY MANAGER POLICIES

You can enable debugging information to help you troubleshoot security policy-related issues. The **java.security.debug** option configures the level of security-related information reported. The command **java -Djava.security.debug=help** will produce help output with the full range of debugging options. Setting the debug level to **all** is useful when troubleshooting a security-related failure whose cause is completely unknown, but for general use it will produce too much information. A sensible general default is **access:failure**.

Procedure 2.3. Enable general debugging

- **This procedure will enable a sensible general level of security-related debug information.**
  Add the following line to the server configuration file.
  - If the JBoss EAP 6 instance is running in a managed domain, the line is added to the **bin/domain.conf** file for Linux or the **bin\domain.conf.bat** file for Windows.
  - If the JBoss EAP 6 instance is running as a standalone server, the line is added to the **bin/standalone.conf** file for Linux, or the **bin\standalone.conf.bat** file for Windows.

Linux

```
JAVA_OPTS="$JAVA_OPTS -Djava.security.debug=access:failure"
```

Windows

```
set "JAVA_OPTS=%JAVA_OPTS% -Djava.security.debug=access:failure"
```

Result

A general level of security-related debug information has been enabled.

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CHAPTER 3. SECURITY REALMS

3.1. ABOUT SECURITY REALMS

A *security realm* is a series of mappings between users and passwords, and users and roles. Security realms are a mechanism for adding authentication and authorization to your EJB and Web applications. JBoss EAP 6 provides two security realms by default:

- **ManagementRealm** stores authentication information for the Management API, which provides the functionality for the Management CLI and web-based Management Console. It provides an authentication system for managing JBoss EAP 6 itself. You could also use the **ManagementRealm** if your application needed to authenticate with the same business rules you use for the Management API.
- **ApplicationRealm** stores user, password, and role information for Web Applications and EJBs.

Each realm is stored in a number of files on the filesystem:

- ***REALM*-users.properties** stores usernames and hashed passwords.
- ***REALM*-roles.properties** stores user-to-role mappings.
- **mgmt-groups.properties** stores user-to-group mapping file for **ManagementRealm**. Only used when Role-based Access Control (RBAC) is enabled.

The properties files are stored in the **domain/configuration/** and **standalone/configuration/** directories. The files are written simultaneously by the **add-user.sh** or **add-user.bat** command. When you run the command, the first decision you make is which realm to add your new user to.

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3.2. ADD A NEW SECURITY REALM

1. **Run the Management CLI.**
   Start the **jboss-cli.sh** or **jboss-cli.bat** command and connect to the server.

2. **Create the new security realm itself.**
   Run the following command to create a new security realm named **MyDomainRealm** on a domain controller or a standalone server.

   For a domain instance, use this command:

   ```
   /host=master/core-service=management/security-realm=MyDomainRealm:add()
   ```

   For a standalone instance, use this command:

   ```
   /core-service=management/security-realm=MyDomainRealm:add()
   ```

3. **Create the references to the properties file which will store information about the new role.**
   Run the following command to create a pointer a file named **myfile.properties**, which will contain the properties pertaining to the new role.

> **NOTE**
>
> The newly created properties file is not managed by the included **add-user.sh** and **add-user.bat** scripts. It must be managed externally.

For a domain instance, use this command:

```
/host=master/core-service=management/security-
realm=MyDomainRealm/authentication=properties:add(path=myfile.properties)
```

For a standalone instance, use this command:

```
/core-service=management/security-
realm=MyDomainRealm/authentication=properties:add(path=myfile.properties)
```

Result

Your new security realm is created. When you add users and roles to this new realm, the information will be stored in a separate file from the default security realms. You can manage this new file using your own applications or procedures.

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3.3. ADD A USER TO A SECURITY REALM

1. **Run the add-user.sh or add-user.bat command.**
   Open a terminal and change directories to the ***EAP_HOME*/bin/** directory. If you run Red Hat Enterprise Linux or another UNIX-like operating system, run **add-user.sh**. If you run Microsoft Windows Server, run **add-user.bat**.

2. **Choose whether to add a Management User or Application User.**
   For this procedure, type **b** to add an Application User.

3. **Choose the realm the user will be added to.**
   By default, the only available realm is **ApplicationRealm**. If you have added a custom realm, you can type its name instead.

4. **Type the username, password, and roles, when prompted.**
   Type the desired username, password, and optional roles when prompted. Verify your choice by typing **yes**, or type **no** to cancel the changes. The changes are written to each of the properties files for the security realm.

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CHAPTER 4. ENCRYPT NETWORK TRAFFIC

4.1. SPECIFY WHICH NETWORK INTERFACE JBOSS EAP 6 USES

Overview

Isolating services so that they are accessible only to the clients who need them increases the security of your network. JBoss EAP 6 includes two interfaces in its default configuration, both of which bind to the IP address **127.0.0.1**, or **localhost**, by default. One of the interfaces is called **management**, and is used by the Management Console, CLI, and API. The other is called **public**, and is used to deploy applications. These interfaces are not special or significant, but are provided as a starting point.

The **management** interface uses ports **9990** and **9999** by default, and the **public** interface uses port **8080**, or port **8443** if you use HTTPS.

You can change the IP address of the management interface, public interface, or both.

WARNING

If you expose the management interfaces to other network interfaces which are accessible from remote hosts, be aware of the security implications. Most of the time, it is not advisable to provide remote access to the management interfaces.

1. **Stop JBoss EAP 6.**
   Stop JBoss EAP 6 by sending an interrupt in the appropriate way for your operating system. If you are running JBoss EAP 6 as a foreground application, the typical way to do this is to press **Ctrl+C**.

2. **Restart JBoss EAP 6, specifying the bind address.**
   Use the **-b** command-line switch to start JBoss EAP 6 on a specific interface.

   NOTE

   In the following examples, the IP address used 10.1.1.1 must be available to you. To know the IP address, use the **ifconfig** command.

   Example 4.1. Specify the public interface.

   ```
   EAP_HOME/bin/domain.sh -b 10.1.1.1
   ```

   Example 4.2. Specify the management interface.

   ```
   EAP_HOME/bin/domain.sh -bmanagement=10.1.1.1
   ```

Example 4.3. Specify different addresses for each interface.

```
EAP_HOME/bin/domain.sh -bmanagement=127.0.0.1 -b 10.1.1.1
```

Example 4.4. Bind the public interface to all network interfaces.

```
EAP_HOME/bin/domain.sh -b 0.0.0.0
```

It is possible to edit your XML configuration file directly, to change the default bind addresses. However, if you do this, you will no longer be able to use the **-b** command-line switch to specify an IP address at runtime, so this is not recommended. If you do decide to do this, be sure to stop JBoss EAP 6 completely before editing the XML file.

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4.2. CONFIGURE NETWORK FIREWALLS TO WORK WITH JBOSS EAP 6

Summary

Most production environments use firewalls as part of an overall network security strategy. If you need multiple server instances to communicate with each other or with external services such as web servers or databases, your firewall must take this into account. A well-managed firewall only opens the ports which are necessary for operation, and limits access to the ports to specific IP addresses, subnets, and network protocols.

A full discussion of firewalls is out of the scope of this documentation.

Prerequisites

- Determine the ports you need to open.
- An understanding of your firewall software is required. This procedure uses the **system-config-firewall** command in Red Hat Enterprise Linux 6. Microsoft Windows Server includes a built-in firewall, and several third-party firewall solutions are available for each platform. On Microsoft Windows Server, you can use PowerShell to configure the firewall.

Assumptions

This procedure configures a firewall in an environment with the following assumptions:

- The operating system is Red Hat Enterprise Linux 6.
- JBoss EAP 6 runs on host **10.1.1.2**. Optionally, the server has its own firewall.
- The network firewall server runs on host **10.1.1.1** on interface **eth0**, and has an external interface **eth1**.
- You want traffic on port **5445** (a port used by JMS) forwarded to JBoss EAP 6. No other traffic should be allowed through the network firewall.

Procedure 4.1. Manage Network Firewalls and JBoss EAP 6 to work together

1. **Log into the Management Console.**
   Log into the Management Console. By default, it runs on http://localhost:9990/console/.

2. **Determine the socket bindings used by the socket binding group.**

   a. Click the **Configuration** label at the top of the Management Console.

   b. Expand the **General Configuration** menu. Select the **Socket Binding**.

   c. The **Socket Binding Declarations** screen appears. Initially, the **standard-sockets** group is shown. Choose a different group by selecting it from the combo box on the right-hand side.

   NOTE

   If you use a standalone server, it has only one socket binding group.

   The list of socket names and ports is shown, eight values per page. You can go through the pages by using the arrow navigation below the table.

3. **Determine the ports you need to open.**
   Depending on the function of the particular port and the requirements of your environment, some ports may need to be opened on your firewall.

4. **Configure your firewall to forward traffic to JBoss EAP 6.**
   Perform these steps to configure your network firewall to allow traffic on the desired port.

   a. Log into your firewall machine and access a command prompt, as the root user.

   b. Issue the command **system-config-firewall** to launch the firewall configuration utility. A GUI or command-line utility launches, depending on the way you are logged into the firewall system. This task makes the assumption that you are logged in via SSH and using the command-line interface.

   c. Use the **TAB** key on your keyboard to navigate to the **Customize** button, and press the **ENTER** key. The **Trusted Services** screen appears.

   d. Do not change any values, but use the **TAB** key to navigate to the **Forward** button, and press **ENTER** to advanced to the next screen. The **Other Ports** screen appears.

   e. Use the **TAB** key to navigate to the **<Add>** button, and press **ENTER**. The **Port and Protocol** screen appears.

   f. Enter **5445** in the **Port** / **Port Range** field, then use the **TAB** key to move to the **Protocol** field, and enter **tcp**. Use the **TAB** key to navigate to the **OK** button, and press **ENTER**.

   g. Use the **TAB** key to navigate to the **Forward** button until you reach the **Port Forwarding** screen.

   h. Use the **TAB** key to navigate to the **<Add>** button, and press the **ENTER** key.

   i. Fill in the following values to set up port forwarding for port **5445**.

      - Source interface: **eth1**

      - Protocol: **tcp**

- Port / Port Range: **5445**
- Destination IP address: **10.1.1.2**
- Port / Port Range: **5445**

Use the **TAB** key to navigate to the **OK** button, and press **ENTER**.

j. Use the **TAB** key to navigate to the **Close** button, and press **ENTER**.

k. Use the **TAB** key to navigate to the **OK** button, and press **ENTER**. To apply the changes, read the warning and click **Yes**.

5. **Configure a firewall on your JBoss EAP 6 host.**
   Some organizations choose to configure a firewall on the JBoss EAP 6 server itself, and close all ports that are not necessary for its operation. See Section 4.3, "Network Ports Used By JBoss EAP 6" and determine which ports to open, then close the rest. The default configuration of Red Hat Enterprise Linux 6 closes all ports except **22** (used for Secure Shell (SSH) and **5353** (used for multicast DNS). While you are configuring ports, ensure you have physical access to your server so that you do not inadvertently lock yourself out.

Result

Your firewall is configured to forward traffic to your internal JBoss EAP 6 server in the way you specified in your firewall configuration. If you chose to enable a firewall on your server, all ports are closed except the ones needed to run your applications.

Procedure 4.2. Configuring Firewall on Microsoft Windows using PowerShell

1. Switch off firewall for debug purpose to determine whether the current network behavior is related to the firewall configuration.

```
Start-Process "$psHome\powershell.exe" -Verb Runas -ArgumentList '-command "NetSh
Advfirewall set allprofiles state off"'
```

2. Allow UDP connections on port 23364. For example:

```
Start-Process "$psHome\powershell.exe" -Verb Runas -ArgumentList '-command "NetSh
Advfirewall firewall add rule name="UDP Port 23364" dir=in  action=allow protocol=UDP
localport=23364"'
Start-Process "$psHome\powershell.exe" -Verb Runas -ArgumentList '-command "NetSh
Advfirewall firewall add rule name="UDP Port 23364" dir=out action=allow protocol=UDP
localport=23364"'
```

Procedure 4.3. Configure the Firewall on Red Hat Enterprise Linux 7 to Allow mod_cluster Advertising

- To allow mod_cluster advertising on Red Hat Enterprise Linux 7, you must enable the UDP port in the firewall as follows:

```
firewall-cmd --permanent --zone=public --add-port=23364/udp
```

NOTE

224.0.1.105:23364 is the default address and port for mod_cluster balancer advertising UDP multicast.

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4.3. NETWORK PORTS USED BY JBOSS EAP 6

The ports used by the JBoss EAP 6 default configuration depend on several factors:

- Whether your server groups use one of the default socket binding groups, or a custom group.
- The requirements of your individual deployments.

NOTE

A numerical port offset can be configured, to alleviate port conflicts when you run multiple servers on the same physical server. If your server uses a numerical port offset, add the offset to the default port number for its server group's socket binding group. For instance, if the HTTP port of the socket binding group is **8080**, and your server uses a port offset of **100**, its HTTP port is **8180**.

Unless otherwise stated, the ports use the TCP protocol.

The default socket binding groups

- **full-ha-sockets**
- **full-sockets**
- **ha-sockets**
- **standard-sockets**

These socket binding groups are available only in **domain.xml**. The standalone server profiles contain only standard socket binding group. This group corresponds to standard-sockets in **standalone.xml**, **ha-sockets** for **standalone-ha.xml**, **full-sockets** for **standalone-full.xml**, and **full-ha-sockets** for **standalone-full-ha.xml**. Standalone profiles contain some more socket bindings, for example, management-{native,http,https}.

Table 4.1. Reference of the default socket bindings

Name	Port	Multicast Port	Description	full-ha-sockets	full-sockets	ha-socket	standard-socket
ajp	8009		Apache JServ Protocol. Used for HTTP clustering and load balancing.	Yes	Yes	Yes	Yes

Name	Port	Multicast Port	Description	full-ha-sockets	full-sockets	ha-socket	standard-socket
http	8080		The default port for deployed web applications.	Yes	Yes	Yes	Yes
https	8443		SSL-encrypted connection between deployed web applications and clients.	Yes	Yes	Yes	Yes
jacorb	3528		CORBA services for JTS transactions and other ORB-dependent services.	Yes	Yes	No	No
jacorb-ssl	3529		SSL-encrypted CORBA services.	Yes	Yes	No	No
jgroups-diagnostics		7500	Multicast. Used for peer discovery in HA clusters. Not configurable using the Management Interfaces.	Yes	No	Yes	No
jgroups-mping		45700	Multicast. Used to discover initial membership in a HA cluster.	Yes	No	Yes	No
jgroups-tcp	7600		Unicast peer discovery in HA clusters using TCP.	Yes	No	Yes	No
jgroups-tcp-fd	57600		Used for HA failure detection over TCP.	Yes	No	Yes	No
jgroups-udp	55200	45688	Multicast peer discovery in HA clusters using UDP.	Yes	No	Yes	No
jgroups-udp-fd	54200		Used for HA failure detection over UDP.	Yes	No	Yes	No
messaging	5445		JMS service.	Yes	Yes	No	No

Name	Port	Multicast Port	Description	full-ha-sockets	full-sockets	ha-socket	standard-socket
messaging-group			Referenced by HornetQ JMS broadcast and discovery groups.	Yes	Yes	No	No
messaging-throughput	5455		Used by JMS Remoting.	Yes	Yes	No	No
mod_cluster		23364	Multicast port for communication between JBoss EAP 6 and the HTTP load balancer.	Yes	No	Yes	No
remoting	4447		Used for remote EJB invocation.	Yes	Yes	Yes	Yes
txn-recovery-environment	4712		The JTA transaction recovery manager.	Yes	Yes	Yes	Yes
txn-status-manager	4713		The JTA / JTS transaction manager.	Yes	Yes	Yes	Yes

Management Ports

In addition to the socket binding groups, each host controller opens two more ports for management purposes:

- **9990** - The Web Management Console port
- **9999** - The port used by the Management Console and Management API

Additionally, if HTTPS is enabled for the Management Console, 9443 is also opened as the default port.

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4.4. ABOUT ENCRYPTION

Encryption refers to obfuscating sensitive information by applying mathematical algorithms to it. Encryption is one of the foundations of securing your infrastructure from data breaches, system outages, and other risks.

Encryption can be applied to simple string data, such as passwords. It can also be applied to data communication streams. The HTTPS protocol, for instance, encrypts all data before transferring it from one party to another. If you connect from one server to another using the Secure Shell (SSH) protocol, all of your communication is sent in an encrypted *tunnel* .

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4.5. ABOUT SSL ENCRYPTION

Secure Sockets Layer (SSL) encrypts network traffic between two systems. Traffic between the two systems is encrypted using a two-way key, generated during the *handshake* phase of the connection and known only by those two systems.

For secure exchange of the two-way encryption key, SSL makes use of Public Key Infrastructure (PKI), a method of encryption that utilizes a *key pair*. A *key pair* consists of two separate but matching cryptographic keys - a public key and a private key. The public key is shared with others and is used to encrypt data, and the private key is kept secret and is used to decrypt data that has been encrypted using the public key.

When a client requests a secure connection, a handshake phase takes place before secure communication can begin. During the SSL handshake the server passes its public key to the client in the form of a certificate. The certificate contains the identity of the server (its URL), the public key of the server, and a digital signature that validates the certificate. The client then validates the certificate and makes a decision about whether the certificate is trusted or not. If the certificate is trusted, the client generates the two-way encryption key for the SSL connection, encrypts it using the public key of the server, and sends it back to the server. The server decrypts the two-way encryption key, using its private key, and further communication between the two machines over this connection is encrypted using the two-way encryption key.

WARNING

Red Hat recommends that you explicitly disable SSL in favor of TLSv1.1 or TLSv1.2 in all affected packages.

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4.6. IMPLEMENT SSL ENCRYPTION FOR THE JBOSS EAP 6 WEB SERVER

Introduction

Many web applications require an SSL-encrypted connection between clients and server, also known as a **HTTPS** connection. You can use this procedure to enable **HTTPS** on your server or server group.

WARNING

Red Hat recommends that you explicitly disable SSL in favor of TLSv1.1 or TLSv1.2 in all affected packages.

Prerequisites

- A set of SSL encryption keys and an SSL encryption certificate. You may purchase these from a certificate-signing authority, or you can generate them yourself using command-line utilities. To generate encryption keys using utilities available on Red Hat Enterprise Linux, see Section 4.7, “Generate a SSL Encryption Key and Certificate”.
- The following details about your specific environment and setup:
    - The full directory name where the certificate files are stored.
    - The encryption password for your encryption keys.
- Management CLI running and connected to your domain controller or standalone server.
- Select appropriate cipher suites.

Cipher Suites

There are a number of available cryptographic primitives used as building blocks to form cipher suites. The first table lists recommended cryptographic primitives. The second lists cryptographic primitives which, while they *may* be used for compatibility with existing software, are not considered as secure as those recommended.

WARNING

Red Hat recommends selectively whitelisting a set of strong ciphers to use for **cipher-suite**. Enabling weak ciphers is a significant security risk. Consult your JDK vendor's documentation before deciding on particular cipher suites as there may be compatibility issues.

Table 4.2. Recommended Cryptographic Primitives

RSA with 2048 bit keys and OAEP
AES-128 in CBC mode
SHA-256
HMAC-SHA-256

HMAC-SHA-1

Table 4.3. Other Cryptographic Primitives

RSA with key sizes larger than 1024 and legacy padding
AES-192
AES-256
3DES (triple DES, with two or three 56 bit keys)
RC4 (strongly discouraged)
SHA-1
HMAC-MD5

For a full listing of parameters you can set for the SSL properties of the connector, see Section 4.8, “SSL Connector Reference”.

NOTE

This procedure uses commands appropriate for a JBoss EAP 6 configuration that uses a managed domain. If you use a standalone server, modify Management CLI commands by removing the **/profile=default** from the beginning of any management CLI commands and replace instances of the **jboss.domain.config.dir** property with **jboss.server.config.dir** (as **jboss.domain.config.dir** is not available in standalone mode).

WARNING

Red Hat recommends that you explicitly disable SSL in favor of TLSv1.1 or TLSv1.2 in all affected packages.

Procedure 4.4. Configure the JBoss Web Server to use HTTPS

1. **Add a new HTTPS connector.**
   Create a secure connector, named *HTTPS*, which uses the **https** scheme, the **https** socket binding (which defaults to **8443**), and is set to be secure.

   ```
   /profile=default/subsystem=web/connector=HTTPS/:add(socket-binding=https,scheme=https,protocol=HTTP/1.1,secure=true)
   ```

2. **Configure the SSL encryption certificate and keys.**

Configure your SSL certificate, substituting your own values for the example ones. This example assumes that the keystore is copied to the server configuration directory, which is ***EAP_HOME*/domain/configuration/** for a managed domain.

```
/profile=default/subsystem=web/connector=HTTPS/ssl=configuration:add(name=https,certificate
-key-file="${jboss.domain.config.dir}/keystore.jks",password=SECRET, key-
alias=KEY_ALIAS, cipher-suite=CIPHERS)
```

3. **Set the protocol to TLSv1.**

```
/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-
attribute(name=protocol,value=TLSv1)
```

4. **Deploy an application.**
   Deploy an application to a server group which uses the profile you have configured. If you use a standalone server, deploy an application to your server. HTTPS requests to it use the new SSL-encrypted connection.

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4.7. GENERATE A SSL ENCRYPTION KEY AND CERTIFICATE

To use a SSL-encrypted HTTP connection (HTTPS), as well as other types of SSL-encrypted communication, you need a signed encryption certificate. You can purchase a certificate from a Certificate Authority (CA), or you can use a self-signed certificate. Self-signed certificates are not considered trustworthy by many third parties, but are appropriate for internal testing purposes.

This procedure enables you to create a self-signed certificate using utilities which are available on Red Hat Enterprise Linux.

Prerequisites

- You need the **keytool** utility, which is provided by any Java Development Kit implementation. OpenJDK on Red Hat Enterprise Linux installs this command to **/usr/bin/keytool**.

- Understand the syntax and parameters of the **keytool** command. This procedure uses extremely generic instructions, because further discussion of the specifics of SSL certificates or the **keytool** command are out of scope for this documentation.

Procedure 4.5. Generate a SSL Encryption Key and Certificate

1. **Generate a keystore with public and private keys.**
   Run the following command to generate a keystore named **server.keystore** with the alias **jboss** in your current directory.

```
keytool -genkeypair -alias jboss -keyalg RSA -keystore server.keystore -storepass
mykeystorepass --dname
"CN=jsmith,OU=Engineering,O=mycompany.com,L=Raleigh,S=NC,C=US"
```

The following table describes the parameters used in the keytool command:

Parameter	Description
-genkeypair	The **keytool** command to generate a key pair containing a public and private key.
-alias	The alias for the keystore. This value is arbitrary, but the alias **jboss** is the default used by the JBoss Web server.
-keyalg	The key pair generation algorithm. In this case it is **RSA**.
-keystore	The name and location of the keystore file. The default location is the current directory. The name you choose is arbitrary. In this case, the file will be named **server.keystore**.
-storepass	This password is used to authenticate to the keystore so that the key can be read. The password must be at least 6 characters long and must be provided when the keystore is accessed. In this case, we used **mykeystorepass**. If you omit this parameter, you will be prompted to enter it when you execute the command.
-keypass	This is the password for the actual key. NOTE Due to an implementation limitation this must be the same as the store password.

Parameter	Description
--dname	A quoted string describing the distinguished name for the key, for example: "CN=jsmith,OU=Engineering,O=mycompany.com,L=Raleigh,C=US". This string is a concatenation of the following components: ◦ **CN** - The common name or host name. If the hostname is "jsmith.mycompany.com", the **CN** is "jsmith". ◦ **OU** - The organizational unit, for example "Engineering" ◦ **O** - The organization name, for example "mycompany.com". ◦ **L** - The locality, for example "Raleigh" or "London" ◦ **S** - The state or province, for example "NC". This parameter is optional. ◦ **C** - The 2 letter country code, for example "US" or "UK",

When you execute the above command, you are prompted for the following information:

- If you did not use the ***-storepass*** parameter on the command line, you are asked to enter the keystore password. Re-enter the new password at the next prompt.
- If you did not use the **-keypass** parameter on the command line, you are asked to enter the key password. Press **Enter** to set this to the same value as the keystore password.

When the command completes, the file **server.keystore** now contains the single key with the alias **jboss**.

2. **Verify the key.**
Verify that the key works properly by using the following command.

```
keytool -list -keystore server.keystore
```

You are prompted for the keystore password. The contents of the keystore are displayed (in this case, a single key called **jboss**). Notice the type of the **jboss** key, which is **PrivateKeyEntry**. This indicates that the keystore contains both a public and private entry for this key.

3. **Generate a certificate signing request.**
Run the following command to generate a certificate signing request using the public key from the keystore you created in step 1.

```
keytool -certreq -keyalg RSA -alias jboss -keystore server.keystore -file certreq.csr
```

You are prompted for the password in order to authenticate to the keystore. The **keytool** command then creates a new certificate signing request called **certreq.csr** in the current working directory.

4. **Test the newly generated certificate signing request.**
   Test the contents of the certificate by using the following command.

   ```
   openssl req -in certreq.csr -noout -text
   ```

   The certificate details are shown.

5. **Optional: Submit your certificate signing request to a Certificate Authority (CA).**
   A Certificate Authority (CA) can authenticate your certificate so that it is considered trustworthy by third-party clients. The CA supplies you with a signed certificate, and optionally with one or more intermediate certificates.

6. **Optional: Export a self-signed certificate from the keystore.**
   If you only need it for testing or internal purposes, you can use a self-signed certificate. You can export one from the keystore you created in step 1 as follows:

   ```
   keytool -export -alias jboss -keystore server.keystore -file server.crt
   ```

   You are prompted for the password in order to authenticate to the keystore. A self-signed certificate, named **server.crt**, is created in the current working directory.

7. **Import the signed certificate, along with any intermediate certificates.**
   Import each certificate, in the order that you are instructed by the CA. For each certificate to import, replace **intermediate.ca** or **server.crt** with the actual file name. If your certificates are not provided as separate files, create a separate file for each certificate, and paste its contents into the file.

   NOTE

   Your signed certificate and certificate keys are valuable assets. Be cautious with how you transport them between servers.

   ```
   keytool -import -keystore server.keystore -alias intermediateCA -file intermediate.ca
   ```

   ```
   keytool -importcert -alias jboss -keystore server.keystore -file server.crt
   ```

8. **Test that your certificates imported successfully.**
   Run the following command, and enter the keystore password when prompted. The contents of your keystore are displayed, and the certificates are part of the list.

   ```
   keytool -list -keystore server.keystore
   ```

Result

Your signed certificate is now included in your keystore and is ready to be used to encrypt SSL connections, including HTTPS web server communications.

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4.8. SSL CONNECTOR REFERENCE

JBoss Web connectors may include the following SSL configuration attributes. The CLI commands provided are designed for a managed domain using profile **default**. Change the profile name to the one you wish to configure, for a managed domain, or omit the **/profile=default** portion of the command, for a standalone server.

NOTE

Before using the **write-attribute** CLI command listed in the table, you need to add **ssl=configuration**.

Table 4.4. SSL Connector Attributes

Attribute	Description	CLI Command
name	The display name of the SSL connector.	Attribute **name** is read-only.

verify-client	The possible values of **verify-client** differ, based upon whether the HTTP/HTTPS connector is used, or the native APR connector is used.
	
	HTTP/HTTPS Connector
	
	Possible values are **true**, **false**, or **want**. Set to **true** to require a valid certificate chain from the client before accepting a connection. Set to **want** if you want the SSL stack to request a client Certificate, but not fail if one is not presented. Set to **false** (the default) to not require a certificate chain unless the client requests a resource protected by a security constraint that uses **CLIENT-CERT** authentication.
	
	Before using the **write-attribute** CLI command, you need to add the APR connector.
	
	Native APR Connector
	
	Possible values are **optional**, **require**, **optionalNoCA**, and **none** (or any other string, which will have the same effect as **none**). These values determine whether a certification is optional, required, optional without a Certificate Authority, or not required at all. The default is **none**, meaning the client will not have the opportunity to submit a certificate.
		The first example command uses the HTTPS connector.
		
		`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=verify-client,value=want)`
		
		The second example command uses the APR connector.
		
		`/profile=default/subsystem=web/connector=APR/ssl=configuration/:write-attribute(name=verify-client,value=require)`

Attribute	Description	CLI Command
verify-depth	The maximum number of intermediate certificate issuers checked before deciding that the clients do not have a valid certificate. The default value is **10**.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=verify-depth,value=10)`
certificate-key-file	The full file path and file name of the keystore file where the signed server certificate is stored. With JSSE encryption, this certificate file will be the only one, while OpenSSL uses several files. The default value is the **.keystore** file in the home directory of the user running JBoss EAP 6. If your **keystoreType** does not use a file, set the parameter to an empty string.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=certificate-key-file,value=../domain/configuration/server.keystore)`
certificate-file	If you use OpenSSL encryption, set the value of this parameter to the path to the file containing the server certificate.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=certificate-file,value=server.crt)`
password	The password for both the truststore and keystore. In the following example, replace *PASSWORD* with your own password.	/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=password,value=*PASSWORD*)

Attribute	Description	CLI Command

protocol	The version of the SSL protocol to use. Supported values depend on the underlying SSL implementation (whether JSSE or OpenSSL). Refer to the Java SSE Documentation.
	
	You can also specify a combination of protocols, which is comma separated. For example, TLSv1, TLSv1.1,TLSv1.2.
	
	WARNING
	
	Red Hat recommends that you explicitly disable SSL in favor of TLSv1.1 or TLSv1.2 in all affected packages.
		`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=protocol,value=ALL)`
		
		`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=protocol,value="TLSv1, TLSv1.1,TLSv1.2")`

Attribute	Description	CLI Command
cipher-suite	A list of the encryption ciphers which are allowed. For JSSE syntax, it must be a comma-separated list. For OpenSSL syntax, it must be a colon-separated list. Ensure that you only use one syntax. The default is **HIGH:!aNULL:!eNULL:!EXPORT:!DES:!RC4:!MD5**. The example only lists two possible ciphers, but real-world examples will likely use more. IMPORTANT Using weak ciphers is a significant security risk. See http://www.nist.gov/manuscript-publication-search.cfm?pub_id=915295 for NIST recommendations on cipher suites. For a list of available OpenSSL ciphers, see https://www.openssl.org/docs/apps/ciphers.html#CIPHER_STRINGS. Note that the following are not supported: **@SECLEVEL**, **SUITEB128**, **SUITEB128ONLY**, **SUITEB192**.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=cipher-suite, value="TLS_RSA_WITH_AES_128_CBC_SHA,TLS_RSA_WITH_AES_256_CBC_SHA")`
key-alias	The alias used to for the server certificate in the keystore. In the following example, replace *KEY_ALIAS* with your certificate's alias.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=key-alias,value=KEY_ALIAS)`
truststore-type	The type of the truststore. Various types of truststores are available, including **PKCS12** and Java's standard **JKS**.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=truststore-type,value=jks)`

Attribute	Description	CLI Command
keystore-type	The type of the keystore, Various types of keystores are available, including **PKCS12** and Java's standard **JKS**.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=keystore-type,value=jks)`
ca-certificate-file	The file containing the CA certificates. This is the **truststoreFile**, in the case of JSSE, and uses the same password as the keystore. The **ca-certificate-file** file is used to validate client certificates.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=certificate-file,value=ca.crt)`
ca-certificate-password	The Certificate password for the **ca-certificate-file**. In the following example, replace the *MASKED_PASSWORD* with your own masked password.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=ca-certificate-password,value=MASKED_PASSWORD)`
ca-revocation-url	A file or URL which contains the revocation list. It refers to the **crlFile** for JSSE or the **SSLCARevocationFile** for SSL.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=ca-revocation-url,value=ca.crl)`
session-cache-size	The size of the SSLSession cache. This attribute applies only to JSSE connectors. The default is **0**, which specifies an unlimited cache size.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=session-cache-size,value=100)`
session-timeout	The number of seconds before a cached SSLSession expires. This attribute applies only to JSSE connectors. The default is **86400** seconds, which is 24 hours.	`/profile=default/subsystem=web/connector=HTTPS/ssl=configuration/:write-attribute(name=session-timeout,value=43200)`

NOTE

For performance testing, you must set one explicit cipher and protocol.

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4.9. FIPS 140-2 COMPLIANT ENCRYPTION

4.9.1. About FIPS 140-2 Compliance

The Federal Information Processing Standard 140-2 (FIPS 140-2) is a US government computer security standard for the accreditation of cryptographic software modules. FIPS 140-2 compliance is often a requirement of software systems used by government agencies and private sector business.

JBoss EAP 6 uses external modules encryption and can be configured to use a FIPS 140-2 compliant cryptography module.

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4.9.2. FIPS 140-2 Compliant Cryptography on IBM JDK

On the IBM JDK, the IBM® JCE (Java™ Cryptographic Extension) IBMJCEFIPS provider and the IBM JSSE (Java Secure Sockets Extension) FIPS 140-2 Cryptographic Module (IBMJSSEFIPS) for Multi-platforms provide FIPS 140-2 compliant cryptography.

For more information on the IBMJCEFIPS provider, refer to the IBM Documentation for IBM JCEFIPS , and the NIST IBMJCEFIPS – Security Policy .

Key storage

Note that the IBM JCE does not provide a keystore. The keys are stored on the computer and do not leave its physical boundary. If the keys are moved between computers they must be encrypted.

To run **keytool** in FIPS-compliant mode use the **-providerClass** option on each command like this:

```
keytool -list -storetype JCEKS -keystore mystore.jck -storepass mystorepass -providerClass
com.ibm.crypto.fips.provider.IBMJCEFIPS
```

Examine FIPS provider information

To examine information about the IBMJCEFIPS used by the server, enable debug-level logging by adding **-Djavax.net.debug=true** to **standalone.conf** or **domain.conf**. Information about the FIPS provider is logged to **server.log**, for example:

```
04:22:45,685 INFO  [stdout] (http-/127.0.0.1:8443-1) JsseJCE:  Using MessageDigest SHA from
provider IBMJCEFIPS version 1.7
04:22:45,689 INFO  [stdout] (http-/127.0.0.1:8443-1) DHCrypt:  DH KeyPairGenerator  from provider
from init IBMJCEFIPS version 1.7
04:22:45,754 INFO  [stdout] (http-/127.0.0.1:8443-1) JsseJCE:  Using KeyFactory DiffieHellman from
provider IBMJCEFIPS version 1.7
04:22:45,754 INFO  [stdout] (http-/127.0.0.1:8443-1) JsseJCE:  Using KeyAgreement DiffieHellman
from provider IBMJCEFIPS version 1.7
04:22:45,754 INFO  [stdout] (http-/127.0.0.1:8443-1) DHCrypt:  DH KeyAgreement  from provider
IBMJCEFIPS version 1.7
04:22:45,754 INFO  [stdout] (http-/127.0.0.1:8443-1) DHCrypt:  DH KeyAgreement  from provider
from initIBMJCEFIPS version 1.7
```

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4.9.3. FIPS 140-2 Compliant Passwords

A FIPS compliant password must have the following characteristics:

1. Must be at least seven (7) characters in length.
2. Must include characters from at least three (3) of the following character classes:
    - ASCII digits,
    - lowercase ASCII,
    - uppercase ASCII,
    - non-alphanumeric ASCII, and
    - non-ASCII.

If the first character of the password is an uppercase ASCII letter, then it is not counted as an uppercase ASCII letter for restriction 2.

If the last character of the password is an ASCII digit, then it does not count as an ASCII digit for restriction 2.

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4.9.4. Enable FIPS 140-2 Cryptography for SSL on Red Hat Enterprise Linux 6

This task describes how to configure the web container (JBoss Web) of JBoss EAP 6 to FIPS 140-2 compliant cryptography for SSL. This task only covers the steps to do this on Red Hat Enterprise Linux 6.

This task uses the Mozilla NSS library in FIPS mode for this feature.

Prerequisites

- Red Hat Enterprise Linux 6 must already be configured to be FIPS 140-2 compliant. Refer to https://access.redhat.com/knowledge/solutions/137833.

Procedure 4.6. Enable FIPS 140-2 Compliant Cryptography for SSL

1. **Create the database**
   Create the NSS database in a directory own by the **jboss** user.

   NOTE

   The **jboss** user is only an example. You need to replace it with a user on your operating system.

   ```
   $ mkdir -p  /usr/share/jboss-as/nssdb
   $ chown jboss /usr/share/jboss-as/nssdb
   $ modutil -create -dbdir /usr/share/jboss-as/nssdb
   ```

2. **Create NSS configuration file**

Create a new text file with the name **nss_pkcsll_fips.cfg** in the **/usr/share/jboss-as** directory with the following contents:

```
name = nss-fips
nssLibraryDirectory=/usr/lib64
nssSecmodDirectory=/usr/share/jboss-as/nssdb
nssModule = fips
```

The NSS configuration file must specify:

- a name,
- the directory where the NSS library is located, and
- the directory where the NSS database was created as per step 1.

If you are not running a 64bit version of Red Hat Enterprise Linux 6 then set **nssLibraryDirectory** to **/usr/lib** instead of **/usr/lib64**.

3. **Enable SunPKCS11 provider**
   Edit the **java.security** configuration file for your JRE (**$JAVA_HOME/jre/lib/security/java.security**) and add the following line:

   ```
   security.provider.1=sun.security.pkcs11.SunPKCS11 /usr/share/jboss-as/nss_pkcsll_fips.cfg
   ```

   Note that the configuration file specified in this line is the file created in step 2.

   Any other ***security.provider.X*** lines in this file must have the value of their *X* increased by one to ensure that this provider is given priority.

4. **Enable FIPS mode for the NSS library**
   Run the **modutil** command as shown to enable FIPS mode:

   ```
   modutil -fips true -dbdir /usr/share/jboss-as/nssdb
   ```

   Note that the directory specified here is the one created in step 1.

   You may get a security library error at this point requiring you to regenerate the library signatures for some of the NSS shared objects.

5. **Change the password on the FIPS token**
   Set the password on the FIPS token using the following command. Note that the name of the token must be **NSS FIPS 140-2 Certificate DB**.

   ```
   modutil -changepw "NSS FIPS 140-2 Certificate DB" -dbdir /usr/share/jboss-as/nssdb
   ```

   The password used for the FIPS token must be a FIPS compliant password.

6. **Create certificate using NSS tools**
   Enter the following command to create a certificate using the NSS tools.

   ```
   certutil -S -k rsa -n jbossweb  -t "u,u,u" -x -s "CN=localhost, OU=MYOU, O=MYORG,
   L=MYCITY, ST=MYSTATE, C=MY" -d /usr/share/jboss-as/nssdb
   ```

7. **Configure the HTTPS connector to use the PKCS11 keystore**
   Add a HTTPS connector using the following command in the JBoss CLI Tool:

   ```
   /subsystem=web/connector=https/:add(socket-
   binding=https,scheme=https,protocol=HTTP/1.1,secure=true)
   ```

   Then add the SSL configuration with the following command, replacing PASSWORD with the FIPS compliant password from step 5.

   ```
   /subsystem=web/connector=https/ssl=configuration:add(name=https,password=PASSWORD,ke
   ystore-type=PKCS11,
   cipher-
   suite="SSL_RSA_WITH_3DES_EDE_CBC_SHA,SSL_DHE_RSA_WITH_3DES_EDE_CBC_S
   HA,
   TLS_RSA_WITH_AES_128_CBC_SHA,TLS_DHE_DSS_WITH_AES_128_CBC_SHA,
   TLS_DHE_RSA_WITH_AES_128_CBC_SHA,TLS_RSA_WITH_AES_256_CBC_SHA,
   TLS_DHE_DSS_WITH_AES_256_CBC_SHA,TLS_DHE_RSA_WITH_AES_256_CBC_SHA,
   TLS_ECDH_ECDSA_WITH_3DES_EDE_CBC_SHA,TLS_ECDH_ECDSA_WITH_AES_128_
   CBC_SHA,
   TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA,TLS_ECDHE_ECDSA_WITH_3DES_EDE
   _CBC_SHA,
   TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA,TLS_ECDHE_ECDSA_WITH_AES_256_
   CBC_SHA,
   TLS_ECDH_RSA_WITH_3DES_EDE_CBC_SHA,TLS_ECDH_RSA_WITH_AES_128_CBC_S
   HA,
   TLS_ECDH_RSA_WITH_AES_256_CBC_SHA,TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_
   SHA,
   TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA,TLS_ECDHE_RSA_WITH_AES_256_CBC_
   SHA,
   TLS_ECDH_anon_WITH_3DES_EDE_CBC_SHA,TLS_ECDH_anon_WITH_AES_128_CBC_
   SHA,
   TLS_ECDH_anon_WITH_AES_256_CBC_SHA")
   ```

8. **Verify**
   Verify that the JVM can read the private key from the PKCS11 keystore by running the following command:

   ```
   keytool -list -storetype pkcs11
   ```

Example 4.5. XML configuration for HTTPS connector using FIPS 140-2 compliance

```
<connector name="https" protocol="HTTP/1.1" scheme="https" socket-binding="https"
secure="true">
  <ssl name="https" password="****"
      cipher-
suite="SSL_RSA_WITH_3DES_EDE_CBC_SHA,SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,

        TLS_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_DSS_WITH_AES_128_CBC_SHA,
        TLS_DHE_RSA_WITH_AES_128_CBC_SHA,TLS_RSA_WITH_AES_256_CBC_SHA,

TLS_DHE_DSS_WITH_AES_256_CBC_SHA,TLS_DHE_RSA_WITH_AES_256_CBC_SHA,

TLS_ECDH_ECDSA_WITH_3DES_EDE_CBC_SHA,TLS_ECDH_ECDSA_WITH_AES_128_CBC_
SHA,
```

```
TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA,TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC
_SHA,

TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA,TLS_ECDHE_ECDSA_WITH_AES_256_CBC
_SHA,

TLS_ECDH_RSA_WITH_3DES_EDE_CBC_SHA,TLS_ECDH_RSA_WITH_AES_128_CBC_SHA,


TLS_ECDH_RSA_WITH_AES_256_CBC_SHA,TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA
,

TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA,TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA,


TLS_ECDH_anon_WITH_3DES_EDE_CBC_SHA,TLS_ECDH_anon_WITH_AES_128_CBC_SHA,

      TLS_ECDH_anon_WITH_AES_256_CBC_SHA"
    keystore-type="PKCS11"/>
</connector>
```

Note that the **cipher-suite** attribute has linebreaks inserted to make it easier to read.

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CHAPTER 5. SECURE THE MANAGEMENT INTERFACES

A common development scenario is to run JBoss EAP 6 with no security on the management interfaces to allow rapid configuration changes.

In production deployment, secure the management interfaces by at least the following methods:

- Section 4.1, “Specify Which Network Interface JBoss EAP 6 Uses”
- Section 4.2, “Configure Network Firewalls to Work with JBoss EAP 6”

Additionally, the default silent local authentication mode allows local clients (on the server machine) to connect to the Management CLI without requiring a username or password. This is a convenience for local users and Management CLI scripts. To disable this, refer to Section 5.4, “Remove Silent Authentication from the Default Security Realm”.

Report a bug

5.1. DEFAULT USER SECURITY CONFIGURATION

Introduction

All management interfaces in JBoss EAP 6 are secured by default. This security takes two different forms:

- Local interfaces are secured by a SASL contract between local clients and the server they connect to. This security mechanism is based on the client's ability to access the local filesystem. This is because access to the local filesystem would allow the client to add a user or otherwise change the configuration to thwart other security mechanisms. This adheres to the principle that if physical access to the filesystem is achieved, other security mechanisms are superfluous. The mechanism happens in four steps:

  NOTE

  HTTP access is considered to be remote, even if you connect to the localhost using HTTP.

  1. The client sends a message to the server which includes a request to authenticate with the local SASL mechanism.
  2. The server generates a one-time token, writes it to a unique file, and sends a message to the client with the full path of the file.
  3. The client reads the token from the file and sends it to the server, verifying that it has local access to the filesystem.
  4. The server verifies the token and then deletes the file.

- Remote clients, including local HTTP clients, use realm-based security. The default realm with the permissions to configure the JBoss EAP 6 instance remotely using the management interfaces is **ManagementRealm**. A script is provided which allows you to add users to this realm (or realms you create). For more information on adding users, see the *User Management* chapter of the *JBoss EAP 6 Administration and Configuration Guide* . For each user, the username and a hashed password are stored in a file.

Managed domain

***EAP_HOME*/domain/configuration/mgmt-users.properties**

Standalone server

***EAP_HOME*/standalone/configuration/mgmt-users.properties**

Even though the contents of the **mgmt-users.properties** are masked, the file must still be treated as a sensitive file. It is recommended that it be set to the file mode of **600**, which gives no access other than read and write access by the file owner.

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5.2. OVERVIEW OF ADVANCED MANAGEMENT INTERFACE CONFIGURATION

The Management interface configuration in the ***EAP_HOME*/domain/configuration/host.xml** or ***EAP_HOME*/standalone/configuration/standalone.xml** controls which network interfaces the host controller process binds to, which types of management interfaces are available at all, and which type of authentication system is used to authenticate users on each interface. This topic discusses how to configure the Management Interfaces to suit your environment.

The Management subsystem consists of a **<management>** element that includes the following four configurable child elements. The security realms and outbound connections are each first defined, and then applied to the management interfaces as attributes.

- <security-realms>
- <outbound-connections>
- <management-interfaces>
- <audit-log>

NOTE

Refer to the *Management Interface Audit Logging* section of the *Administration and Configuration Guide* for more information on audit logging.

Security Realms

The security realm is responsible for the authentication and authorization of users allowed to administer JBoss EAP 6 via the Management API, Management CLI, or web-based Management Console.

Two different file-based security realms are included in a default installation: **ManagementRealm** and **ApplicationRealm**. Each of these security realms uses a **-users.properties** file to store users and hashed passwords, and a **-roles.properties** to store mappings between users and roles. Support is also included for an LDAP-enabled security realm.

NOTE

Security realms can also be used for your own applications. The security realms discussed here are specific to the management interfaces.

Outbound Connections

Some security realms connect to external interfaces, such as an LDAP server. An outbound connection defines how to make this connection. A pre-defined connection type, **ldap-connection**, sets all of the required and optional attributes to connect to the LDAP server and verify the credential.

For more information on how to configure LDAP authentication see Section 5.11.2, “Use LDAP to Authenticate to the Management Interfaces”.

Management Interfaces

A management interface includes properties about how connect to and configure JBoss EAP. Such information includes the named network interface, port, security realm, and other configurable information about the interface. Two interfaces are included in a default installation:

- **http-interface** is the configuration for the web-based Management Console.
- **native-interface** is the configuration for the command-line Management CLI and the REST-like Management API.

Each of the main configurable elements of the host management subsystem are interrelated. A security realm refers to an outbound connection, and a management interface refers to a security realm.

Associated information can be found in Chapter 5, *Secure the Management Interfaces*.

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5.3. DISABLE THE HTTP MANAGEMENT INTERFACE

In a managed domain, you only need access to the HTTP interface on the domain controller, rather than on domain member servers. In addition, on a production server, you may decide to disable the web-based Management Console altogether.

NOTE

Other clients, such as JBoss Operations Network, also operate using the HTTP interface. If you want to use these services, and simply disable the Management Console itself, you can set the **console-enabled** attribute of the HTTP interface to **false**, instead of disabling the interface completely.

```
/host=master/core-service=management/management-interface=http-interface/:write-attribute(name=console-enabled,value=false)
```

To disable access to the HTTP interface, which also disables access to the web-based Management Console, you can delete the HTTP interface altogether.

The following JBoss CLI command allows you to read the current contents of your HTTP interface, in case you decide to add it again.

Example 5.1. Read the Configuration of the HTTP Interface

```
/host=master/core-service=management/management-interface=http-interface/:read-resource(recursive=true,proxies=false,include-runtime=false,include-defaults=true)
{
    "outcome" => "success",
    "result" => {
        "console-enabled" => true,
        "interface" => "management",
        "port" => expression "${jboss.management.http.port:9990}",
        "secure-port" => undefined,
        "security-realm" => "ManagementRealm"
    }
}
```

To remove the HTTP interface, issue the following command:

Example 5.2. Remove the HTTP Interface

```
/host=master/core-service=management/management-interface=http-interface/:remove
```

To re-enable access, issue the following commands to re-create the HTTP Interface with the default values.

Example 5.3. Re-Create the HTTP Interface

```
/host=master/core-service=management/management-interface=http-interface:add(console-
enabled=true,interface=management,port="${jboss.management.http.port:9990}",security-
realm=ManagementRealm)
```

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5.4. REMOVE SILENT AUTHENTICATION FROM THE DEFAULT SECURITY REALM

Summary

The default installation of JBoss EAP 6 contains a method of silent authentication for a local Management CLI user. This allows the local user the ability to access the Management CLI without username or password authentication. This functionality is enabled as a convenience, and to assist local users running Management CLI scripts without requiring authentication. It is considered a useful feature given that access to the local configuration typically also gives the user the ability to add their own user details or otherwise disable security checks.

The convenience of silent authentication for local users can be disabled where greater security control is required. This can be achieved by removing the **local** element within the **security-realm** section of the configuration file. This applies to both the **standalone.xml** for a Standalone Server instance, or **host.xml** for a Managed Domain. You should only consider the removal of the **local** element if you understand the impact that it might have on your particular server configuration.

The preferred method of removing silent authentication is by use of the Management CLI, which directly removes the **local** element visible in the following example.

Example 5.4. Example of the local element in the security-realm

```
<security-realms>
```

```
    <security-realm name="ManagementRealm">
        <authentication>
            <local default-user="$local"/>
            <properties path="mgmt-users.properties" relative-to="jboss.server.config.dir"/>
        </authentication>
    </security-realm>
    <security-realm name="ApplicationRealm">
        <authentication>
            <local default-user="$local" allowed-users="*"/>
            <properties path="application-users.properties" relative-to="jboss.server.config.dir"/>
        </authentication>
        <authorization>
            <properties path="application-roles.properties" relative-to="jboss.server.config.dir"/>
        </authorization>
    </security-realm>
</security-realms>
```

Prerequisites

- Start the JBoss EAP 6 instance.
- Launch the Management CLI.

Procedure 5.1. Remove Silent Authentication from the Default Security Realm

- **Remove silent authentication with the Management CLI**
  Remove the **local** element from the Management Realm and Application Realm as required.

  a. Remove the **local** element from the Management Realm.

     - **For Standalone Servers**

       ```
       /core-service=management/security-
       realm=ManagementRealm/authentication=local:remove
       ```

     - **For Managed Domains**

       ```
       /host=HOST_NAME/core-service=management/security-
       realm=ManagementRealm/authentication=local:remove
       ```

  b. Remove the **local** element from the Application Realm.

     - **For Standalone Servers**

       ```
       /core-service=management/security-
       realm=ApplicationRealm/authentication=local:remove
       ```

     - **For Managed Domains**

       ```
       /host=HOST_NAME/core-service=management/security-
       realm=ApplicationRealm/authentication=local:remove
       ```

Result

The silent authentication mode is removed from the **ManagementRealm** and the **ApplicationRealm**.

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5.5. DISABLE REMOTE ACCESS TO THE JMX SUBSYSTEM

Remote access to the JMX subsystem allows you to trigger JDK and application management operations remotely. In order to secure an installation, disable this function either by removing the remoting connector or removing the JMX subsystem. The example Management CLI commands are suitable for a managed domain. For a standalone server, remove the **/profile=default** prefix from the commands.

NOTE

In a managed domain the remoting connector is removed from the JMX subsystem by default. This command is provided for your information, in case you add it during development.

Example 5.5. Remove the Remoting Connector from the JMX Subsystem

```
/profile=default/subsystem=jmx/remoting-connector=jmx/:remove
```

Example 5.6. Remove the JMX Subsystem

For a managed domain, run this command for each profile.

```
/profile=default/subsystem=jmx/:remove
```

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5.6. CONFIGURE SECURITY REALMS FOR THE MANAGEMENT INTERFACES

The management interfaces use security realms to control authentication and access to the configuration mechanisms of JBoss EAP 6. A Security Realm is similar to a Unix group. It is effectively a database of usernames and passwords that can be use to authenticate users.

Default Management Realm

The management interfaces are configured to use the **ManagementRealm** security realm by default. The ManagementRealm stores its user password combinations in the file **mgmt-users.properties**.

Example 5.7. Default ManagementRealm

```
/host=master/core-service=management/security-realm=ManagementRealm/:read-
resource(recursive=true,proxies=false,include-runtime=false,include-defaults=true)
{
    "outcome" => "success",
    "result" => {
        "map-groups-to-roles" => false,
        "authentication" => {
            "local" => {
                "allowed-users" => undefined,
                "default-user" => "$local"
            },
            "properties" => {
                "path" => "mgmt-users.properties",
                "plain-text" => false,
                "relative-to" => "jboss.domain.config.dir"
            }
        },
        "authorization" => {"properties" => {
            "path" => "mgmt-groups.properties",
            "relative-to" => "jboss.domain.config.dir"
        }},
        "plug-in" => undefined,
        "server-identity" => undefined
    }
}
```

Create a new Security Realm

The following commands create a new security realm called **TestRealm** and set the directory for the relevant properties file.

Example 5.8. Create a new Security Realm

```
/host=master/core-service=management/security-realm=TestRealm/:add
/host=master/core-service=management/security-
realm=TestRealm/authentication=properties/:add(path=TestUsers.properties, relative-
to=jboss.domain.config.dir)
```

Configure Security Realm authentication through an existing Security Domain

To use Security Domain to authenticate to the Management interfaces:

First, create a Security Realm. Then, set specify it as the value for the **security-realm** attribute of the management interface:

Example 5.9. Specify a Security Realm to use for the HTTP Management Interface

```
/host=master/core-service=management/management-interface=http-interface/:write-
attribute(name=security-realm,value=TestRealm)
```

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5.7. CONFIGURE THE MANAGEMENT CONSOLE FOR HTTPS

Configuring the JBoss EAP management console for communication **only** via HTTPS provides increased security. All network traffic between the client (web browser) and management console is encrypted, which reduces the risk of security attacks such as a man-in-the-middle attack. Anyone administering a JBoss EAP instance has greater permissions on that instance than non-privileged users, and using HTTPS helps protect the integrity and availability of that instance.

In this procedure unencrypted communications with the JBoss EAP standalone instance or domain is disabled. Passwords used in these communications are stored encrypted using the JBoss EAP **vault** feature, and passwords used in configuration files are masked.

This procedure applies to both **standalone** and **domain** mode configurations. For **domain** mode, prefix the management CLI commands with the name of the host, for example: **/host=master**.

Procedure 5.2.

1. **Create a keystore to secure the management console.**

   NOTE

   This keystore must be in JKS format as the management console is not compatible with keystores in JCEKS format.

   In a terminal emulator, enter the following command. For the parameters ***alias***, ***keypass***, ***keystore***, ***storepass*** and ***dname***, replace the example values with values of your choice.

   The parameter ***validity*** specifies for how many days the key is valid. A value of 730 equals two years.

   ```
   keytool -genkeypair -alias appserver -storetype jks -keyalg RSA -keysize 2048 -keypass
   password1 -keystore EAP_HOME/standalone/configuration/identity.jks -storepass
   password1 -dname "CN=appserver,OU=Sales,O=Systems Inc,L=Raleigh,ST=NC,C=US" -
   validity 730 -v
   ```

2. **Ensure the Management Console Binds to HTTPS**

   - Standalone Mode
     Ensure the management console binds to **HTTPS** for its interface by adding the **management-https** configuration and removing the **management-http** configuration.

     Ensure the JBoss EAP instance is running, then enter the following management CLI commands:

     ```
     /core-service=management/management-interface=http-interface:write-
     attribute(name=secure-socket-binding, value=management-https)
     ```

     ```
     /core-service=management/management-interface=http-interface:undefine-
     attribute(name=socket-binding)
     ```

     The expected output from these commands is:

     ```
     {"outcome" => "success"}
     ```

NOTE

At this point the JBoss EAP log may display the following error message. This is to be expected because the SSL configuration is not yet completed.

```
JBAS015103: A secure port has been specified for the HTTP interface but no SSL configuration in the realm.
```

- **Domain Mode**
  Change the socket element within the management-interface section by adding secure-port and removing port configuration.

  Ensure the JBoss EAP instance is running, then enter the following management CLI commands:

```
/host=master/core-service=management/management-interface=http-interface:write-attribute(name=secure-port,value=9443)
/host=master/core-service=management/management-interface=http-interface:undefine-attribute(name=port)
```

NOTE

At this point the JBoss EAP log may display the following error message. This is to be expected because the SSL configuration is not yet completed.

```
JBAS015103: A secure port has been specified for the HTTP interface but no SSL configuration in the realm.
```

3. **Optional: Custom socket-binding group**
   If you are using a custom ***socket-binding*** group, ensure the ***management-https*** binding is defined (it is present by default, bound to port **9443**). Edit the master configuration file - for example **standalone.xml** - to match the following.

```
 <socket-binding-group name="standard-sockets" default-interface="public" port-offset="${jboss.socket.binding.port-offset:0}">
        <socket-binding name="management-native" interface="management" port="${jboss.management.native.port:9999}"/>
        <socket-binding name="management-http" interface="management" port="${jboss.management.http.port:9990}"/>
        <socket-binding name="management-https" interface="management" port="${jboss.management.https.port:9443}"/>
```

4. **Create a new Security Realm**
   Enter the following commands to create a new security realm named **ManagementRealmHTTPS**:

```
/host=master/core-service=management/security-realm=ManagementRealmHTTPS/:add
/host=master/core-service=management/security-realm=ManagementRealmHTTPS/authentication=properties/:add(path=ManagementUsers.properties, relative-to=jboss.domain.config.dir)
```

5. **Configure Management Interface to use the new security realm**
   Enter the following commands:

   ```
   /host=master/core-service=management/management-interface=http-interface/:write-
   attribute(name=security-realm,value=ManagementRealmHTTPS)
   ```

6. **Configure the management console to use the keystore.**
   Enter the following management CLI command. For the parameters ***file***, ***password*** and ***alias*** their values must be copied from the step *Create a keystore to secure the management console* .

   ```
   /core-service=management/security-realm=ManagementRealmHTTPS/server-
   identity=ssl:add(keystore-path=identity.jks,keystore-relative-to=jboss.server.config.dir,
   keystore-password=password1, alias=appserver)
   ```

   The expected output from this command is:

   ```
   {
       "outcome" => "success",
       "response-headers" => {
           "operation-requires-reload" => true,
           "process-state" => "reload-required"
       }
   }
   ```

7. **Restart the JBoss EAP server.**
   On restarting the server the log should contain the following, just before the text which states the number of services that are started. The management console is now listening on port 9443, which confirms that the procedure was successful.

   ```
   14:53:14,720 INFO  [org.jboss.as] (Controller Boot Thread) JBAS015962: Http management
   interface listening on https://127.0.0.1:9443/management
   14:53:14,721 INFO  [org.jboss.as] (Controller Boot Thread) JBAS015952: Admin console
   listening on https://127.0.0.1:9443
   ```

NOTE

For security reasons it is recommended that you mask the keystore password. For details on how to do this see Section 7.1, "Password Vault System".

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5.8. USE DISTINCT INTERFACES FOR HTTP AND HTTPS CONNECTIONS TO THE MANAGEMENT INTERFACE

The Management Interface can listen on distinct interfaces for HTTP and HTTPS connections. One scenario for this is to listen for encrypted traffic on an external network, and use unencrypted traffic on an internal network.

The **secure-interface** attribute specifies the network interface on which the host's socket for HTTPS management communication should be opened, if a different interface should be used from that specified by the **interface** attribute. If it is not specified then the interface specified by the **interface** attribute is used.

The **secure-interface** attribute has no effect if the **secure-port** attribute is not set.

Note that when the server listens for HTTP and HTTPS traffic on the *same* interface, HTTPS requests received by the HTTP listener are automatically redirected to the HTTPS port. When *distinct* interfaces are used for HTTP and HTTPS traffic, no redirection is performed when an HTTPS request is received by the HTTP listener.

Here is an example ***EAP_HOME*/domain/configuration/host.xml** configuration that sets the **secure-interface** attribute to listen for HTTPS traffic on a distinct interface from HTTP traffic:

```
<?xml version='1.0' encoding='UTF-8'?>

<host name="master" xmlns="urn:jboss:domain:3.0">

    <management>
        <security-realms>
            <security-realm name="ManagementRealm">
                <authentication>
                    <local default-user="$local" />
                    <properties path="mgmt-users.properties" relative-to="jboss.domain.config.dir"/>
                </authentication>
            </security-realm>
        </security-realms>
        <management-interfaces>
            <native-interface security-realm="ManagementRealm">
                <socket interface="management" port="${jboss.management.native.port:9999}"/>
            </native-interface>
            <http-interface security-realm="ManagementRealm">
                <socket interface="management" port="${jboss.management.http.port:9990}" secure-
port="${jboss.management.https.port:9943}" secure-interface="secure-management"/>
            </http-interface>
        </management-interfaces>
    </management>

    <domain-controller>
        <local/>
        <!-- Alternative remote domain controller configuration with a host and port -->
        <!-- <remote host="${jboss.domain.master.address}" port="${jboss.domain.master.port:9999}"
security-realm="ManagementRealm"/> -->
    </domain-controller>

    <interfaces>
        <interface name="management">
            <inet-address value="${jboss.bind.address.management:127.0.0.1}"/>
        </interface>
        <interface name="secure-management">
            <inet-address value="${jboss.bind.address:10.10.64.1}"/>
        </interface>
    </interfaces>
</host>
```

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5.9. USING 2-WAY SSL FOR THE MANAGEMENT INTERFACE AND THE CLI

2-way SSL authentication, also known as *client authentication*, authenticates both the client and the server using SSL certificates. This provides assurance that not only is the server who it says it is, but the client is also who it says it is.

In this topic the following conventions are used:

HOST1

The JBoss server hostname. For example; **jboss.redhat.com**

HOST2

A suitable name for the client. For example: **myclient**. Note this is not necessarily an actual hostname.

CA_HOST1

The DN (distinguished name) to use for the *HOST1* certificate. For example **cn=jboss,dc=redhat,dc=com**.

CA_HOST2

The DN (distinguished name) to use for the *HOST2* certificate. For example **cn=myclient,dc=redhat,dc=com**.

Prerequisites

- If you are going to use a password vault to store the keystore and truststore passwords (recommended), the password vault should already be created. Refer to Section 7.1, “Password Vault System”.

Procedure 5.3.

1. Generate the stores:

```
keytool -genkeypair -alias HOST1_alias -keyalg RSA -keysize 1024 -validity 365 -keystore host1.keystore.jks -dname "CA_HOST1" -keypass secret -storepass secret
```

```
keytool -genkeypair -alias HOST2_alias -keyalg RSA -keysize 1024 -validity 365 -keystore host2.keystore.jks -dname "CA_HOST2" -keypass secret -storepass secret
```

2. Export the certificates:

```
keytool -exportcert  -keystore HOST1.keystore.jks -alias HOST1_alias -keypass secret -storepass secret -file HOST1.cer
```

```
keytool -exportcert  -keystore HOST2.keystore.jks -alias HOST2_alias -keypass secret -storepass secret -file HOST2.cer
```

3. Import the certificates into the opposing trust stores:

```
keytool -importcert -keystore HOST1.truststore.jks -storepass secret -alias HOST2_alias -trustcacerts -file HOST2.cer
keytool -importcert -keystore HOST2.truststore.jks -storepass secret -alias HOST1_alias -
trustcacerts -file HOST1.cer
```

4. Define a CertificateRealm in the configuration for your installation (**host.xml** or **standalone.xml**) and point the interface to it:

   This can be done by manually editing the configuration file (not recommended) or by using the following commands:

   ```
   /core-service=management/security-realm=CertificateRealm:add()
   ```

   ```
   /core-service=management/security-realm=CertificateRealm/server-
   identity=ssl:add(keystore-path=/path/to/HOST1.keystore.jks,keystore-
   password=secret, alias=HOST1_alias)
   ```

   ```
   /core-service=management/security-
   realm=CertificateRealm/authentication=truststore:add(keystore-
   path=/path/to/HOST1.truststore.jks,keystore-password=secret)
   ```

   IMPORTANT

   The provided commands apply to standalone mode only. For domain mode, add **/host=master** before each command.

5. Change the ***security-realm*** of the native-interface to the new Certificate Realm.

   ```
   /host=master/core-service=management/management-interface=native-interface:write-
   attribute(name=security-realm,value=CertificateRealm)
   ```

6. Add the SSL configuration for the CLI, which uses ***EAP_HOME*/bin/jboss-cli.xml** as a settings file. Either use a password vault to store the keystore and truststore passwords (recommended), or store them in plain text:

   - To store the keystore and truststore passwords in a password vault:

     Edit ***EAP_HOME*/bin/jboss-cli.xml** and add the SSL configuration (using the appropriate values for the variables). Also add the vault configuration, replacing each value with those of your vault.

     ```
     <ssl>
       <vault>
         <vault-option name="KEYSTORE_URL" value="path-to/vault/vault.keystore"/>
         <vault-option name="KEYSTORE_PASSWORD" value="MASK-5WNXs8oEbrs"/>
         <vault-option name="KEYSTORE_ALIAS" value="vault"/>
         <vault-option name="SALT" value="12345678"/>
         <vault-option name="ITERATION_COUNT" value="50"/>
         <vault-option name="ENC_FILE_DIR" value="path-to/jboss-eap/vault/"/>
       </vault>
       <alias>$HOST2alias</alias>
       <key-store>/path/to/HOST2.keystore.jks</key-store>
       <key-store-password>VAULT::VB::cli_pass::1</key-store-password>
       <key-password>VAULT::VB::cli_pass::1</key-password>
     ```

```
  <trust-store>/path/to/HOST2.truststore.jks</trust-store>
  <trust-store-password>VAULT::VB::cli_pass::1</trust-store-password>
  <modify-trust-store>true</modify-trust-store>
</ssl>
```

- To store the keystore and truststore passwords in plain text:

  Edit ***EAP_HOME*/bin/jboss-cli.xml** and add the SSL configuration (using the appropriate values for the variables):

```
<ssl>
  <alias>$HOST2alias</alias>
  <key-store>/path/to/HOST2.keystore.jks</key-store>
  <key-store-password>secret</key-store-password>
  <trust-store>/path/to/HOST2.truststore.jks</trust-store>
  <trust-store-password>secret</trust-store-password>
  <modify-trust-store>true</modify-trust-store>
</ssl>
```

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5.10. SECURE THE MANAGEMENT INTERFACES VIA JAAS

To use JAAS to authenticate to the Management interfaces:

First, create a security domain with the UsersRoles login module:

```
/subsystem=security/security-domain=UsersLMDomain:add(cache-type=default)
/subsystem=security/security-domain=UsersLMDomain/authentication=classic:add
/subsystem=security/security-domain=UsersLMDomain/authentication=classic/login-
module=UsersRoles:add()
```

Then, create a security realm with JAAS Authentication:

```
/core-service=management/security-realm=SecurityDomainAuthnRealm:add
/core-service=management/security-
realm=SecurityDomainAuthnRealm/authentication=jaas:add(name=UsersLMDomain)
```

The attribute **assign-groups** determines whether loaded user membership information from the Security Domain is used for group assignment in the Security Realm. When set to **true** this group assignment is used for Role-Based Access Control (RBAC).

The **assign-groups** attribute can be set to true by this CLI command:

```
/core-service=management/security-realm=ManagementRealm/authentication=jaas:write-
attribute(name=assign-groups,value=true)
```

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5.11. LDAP

5.11.1. About LDAP

Lightweight Directory Access Protocol (LDAP) is a protocol for storing and distributing directory information across a network. This directory information includes information about users, hardware devices, access roles and restrictions, and other information.

Some common implementations of LDAP include OpenLDAP, Microsoft Active Directory, IBM Tivoli Directory Server, Oracle Internet Directory, and others.

JBoss EAP 6 includes several authentication and authorization modules which allow you to use a LDAP server as the authentication and authorization authority for your Web and EJB applications.

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5.11.2. Use LDAP to Authenticate to the Management Interfaces

To use an LDAP directory server as the authentication source for the Management Console, Management CLI, or Management API, you need to perform the following procedures:

1. Create an outbound connection to the LDAP server.
2. Create an LDAP-enabled security realm.
3. Reference the new security domain in the Management Interface.

Create an Outbound Connection to an LDAP Server

The LDAP outbound connection allows the following attributes:

Table 5.1. Attributes of an LDAP Outbound Connection

Attribute	Required	Description
url	yes	The URL address of the directory server.
search-dn	no	The fully distinguished name (DN) of the user authorized to perform searches.
search-credentials	no	The password of the user authorized to perform searches.
initial-context-factory	no	The initial context factory to use when establishing the connection. Defaults to **com.sun.jndi.ldap.LdapCtxFactory**.
security-realm	no	The security realm to reference to obtain a configured **SSLContext** to use when establishing the connection.

Example 5.10. Add an LDAP Outbound Connection

This example adds an outbound connection with the following properties set:

- Search DN: **cn=search,dc=acme,dc=com**
- Search Credential: **myPass**
- URL: **ldap://127.0.0.1:389**

The first command adds the security realm.

```
/host=master/core-service=management/security-realm=ldap_security_realm:add
```

The second command adds the LDAP connection.

```
/host=master/core-service=management/ldap-connection=ldap_connection/:add(search-
credential=myPass,url=ldap://127.0.0.1:389,search-dn="cn=search,dc=acme,dc=com")
```

Create an LDAP-Enabled Security Realm

The Management Interfaces can authenticate against LDAP server instead of the property-file based security realms configured by default. The LDAP authenticator operates by first establishing a connection to the remote directory server. It then performs a search using the username which the user passed to the authentication system, to find the fully-qualified distinguished name (DN) of the LDAP record. A new connection is established, using the DN of the user as the credential, and password supplied by the user. If this authentication to the LDAP server is successful, the DN is verified to be valid.

The LDAP security realm uses the following configuration attributes:

connection

The name of the connection defined in ***outbound-connections*** to use to connect to the LDAP directory.

advanced-filter

The fully defined filter used to search for a user based on the supplied user ID. The filter must contain a variable in the following format: **{0}**. This is later replaced with the user name supplied by the user.

base-dn

The distinguished name of the context to begin searching for the user.

recursive

Whether the search should be recursive throughout the LDAP directory tree, or only search the specified context. Defaults to **false**.

user-dn

The attribute of the user that holds the distinguished name. This is subsequently used to test authentication as the user can complete. Defaults to **dn**.

username-attribute

The name of the attribute to search for the user. This filter performs a simple search where the user name entered by the user matches the specified attribute.

allow-empty-passwords

This attribute determines whether an empty password is accepted. The default value for this attribute is **false**.

Either username-filter or advanced-filter must be specified

The ***advanced-filter*** attribute contains a filter query in the standard LDAP syntax, for example:

```
(&(sAMAccountName={0})(memberOf=cn=admin,cn=users,dc=acme,dc=com))
```

Example 5.11. XML Representing an LDAP-enabled Security Realm

This example uses the following parameters:

- connection - **ldap_connection**
- base-dn - **cn=users,dc=acme,dc=com**.
- username-filter - **attribute="sambaAccountName"**

```
<security-realm name="ldap_security_realm">
  <authentication>
    <ldap connection="ldap_connection" base-dn="cn=users,dc=acme,dc=com">
      <username-filter attribute="sambaAccountName" />
    </ldap>
 </authentication>
</security-realm>
```

WARNING

It is important to ensure that you do not allow empty LDAP passwords; unless you specifically desire this in your environment, it is a serious security concern.

EAP 6.1 includes a patch for CVE-2012-5629, which sets the allowEmptyPasswords option for the LDAP login modules to false if the option is not already configured. For older versions, this option should be configured manually

Example 5.12. Add an LDAP Security Realm

The command below adds an LDAP authentication to a security realm and sets its attributes for a host named master in the domain.

```
/host=master/core-service=management/security-
realm=ldap_security_realm/authentication=ldap:add(base-dn="DC=mycompany,DC=org",
recursive=true, username-attribute="MyAccountName", connection="ldap_connection")
```

Apply the New Security Realm to the Management Interface

After you create a security realm, you need to reference it in the configuration of your management interface. The management interface will use the security realm for HTTP digest authentication.

Example 5.13. Apply the Security Realm to the HTTP Interface

After this configuration is in place, and you restart the host controller, the web-based Management Console will use LDAP to authenticate its users.

```
/host=master/core-service=management/management-interface=http-interface/:write-attribute(name=security-realm,value=ldap_security_realm)
```

Example 5.14. Apply the Security Realm to the Native Interface

Use the following command to apply the same settings to the native interface:

```
/host=master/core-service=management/management-interface=native-interface/:write-attribute(name=security-realm,value=ldap_security_realm)
```

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5.11.3. Using Outbound LDAP with 2-way SSL in the Management Interface and CLI

JBoss EAP 6 can be configured to use an outbound connection to a LDAP server using 2-way SSL for authentication in the Management Interface and CLI.

Prerequisites

- An LDAP-enabled security realm must be created. See Section 5.11.2, “Use LDAP to Authenticate to the Management Interfaces” for details on creating the security realm.

Procedure 5.4. Configure Outbound LDAP with 2-way SSL

1. Configure the security realm keystore and truststore. The security realm must contain a keystore configured with the key that the JBoss EAP 6 server will use to authenticate against the LDAP server. The security realm must also contain a truststore configured with the LDAP server's certificates. See Section 5.9, “Using 2-way SSL for the Management interface and the CLI” for instructions on configuring keystores and truststores.

2. Add the outbound connection to the LDAP server, specifying the configured security realm:

   ```
   /core-service=management/ldap-connection=LocalLdap:add(url="ldaps://LDAP_HOST:LDAP_PORT")

   /core-service=management/ldap-connection=LocalLdap:write-attribute(name=security-realm,value="LdapSSLRealm")
   ```

3. Configure LDAP authentication within the security realm and the management interfaces as shown in Section 5.11.2, “Use LDAP to Authenticate to the Management Interfaces” .

Report a bug

CHAPTER 6. SECURE THE MANAGEMENT INTERFACES WITH ROLE-BASED ACCESS CONTROL

6.1. ABOUT ROLE-BASED ACCESS CONTROL (RBAC)

Role-Based Access Control (RBAC) is a mechanism for specifying a set of permissions for management users. It allows multiple users to share responsibility for managing JBoss EAP 6 servers without each of them requiring unrestricted access. By providing "separation of duties" for management users, JBoss EAP 6 makes it easy for an organization to spread responsibility between individuals or groups without granting unnecessary privileges. This ensures the maximum possible security of your servers and data while still providing flexibility for configuration, deployment, and management.

Role-Based Access Control in JBoss EAP 6 works through a combination of role permissions and constraints.

Seven predefined roles are provided that each have different fixed permissions. The predefined roles are: Monitor, Operator, Maintainer, Deployer, Auditor, Administrator, and SuperUser. Each management user is assigned one or more roles, which specify what the user is permitted to do when managing the server.

IMPORTANT

Before changing the provider to **rbac**, be sure your configuration has a user who will be mapped to one of the RBAC roles, preferably with at least one in the Administrator or SuperUser role. Otherwise your installation will not be manageable unless it is shut down and the XML configuration is edited.

If you have started with one of the standard XML configurations shipped with JBoss EAP 6, the **$local** user will be mapped to the **SuperUser** role and the **local** authentication scheme will be enabled. This will allow a user running the CLI on the same system as the JBoss EAP 6 process to have full administrative permissions. Remote CLI users and web-based admin console users will have no permissions.

Map at least one user other than **$local** before switching the provider to **rbac**.

Report a bug

6.2. ROLE-BASED ACCESS CONTROL IN THE MANAGEMENT CONSOLE AND CLI

When Role-Based Access Control (RBAC) is enabled, the role assigned to a user determines the resources to which they have access and what operations they can conduct with a resource's attributes.

The Management Console

In the management console some controls and views are disabled (greyed out) or not visible at all depending on the permissions of the role to which the user has been assigned.

If you do not have read permissions to a resource attribute, that attribute will appear blank in the console. For example, most roles cannot read the username and password fields for datasources.

If you do not have write permissions to a resource attribute, that attribute will be disabled (greyed-out) in the edit form for the resource. If you do not have write permissions to the resource, then the edit button for the resource will not appear.

If a user does not have permissions to access a resource or attribute (it is "unaddressable" for that role), it will not appear in the console for that user. An example of that is the access control system itself which is only visible to a few roles by default.

The Management CLI or API

Users of the Management CLI or management API will encounter slightly different behavior in the API when RBAC is enabled.

Resources and attributes that cannot be read are filtered from results. If the filtered items are addressable by the role, their names are listed as **filtered-attributes** in the **response-headers** section of the result. If a resource or attribute is not addressable by the role, it is not listed.

Attempting to access a resource that is not addressable will result in a **resource not found** error.

If a user attempts to write or read a resource that they can address but lack the appropriate write or read permissions, a **Permission Denied** error is returned.

Report a bug

6.3. SUPPORTED AUTHENTICATION SCHEMES

Role-Based Access Control works with the standard authentication providers that are included with JBoss EAP 6. The standard authentication providers are: **username**/**password**, **client certificate**, and **local user**.

Username/Password

Users are authenticated using a username and password combination which is verified against either the **mgmt-users.properties** file, or an LDAP server.

Client Certificate

Using the Trust Store.

Local User

jboss-cli.sh authenticates automatically as Local User if the server that is running on the same machine. By default Local User is a member of the **SuperUser** group.

Regardless of which provider is used, JBoss EAP is responsible for the assignment of roles to users. However when authenticating with the **mgmt-users.properties** file or an LDAP server, those systems can supply user group information. This information can also be used by JBoss EAP to assign roles to users.

Report a bug

6.4. THE STANDARD ROLES

JBoss EAP 6 provides seven predefined user roles: Monitor, Operator, Maintainer, Deployer, Auditor, Administrator, and SuperUser. Each of these roles has a different set of permissions and is designed for specific use cases. The Monitor, Operator, Maintainer, Administrator, and SuperUser role each build upon each other, with each having more permissions than the previous. The Auditor and Deployer roles are similar to the Monitor and Maintainer roles respectively but have some additional special permissions and restrictions.

Monitor

Users of the Monitor role have the fewest permissions and can only read the current configuration and state of the server. This role is intended for users who need to track and report on the performance of the server.

Monitors cannot modify server configuration nor can they access sensitive data or operations.

Operator

The Operator role extends the Monitor role by adding the ability to modify the runtime state of the server. This means that Operators can reload and shutdown the server as well as pause and resume JMS destinations. The Operator role is ideal for users who are responsible for the physical or virtual hosts of the application server so they can ensure that servers can be shutdown and restarted corrected when needed.

Operators cannot modify server configuration or access sensitive data or operations.

Maintainer

The Maintainer role has access to view and modify runtime state and all configuration except sensitive data and operations. The Maintainer role is the general purpose role that doesn't have access to sensitive data and operation. The Maintainer role allows users to be granted almost complete access to administer the server without giving those users access to passwords and other sensitive information.

Maintainers cannot access sensitive data or operations.

Administrator

The Administrator role has unrestricted access to all resources and operations on the server except the audit logging system. The Administrator role has access to sensitive data and operations. This role can also configure the access control system. The Administrator role is only required when handling sensitive data or configuring users and roles.

Administrators cannot access the audit logging system and cannot change themselves to the Auditor or SuperUser role.

SuperUser

The SuperUser role has no restrictions and has complete access to all resources and operations of the server including the audit logging system. This role is equivalent to the administrator users of earlier versions of JBoss EAP 6 (6.0 and 6.1). If RBAC is disabled, all management users have permissions equivalent to the SuperUser role.

Deployer

The Deployer role has the same permissions as the Monitor, but can modify configuration and state for deployments and any other resource type enabled as an application resource.

Auditor

The Auditor role has all the permissions of the Monitor role and can also view (but not modify) sensitive data, and has full access to the audit logging system. The Auditor role is the only role other than SuperUser that can access the audit logging system.

Auditors cannot modify sensitive data or resources. Only read access is permitted.

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6.5. ABOUT ROLE PERMISSIONS

What each role is allowed to do is defined by what permissions it has. Not every role has every permission. Notably SuperUser has every permission and Monitor has the least.

Each permission can grant read and/or write access for a single category of resources.

The categories are: runtime state, server configuration, sensitive data, the audit log, and the access control system.

Table 6.1, “Role Permissions Matrix” summarizes the permissions of each role.

Table 6.1. Role Permissions Matrix

	Monitor	Operator	Maintainer	Deployer	Auditor	Administrator	SuperUser
Read Config and State	X	X	X	X	X	X	X
Read Sensitive Data [2]					X	X	X
Modify Sensitive Data [2]						X	X
Read/Modify Audit Log					X		X
Modify Runtime State		X	X	X[1]		X	X
Modify Persistent Config			X	X[1]		X	X

Read/Modify Access Control						X	X

[1] permissions are restricted to application resources.

[2] What resources are considered to be "sensitive data" are configured using Sensitivity Constraints.

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6.6. ABOUT CONSTRAINTS

Constraints are named sets of access-control configuration for a specified list of resources. The RBAC system uses the combination of constraints and role permissions to determine if any specific user can perform a management action.

Constraints are divided into three classifications: application, sensitivity and vault expression.

Application Constraints

Application Constraints define sets of resources and attributes that can be accessed by users of the Deployer role. By default the only enabled Application Constraint is core which includes deployments, deployment overlays. Application Constraints are also included (but not enabled by default) for datasources, logging, mail, messaging, naming, resource-adapters and security. These constraints allow Deployer users to not only deploy applications but also configure and maintain the resources that are required by those applications.

Application constraint configuration is in the Management API at **/core-service=management/access=authorization/constraint=application-classification**.

Sensitivity Constraints

Sensitivity Constraints define sets of resources that are considered "sensitive". A sensitive resource is generally one that is either secret, like a password, or one that will have serious impact on the operation of the server, like networking, JVM configuration, or system properties. The access control system itself is also considered sensitive.

The only roles permitted to write to sensitive resources are Administrator and SuperUser. The Auditor role is only able to read sensitive resources. No other roles have access.

Sensitivity constraint configuration is in the Management API at **/core-service=management/access=authorization/constraint=sensitivity-classification**.

Vault Expression Constraint

The Vault Expression constraint defines if reading or writing vault expressions is consider a sensitive operation. By default both reading and writing vault expressions is a sensitive operation.

Vault Expression constraint configuration is in the Management API at **/core-service=management/access=authorization/constraint=vault-expression**.

Constraints can not be configured in the Management Console at this time.

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6.7. ABOUT JMX AND ROLE-BASED ACCESS CONTROL

Role-Based Access Control applies to JMX in three ways:

1. The Management API of JBoss EAP 6 is exposed as JMX Management Beans. These Management Beans are referred to as "core mbeans" and access to them is controlled and filtered exactly the same as the underlying Management API itself.

2. The JMX subsystem is configured with write permissions being "sensitive". This means only users of the Administrator and SuperUser roles can make changes to that subsystem. Users of the Auditor role can also read this subsystem configuration.

3. By default Management Beans registered by deployed applications and services (non-core mbeans) can be accessed by all management users, but only users of the Maintainer, Operator, Administrator, SuperUser roles can write to them.

NOTE

Users can receive JMX notifications from a JMX client, such as jconsole. This feature is limited to local JMX connections. The JMX client must be connected either inside the same JVM as the application server, or on the same machine and use the Attach agent to connect to the application server (as jconsole does). JMX notifications for MBean registration/unregistration and attribute value changes are now also generated for MBeans in jboss.as and jboss.as.expr domains.

Report a bug

6.8. CONFIGURING ROLE-BASED ACCESS CONTROL

6.8.1. Overview of RBAC Configuration Tasks

When RBAC is enabled only users of the Administration or SuperUser role can view and make changes to the Access Control system.

The management console provides an interface for the following common RBAC tasks:

- View and configure what roles are assigned to (or excluded from) each user
- View and configure what roles are assigned to (or excluded from) each group
- View group and user membership per role.
- Configure default membership per role.
- Create a scoped role

NOTE

The Management Console **cannot** be used to enable or disable RBAC. Those settings are not exposed in the UI. Use the command line interface to perform these tasks.

The management CLI provides access to the complete access control system. This means that everything that can be done in the management console can be done there, but a number of additional tasks can be performed with the management CLI that cannot be done with the management console.

The following additional tasks can be performed in the CLI:

- Enable and disable RBAC
- Change permission combination policy
- Configuring Application Resource and Resource Sensitivity Constraints

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6.8.2. Enabling Role-Based Access Control

By default the Role-Based Access Control (RBAC) system is disabled. It is enabled by changing the provider attribute from **simple** to **rbac**. This can be done using the Management CLI or by editing the server configuration XML file if the server is offline. When RBAC is disabled or enabled on a running server, the server configuration must be reloaded before it takes effect.

Once enabled it can only be disabled by a user of the Administrator or SuperUser roles. By default the Management CLI runs as the **SuperUser** role if it is run on the same machine as the server.

Procedure 6.1. Enabling RBAC

- To enable RBAC with the Management CLI, use the **write-attribute** operation of the access authorization resource to set the provider attribute to **rbac**.

```
/core-service=management/access=authorization:write-attribute(name=provider, value=rbac)
```

```
[standalone@localhost:9999 /] /core-service=management/access=authorization:write-
attribute(name=provider, value=rbac)
{
    "outcome" => "success",
    "response-headers" => {
        "operation-requires-reload" => true,
        "process-state" => "reload-required"
    }
}
[standalone@localhost:9999 /] /:reload
{
    "outcome" => "success",
    "result" => undefined
}
```

Procedure 6.2. Disabling RBAC

- To disable RBAC with the Management CLI, use the **write-attribute** operation of the access authorization resource to set the provider attribute to **simple**.

```
/core-service=management/access=authorization:write-attribute(name=provider,
value=simple)
```

```
[standalone@localhost:9999 /] /core-service=management/access=authorization:write-
attribute(name=provider, value=simple)
{
    "outcome" => "success",
    "response-headers" => {
        "operation-requires-reload" => true,
        "process-state" => "reload-required"
    }
}
[standalone@localhost:9999 /] /:reload
{
    "outcome" => "success",
    "result" => undefined
}
```

If the server is offline the XML configuration can be edited to enabled or disable RBAC. To do this, edit the **provider** attribute of the **access-control** element of the management element. Set the value to **rbac** to enable, and **simple** to disable.

```
<management>

        <access-control provider="rbac">
            <role-mapping>
                <role name="SuperUser">
                    <include>
                        <user name="$local"/>
                    </include>
                </role>
            </role-mapping>
        </access-control>

    </management>
```

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6.8.3. Changing the Permission Combination Policy

The Permission Combination Policy determines how permissions are determined if a user is assigned more than one role. This can be set to **permissive** or **rejecting**. The default is **permissive**.

When set to **permissive**, if any role is assigned to the user that permits an action, then the action is allowed.

When set to **rejecting**, if multiple roles are assigned to a user, then no action is allowed. This means that when the policy is set to **rejecting** each user should only be assigned one role. Users with multiple roles will not be able to use the Management Console or the Management CLI when the policy is set to **rejecting**.

The Permission Combination Policy is configured by setting the **permission-combination-policy** attribute to either **permissive** or **rejecting**. This can be done using the Management CLI or by editing the server configuration XML file if the server is offline.

Procedure 6.3. Set the Permission Combination Policy

- Use the **write-attribute** operation of the access authorization resource to set the **permission-combination-policy** attribute to the required policy name.

  ```
  /core-service=management/access=authorization:write-attribute(name=permission-combination-policy, value=POLICYNAME)
  ```

  The valid policy names are rejecting and permissive.

  ```
  [standalone@localhost:9999 /] /core-service=management/access=authorization:write-attribute(name=permission-combination-policy, value=rejecting)
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

If the server is offline the XML configuration can be edited to change the permission combination policy value. To do this, edit the **permission-combination-policy** attribute of the access-control element.

```
<access-control provider="rbac" permission-combination-policy="rejecting">
  <role-mapping>
    <role name="SuperUser">
      <include>
        <user name="$local"/>
      </include>
    </role>
  </role-mapping>
</access-control>
```

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6.9. MANAGING ROLES

6.9.1. About Role Membership

When Role-Based Access Control (RBAC) is enabled, what a management user is permitted to do is determined by the roles to which the user is assigned. JBoss EAP 6 uses a system of includes and excludes based on both the user and group membership to determine to which role a user belongs.

A user is considered to be assigned to a role if:

1. The user is:
   - listed as a user to be included in the role, or
   - a member of a group that is listed to be included in the role.
2. The user is not:
   - listed as a user to exclude from the role, or
   - a member of a group that is listed to be excluded from the role.

Exclusions take priority over inclusions.

Role include and exclude settings for users and groups can be configured using both the management console and the management CLI.

Only users of the SuperUser or Administrator roles can perform this configuration.

Report a bug

6.9.2. Configure User Role Assignment

Roles for a user to be included in and excluded from can be configured in the Management Console and the Management CLI. This topic only shows using the Management Console.

Only users in the **SuperUser** or **Administrator** roles can perform this configuration.

The User roles configuration in the management console can be found by following these steps:

1. Login to the Management Console.
2. Click on the **Administration** tab.
3. Expand the **Access Control** menu and select **Role Assignment**.
4. Select the **USERS** tab.

Procedure 6.4. Create a new role assignment for a user

1. Login to the Management console.
2. Navigate to the **Users** tab of the **Role Assignment** section.
3. Click the **Add** button at the top right of the user list. **Add User** dialog appears.

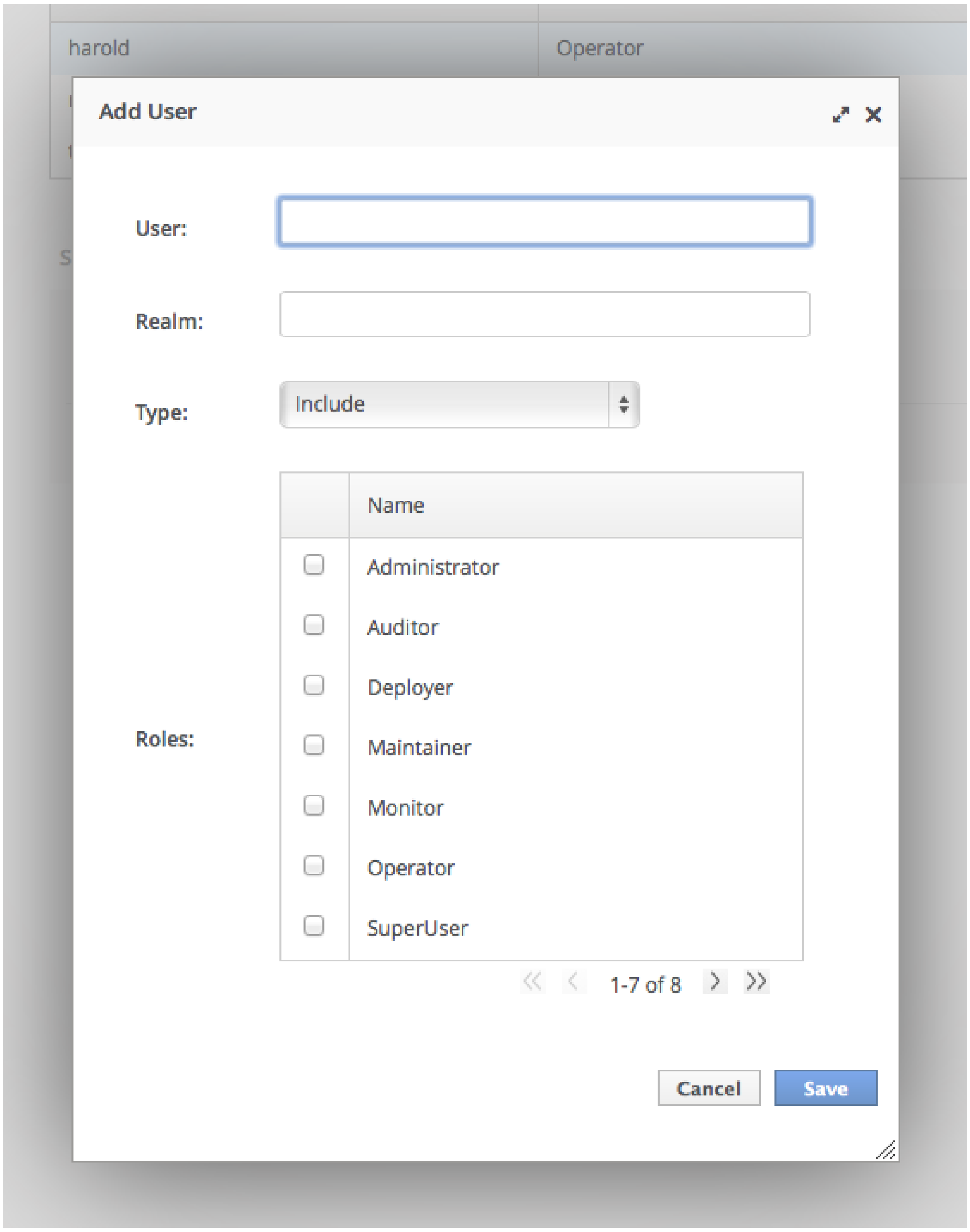


Figure 6.1. Add User Dialog

4. Specify user name, and optionally realm.

5. Set the type menu to include or exclude.

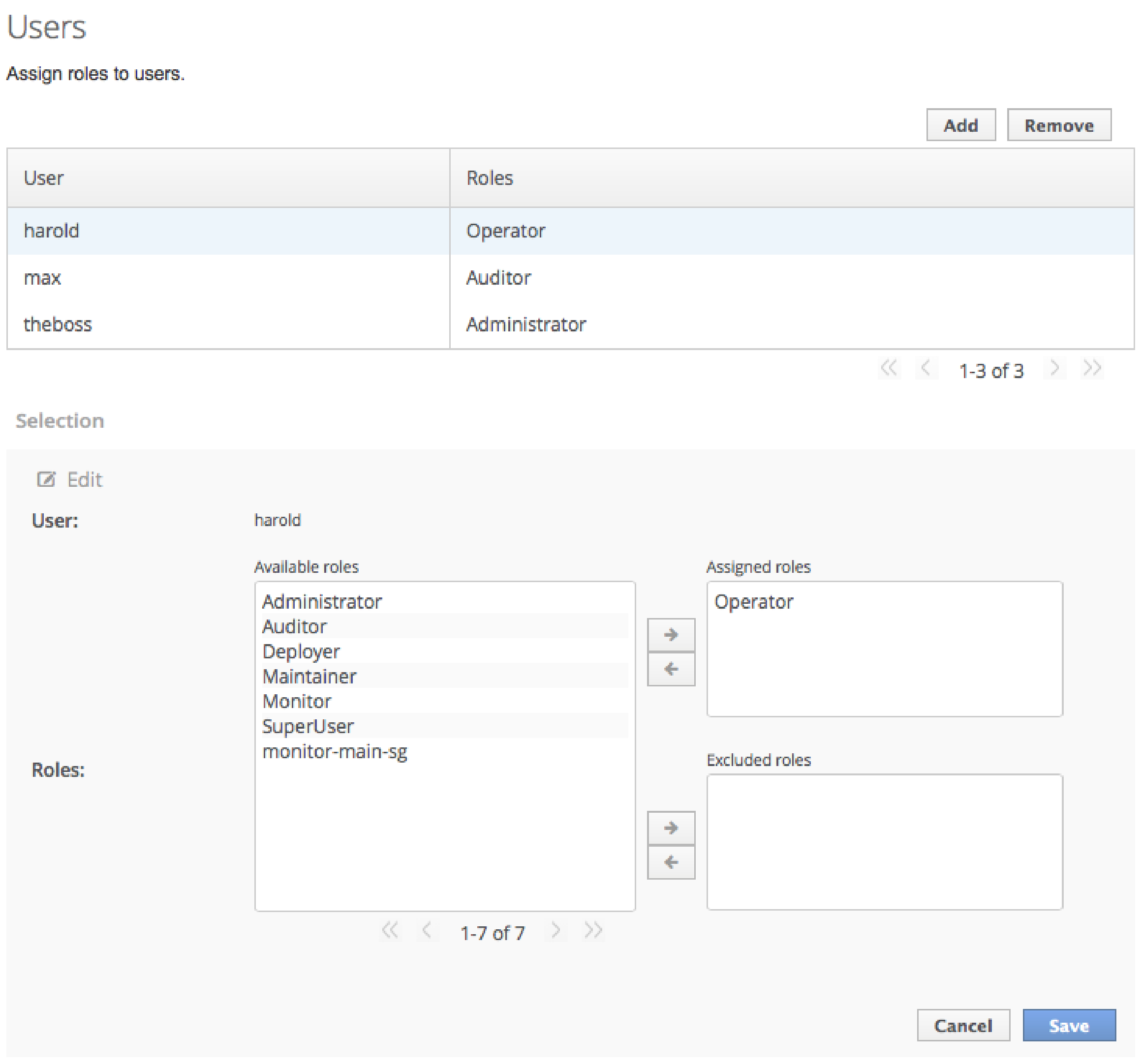
6. Click the checkbox of the roles to include or exclude. To check multiple items, hold down the Control key (Command key on OSX).

7. Click **Save** to finish.

   When successful, the **Add User** dialog closes, and the list of users is updated to reflect the changes made. If unsuccessful a **Failed to save role assignment** message is displayed.

Procedure 6.5. Update the role assignment for a user

1. Login to the Management console.
2. Navigate to the **Users** tab of the **Role Assignment** section.
3. Select user from the list.
4. Click **Edit**. The selection panel enters edit mode.



User	Roles
harold	Operator
max	Auditor
theboss	Administrator

User: harold

Roles:

Available roles: Administrator, Auditor, Deployer, Maintainer, Monitor, SuperUser, monitor-main-sg

Assigned roles: Operator

Figure 6.2. Selection Edit View

Here you can add and remove assigned and excluded roles for the user.

1. To add an assigned role, select the required role from the list of available roles on the left and click button with the right-facing arrow next to the assigned roles list. The role moves from the available list to the assigned list.
2. To remove an assigned role, selected the required role from the assigned roles list on the right and click the button with the left-facing arrow next to the assigned roles list. The role moves from the assigned list to the available list.
3. To add an excluded role, select the required role from the list of available roles on the left

3. To add an excluded role, select the required role from the list of available roles on the left and click button with the right-facing arrow next to the excluded roles list. The role moves from the available list to the excluded list.

4. To remove an excluded role, selected the required role from the excluded roles list on the right and click the button with the left-facing arrow next to the excluded roles list. The role moves from the excluded list to the available list.

5. Click **Save** to finish.

   When successful, the edit view closes, and the list of users is updated to reflect the changes made. If unsuccessful a **Failed to save role assignment** message is displayed.

Procedure 6.6. Remove role assignment for a user

1. Login to the Management console.
2. Navigate to the **Users** tab of the Role Assignment section.
3. Select the user from the list.
4. Click **Remove**. The **Remove Role Assignment** confirmation prompt appears.
5. Click **Confirm**.

   When successful, the user will no longer appear in the list of user role assignments.

IMPORTANT

Removing the user from the list of role assignments does not remove the user from the system, nor does it guarantee that no roles will be assigned to the user. Roles might still be assigned from group membership.

Report a bug

6.9.3. Configure User Role Assignment using the Management CLI

Roles for a user to be included in and excluded from can be configured in the Management Console and the Management CLI. This topic only shows using the Management CLI.

The configuration of mapping users and groups to roles is located in the management API at: **/core-service=management/access=authorization** as **role-mapping** elements.

Only users of the SuperUser or Administrator roles can perform this configuration.

For easier access to the commands, in the Management CLI change to the **/core-service=management/access=authorization** location:

```
[standalone@localhost:9999] cd /core-service=management/access=authorization
```

Procedure 6.7. Viewing Role Assignment Configuration

1. Use the :read-children-names operation to get a complete list of the configured roles:

```
/core-service=management/access=authorization:read-children-names(child-type=role-
mapping)
```

```
[standalone@localhost:9999 access=authorization] :read-children-names(child-type=role-
mapping)
{
    "outcome" => "success",
    "result" => [
        "Administrator",
        "Deployer",
        "Maintainer",
        "Monitor",
        "Operator",
        "SuperUser"
    ]
}
```

2. Use the **read-resource** operation of a specified role-mapping to get the full details of a specific role:

```
/core-service=management/access=authorization/role-mapping=ROLENAME:read-
resource(recursive=true)
```

```
[standalone@localhost:9999 access=authorization] ./role-mapping=Administrator:read-
resource(recursive=true)
{
    "outcome" => "success",
    "result" => {
        "include-all" => false,
        "exclude" => undefined,
        "include" => {
            "user-theboss" => {
                "name" => "theboss",
                "realm" => undefined,
                "type" => "USER"
            },
            "user-harold" => {
                "name" => "harold",
                "realm" => undefined,
                "type" => "USER"
            },
            "group-SysOps" => {
                "name" => "SysOps",
                "realm" => undefined,
                "type" => "GROUP"
            }
        }
    }
}
[standalone@localhost:9999 access=authorization]
```

Procedure 6.8. Add a new role

This procedure shows how to add a role-mapping entry for a role. This must be done before the role can be configured.

- Use the **add** operation to add a new role configuration.

  ```
  /core-service=management/access=authorization/role-mapping=ROLENAME:add
  ```

  ROLENAME is the name of the role that the new mapping is for.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor:add
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

Procedure 6.9. Add a user as included in a role

This procedure shows how to add a user to the included list of a role.

If no configuration for a role has been done, then a role-mapping entry for it must be done first.

- Use the **add** operation to add a user entry to the includes list of the role.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/include=ALIAS:add(name=USERNAME, type=USER)
  ```

  ROLENAME is the name of the role being configured.

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **user-*USERNAME***.

  USERNAME is the name of the user being added to the include list.

  ```
   [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/include=user-
  max:add(name=max, type=USER)
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

Procedure 6.10. Add a user as excluded in a role

This procedure shows how to add a user to the excluded list of a role.

If no configuration for a role has been done, then a role-mapping entry for it must be done first.

- Use the **add** operation to add a user entry to the excludes list of the role.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/exclude=ALIAS:add(name=USERNAME, type=USER)
  ```

  ROLENAME is the name of the role being configured.

  USERNAME is the name of the user being added to the exclude list.

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **user-*USERNAME***.

```
[standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/exclude=user-
max:add(name=max, type=USER)
{"outcome" => "success"}
[standalone@localhost:9999 access=authorization]
```

Procedure 6.11. Remove user role include configuration

This procedure shows how to remove a user include entry from a role mapping.

- Use the **remove** operation to remove the entry.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/include=ALIAS:remove
  ```

  ROLENAME is the name of the role being configured

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **user-*USERNAME***.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/include=user-
  max:remove
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

  Removing the user from the list of includes does not remove the user from the system, nor does it guarantee that the role won't be assigned to the user. The role might still be assigned based on group membership.

Procedure 6.12. Remove user role exclude configuration

This procedure shows how to remove an user exclude entry from a role mapping.

- Use the **remove** operation to remove the entry.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/exclude=ALIAS:remove
  ```

  ROLENAME is the name of the role being configured.

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **user-*USERNAME***.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/exclude=user-
  max:remove
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

  Removing the user from the list of excludes does not remove the user from the system, nor does it guarantee the role will be assigned to the user. Roles might still be excluded based on group membership.

Report a bug

6.9.4. About Roles and User Groups

Users authenticated using either the **mgmt-users.properties** file or an LDAP server, can be members of user groups. A user group is an arbitrary label that can be assigned to one or more users.

The RBAC system can be configured to automatically assign roles to users depending on what user groups they are members of. It can also exclude users from roles based on group membership.

When using the **mgmt-users.properties** file, group information is stored in the **mgmt-groups.properties** file. When using LDAP the group information is stored in the LDAP sever and maintained by those responsible for the LDAP server.

Report a bug

6.9.5. Configure Group Role Assignment

Roles can be assigned to a user based on the user's membership of a user group.

Groups to be included or excluded from a role can be configured in the Management Console and the Management CLI. This topic only shows using the Management Console.

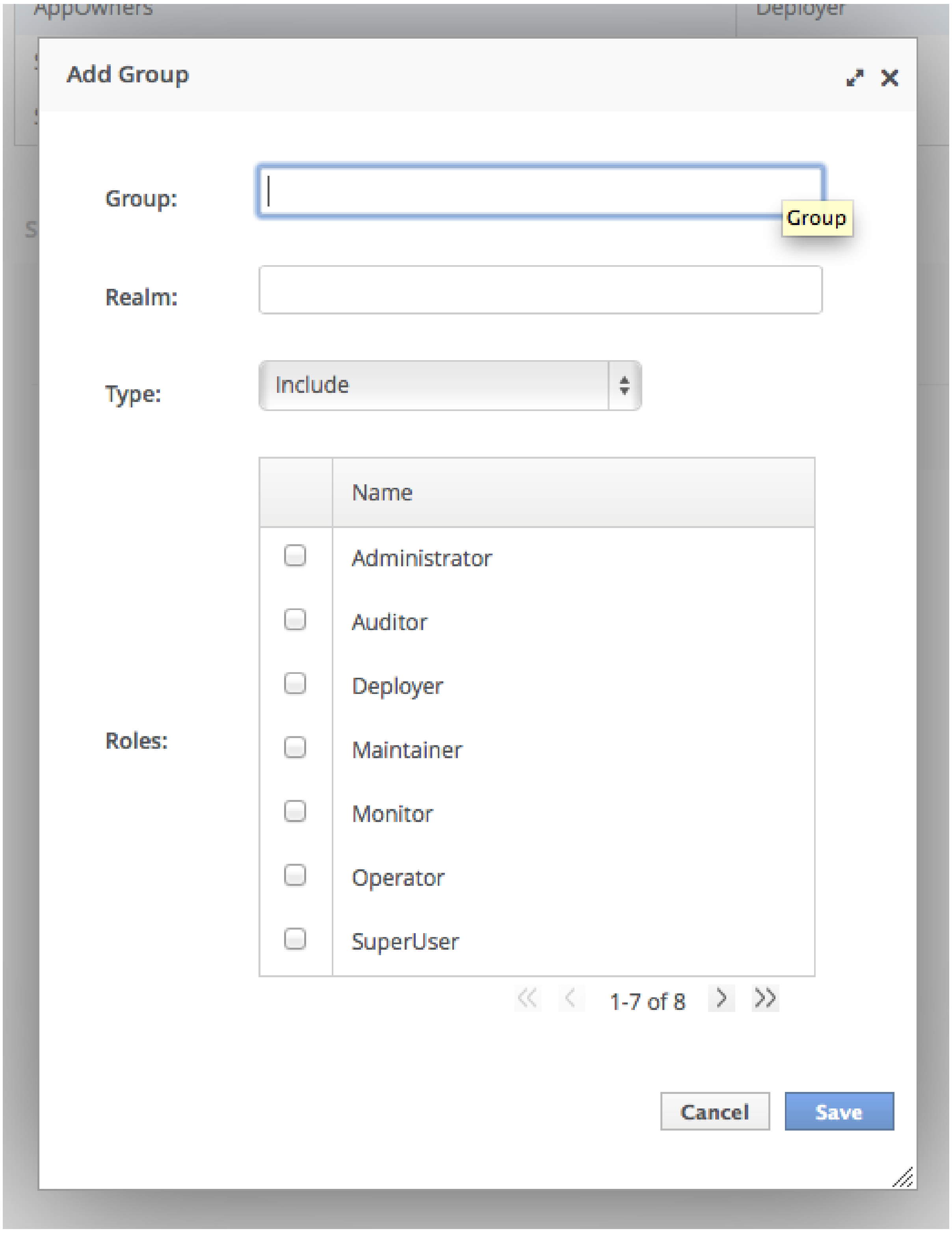
Only users in the **SuperUser** or **Administrator** roles can perform this configuration.

The Group roles configuration in the management console can be found by following these steps:

1. Login to the Management Console.
2. Click on the **Administration** tab.
3. Expand the **Access Control** menu and select **Role Assignment**.
4. Select the **GROUPS** tab.

Procedure 6.13. Create a new role assignment for a group

1. Login to the Management console
2. Navigate to the **GROUPS** tab of the **Role Assignment** section.
3. Click the **Add** button at the top right of the user list. **Add Group** dialog appears.



Group:

Realm:

Type: Include

Roles:

	Name
☐	Administrator
☐	Auditor
☐	Deployer
☐	Maintainer
☐	Monitor
☐	Operator
☐	SuperUser

1-7 of 8

Figure 6.3. Add Group Dialog

4. Specify the group name, and optionally the realm.

5. Set the type menu to include or exclude.

6. Click the checkbox of the roles to include or exclude. To check multiple items, hold down the Control key (Command key on OSX).

7. Click **Save** to finish.

[illegible]

When successful, the **Add Group** dialog closes, and the list of groups is updated to reflect the changes made. If unsuccessful a **Failed to save role assignment** message is displayed.

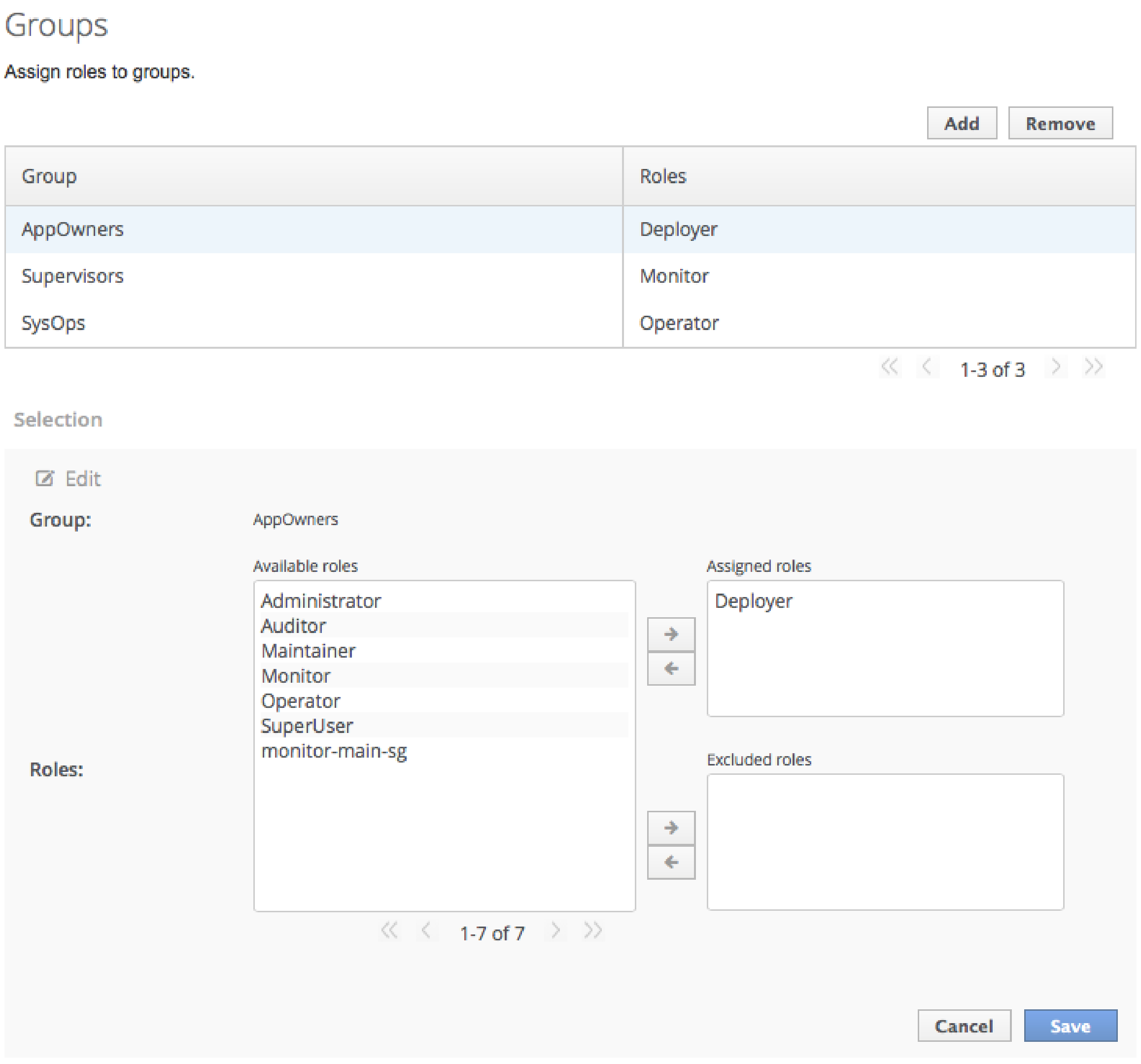
Procedure 6.14. Update a role assignment for a group

1. Login to the Management console.

2. Navigate to the **GROUPS** tab of the Role Assignment section.

3. Select the group from the list.

4. Click Edit. The Selection view enters Edit mode.



Groups

Assign roles to groups.

Group	Roles
AppOwners	Deployer
Supervisors	Monitor
SysOps	Operator

1-3 of 3

Selection

Edit

Group: AppOwners

Roles:

Available roles: Administrator, Auditor, Maintainer, Monitor, Operator, SuperUser, monitor-main-sg

1-7 of 7

Assigned roles: Deployer

Excluded roles:

Figure 6.4. Selection View Edit Mode

Here you can add and remove assigned and excluded roles from the group:

- To add assigned role, select the required role from the list of available roles on the left and click button with the right-facing arrow next to the assigned roles list. The role moves from the available list to the assigned list.

- To remove an assigned role, selected the required role from the assigned roles list on the right and click the button with the left-facing arrow next to the assigned roles list. The role moves from the assigned list to the available list.

- To add an excluded role, select the required role from the list of available roles on the left and click button with the right-facing arrow next to the excluded roles list. The role moves from the available list to the excluded list.

- To remove an excluded role, selected the required role from the excluded roles list on the right and click the button with the left-facing arrow next to the excluded roles list. The role moves from the excluded list to the available list.

5. Click **Save** to finish.

   When successful, the edit view closes, and the list of groups is updated to reflect the changes made. If unsuccessful a **Failed to save role assignment** message is displayed.

Procedure 6.15. Remove role assignment for a group

1. Login to the Management console.

2. Navigate to the **GROUPS** tab of the **Role Assignment** section.

3. Select the group from the list.

4. Click **Remove**. The **Remove Role Assignment** confirmation prompt appears.

5. Click **Confirm**.

   When successful, the role will no longer appear in the list of group role assignments.

   Removing the group from the list of role assignments does not remove the user group from the system, nor does it guarantee that no roles will be assigned to members of that group. Each group member might still have a role assigned to them directly.

Report a bug

6.9.6. Configure Group Role Assignment using the Management CLI

Groups to be included or excluded from a role can be configured in the Management Console and the Management CLI. This topic only shows using the Management CLI.

The configuration of mapping users and groups to roles is located in the management API at: **/core-service=management/access=authorization** as role-mapping elements.

Only users in the SuperUser or Administrator roles can perform this configuration.

For easier access to the commands, in the Management CLI change to the **/core-service=management/access=authorization** location:

```
[standalone@localhost:9999] cd /core-service=management/access=authorization
```

Procedure 6.16. Viewing Group Role Assignment Configuration

1. Use the **read-children-names** operation to get a complete list of the configured roles:

   ```
   /core-service=management/access=authorization:read-children-names(child-type=role-
   mapping)
   ```

```
[standalone@localhost:9999 access=authorization] :read-children-names(child-type=role-
mapping)
{
    "outcome" => "success",
    "result" => [
        "Administrator",
        "Deployer",
        "Maintainer",
        "Monitor",
        "Operator",
        "SuperUser"
    ]
}
```

2. Use the **read-resource** operation of a specified role-mapping to get the full details of a specific role:

```
/core-service=management/access=authorization/role-mapping=ROLENAME:read-
resource(recursive=true)
```

```
[standalone@localhost:9999 access=authorization] ./role-mapping=Administrator:read-
resource(recursive=true)
{
    "outcome" => "success",
    "result" => {
        "include-all" => false,
        "exclude" => undefined,
        "include" => {
            "user-theboss" => {
                "name" => "theboss",
                "realm" => undefined,
                "type" => "USER"
            },
            "user-harold" => {
                "name" => "harold",
                "realm" => undefined,
                "type" => "USER"
            },
            "group-SysOps" => {
                "name" => "SysOps",
                "realm" => undefined,
                "type" => "GROUP"
            }
        }
    }
}
[standalone@localhost:9999 access=authorization]
```

Procedure 6.17. Add a new role

This procedure shows how to add a role-mapping entry for a role. This must be done before the role can be configured.

- Use the **add** operation to add a new role configuration.

```
/core-service=management/access=authorization/role-mapping=ROLENAME:add
```

```
[standalone@localhost:9999 access=authorization] ./role-mapping=Auditor:add
{"outcome" => "success"}
[standalone@localhost:9999 access=authorization]
```

Procedure 6.18. Add a Group as included in a role

This procedure shows how to add a Group to the included list of a role.

If no configuration for a role has been done, then a role-mapping entry for it must be done first.

- Use the **add** operation to add a Group entry to the includes list of the role.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/include=ALIAS:add(name=GROUPNAME, type=GROUP)
  ```

  ROLENAME is the name of the role being configured.

  GROUPNAME is the name of the group being added to the include list.

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **group-*GROUPNAME***.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/include=group-
  investigators:add(name=investigators, type=GROUP)
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

Procedure 6.19. Add a group as excluded in a role

This procedure shows how to add a group to the excluded list of a role.

If no configuration for a role has been done, then a role-mapping entry for it must be created first.

- Use the **add** operation to add a group entry to the excludes list of the role.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/exclude=ALIAS:add(name=GROUPNAME, type=GROUP)
  ```

  ROLENAME is the name of the role being configured

  GROUPNAME is the name of the group being added to the include list

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **group-*GROUPNAME***.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/exclude=group-
  supervisors:add(name=supervisors, type=GROUP)
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

Procedure 6.20. Remove group role include configuration

This procedure shows how to remove a group include entry from a role mapping.

- Use the **remove** operation to remove the entry.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/include=ALIAS:remove
  ```

  ROLENAME is the name of the role being configured

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **group-*GROUPNAME***.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/include=group-
  investigators:remove
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

  Removing the group from the list of includes does not remove the group from the system, nor does it guarantee that the role won't be assigned to users in this group. The role might still be assigned to users in the group individually.

Procedure 6.21. Remove a user group exclude entry

This procedure shows how to remove a group exclude entry from a role mapping.

- Use the **remove** operation to remove the entry.

  ```
  /core-service=management/access=authorization/role-
  mapping=ROLENAME/exclude=ALIAS:remove
  ```

  ROLENAME is the name of the role being configured.

  ALIAS is a unique name for this mapping. Red Hat recommends that you use a naming convention for your aliases such as **group-*GROUPNAME***.

  ```
  [standalone@localhost:9999 access=authorization] ./role-mapping=Auditor/exclude=group-
  supervisors:remove
  {"outcome" => "success"}
  [standalone@localhost:9999 access=authorization]
  ```

  Removing the group from the list of excludes does not remove the group from the system. It also does not guarantee the role will be assigned to members of the group. Roles might still be excluded based on group membership.

Report a bug

6.9.7. About Authorization and Group Loading with LDAP

An LDAP directory contains entries for user accounts and groups, cross referenced by attributes. Depending on the LDAP server configuration, a user entity may map the groups the user belongs to through **memberOf** attributes; a group entity may map which users belong to it through **uniqueMember** attributes; or both mappings may be maintained by the LDAP server.

Users generally authenticate against the server using a simple user name. When searching for group membership information, depending on the directory server in use, searches could be performed using this simple name or using the distinguished name of the user's entry in the directory.

The authentication step of a user connecting to the server always happens first. Once the user is successfully authenticated the server loads the user's groups. The authentication step and the authorization step each require a connection to the LDAP server. The realm optimizes this process by reusing the authentication connection for the group loading step. As will be shown within the configuration steps below it is possible to define rules within the authorization section to convert a user's simple user name to their distinguished name. The result of a "user name to distinguished name mapping" search during authentication is cached and reused during the authorization query when the **force** attribute is set to "false". When **force** is true, the search is performed again during authorization (while loading groups). This is typically done when different servers perform authentication and authorization.

```
<authorization>
   <ldap connection="...">
    <!-- OPTIONAL -->
     <username-to-dn force="true">
        <!-- Only one of the following. -->
        <username-is-dn />
        <username-filter base-dn="..." recursive="..." user-dn-attribute="..." attribute="..." />
        <advanced-filter base-dn="..." recursive="..." user-dn-attribute="..." filter="..." />
      </username-to-dn>

     <group-search group-name="..." iterative="..." group-dn-attribute="..." group-name-attribute="..." >
        <!-- One of the following -->
        <group-to-principal base-dn="..." recursive="..." search-by="...">
           <membership-filter principal-attribute="..." />
        </group-to-principal>
        <principal-to-group group-attribute="..." />
     </group-search>
   </ldap>
</authorization>
```

IMPORTANT

These examples specify some attributes with their default values. This is done for demonstration. Attributes that specify their default values are removed from the configuration when it is persisted by the server. The exception is the **force** attribute. It is required, even when set to the default value of **false**.

username-to-dn

The **username-to-dn** element specifies how to map the user name to the distinguished name of their entry in the LDAP directory. This element is only required when *both* of the following are true:

- The authentication and authorization steps are against different LDAP servers.
- The group search uses the distinguished name.

1:1 username-to-dn

This specifies that the user name entered by the remote user is the user's distinguished name.

```
<username-to-dn force="false">
  <username-is-dn />
</username-to-dn>
```

This defines a 1:1 mapping and there is no additional configuration.

username-filter

The next option is very similar to the simple option described above for the authentication step. A specified attribute is searched for a match against the supplied user name.

```
<username-to-dn force="true">
   <username-filter base-dn="dc=people,dc=harold,dc=example,dc=com" recursive="false"
attribute="sn" user-dn-attribute="dn" />
</username-to-dn>
```

The attributes that can be set here are:

- **base-dn**: The distinguished name of the context to begin the search.
- **recursive**: Whether the search will extend to sub contexts. Defaults to **false**.
- **attribute**: The attribute of the users entry to try and match against the supplied user name. Defaults to **uid**.
- **user-dn-attribute**: The attribute to read to obtain the users distinguished name. Defaults to **dn**.

advanced-filter

The final option is to specify an advanced filter, as in the authentication section this is an opportunity to use a custom filter to locate the users distinguished name.

```
<username-to-dn force="true">
   <advanced-filter base-dn="dc=people,dc=harold,dc=example,dc=com" recursive="false"
filter="sAMAccountName={0}" user-dn-attribute="dn" />
</username-to-dn>
```

For the attributes that match those in the *username-filter* example, the meaning and default values are the same. There is one new attribute:

- **filter**: Custom filter used to search for a user's entry where the user name will be substituted in the **{0}** place holder.

IMPORTANT

The XML must remain valid after the filter is defined so if any special characters are used such as **&** ensure the proper form is used. For example **&amp;** for the **&** character.

The Group Search

There are two different styles that can be used when searching for group membership information. The first style is where the user's entry contains an attribute that references the groups the user is a member of. The second style is where the group contains an attribute referencing the users entry.

When there is a choice of which style to use Red Hat recommends that the configuration for a user's entry referencing the group is used. This is because with this method group information can be loaded by reading attributes of known distinguished names without having to perform any searches. The other approach requires extensive searches to identify the groups that reference the user.

Before describing the configuration here are some LDIF examples to illustrate this.

Example 6.1. Principal to Group - LDIF example.

This example illustrates where we have a user **TestUserOne** who is a member of **GroupOne**, **GroupOne** is in turn a member of **GroupFive**. The group membership is shown by the use of a **memberOf** attribute which is set to the distinguished name of the group of which the user (or group) is a member.

It is not shown here but a user could potentially have multiple **memberOf** attributes set, one for each group of which the user is directly a member.

```
dn: uid=TestUserOne,ou=users,dc=principal-to-group,dc=example,dc=org
objectClass: extensibleObject
objectClass: top
objectClass: groupMember
objectClass: inetOrgPerson
objectClass: uidObject
objectClass: person
objectClass: organizationalPerson
cn: Test User One
sn: Test User One
uid: TestUserOne
distinguishedName: uid=TestUserOne,ou=users,dc=principal-to-group,dc=example,dc=org
memberOf: uid=GroupOne,ou=groups,dc=principal-to-group,dc=example,dc=org
memberOf: uid=Slashy/Group,ou=groups,dc=principal-to-group,dc=example,dc=org
userPassword::
e1NTSEF9WFpURzhLVjc4WVZBQUJNbEI3Ym96UVAva0RTNlFNWUpLOTdTMUE9PQ==

dn: uid=GroupOne,ou=groups,dc=principal-to-group,dc=example,dc=org
objectClass: extensibleObject
objectClass: top
objectClass: groupMember
objectClass: group
objectClass: uidObject
uid: GroupOne
distinguishedName: uid=GroupOne,ou=groups,dc=principal-to-group,dc=example,dc=org
memberOf: uid=GroupFive,ou=subgroups,ou=groups,dc=principal-to-group,dc=example,dc=org

dn: uid=GroupFive,ou=subgroups,ou=groups,dc=principal-to-group,dc=example,dc=org
objectClass: extensibleObject
objectClass: top
objectClass: groupMember
objectClass: group
objectClass: uidObject
```

```
uid: GroupFive
distinguishedName: uid=GroupFive,ou=subgroups,ou=groups,dc=principal-to-
group,dc=example,dc=org
```

Example 6.2. Group to Principal - LDIF Example

This example shows the same user **TestUserOne** who is a member of **GroupOne** which is in turn a member of **GroupFive** - however in this case it is an attribute **uniqueMember** from the group to the user being used for the cross reference.

Again the attribute used for the group membership cross reference can be repeated, if you look at *GroupFive* there is also a reference to another user *TestUserFive* which is not shown here.

```
dn: uid=TestUserOne,ou=users,dc=group-to-principal,dc=example,dc=org
objectClass: top
objectClass: inetOrgPerson
objectClass: uidObject
objectClass: person
objectClass: organizationalPerson
cn: Test User One
sn: Test User One
uid: TestUserOne
userPassword::
e1NTSEF9SjR0OTRDR1ltaHc1VVZQOEJvbXhUYjl1dkFVd1lQTmRLSEdzaWc9PQ==

dn: uid=GroupOne,ou=groups,dc=group-to-principal,dc=example,dc=org
objectClass: top
objectClass: groupOfUniqueNames
objectClass: uidObject
cn: Group One
uid: GroupOne
uniqueMember: uid=TestUserOne,ou=users,dc=group-to-principal,dc=example,dc=org

dn: uid=GroupFive,ou=subgroups,ou=groups,dc=group-to-principal,dc=example,dc=org
objectClass: top
objectClass: groupOfUniqueNames
objectClass: uidObject
cn: Group Five
uid: GroupFive
uniqueMember: uid=TestUserFive,ou=users,dc=group-to-principal,dc=example,dc=org
uniqueMember: uid=GroupOne,ou=groups,dc=group-to-principal,dc=example,dc=org
```

General Group Searching

Before looking at the examples for the two approaches shown above we first need to define the attributes common to both of these.

```
<group-search group-name="..." iterative="..." group-dn-attribute="..." group-name-attribute="..." >
    ...
</group-search>
```

- **group-name**: This attribute is used to specify the form that should be used for the group name returned as the list of groups of which the user is a member. This can either be the simple form of the group name or the group's distinguished name. If the distinguished name is required this attribute can be set to **DISTINGUISHED_NAME**. Defaults to **SIMPLE**.

- **iterative**: This attribute is used to indicate if, after identifying the groups a user is a member of, we should also iteratively search based on the groups to identify which groups the groups are a member of. If iterative searching is enabled we keep going until either we reach a group that is not a member if any other groups or a cycle is detected. Defaults to **false**.

Cyclic group membership is not a problem. A record of each search is kept to prevent groups that have already been searched from being searched again.

IMPORTANT

For iterative searching to work the group entries need to look the same as user entries. The same approach used to identify the groups a user is a member of is then used to identify the groups of which the group is a member. This would not be possible if for group to group membership the name of the attribute used for the cross reference changes or if the direction of the reference changes.

- **group-dn-attribute**: On an entry for a group which attribute is its distinguished name. Defaults to **dn**.

- **group-name-attribute**: On an entry for a group which attribute is its simple name. Defaults to **uid**.

Example 6.3. Principal to Group Example Configuration

Based on the example LDIF from above here is an example configuration iteratively loading a user's groups where the attribute used to cross reference is the **memberOf** attribute on the user.

```
<authorization>
   <ldap connection="LocalLdap">
      <username-to-dn>
         <username-filter base-dn="ou=users,dc=principal-to-group,dc=example,dc=org"
recursive="false" attribute="uid" user-dn-attribute="dn" />
      </username-to-dn>
      <group-search group-name="SIMPLE" iterative="true" group-dn-attribute="dn" group-name-
attribute="uid">
         <principal-to-group group-attribute="memberOf" />
      </group-search>
   </ldap>
</authorization>
```

The most important aspect of this configuration is that the **principal-to-group** element has been added with a single attribute.

- **group-attribute**: The name of the attribute on the user entry that matches the distinguished name of the group the user is a member of. Defaults to **memberOf**.

Example 6.4. Group to Principal Example Configuration

This example shows an iterative search for the group to principal LDIF example shown above.

```
<authorization>
    <ldap connection="LocalLdap">
        <username-to-dn>
            <username-filter base-dn="ou=users,dc=group-to-principal,dc=example,dc=org"
recursive="false" attribute="uid" user-dn-attribute="dn" />
        </username-to-dn>
        <group-search group-name="SIMPLE" iterative="true" group-dn-attribute="dn" group-name-
attribute="uid">
            <group-to-principal base-dn="ou=groups,dc=group-to-principal,dc=example,dc=org"
recursive="true" search-by="DISTINGUISHED_NAME">
                <membership-filter principal-attribute="uniqueMember" />
            </group-to-principal>
        </group-search>
    </ldap>
  </authorization>
```

Here an element **group-to-principal** is added. This element is used to define how searches for groups that reference the user entry will be performed. The following attributes are set:

- **base-dn**: The distinguished name of the context to use to begin the search.
- **recursive**: Whether sub-contexts also be searched. Defaults to **false**.
- **search-by**: The form of the role name used in searches. Valid values are **SIMPLE** and **DISTINGUISHED_NAME**. Defaults to **DISTINGUISHED_NAME**.

Within the *group-to-principal* element there is a *membership-filter* element to define the cross reference.

- **principal-attribute**: The name of the attribute on the group entry that references the user entry. Defaults to **member**.

Report a bug

6.9.8. About Scoped Roles

Scoped Roles are user-defined roles that grant the permissions of one of the standard roles but only for one or more specified server groups or hosts. Scoped roles allow for management users to be granted permissions that are limited to only those server groups or hosts that are required.

Scoped roles can be created by users assigned the Administrator or SuperUser roles.

They are defined by five characteristics:

1. A unique name.
2. Which of the standard roles it is based on.
3. If it applies to Server Groups or Hosts
4. The list of server groups or hosts that it is restricted to.
5. If all users are automatically include. This defaults to false.

Once created a scoped role can be assigned to users and groups the same way that the standard roles are.

Creating a scoped role does not let you define new permissions. Scoped roles can only be used to apply the permissions of an existing role in a limited scope. For example, you could create a scoped role based on the Deployer role which is restricted to a single server group.

There are only two scopes that roles can be limited to, host and server group.

Host-scoped roles

A role that is host-scoped restricts the permissions of that role to one or more hosts. This means access is provided to the relevant /**host=***/ resource trees but resources that are specific to other hosts are hidden.

Server-Group-scoped roles

A role that is server-group-scoped restricts the permissions of that role to one or more server groups. Additionally the role permissions will also apply to the profile, socket binding group, server config and server resources that are associated with the specified server-groups. Any sub-resources within any of those that are not logically related to the server-group will not be visible to the user.

Both host and server-group scoped roles have permissions of the Monitor role for the remainder of the managed domain configuration.

Report a bug

6.9.9. Creating Scoped Roles

Scoped Roles are user-defined roles that grant the permissions of one of the standard roles but only for one or more specified server groups or hosts. This topic shows how to create scoped roles.

Only users in the **SuperUser** or **Administrator** roles can perform this configuration.

Scoped Role configuration in the management console can be found by following these steps:

1. Login to the Management Console
2. Click on the **Administration** tab
3. Expand the **Access Control** menu and select **Role Assignment**.
4. Select **ROLES** tab, and then the **Scoped Roles** tab within it.

The **Scoped Roles** section of the Management Console consists of two main areas, a table containing a list of the currently configured scoped roles, and the **Selection** panel which displays the details of the role currently selected in the table.

The following procedures show how to perform configuration tasks for Scoped Roles.

Procedure 6.22. Add a New Scoped Role

1. Login to the Management Console
2. Navigate to the **Scoped Roles** area of the **Roles** tab.

3. Click **Add**. The **Add Scoped Role** dialog appears.

4. Specify the following details:

   - **Name**, the unique name for the new scoped role.
   - **Base Role**, the role which this role will base its permissions on.
   - **Type**, whether this role will be restricted to hosts or server groups.
   - **Scope**, the list of hosts or server groups that the role is restricted to. Multiple entries can be selected.
   - **Include All**, should this role automatically include all users. Defaults to no.

5. Click **Save** and the dialog will close and the newly created role will appear in the table.

Procedure 6.23. Edit a Scoped Role

1. Login to the Management Console
2. Navigate to the **Scoped Roles** area of the **Roles** tab.
3. Click on the scoped role you want to edit in the table. The details of that role appears in the **Selection** panel below the table.
4. Click **Edit** in the **Selection** panel. The **Selection** panel enters edit mode.
5. Update the details you need to change and click the **Save** button. The **Selection** panel returns to its previous state. Both the **Selection** panel and table show the newly updated details.

Procedure 6.24. View Scoped Role Members

1. Login to the Management Console
2. Navigate to the **Scoped Roles** area of the **Roles** tab.
3. Click on the scoped role in the table that you want to view the **Members** of, then click **Members**. The **Members of role** dialog appears. It shows users and groups that are included or excluded from the role.
4. Click **Done** when you have finished reviewing this information.

Procedure 6.25. Delete a Scoped Role

IMPORTANT

A **Scoped Role** cannot be deleted if users or groups are assigned to it. Remove the role assignments first, and then delete it.

1. Login to the Management Console
2. Navigate to the **Scoped Roles** area of the **Roles** tab.
3. Select the scoped role to be removed in the table.

4. Click the **Remove** button. The **Remove Scoped Role** dialog appears.

5. Click **Confirm**.The dialog closes and the role is removed.

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6.10. CONFIGURING CONSTRAINTS

6.10.1. Configure Sensitivity Constraints

Each Sensitivity Constraint defines a set of resources that are considered "sensitive". A sensitive resource is generally one that either should be secret, like passwords, or one that will have serious impact on the server, like networking, JVM configuration, or system properties. The access control system itself is also considered sensitive. Resource sensitivity limits which roles are able to read, write or address a specific resource.

Sensitivity constraint configuration is in the Management API at **/core-service=management/access=authorization/constraint=sensitivity-classification**.

Within the management model each Sensitivity Constraint is identified as a **classification**. The classifications are then grouped into **types**. There are 39 included classifications that are arranged into 13 types.

To configure a sensitivity constraint, use the **write-attribute** operation to set the **configured-requires-read**, **configured-requires-write**, or **configured-requires-addressable** attribute. To make that type of operation sensitive set the value of the attribute to **true**, otherwise to make it nonsensitive set it to **false**. By default these attributes are not set and the values of **default-requires-read**, **default-requires-write**, and **default-requires-addressable** are used. Once the configured attribute is set it is that value that is used instead of the default. The default values cannot be changed.

Example 6.5. Make reading system properties a sensitive operation

```
[domain@localhost:9999 /] cd /core-
service=management/access=authorization/constraint=sensitivity-
classification/type=core/classification=system-property
[domain@localhost:9999 classification=system-property] :write-attribute(name=configured-
requires-read, value=true)
{
    "outcome" => "success",
    "result" => undefined,
    "server-groups" => {"main-server-group" => {"host" => {"master" => {
        "server-one" => {"response" => {"outcome" => "success"}},
        "server-two" => {"response" => {"outcome" => "success"}}
    }}}}
}
[domain@localhost:9999 classification=system-property] :read-resource
{
    "outcome" => "success",
    "result" => {
        "configured-requires-addressable" => undefined,
        "configured-requires-read" => true,
        "configured-requires-write" => undefined,
        "default-requires-addressable" => false,
        "default-requires-read" => false,
        "default-requires-write" => true,
            "applies-to" => {
                "/host=master/system-property=*" => undefined,
                "/host=master/core-service=platform-mbean/type=runtime" => undefined,
                "/server-group=*/system-property=*" => undefined,
                "/host=master/server-config=*/system-property=*" => undefined,
                "/host=master" => undefined,
                "/system-property=*" => undefined,
                "/" => undefined
            }
        }
    }
[domain@localhost:9999 classification=system-property]
```

What roles will be able to perform what operations depending on the configuration of these attributes is summarized in Table 6.2, "Sensitivity Constraint Configuration outcomes" .

Table 6.2. Sensitivity Constraint Configuration outcomes

Value	requires-read	requires-write	requires-addressable
true	Read is sensitive. Only **Auditor**, **Administrator**, **SuperUser** can read.	Write is sensitive. Only **Administrator** and **SuperUser** can write	Addressing is sensitive. Only **Auditor**, **Administrator**, **SuperUser** can address.
false	Read is not sensitive. Any management user can read.	Write is not sensitive. Only **Maintainer**, **Administrator** and **SuperUser** can write. **Deployers** can also write the resource is an application resource.	Addressing is not sensitive. Any management user can address.

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6.10.2. Configure Application Resource Constraints

Each Application Resource Constraint defines a set of resources, attributes and operations that are usually associated with the deployment of applications and services. When an application resource constraint is enabled management users of the Deployer role are granted access to the resources that it applies to.

Application constraint configuration is in the Management Model at /**core-service=management/access=authorization/constraint=application-classification**/.

Within the management model each Application Resource Constraint is identified as a **classification**. The classifications are then grouped into **types**. There are 14 included classifications that are arranged into 8 types. Each classification has an **applies-to** element which is a list of resource path patterns to which the classifications configuration applies.

By default the only Application Resource classification that is enabled is **core**. Core includes deployments, deployment overlays, and the deployment operations.

To enable an Application Resource, use the **write-attribute** operation to set the **configured-application attribute** of the classification to **true**. To disable an Application Resource, set this attribute to **false**. By default these attributes are not set and the value of **default-application attribute** is used. The default value cannot be changed.

Example 6.6. Enabling the logger-profile application resource classification

```
[domain@localhost:9999 /] cd /core-
service=management/access=authorization/constraint=application-
classification/type=logging/classification=logging-profile
[domain@localhost:9999 classification=logging-profile] :write-attribute(name=configured-
application, value=true)
{
    "outcome" => "success",
    "result" => undefined,
    "server-groups" => {"main-server-group" => {"host" => {"master" => {
        "server-one" => {"response" => {"outcome" => "success"}},
        "server-two" => {"response" => {"outcome" => "success"}}
    }}}}
}
[domain@localhost:9999 classification=logging-profile] :read-resource
{
    "outcome" => "success",
    "result" => {
        "configured-application" => true,
        "default-application" => false,
        "applies-to" => {"/profile=*/subsystem=logging/logging-profile=*" => undefined}
    }
}
[domain@localhost:9999 classification=logging-profile]
```

IMPORTANT

Application Resource Constraints apply to all resources that match its configuration. For example, It is not possible to grant a **Deployer** user access to one datasource resource but not another. If this level of separation is required then it is recommended to configure the resources in different server groups and create different scoped **Deployer** roles for each group.

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6.10.3. Configure the Vault Expression Constraint

By default, reading and writing vault expressions are sensitive operations. Configuring the Vault Expression Constraint allows you to set either or both of those operations to being nonsensitive. Changing this constraint allows a greater number of roles to read and write vault expressions.

The vault expression constraint is found in the management model at **/core-service=management/access=authorization/constraint=vault-expression**.

To configure the vault expression constraint, use the **write-attribute** operation to set the attributes of **configured-requires-write** and **configured-requires-read** to **true** or **false**. By default these are not set and the values of **default-requires-read** and **default-requires-write** are used. The default values cannot be changed.

Example 6.7. Making writing to vault expressions a nonsensitive operation

```
[domain@localhost:9999 /] cd /core-service=management/access=authorization/constraint=vault-
expression
[domain@localhost:9999 constraint=vault-expression] :write-attribute(name=configured-requires-
write, value=false)
{
    "outcome" => "success",
    "result" => undefined,
    "server-groups" => {"main-server-group" => {"host" => {"master" => {
        "server-one" => {"response" => {"outcome" => "success"}},
        "server-two" => {"response" => {"outcome" => "success"}}
    }}}}
}
[domain@localhost:9999 constraint=vault-expression] :read-resource
{
    "outcome" => "success",
    "result" => {
        "configured-requires-read" => undefined,
        "configured-requires-write" => false,
        "default-requires-read" => true,
        "default-requires-write" => true
    }
}
[domain@localhost:9999 constraint=vault-expression]
```

What roles will be able to read and write to vault expressions depending on this configuration is summarized in Table 6.3, “Vault Expression Constraint Configuration outcomes” .

Table 6.3. Vault Expression Constraint Configuration outcomes

Value	requires-read	requires-write
true	Read operation is sensitive. Only **Auditor**, **Administrator**, and **SuperUser** can read.	Write operation is sensitive. Only **Administrator**, and **SuperUser** can write.
false	Read operation is not sensitive. All management users can read.	Write operation is not sensitive. **Monitor**, **Administrator**, and **SuperUser** can write. **Deployers** can also write if the vault expression is in an Application Resource.

Report a bug

6.11. CONSTRAINTS REFERENCE

6.11.1. Application Resource Constraints Reference

Type: core

Classification: deployment-overlay

- default: true
- PATH: /deployment-overlay=*
- PATH: /deployment=*
- PATH: /

  Operation:

  upload-deployment-stream, full-replace-deployment, upload-deployment-url, upload-deployment-bytes

Type: datasources

Classification: datasource

- default: false
- PATH: /deployment=*/subdeployment=*/subsystem=datasources/data-source=*
- PATH: /subsystem=datasources/data-source=*
- PATH: /subsystem=datasources/data-source=ExampleDS
- PATH: /deployment=*/subsystem=datasources/data-source=*

Classification: jdbc-driver

- default: false
- PATH: /subsystem=datasources/jdbc-driver=*

Classification: xa-data-source

- default: false
- PATH: /subsystem=datasources/xa-data-source=*
- PATH: /deployment=*/subsystem=datasources/xa-data-source=*
- PATH: /deployment=*/subdeployment=*/subsystem=datasources/xa-data-source=*

Type: logging

Classification: logger

- default: false
- PATH: /subsystem=logging/logger=*
- PATH: /subsystem=logging/logging-profile=*/logger=*

Classification: logging-profile

- default: false
- PATH: /subsystem=logging/logging-profile=*

Type: mail

Classification: mail-session

- default: false
- PATH: /subsystem=mail/mail-session=*

Type: naming

Classification: binding

- default: false
- PATH: /subsystem=naming/binding=*

Type: resource-adapters

Classification: resource-adapters

- default: false
- PATH: /subsystem=resource-adapters/resource-adapter=*

Type: security

Classification: security-domain

- default: false
- PATH: /subsystem=security/security-domain=*

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6.11.2. Sensitivity Constraints Reference

Type: core

Classification: access-control

- requires-addressable: true
- requires-read: true
- requires-write: true
- PATH: /core-service=management/access=authorization
- PATH: /subsystem=jmx ATTRIBUTE: non-core-mbean-sensitivity

Classification: credential

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=mail/mail-session=*/server=pop3 ATTRIBUTE: username , password
- PATH: /subsystem=mail/mail-session=*/server=imap ATTRIBUTE: username , password
- PATH: /subsystem=datasources/xa-data-source=* ATTRIBUTE: user-name, recovery-username, password, recovery-password
- PATH: /subsystem=mail/mail-session=*/custom=* ATTRIBUTE: username, password
- PATH: /subsystem=datasources/data-source=*" ATTRIBUTE: user-name, password
- PATH: /subsystem=remoting/remote-outbound-connection=*" ATTRIBUTE: username
- PATH: /subsystem=mail/mail-session=*/server=smtp ATTRIBUTE: username, password
- PATH: /subsystem=web/connector=*/configuration=ssl ATTRIBUTE: key-alias, password
- PATH: /subsystem=resource-adapters/resource-adapter=*/connection-definitions=*" ATTRIBUTE: recovery-username, recovery-password

Classification: domain-controller

- requires-addressable: false
- requires-read: false
- requires-write: true

Classification: domain-names

- requires-addressable: false
- requires-read: false
- requires-write: true

Classification: extensions

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /extension=*

Classification: jvm

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /core-service=platform-mbean/type=runtime ATTRIBUTE: input-arguments, boot-class-path, class-path, boot-class-path-supported, library-path

Classification: management-interfaces

- requires-addressable: false
- requires-read: false
- requires-write: true
- /core-service=management/management-interface=native-interface
- /core-service=management/management-interface=http-interface

Classification: module-loading

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /core-service=module-loading

Classification: patching

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /core-service=patching/addon=*
- PATH: /core-service=patching/layer=*"
- PATH: /core-service=patching

Classification: read-whole-config

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: / OPERATION: read-config-as-xml

Classification: security-domain

- requires-addressable: true
- requires-read: true
- requires-write: true
- PATH: /subsystem=security/security-domain=*

Classification: security-domain-ref

- requires-addressable: true
- requires-read: true
- requires-write: true
- PATH: /subsystem=datasources/xa-data-source=* ATTRIBUTE: security-domain
- PATH: /subsystem=datasources/data-source=* ATTRIBUTE: security-domain
- PATH: /subsystem=ejb3 ATTRIBUTE: default-security-domain
- PATH: /subsystem=resource-adapters/resource-adapter=*/connection-definitions=* ATTRIBUTE: security-domain, recovery-security-domain, security-application, security-domain-and-application

Classification: security-realm

- requires-addressable: true
- requires-read: true
- requires-write: true
- PATH: /core-service=management/security-realm=*

Classification: security-realm-ref

- requires-addressable: true
- requires-read: true
- requires-write: true
- PATH: /subsystem=remoting/connector=* ATTRIBUTE: security-realm

- PATH: /core-service=management/management-interface=native-interface ATTRIBUTE: security-realm
- PATH: /core-service=management/management-interface=http-interface ATTRIBUTE: security-realm
- PATH: /subsystem=remoting/remote-outbound-connection=* ATTRIBUTE: security-realm

Classification: security-vault

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /core-service=vault

Classification: service-container

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /core-service=service-container

Classification: snapshots

- requires-addressable: false
- requires-read: false
- requires-write: false
- PATH: / ATTRIBUTE: take-snapshot, list-snapshots, delete-snapshot

Classification: socket-binding-ref

- requires-addressable: false
- requires-read: false
- requires-write: false
- PATH: /subsystem=mail/mail-session=*/server=pop3 ATTRIBUTE: outbound-socket-binding-ref
- PATH: /subsystem=mail/mail-session=*/server=imap ATTRIBUTE: outbound-socket-binding-ref
- PATH: /subsystem=remoting/connector=* ATTRIBUTE: socket-binding
- PATH: /subsystem=web/connector=* ATTRIBUTE: socket-binding

- PATH: /subsystem=remoting/local-outbound-connection=* ATTRIBUTE: outbound-socket-binding-ref
- PATH: /socket-binding-group=*/local-destination-outbound-socket-binding=* ATTRIBUTE: socket-binding-ref
- PATH: /subsystem=remoting/remote-outbound-connection=* ATTRIBUTE: outbound-socket-binding-ref
- PATH: /subsystem=mail/mail-session=*/server=smtp ATTRIBUTE: outbound-socket-binding-ref
- PATH: /subsystem=transactions ATTRIBUTE: process-id-socket-binding, status-socket-binding, socket-binding

Classification: socket-config

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /interface=* OPERATION: resolve-internet-address
- PATH: /core-service=management/management-interface=native-interface ATTRIBUTE: port, interface, socket-binding
- PATH: /socket-binding-group=*
- PATH: /core-service=management/management-interface=http-interface ATTRIBUTE: port, secure-port, interface, secure-socket-binding, socket-binding
- PATH: / OPERATION: resolve-internet-address
- PATH: /subsystem=transactions ATTRIBUTE: process-id-socket-max-ports

Classification: system-property

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /core-service=platform-mbean/type=runtime ATTRIBUTE: system-properties
- PATH: /system-property=*
- PATH: / OPERATION: resolve-expression

Type: datasources

Classification: data-source-security

- requires-addressable: false

- requires-read: true
- requires-write: true
- PATH: /subsystem=datasources/xa-data-source=* ATTRIBUTE: user-name, security-domain, password
- PATH: /subsystem=datasources/data-source=* ATTRIBUTE: user-name, security-domain, password

Type: jdr

Classification: jdr

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /subsystem=jdr OPERATION: generate-jdr-report

Type: jmx

Classification: jmx

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /subsystem=jmx

Type: mail

Classification: mail-server-security

- requires-addressable: false
- requires-read: false
- requires-write: true
- PATH: /subsystem=mail/mail-session=*/server=pop3 ATTRIBUTE: username, tls, ssl, password
- PATH: /subsystem=mail/mail-session=*/server=imap ATTRIBUTE: username, tls, ssl, password
- PATH: /subsystem=mail/mail-session=*/custom=* ATTRIBUTE: username, tls, ssl, password
- PATH: /subsystem=mail/mail-session=*/server=smtp ATTRIBUTE: username, tls, ssl, password

Type: naming

Classification: jndi-view

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=naming OPERATION: jndi-view

Classification: naming-binding

- requires-addressable: false
- requires-read: false
- requires-write: false
- PATH: /subsystem=naming/binding=*

Type: remoting

Classification: remoting-security

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=remoting/connector=* ATTRIBUTE: authentication-provider, security-realm
- PATH: /subsystem=remoting/remote-outbound-connection=* ATTRIBUTE: username, security-realm
- PATH: /subsystem=remoting/connector=*/security=sasl

Type: resource-adapters

Classification: resource-adapter-security

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=resource-adapters/resource-adapter=*/connection-definitions=* ATTRIBUTE: security-domain, recovery-username, recovery-security-domain, security-application, security-domain-and-application, recovery-password

Type: security

Classification: misc-security

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=security ATTRIBUTE: deep-copy-subject-mode

Type: web

Classification: web-access-log

- requires-addressable: false
- requires-read: false
- requires-write: false
- PATH: /subsystem=web/virtual-server=*/configuration=access-log

Classification: web-connector

- requires-addressable: false
- requires-read: false
- requires-write: false
- PATH: /subsystem=web/connector=*

Classification: web-ssl

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=web/connector=*/configuration=ssl

Classification: web-sso

- requires-addressable: false
- requires-read: true
- requires-write: true
- PATH: /subsystem=web/virtual-server=*/configuration=sso

Classification: web-valve

- requires-addressable: false
- requires-read: false
- requires-write: false
- PATH: /subsystem=web/valve=*

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CHAPTER 7. SECURE PASSWORDS AND OTHER SENSITIVE STRINGS WITH PASSWORD VAULT

7.1. PASSWORD VAULT SYSTEM

Configuration of JBoss EAP and associated applications requires potentially sensitive information, such as usernames and passwords. Instead of storing this sensitive information as plain text in configuration files, use the Password Vault feature to mask this information and store it in an encrypted keystore.

Instead of storing the password as plain text in configuration files, you can use the Password Vault feature to mask the password information and store it in an encrypted keystore. Once the password is stored, you can include references in Management CLI commands or your own applications. The Password Vault uses the Java Keystore as its storage mechanism. Password Vault consists of two parts: storage and key storage. Java Keystore is used to store the key, which is used to encrypt or decrypt sensitive strings in Vault storage.

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7.2. CONFIGURE AND USE PASSWORD VAULT

The masked keystore password feature provided in Password Vault provides the option to obtain the masked keystore password from Password Vault, which is stored on the JBoss EAP server. The Password Vault uses the Java Keystore as its storage mechanism.

Procedure 7.1. Basic steps to configure and use Password Vault

1. Setup a Java Keystore to store key for password encryption.

   For information on creating a keystore, refer Section 7.3, “Create a Java Keystore to Store Sensitive Strings”.

2. Initialize the Password Vault.

   For information on masking the password and initialize the password value, refer Section 7.4, “Initialize the Password Vault”.

3. Configure JBoss EAP 6 to use the Password Vault.

   For information on configuring EAP 6 to use Password Vault, refer Section 7.6, “Configure JBoss EAP 6 to Use the Password Vault”.

4. Store a Sensitive String in the Password Vault.

   For information on storing sensitive string in Password Vault, refer Section 7.8, “Store a Sensitive String in the Password Vault”.

5. Configure JBoss EAP 6 to use the Password Vault.

   For information on configuring JBoss EAP 6 to use the Password Vault, refer Section 7.6, “Configure JBoss EAP 6 to Use the Password Vault”. For custom implementation, refer Section 7.7, “Configure JBoss EAP 6 to Use a Custom Implementation of the Password Vault” .

NOTE

To use an encrypted sensitive string in configuration, refer Section 7.9, “Use an Encrypted Sensitive String in Configuration”.

To use an encrypted sensitive string in an application, refer Section 7.10, “Use an Encrypted Sensitive String in an Application”.

To verify a sensitive string in Password Vault, refer Section 7.11, “Check if a Sensitive String is in the Password Vault”.

To remove a sensitive string from Password Vault, refer Section 7.12, “Remove a Sensitive String from the Password Vault”.

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7.3. CREATE A JAVA KEYSTORE TO STORE SENSITIVE STRINGS

Prerequisites

- The **keytool** utility, provided by the Java Runtime Environment (JRE). Locate the path for the file, which on Red Hat Enterprise Linux is **/usr/bin/keytool**.

WARNING

JCEKS keystore implementations differ between Java vendors so you must generate the keystore using the **keytool** utility from the same vendor as the JDK you use.

Using a keystore generated by the **keytool** from one vendor's JDK in a JBoss EAP instance running on a JDK from a different vendor results in the following exception:

```
java.io.IOException: com.sun.crypto.provider.SealedObjectForKeyProtector
```

Procedure 7.2. Set up a Java Keystore

1. **Create a directory to store your keystore and other encrypted information.**
   Create a directory to store your keystore and other important information. The rest of this procedure assumes that the directory is ***EAP_HOME*/vault/**. Since this directory will contain sensitive information it should be accessible to only limited users. At a minimum the user account under which JBoss EAP is running requires read-write access.

2. **Determine the parameters to use withkeytool utility.**
   Decide on values for the following parameters:

   alias

   The alias is a unique identifier for the vault or other data stored in the keystore. Aliases are case-insensitive.

storetype

The storetype specifies the keystore type. The value **jceks** is recommended.

keyalg

The algorithm to use for encryption. Use the documentation for your JRE and operating system to see which other choices may be available to you.

keysize

The size of an encryption key impacts how difficult it is to decrypt through brute force. For information on appropriate values, see the documentation distributed with the **keytool** utility.

storepass

The value of **storepass** is the password is used to authenticate to the keystore so that the key can be read. The password must be at least 6 characters long and must be provided when the keystore is accessed. If you omit this parameter, you will be prompted to enter it when you execute the command.

keypass

The value of **keypass** is the password used to access the specific key and must match the value of the **storepass** parameter.

validity

The value of **validity** is the period (in days) for which the key will be valid.

keystore

The value of **keystore** is the filepath and filename in which the keystore's values are to be stored. The keystore file is created when data is first added to it.

Ensure you use the correct file path separator: / (forward slash) for Red Hat Enterprise Linux and similar operating systems, \ (backslash) for Microsoft Windows Server.

The **keytool** utility has many other options. See the documentation for your JRE or your operating system for more details.

3. **Run the keytool command**
   Launch your operating system's command line interface and run the **keytool** utility, supplying the information that you gathered.

Example 7.1. Create a Java Keystore

```
$ keytool -genseckey -alias vault -storetype jceks -keyalg AES -keysize 128 -storepass vault22 -
keypass vault22 -validity 730 -keystore EAP_HOME/vault/vault.keystore
```

Result

In this a keystore has been created in the file ***EAP_HOME*/vault/vault.keystore**. It stores a single key, with the alias **vault**, which will be used to store encrypted strings, such as passwords, for JBoss EAP.

Report a bug

7.4. INITIALIZE THE PASSWORD VAULT

Prerequisites

- Section 7.3, “Create a Java Keystore to Store Sensitive Strings”

Overview

The Password Vault can be initialized either interactively, where you are prompted for each parameter's value, or non-interactively, where you provide all parameters' values on the commmand line. Each method gives the same result, so choose whichever method you prefer.

Refer to the following list when using either method.

Keystore URL (KEYSTORE_URL)

The file system path or URI of the keystore file. The examples use ***EAP_HOME*/vault/vault.keystore**.

Keystore password (KEYSTORE_PASSWORD)

The password used to access the keystore.

Salt (SALT)

The **salt** value is a random string of eight characters used, together with the iteration count, to encrypt the content of the keystore.

Keystore Alias (KEYSTORE_ALIAS)

The alias by which the keystore is known.

Iteration Count (ITERATION_COUNT)

The number of times the encryption algorithm is run.

Directory to store encrypted files (ENC_FILE_DIR)

The path in which the encrypted files are to be stored. This is typically the directory containing the password vault.

It is convenient but not mandatory to store all of your encrypted information in the same place as the key store. This directory should be only accessible to limited users. At a minimum the user account under which JBoss EAP is running requires read-write access. If you followed Section 7.3, “Create a Java Keystore to Store Sensitive Strings”, your keystore is in a directory called ***EAP_HOME*/vault/**.

NOTE

The trailing backslash or forward slash on the directory name is required. Ensure you use the correct file path separator: / (forward slash) for Red Hat Enterprise Linux and similar operating systems, \ (backslash) for Microsoft Windows Server.

Vault Block (VAULT_BLOCK)

The name to be given to this block in the password vault. Choose a value which is significant to you.

Attribute (ATTRIBUTE)

The name to be given to the attribute being stored. Choose a value which is significant to you. For example, you could choose a name which you associate with a datasource.

Security Attribute (SEC-ATTR)

The password which is being stored in the password vault.

Procedure 7.3. Run the Password Vault Command Interactively

Use this method if you would prefer to be prompted for the value of each parameter.

1. **Launch the Password Vault command interactively.**
   Launch your operating system's command line interface and run ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server). Start a new interactive session by typing **0** (zero).

2. **Complete the prompted parameters.**
   Follow the prompts to input the required parameters.

3. **Make a note of the masked password information.**
   The masked password, salt, and iteration count are printed to standard output. Make a note of them in a secure location. They are required to add entries to the Password Vault. Access to the keystore file and these values could allow an attacker access to obtain access to sensitive information in the Password Vault.

4. **Exit the interactive console.**
   Type **3** (three) to exit the interactive console.

Example 7.2. Run the Password Vault command interactively

```
Please enter a Digit::   0: Start Interactive Session  1: Remove Interactive Session  2: Exit
0
Starting an interactive session
Enter directory to store encrypted files:EAP_HOME/vault/
Enter Keystore URL:EAP_HOME/vault/vault.keystore
Enter Keystore password: vault22
Enter Keystore password again: vault22
Values match
Enter 8 character salt:1234abcd
Enter iteration count as a number (Eg: 44):120
Enter Keystore Alias:vault
Initializing Vault
Oct 17, 2014 12:58:11 PM org.picketbox.plugins.vault.PicketBoxSecurityVault init
INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
Vault Configuration in AS7 config file:
********************************************
...
</extensions>
<vault>
  <vault-option name="KEYSTORE_URL" value="EAP_HOME/vault/vault.keystore"/>
  <vault-option name="KEYSTORE_PASSWORD" value="MASK-5dOaAVafCSd"/>
  <vault-option name="KEYSTORE_ALIAS" value="vault"/>
  <vault-option name="SALT" value="1234abcd"/>
  <vault-option name="ITERATION_COUNT" value="120"/>
  <vault-option name="ENC_FILE_DIR" value="EAP_HOME/vault/"/>
```

```
</vault><management> ...
********************************************
Vault is initialized and ready for use
Handshake with Vault complete
```

Procedure 7.4. Run the Password Vault Command Non-interactively

Use this method if you would prefer to provide all parameters' values at once.

- Launch your operating system's command line interface and run the Password Vault command. Refer to the list in the Overview, substituting the placeholder values with your preferred values.

  Use ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server).

  ```
  vault.sh --keystore KEYSTORE_URL --keystore-password KEYSTORE_PASSWORD --alias
  KEYSTORE_ALIAS --vault-block VAULT_BLOCK --attribute ATTRIBUTE --sec-attr SEC-
  ATTR --enc-dir ENC_FILE_DIR --iteration ITERATION_COUNT --salt SALT
  ```

  Example 7.3. Run the Password Vault command non-interactively

  ```
  vault.sh --keystore EAP_HOME/vault/vault.keystore --keystore-password vault22 --alias
  vault --vault-block vb --attribute password --sec-attr 0penS3sam3 --enc-dir
  EAP_HOME/vault/ --iteration 120 --salt 1234abcd
  ```

  Command output

  ```
  =========================================================================
  =

    JBoss Vault

    JBOSS_HOME: EAP_HOME

    JAVA: java

  =========================================================================
  =

  Oct 17, 2014 2:23:43 PM org.picketbox.plugins.vault.PicketBoxSecurityVault init
  INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
  Secured attribute value has been stored in vault.
  Please make note of the following:
  ********************************************
  Vault Block:vb
  Attribute Name:password
  Configuration should be done as follows:
  VAULT::vb::password::1
  ********************************************
  Vault Configuration in AS7 config file:
  ********************************************
  ...
  </extensions>
  ```

```
<vault>
  <vault-option name="KEYSTORE_URL" value="EAP_HOME/vault/vault.keystore"/>
  <vault-option name="KEYSTORE_PASSWORD" value="MASK-5dOaAVafCSd"/>
  <vault-option name="KEYSTORE_ALIAS" value="vault"/>
  <vault-option name="SALT" value="1234abcd"/>
  <vault-option name="ITERATION_COUNT" value="120"/>
  <vault-option name="ENC_FILE_DIR" value="EAP_HOME/vault/"/>
</vault><management> ...
********************************************
```

Result

Your keystore password has been masked for use in configuration files and deployments. In addition, your vault is initialized and ready to use.

Report a bug

7.5. OBTAIN KEYSTORE PASSWORD FROM EXTERNAL SOURCE

You can also the use the EXT, EXTC, CMD, CMDC or CLASS methods in Vault configuration for obtaining the Java keystore password.

```
<vault-option name="KEYSTORE_PASSWORD" value="[here]"
```

The description for the methods are listed as:

- **{EXT}...**: Refers to the exact command, where '...' is the exact command. For example: **{EXT}/usr/bin/getmypassword --section 1 --query company**, run the **/usr/bin/getmypassword** command, which displays the password on standard output and use it as password for Security Vault's keystore. In this example, the command is using two options: --section 1 and --query company.

- **{EXTC[:expiration_in_millis]}...**: Refers to the exact command, where the '...' is the exact command line that is passed to the Runtime.exec(String) method to execute a platform command. The first line of the command output is used as the password. EXTC variant caches the passwords for expiration_in_millis milliseconds. Default cache expiration is 0 (zero), meaning items in the cache never expire. For example: **{EXTC:120000}/usr/bin/getmypassword --section 1 --query company** Verify if cache contains **/usr/bin/getmypassword** output, if it contains the output then use it. If it does not contain the output, run the command to output it to cache and use it. In this example, the cache expires in 2 minute (120000 milliseconds).

- **{CMD}...** or **{CMDC[:expiration_in_millis]}...**: The general command is a string delimited by ',' where the first part is the actual command and further parts represents the parameters. The comma can be backslashed to keep it as a part of the parameter. For example, **{CMD}/usr/bin/getmypassword,--section,1,--query,company**

- **{CLASS[@jboss_module_spec]}classname[:ctorargs]**: Where the '[:ctorargs]' is an optional string delimited by the ':' from the classname is passed to the classname ctor. The ctorargs is a comma delimited list of strings. For example, **{CLASS@org.test.passwd}org.test.passwd.ExternamPassworProvider**. In this example, we load **org.test.passwd.ExternamPassworProvider** class from **org.test.passwd** module and use the **toCharArray()** method to get the password. If **toCharArray()** is not available use **toString()** method. The **org.test.passwd.ExternamPassworProvider** class must have the default constructor.

Report a bug

7.6. CONFIGURE JBOSS EAP 6 TO USE THE PASSWORD VAULT

Overview

Before you can mask passwords and other sensitive attributes in configuration files, you need to make JBoss EAP 6 aware of the password vault which stores and decrypts them.

Prerequisites

- Section 7.4, “Initialize the Password Vault”

Procedure 7.5. Enable the Password Vault

- Run the following Management CLI command, substituting the placeholder values with those from the output of the Password Vault command in Section 7.4, “Initialize the Password Vault” .

NOTE

If you use Microsoft Windows Server, use two backslashes (\\) in the file path where you would normally use one. For example, **C:\\data\\vault\\vault.keystore**. This is because a single backslash character (\) is used for character escaping.

```
/core-service=vault:add(vault-options=[("KEYSTORE_URL" => "PATH_TO_KEYSTORE"),
("KEYSTORE_PASSWORD" => "MASKED_PASSWORD"), ("KEYSTORE_ALIAS" =>
"ALIAS"), ("SALT" => "SALT"),("ITERATION_COUNT" => "ITERATION_COUNT"),
("ENC_FILE_DIR" => "ENC_FILE_DIR")])
```

Example 7.4. Enable the Password Vault

```
/core-service=vault:add(vault-options=[("KEYSTORE_URL" =>
"EAP_HOME/vault/vault.keystore"), ("KEYSTORE_PASSWORD" => "MASK-5dOaAVafCSd"),
("KEYSTORE_ALIAS" => "vault"), ("SALT" => "1234abcd"),("ITERATION_COUNT" => "120"),
("ENC_FILE_DIR" => "EAP_HOME/vault/")])
```

Result

JBoss EAP 6 is configured to decrypt masked strings stored in the Password Vault. To add strings to the Password Vault and use them in your configuration, see Section 7.8, “Store a Sensitive String in the Password Vault”.

Report a bug

7.7. CONFIGURE JBOSS EAP 6 TO USE A CUSTOM IMPLEMENTATION OF THE PASSWORD VAULT

Overview

You can use your own implementation of **SecurityVault** to mask passwords and other sensitive attributes in configuration files.

Prerequisites

- Section 7.4, "Initialize the Password Vault"

Procedure 7.6. Use a Custom Implementation of the Password Vault

1. Create a class that implements the interface **SecurityVault**.
2. Create a module containing the class from the previous step, and specify a dependency on **org.picketbox** where the interface is **SecurityVault**.
3. Enable the custom Password Vault in the JBoss EAP server configuration by adding the vault element with the following attributes:

   code

   The fully qualified name of class that implements **SecurityVault**.

   module

   The name of the module that contains the custom class.

   Optionally, you can use **vault-options** parameters to initialize the custom class for a Password Vault.

   Example 7.5. Use vault-options Parameters to Initialize the Custom Class

   ```
   /core-service=vault:add(code="custom.vault.implementation.CustomSecurityVault",
   module="custom.vault.module", vault-options=[("KEYSTORE_URL" =>
   "PATH_TO_KEYSTORE"), ("KEYSTORE_PASSWORD" => "MASKED_PASSWORD"),
   ("KEYSTORE_ALIAS" => "ALIAS"), ("SALT" => "SALT"),("ITERATION_COUNT" =>
   "ITERATION_COUNT"), ("ENC_FILE_DIR" => "ENC_FILE_DIR")])
   ```

Result

JBoss EAP 6 is configured to decrypt masked strings using a custom implementation of the password vault.

Report a bug

7.8. STORE A SENSITIVE STRING IN THE PASSWORD VAULT

Overview

Including passwords and other sensitive strings in plaintext configuration files is a security risk. Store these strings instead in the Password Vault for improved security, where they can then be referenced in configuration files, Management CLI commands and applications in their masked form.

Sensitive strings can be store in the Password Vault either interactively, where you are prompted for each parameter's value, or non-interactively, where you provide all parameters' values on the commmand line. Each method gives the same result, so choose whichever method you prefer. For a description of all parameters, see Section 7.4, “Initialize the Password Vault” .

Prerequisites

- Section 7.6, “Configure JBoss EAP 6 to Use the Password Vault”

Procedure 7.7. Store a Sensitive String Interactively

Use this method if you would prefer to be prompted for the value of each parameter.

1. **Run the Password Vault command**
   Launch your operating system's command line interface and run the Password Vault command. Use ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server). Start a new interactive session by typing **0** (zero).

2. **Complete the prompted parameters about the Password Vault**
   Follow the prompts to input the required authentication parameters. These values must match those provided when the Password Vault was created.

   NOTE

   The keystore password must be given in plaintext form, not masked form.

3. **Complete the prompted parameters about the sensitive string**
   Enter **0** (zero) to start storing the sensitive string. Follow the prompts to input the required parameters.

4. **Make note of the information about the masked string**
   A message prints to standard output, showing the vault block, attribute name, masked string, and advice about using the string in your configuration. Make note of this information in a secure location. An extract of sample output is as follows:

   ```
   Vault Block:ds_Example1
   Attribute Name:password
   Configuration should be done as follows:
   VAULT::ds_Example1::password::1
   ```

5. **Exit the interactive console**
   Enter **3** (three) to exit the interactive console.

Example 7.6. Store a Sensitive String Interactively

```
=========================================================================

 JBoss Vault

 JBOSS_HOME: EAP_HOME/jboss-eap-6.4

 JAVA: java

=========================================================================
```

```
**********************************
****  JBoss Vault  ***************
**********************************
Please enter a Digit::   0: Start Interactive Session  1: Remove Interactive Session  2: Exit
0
Starting an interactive session
Enter directory to store encrypted files:11:18:46,086 INFO  [org.jboss.security] (management-
handler-thread - 4) PBOX0
Enter directory to store encrypted files:EAP_HOME/vault/
Enter Keystore URL:EAP_HOME/vault/vault.keystore
Enter Keystore password:
Enter Keystore password again:
Values match
Enter 8 character salt:1234abcd
Enter iteration count as a number (Eg: 44):120
Enter Keystore Alias:vault
Initializing Vault
Oct 21, 2014 11:20:49 AM org.picketbox.plugins.vault.PicketBoxSecurityVault init
INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
Vault Configuration in AS7 config file:
********************************************
...
</extensions>
<vault>
  <vault-option name="KEYSTORE_URL" value="EAP_HOME/vault/vault.keystore"/>
  <vault-option name="KEYSTORE_PASSWORD" value="MASK-5dOaAVafCSd"/>
  <vault-option name="KEYSTORE_ALIAS" value="vault"/>
  <vault-option name="SALT" value="1234abcd"/>
  <vault-option name="ITERATION_COUNT" value="120"/>
  <vault-option name="ENC_FILE_DIR" value="EAP_HOME/vault/"/>
</vault><management> ...
********************************************
Vault is initialized and ready for use
Handshake with Vault complete
Please enter a Digit::   0: Store a secured attribute  1: Check whether a secured attribute exists  2:
Remove secured attribute  3: Exit
0
Task: Store a secured attribute
Please enter secured attribute value (such as password):
Please enter secured attribute value (such as password) again:
Values match
Enter Vault Block:ds_Example1
Enter Attribute Name:password
Secured attribute value has been stored in vault.
Please make note of the following:
********************************************
Vault Block:ds_Example1
Attribute Name:password
Configuration should be done as follows:
VAULT::ds_Example1::password::1
********************************************
Please enter a Digit::   0: Store a secured attribute  1: Check whether a secured attribute exists  2:
Remove secured attribute  3: Exit
```

Procedure 7.8. Store a Sensitive String Non-interactively

Use this method if you would prefer to provide all parameters' values at once.

1. Launch your operating system's command line interface and run the Password Vault command. Use ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server).

   Substitute the placeholder values with your own values. The values for parameters ***KEYSTORE_URL***, ***KEYSTORE_PASSWORD*** and ***KEYSTORE_ALIAS*** must match those provided when the Password Vault was created.

   NOTE

   The keystore password must be given in plaintext form, not masked form.

   ```
   EAP_HOME/bin/vault.sh --keystore KEYSTORE_URL --keystore-password
   KEYSTORE_PASSWORD --alias KEYSTORE_ALIAS --vault-block VAULT_BLOCK --
   attribute ATTRIBUTE --sec-attr SEC-ATTR --enc-dir ENC_FILE_DIR --iteration
   ITERATION_COUNT --salt SALT
   ```

2. **Make note of the information about the masked string**
   A message prints to standard output, showing the vault block, attribute name, masked string, and advice about using the string in your configuration. Make note of this information in a secure location. An extract of sample output is as follows:

   ```
   Vault Block:vb
   Attribute Name:password
   Configuration should be done as follows:
   VAULT::vb::password::1
   ```

Example 7.7. Run the Password Vault command non-interactively

```
EAP_HOME/bin/vault.sh --keystore EAP_HOME/vault/vault.keystore --keystore-password vault22
--alias vault --vault-block vb --attribute password --sec-attr 0penS3sam3 --enc-dir
EAP_HOME/vault/ --iteration 120 --salt 1234abcd
```

Command output

```
=========================================================================

  JBoss Vault

  JBOSS_HOME: EAP_HOME

  JAVA: java

=========================================================================

Oct 22, 2014 9:24:43 AM org.picketbox.plugins.vault.PicketBoxSecurityVault init
INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
Secured attribute value has been stored in vault.
Please make note of the following:
```

```
********************************************
Vault Block:vb
Attribute Name:password
Configuration should be done as follows:
VAULT::vb::password::1
********************************************
Vault Configuration in AS7 config file:
********************************************
...
</extensions>
<vault>
  <vault-option name="KEYSTORE_URL" value="EAP_HOME/vault/vault.keystore"/>
  <vault-option name="KEYSTORE_PASSWORD" value="vault22"/>
  <vault-option name="KEYSTORE_ALIAS" value="vault"/>
  <vault-option name="SALT" value="1234abcd"/>
  <vault-option name="ITERATION_COUNT" value="120"/>
  <vault-option name="ENC_FILE_DIR" value="EAP_HOME/vault/vault/"/>
</vault><management> ...
********************************************
```

Result

The sensitive string has now been stored in the Password Vault and can be used in configuration files, Management CLI commands and applications in its masked form.

Report a bug

7.9. USE AN ENCRYPTED SENSITIVE STRING IN CONFIGURATION

Prerequisites

- Section 7.8, "Store a Sensitive String in the Password Vault"

Any sensitive string which has been encrypted can be used in a configuration file or Management CLI command in its masked form, providing expressions are allowed.

To confirm if expressions are allowed within a particular subsystem, run the following Management CLI command against that subsystem.

NOTE

Add the prefix /**host=*HOST_NAME*** to the command for a managed domain.

```
/core-service=SUBSYSTEM:read-resource-description(recursive=true)
```

Example 7.8. List the Description of all Resources in the Management Subsystem

```
/core-service=management:read-resource-description(recursive=true)
```

From the output of running this command, look for the value of the **expressions-allowed** parameter. If this is **true**, then you can use expressions within the configuration of this subsystem.

Use the following syntax to replace any plaintext string with the masked form.

```
${VAULT::VAULT_BLOCK::ATTRIBUTE_NAME::MASKED_STRING}
```

Example 7.9. Datasource Definition Using a Password in Masked Form

In this example the vault block is **ds_ExampleDS** and the attribute is **password**.

```
...
  <subsystem xmlns="urn:jboss:domain:datasources:1.0">
    <datasources>
      <datasource jndi-name="java:jboss/datasources/ExampleDS" enabled="true" use-java-
context="true" pool-name="H2DS">
        <connection-url>jdbc:h2:mem:test;DB_CLOSE_DELAY=-1</connection-url>
        <driver>h2</driver>
        <pool></pool>
        <security>
          <user-name>sa</user-name>
          <password>${VAULT::ds_ExampleDS::password::1}</password>
        </security>
      </datasource>
      <drivers>
         <driver name="h2" module="com.h2database.h2">
            <xa-datasource-class>org.h2.jdbcx.JdbcDataSource</xa-datasource-class>
         </driver>
      </drivers>
    </datasources>
  </subsystem>
...
```

Report a bug

7.10. USE AN ENCRYPTED SENSITIVE STRING IN AN APPLICATION

Prerequisites

- Section 7.8, “Store a Sensitive String in the Password Vault”

Encrypted strings stored in the Password Vault can be used in your application's source code.

Example 7.10. Servlet Using a Vaulted Password

This example is an extract of a servlet's source code, illustrating the use of a masked password in a datasource definition, instead of the plaintext password. The plaintext version is commented out so that you can see the difference.

```
/*@DataSourceDefinition(
        name = "java:jboss/datasources/LoginDS",
        user = "sa",
        password = "sa",
        className = "org.h2.jdbcx.JdbcDataSource",
        url = "jdbc:h2:tcp://localhost/mem:test"
)*/
@DataSourceDefinition(
        name = "java:jboss/datasources/LoginDS",
        user = "sa",
        password = "VAULT::DS::thePass::1",
        className = "org.h2.jdbcx.JdbcDataSource",
        url = "jdbc:h2:tcp://localhost/mem:test"
)
```

Report a bug

7.11. CHECK IF A SENSITIVE STRING IS IN THE PASSWORD VAULT

Overview

Before attempting to store or use a sensitive string in the Password Vault it can be useful to first confirm if it is already stored.

This check can be done either interactively, where you are prompted for each parameter's value, or non-interactively, where you provide all parameters' values on the commmand line. Each method gives the same result, so choose whichever method you prefer.

Procedure 7.9. Check For a Sensitive String Interactively

Use this method if you would prefer to be prompted for the value of each parameter.

1. **Run the Password Vault command**
   Launch your operating system's command line interface and run the Password Vault command. Use ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server). Start a new interactive session by typing **0** (zero).

2. **Complete the prompted parameters about the Password Vault**
   Follow the prompts to input the required authentication parameters. These values must match those provided when the Password Vault was created.

   NOTE

   The keystore password must be given in plaintext form, not masked form.

3. Enter **1** (one) to select “Check whether a secured attribute exists”.

4. Enter the name of the vault block in which the sensitive string is stored.

5. Enter the name of the sensitive string to be checked.

Result

If the sensitive string is stored in the vault block specified, a confirmation message like the following will be output.

```
A value exists for (VAULT_BLOCK, ATTRIBUTE)
```

If the sensitive string is *not* stored in the specified block, a message like the following will be output.

```
No value has been store for (VAULT_BLOCK, ATTRIBUTE)
```

Example 7.11. Check For a Sensitive String Interactively

```
=========================================================================

  JBoss Vault

  JBOSS_HOME: EAP_HOME

  JAVA: java

=========================================================================

**********************************
****  JBoss Vault  ***************
**********************************
Please enter a Digit::   0: Start Interactive Session  1: Remove Interactive Session  2: Exit
0
Starting an interactive session
Enter directory to store encrypted files:EAP_HOME/vault
Enter Keystore URL:EAP_HOME/vault/vault.keystore
Enter Keystore password:
Enter Keystore password again:
Values match
Enter 8 character salt:1234abcd
Enter iteration count as a number (Eg: 44):120
Enter Keystore Alias:vault
Initializing Vault
Oct 22, 2014 12:53:56 PM org.picketbox.plugins.vault.PicketBoxSecurityVault init
INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
Vault Configuration in AS7 config file:
********************************************
...
</extensions>
<vault>
  <vault-option name="KEYSTORE_URL" value="EAP_HOME/vault/vault.keystore"/>
  <vault-option name="KEYSTORE_PASSWORD" value="MASK-5dOaAVafCSd"/>
  <vault-option name="KEYSTORE_ALIAS" value="vault"/>
  <vault-option name="SALT" value="1234abcd"/>
  <vault-option name="ITERATION_COUNT" value="120"/>
  <vault-option name="ENC_FILE_DIR" value="EAP_HOME/vault/"/>
</vault><management> ...
********************************************
Vault is initialized and ready for use
Handshake with Vault complete
Please enter a Digit::   0: Store a secured attribute  1: Check whether a secured attribute exists  2:
Remove secured attribute  3: Exit
1
Task: Verify whether a secured attribute exists
Enter Vault Block:vb
Enter Attribute Name:password
```

```
A value exists for (vb, password)
Please enter a Digit::   0: Store a secured attribute  1: Check whether a secured attribute exists  2:
Remove secured attribute  3: Exit
```

Procedure 7.10. Check For a Sensitive String Non-Interactively

Use this method if you would prefer to provide all parameters' values at once. For a description of all parameters, see Section 7.4, "Initialize the Password Vault".

- Launch your operating system's command line interface and run the Password Vault command. Use ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server).

  Substitute the placeholder values with your own values. The values for parameters ***KEYSTORE_URL***, ***KEYSTORE_PASSWORD-password*** and ***KEYSTORE_ALIAS*** must match those provided when the Password Vault was created.

  NOTE

  The keystore password must be given in plaintext form, not masked form.

  ```
  EAP_HOME/bin/vault.sh --keystore KEYSTORE_URL --keystore-password
  KEYSTORE_PASSWORD --alias KEYSTORE_ALIAS --check-sec-attr --vault-block
  VAULT_BLOCK --attribute ATTRIBUTE --enc-dir ENC_FILE_DIR --iteration
  ITERATION_COUNT --salt SALT
  ```

Result

If the sensitive string is stored in the vault block specified, the following message will be output.

```
Password already exists.
```

If the value is *not* stored in the specified block, the following message will be output.

```
Password doesn't exist.
```

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7.12. REMOVE A SENSITIVE STRING FROM THE PASSWORD VAULT

Overview

For security reasons it is best to remove sensitive strings from the Password Vault when they are no longer required. For example, if you are decommissioning an application, any sensitive strings used in datasource definitions should be removed at the same time.

Prerequisite

Before removing a sensitive string from the Password Vault, confirm if it is used in the configuration of JBoss EAP. One method of doing this is to use the 'grep' utility to search configuration files for instances of the masked string. On Red Hat Enterprise Linux (and similar operating systems), **grep** is installed by default but for Microsoft Windows Server it must be installed manually.

The Password Vault utility provides two modes: interactive and non-interactive. Interactive mode prompts you for each parameter's value, where non-interactive mode requires you to provide all parameters' values in a single command.

Procedure 7.11. Remove a Sensitive String Interactively

Use this method if you would prefer to be prompted for the value of each parameter.

1. **Run the Password Vault command**
   Launch your operating system's command line interface and run ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server). Start a new interactive session by typing **0** (zero).

2. **Provide Authentication Details**
   Follow the prompts to input the required authentication parameters. These values must match those provided when the Password Vault was created.

   NOTE

   The keystore password must be given in plaintext form, not masked form.

3. Enter **2** (two) to choose option **Remove secured attribute**.

4. Enter the name of the vault block in which the sensitive string is stored.

5. Enter the name of the sensitive string to be removed.

Result

If the sensitive string is successfully removed, a confirmation message like the following will be output.

```
Secured attribute [VAULT_BLOCK::ATTRIBUTE] has been successfully removed from vault
```

If the sensitive string is *not removed, a message like the following will be output.*

```
Secured attribute [VAULT_BLOCK::ATTRIBUTE] was not removed from vault, check whether it exist
```

Example 7.12. Remove a Sensitive String Interactively

```
**********************************
****  JBoss Vault  ***************
**********************************
Please enter a Digit::   0: Start Interactive Session  1: Remove Interactive Session  2: Exit
0
Starting an interactive session
Enter directory to store encrypted files:EAP_HOME/vault/
Enter Keystore URL:EAP_HOME/vault/vault.keystore
Enter Keystore password:
Enter Keystore password again:
Values match
Enter 8 character salt:1234abcd
Enter iteration count as a number (Eg: 44):120
Enter Keystore Alias:vault
Initializing Vault
```

```
Dec 23, 2014 1:40:56 PM org.picketbox.plugins.vault.PicketBoxSecurityVault init
INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
Vault Configuration in configuration file:
*********************************************
...
</extensions>
<vault>
  <vault-option name="KEYSTORE_URL" value="EAP_HOME/vault/vault.keystore"/>
  <vault-option name="KEYSTORE_PASSWORD" value="MASK-5dOaAVafCSd"/>
  <vault-option name="KEYSTORE_ALIAS" value="vault"/>
  <vault-option name="SALT" value="1234abcd"/>
  <vault-option name="ITERATION_COUNT" value="120"/>
  <vault-option name="ENC_FILE_DIR" value="EAP_HOME/vault/"/>
</vault><management> ...
*********************************************
Vault is initialized and ready for use
Handshake with Vault complete
Please enter a Digit::  0: Store a secured attribute  1: Check whether a secured attribute exists  2:
Remove secured attribute  3: Exit
2
Task: Remove secured attribute
Enter Vault Block:craft
Enter Attribute Name:password
Secured attribute [craft::password] has been successfully removed from vault
```

Procedure 7.12. Remove a Sensitive String Non-interactively

Use this method if you would prefer to provide all parameters' values at once. For a description of all parameters, see Section 7.4, “Initialize the Password Vault”.

- Launch your operating system's command line interface and run the Password Vault command. Use ***EAP_HOME*/bin/vault.sh** (on Red Hat Enterprise Linux and similar operating systems) or ***EAP_HOME*\bin\vault.bat** (on Microsoft Windows Server).

  Substitute the placeholder values with your own values. The values for parameters ***KEYSTORE_URL***, ***KEYSTORE_PASSWORD*** and ***KEYSTORE_ALIAS*** must match those provided when the Password Vault was created.

  NOTE

  The keystore password must be given in plaintext form, not masked form.

  ```
  EAP_HOME/bin/vault.sh --keystore KEYSTORE_URL --keystore-password
  KEYSTORE_PASSWORD --alias KEYSTORE_ALIAS --remove-sec-attr --vault-block
  VAULT_BLOCK --attribute ATTRIBUTE --enc-dir ENC_FILE_DIR --iteration
  ITERATION_COUNT --salt SALT
  ```

Result

If the sensitive string is successfully removed, a confirmation message like the following will be output.

```
Secured attribute [VAULT_BLOCK::ATTRIBUTE] has been successfully removed from vault
```

If the sensitive string is *not removed, a message like the following will be output.*

```
Secured attribute [VAULT_BLOCK::ATTRIBUTE] was not removed from vault, check whether it exist
```

Example 7.13. Remove a Sensitive String Non-interactively

```
./vault.sh --keystore EAP_HOME/vault/vault.keystore --keystore-password vault22 --alias vault --
remove-sec-attr --vault-block craft --attribute password --enc-dir ../vault/ --iteration 120 --salt
1234abcd
=========================================================================

  JBoss Vault

  JBOSS_HOME: EAP_HOME

  JAVA: java

=========================================================================

Dec 23, 2014 1:54:24 PM org.picketbox.plugins.vault.PicketBoxSecurityVault init
INFO: PBOX000361: Default Security Vault Implementation Initialized and Ready
Secured attribute [craft::password] has been successfully removed from vault
```

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PART III. DEVELOPING SECURE APPLICATIONS

CHAPTER 8. SECURITY OVERVIEW

8.1. ABOUT APPLICATION SECURITY

Securing your applications is a multi-faceted and important concern for every application developer. JBoss EAP 6 provides all the tools you need to write secure applications, including the following abilities:

- Section 11.2.1, "About Authentication"
- Section 11.5.1, "About Authorization"
- Section 11.7.1, "About Security Auditing"
- Section 11.8.1, "About Security Mapping"
- Section 8.2, "Declarative Security"
- Section 9.2.2.1, "About EJB Method Permissions"
- Section 9.2.3.1, "About EJB Security Annotations"

See also Section 11.9, "Use a Security Domain in Your Application" .

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8.2. DECLARATIVE SECURITY

Declarative security is a method to separate security concerns from your application code by using the container to manage security. The container provides an authorization system based on either file permissions or users, groups, and roles. This approach is usually superior to *programmatic* security, which gives the application itself all of the responsibility for security.

JBoss EAP 6 provides declarative security via security domains.

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8.2.1. Java EE Declarative Security Overview

The Java EE security model is declarative in that you describe the security roles and permissions in a standard XML descriptor rather than embedding security into your business component. This isolates security from business-level code because security tends to be more a function of where the component is deployed than an inherent aspect of the component's business logic. For example, consider an Automated Teller Machine (ATM) that is to be used to access a bank account. The security requirements, roles and permissions will vary independent of how you access the bank account, based on what bank is managing the account, where the ATM is located, and so on.

Securing a Java EE application is based on the specification of the application security requirements via the standard Java EE deployment descriptors. You secure access to EJBs and web components in an enterprise application by using the **ejb-jar.xml** and **web.xml** deployment descriptors.

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8.2.2. Security References

Both Enterprise Java Beans (EJBs) and servlets can declare one or more <security-role-ref> elements.

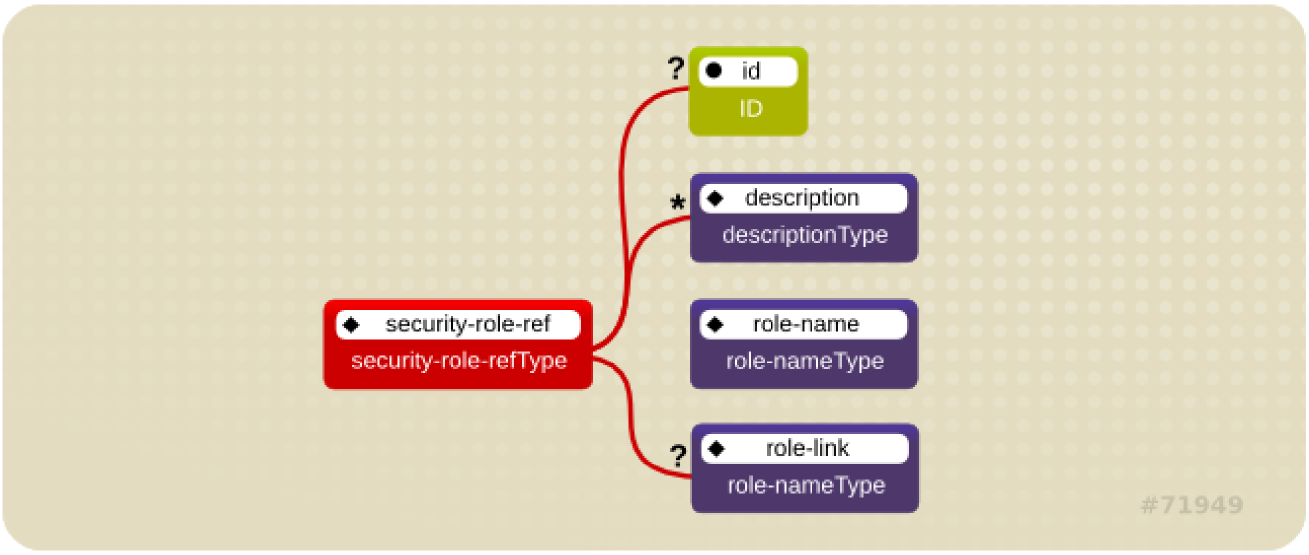

Figure 8.1. Security Roles Reference Model

This element declares that a component is using the <role-name> element's **role-nameType** attribute value as an argument to the **isCallerInRole(String)** method. By using the **isCallerInRole** method, a component can verify whether the caller is in a role that has been declared with a <security-role-ref> or <role-name> element. The <role-name> element value must link to a <security-role> element through the <role-link> element. The typical use of **isCallerInRole** is to perform a security check that cannot be defined by using the role-based <method-permissions> elements.

Example 8.1. ejb-jar.xml descriptor fragment

```
<!-- A sample ejb-jar.xml fragment -->
 <ejb-jar>
   <enterprise-beans>
     <session>
       <ejb-name>ASessionBean</ejb-name>
       ...
       <security-role-ref>
         <role-name>TheRoleICheck<role-name>
           <role-link>TheApplicationRole</role-link>
       </security-role-ref>
     </session>
   </enterprise-beans>
 ...
 </ejb-jar>
```

NOTE

This fragment is an example only. In deployments, the elements in this section must contain role names and links relevant to the EJB deployment.

Example 8.2. web.xml descriptor fragment

```
<web-app>
  <servlet>
    <servlet-name>AServlet</servlet-name>
    ...
    <security-role-ref>
      <role-name>TheServletRole</role-name>
      <role-link>TheApplicationRole</role-link>
    </security-role-ref>
  </servlet>
    ...
</web-app>
```

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8.2.3. Security Identity

An Enterprise Java Bean (EJB) can specify the identity another EJB must use when it invokes methods on components using the <security-identity> element.

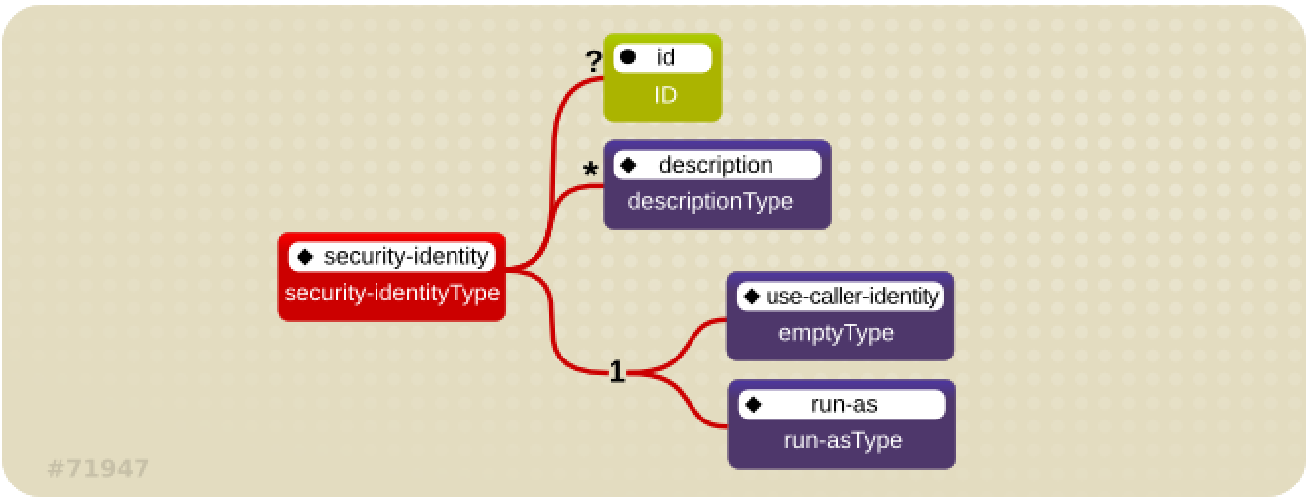

Figure 8.2. Java EE Security Identity Data Model

The invocation identity can be that of the current caller, or it can be a specific role. The application assembler uses the <security-identity> element with a <use-caller-identity> child element. This indicate that the current caller's identity should be propagated as the security identity for method invocations made by the EJB. Propagation of the caller's identity is the default used in the absence of an explicit <security-identity> element declaration.

Alternatively, the application assembler can use the <run-as> or <role-name> child element to specify that a specific security role supplied by the <role-name> element value must be used as the security identity for method invocations made by the EJB.

Note that this does not change the caller's identity as seen by the **EJBContext.getCallerPrincipal()** method. Rather, the caller's security roles are set to the single role specified by the <run-as> or <role-name> element value.

One use case for the <run-as> element is to prevent external clients from accessing internal EJBs. You configure this behavior by assigning the internal EJB <method-permission> elements, which restrict access to a role never assigned to an external client. EJBs that must in turn use internal EJBs are then configured with a <run-as> or <role-name> equal to the restricted role. The following descriptor fragment describes an example<security-identity> element usage.

```
<ejb-jar>
    <enterprise-beans>
        <session>
            <ejb-name>ASessionBean</ejb-name>
            <!-- ... -->
            <security-identity>
                <use-caller-identity/>
            </security-identity>
        </session>
        <session>
            <ejb-name>RunAsBean</ejb-name>
            <!-- ... -->
            <security-identity>
                <run-as>
                    <description>A private internal role</description>
                    <role-name>InternalRole</role-name>
                </run-as>
            </security-identity>
        </session>
    </enterprise-beans>
    <!-- ... -->
</ejb-jar>
```

When you use <run-as> to assign a specific role to outgoing calls, a principal named **anonymous** is assigned to all outgoing calls. If you want another principal to be associated with the call, you must associate a <run-as-principal> with the bean in the **jboss-ejb3.xml** file. The following fragment associates a principal named **internal** with **RunAsBean** from the prior example.

```
<session>
    <ejb-name>RunAsBean</ejb-name>
    <security-identity>
        <run-as-principal>internal</run-as-principal>
    </security-identity>
</session>
```

The <run-as> element is also available in servlet definitions in a **web.xml** file. The following example shows how to assign the role **InternalRole** to a servlet:

```
  <servlet>
    <servlet-name>AServlet</servlet-name>
    <!-- ... -->
    <run-as>
        <role-name>InternalRole</role-name>
    </run-as>
  </servlet>
```

Calls from this servlet are associated with the anonymous **principal**. The <run-as-principal> element is available in the **jboss-web.xml** file to assign a specific principal to go along with the **run-as** role. The following fragment shows how to associate a principal named **internal** to the servlet above.

```
<servlet>
  <servlet-name>AServlet</servlet-name>
  <run-as-principal>internal</run-as-principal>
</servlet>
```

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8.2.4. Security Roles

The security role name referenced by either the **security-role-ref** or **security-identity** element needs to map to one of the application's declared roles. An application assembler defines logical security roles by declaring **security-role** elements. The **role-name** value is a logical application role name like Administrator, Architect, SalesManager, etc.

The Java EE specifications note that it is important to keep in mind that the security roles in the deployment descriptor are used to define the logical security view of an application. Roles defined in the Java EE deployment descriptors should not be confused with the user groups, users, principals, and other concepts that exist in the target enterprise's operational environment. The deployment descriptor roles are application constructs with application domain-specific names. For example, a banking application might use role names such as BankManager, Teller, or Customer.

In JBoss EAP, a **security-role** element is only used to map **security-role-ref/role-name** values to the logical role that the component role references. The user's assigned roles are a dynamic function of the application's security manager. JBoss does not require the definition of **security-role** elements in order to declare method permissions. However, the specification of **security-role** elements is still a recommended practice to ensure portability across application servers and for deployment descriptor maintenance.

Example 8.3. An ejb-jar.xml descriptor fragment that illustrates the security-role element usage.

```
<!-- A sample ejb-jar.xml fragment -->
<ejb-jar>
    <assembly-descriptor>
        <security-role>
            <description>The single application role</description>
            <role-name>TheApplicationRole</role-name>
        </security-role>
    </assembly-descriptor>
</ejb-jar>
```

Example 8.4. An example web.xml descriptor fragment that illustrates the security-role element usage.

```
<!-- A sample web.xml fragment -->
<web-app>
  <security-role>
    <description>The single application role</description>
```

```
      <role-name>TheApplicationRole</role-name>
    </security-role>
  </web-app>
```

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8.2.5. EJB Method Permissions

An application assembler can set the roles that are allowed to invoke an EJB's home and remote interface methods through method-permission element declarations.

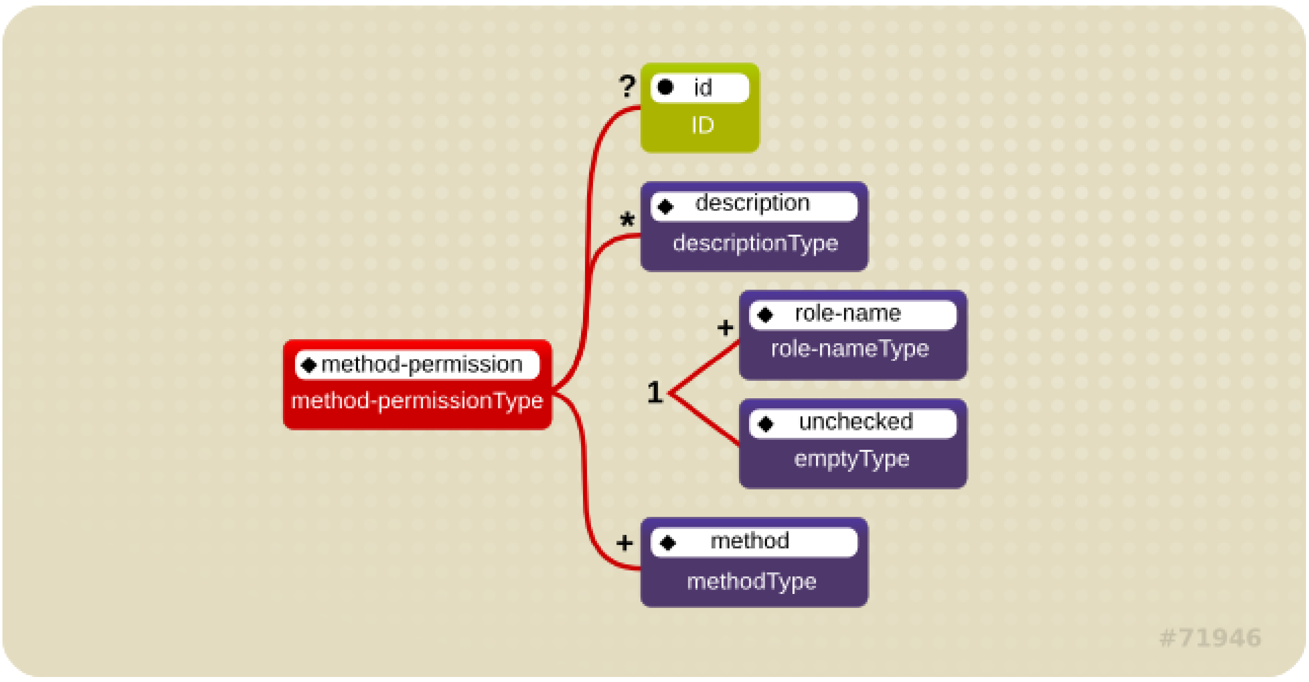

Figure 8.3. Java EE Method Permissions Element

Each **method-permission** element contains one or more role-name child elements that define the logical roles that are allowed to access the EJB methods as identified by method child elements. You can also specify an **unchecked** element instead of the **role-name** element to declare that any authenticated user can access the methods identified by method child elements. In addition, you can declare that no one should have access to a method that has the **exclude-list** element. If an EJB has methods that have not been declared as accessible by a role using a **method-permission** element, the EJB methods default to being excluded from use. This is equivalent to defaulting the methods into the **exclude-list**.

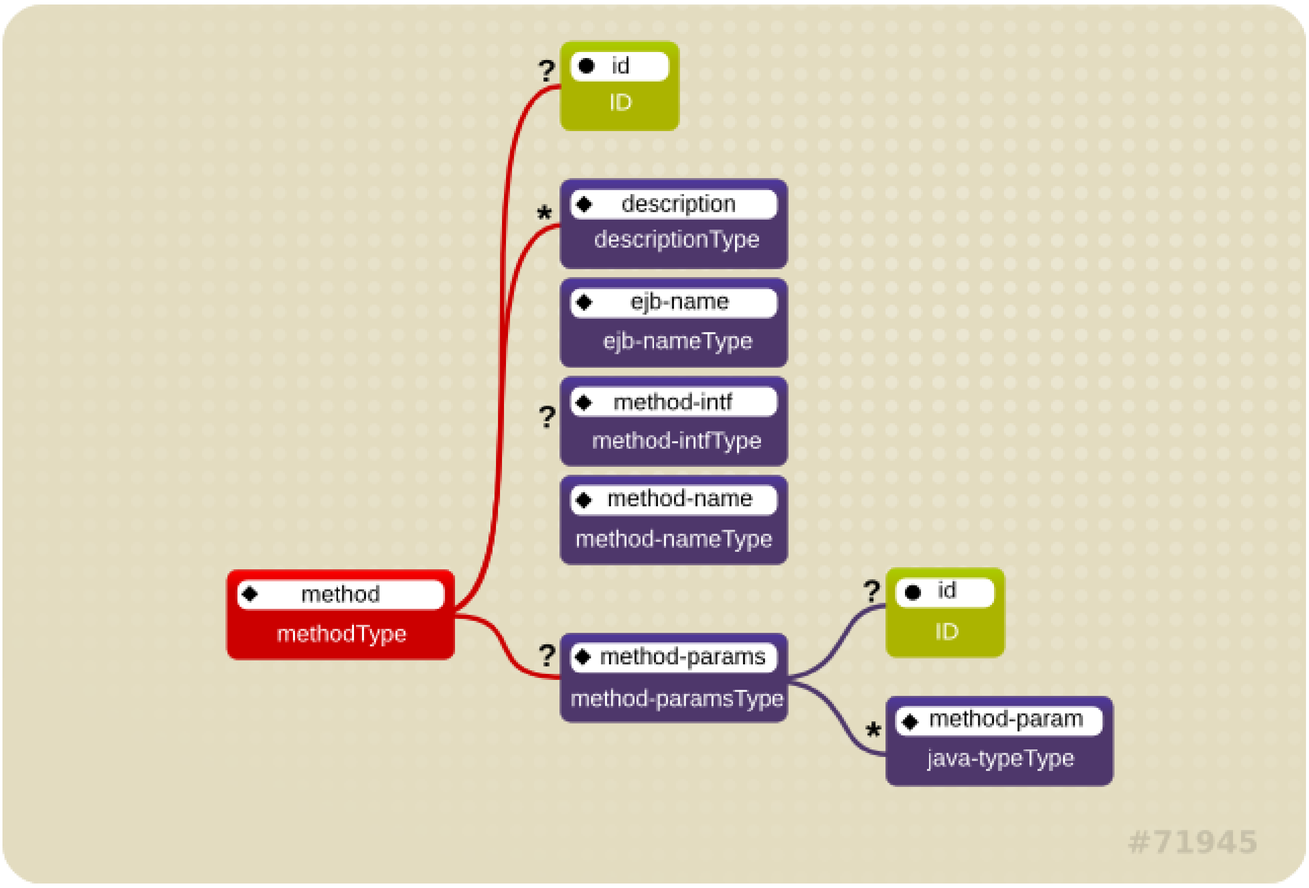

Figure 8.4. Java EE Method Element

There are three supported styles of method element declarations.

The first is used for referring to all the home and component interface methods of the named enterprise bean:

```
<method>
  <ejb-name>EJBNAME</ejb-name>
  <method-name>*</method-name>
</method>
```

The second style is used for referring to a specified method of the home or component interface of the named enterprise bean:

```
  <method>
    <ejb-name>EJBNAME</ejb-name>
    <method-name>METHOD</method-name>
  </method>
```

If there are multiple methods with the same overloaded name, this style refers to all of the overloaded methods.

The third style is used to refer to a specified method within a set of methods with an overloaded name:

```
<method>
    <ejb-name>EJBNAME</ejb-name>
    <method-name>METHOD</method-name>
    <method-params>
        <method-param>PARAMETER_1</method-param>
        <!-- ... -->
        <method-param>PARAMETER_N</method-param>
    </method-params>
</method>
```

The method must be defined in the specified enterprise bean's home or remote interface. The method-param element values are the fully qualified name of the corresponding method parameter type. If there are multiple methods with the same overloaded signature, the permission applies to all of the matching overloaded methods.

The optional **method-intf** element can be used to differentiate methods with the same name and signature that are defined in both the home and remote interfaces of an enterprise bean.

Example 8.5, "An ejb-jar.xml descriptor fragment that illustrates the method-permission element usage." provides complete examples of the **method-permission** element usage.

Example 8.5. An ejb-jar.xml descriptor fragment that illustrates the method-permission element usage.

```
<ejb-jar>
    <assembly-descriptor>
        <method-permission>
            <description>The employee and temp-employee roles may access any
                method of the EmployeeService bean </description>
            <role-name>employee</role-name>
            <role-name>temp-employee</role-name>
            <method>
                <ejb-name>EmployeeService</ejb-name>
                <method-name>*</method-name>
            </method>
        </method-permission>
        <method-permission>
            <description>The employee role may access the findByPrimaryKey,
                getEmployeeInfo, and the updateEmployeeInfo(String) method of
                the AardvarkPayroll bean </description>
            <role-name>employee</role-name>
            <method>
                <ejb-name>AardvarkPayroll</ejb-name>
                <method-name>findByPrimaryKey</method-name>
            </method>
            <method>
                <ejb-name>AardvarkPayroll</ejb-name>
                <method-name>getEmployeeInfo</method-name>
            </method>
            <method>
                <ejb-name>AardvarkPayroll</ejb-name>
                <method-name>updateEmployeeInfo</method-name>
                <method-params>
                    <method-param>java.lang.String</method-param>
                </method-params>
            </method>
        </method-permission>
        <method-permission>
            <description>The admin role may access any method of the
                EmployeeServiceAdmin bean </description>
            <role-name>admin</role-name>
            <method>
                <ejb-name>EmployeeServiceAdmin</ejb-name>
                <method-name>*</method-name>
            </method>
        </method-permission>
        <method-permission>
            <description>Any authenticated user may access any method of the
                EmployeeServiceHelp bean</description>
            <unchecked/>
            <method>
                <ejb-name>EmployeeServiceHelp</ejb-name>
                <method-name>*</method-name>
            </method>
        </method-permission>
        <exclude-list>
            <description>No fireTheCTO methods of the EmployeeFiring bean may be
                used in this deployment</description>
            <method>
                <ejb-name>EmployeeFiring</ejb-name>
                <method-name>fireTheCTO</method-name>
            </method>
        </exclude-list>
    </assembly-descriptor>
</ejb-jar>
```

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8.2.6. Enterprise Beans Security Annotations

Enterprise beans use Annotations to pass information to the deployer about security and other aspects of the application. The deployer can set up the appropriate enterprise bean security policy for the application if specified in annotations, or the deployment descriptor.

Any method values explicitly specified in the deployment descriptor override annotation values. If a method value is not specified in the deployment descriptor, those values set using annotations are used. The overriding granularity is on a per-method basis

Those annotations that address security and can be used in an enterprise beans include the following:

@DeclareRoles

Declares each security role declared in the code. For information about configuring roles, refer to the *Java EE 6 Tutorial* Specifying Authorized Users by Declaring Security Roles .

@RolesAllowed*, *@PermitAll*, and *@DenyAll

Specifies method permissions for annotations. For information about configuring annotation method permissions, refer to the *Java EE 6 Tutorial* Specifying Authorized Users by Declaring Security Roles .

@RunAs

Configures the propagated security identity of a component. For information about configuring propagated security identities using annotations, refer to the *Java EE 6 Tutorial* Propagating a Security Identity (Run-As).

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8.2.7. Web Content Security Constraints

In a web application, security is defined by the roles that are allowed access to content by a URL pattern that identifies the protected content. This set of information is declared by using the **web.xml** security-constraint element.

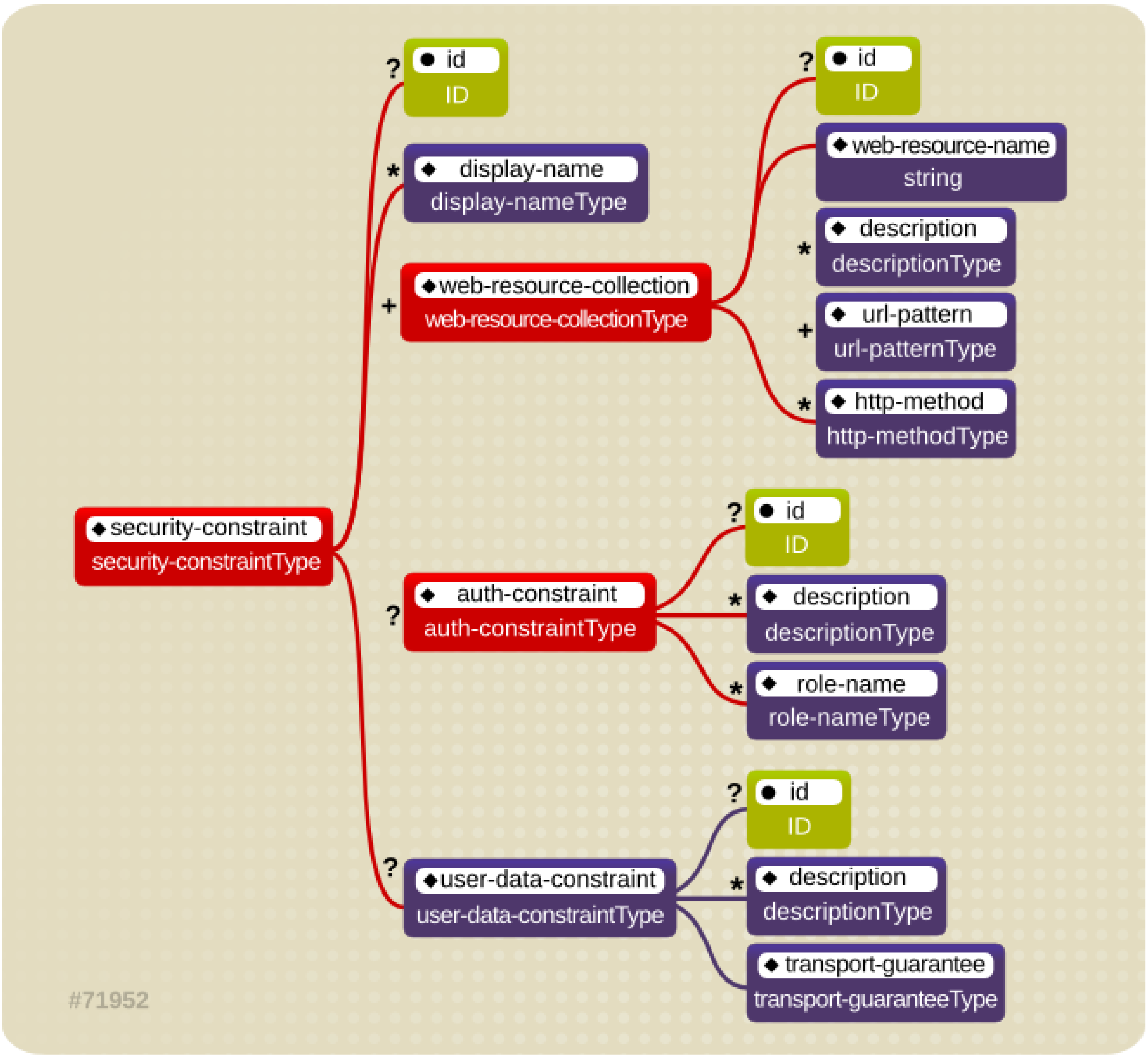

Figure 8.5. Web Content Security Constraints

The content to be secured is declared using one or more <web-resource-collection> elements. Each <web-resource-collection> element contains an optional series of <url-pattern> elements followed by an optional series of <http-method> elements. The <url-pattern> element value specifies a URL pattern against which a request URL must match for the request to correspond to an attempt to access secured content. The <http-method> element value specifies a type of HTTP request to allow.

The optional <user-data-constraint> element specifies the requirements for the transport layer of the client to server connection. The requirement may be for content integrity (preventing data tampering in the communication process) or for confidentiality (preventing reading while in transit). The <transport-guarantee> element value specifies the degree to which communication between the client and server should be protected. Its values are **NONE**, **INTEGRAL**, and **CONFIDENTIAL**. A value of **NONE** means that the application does not require any transport guarantees. A value of **INTEGRAL** means that the application requires the data sent between the client and server to be sent in such a way that it can not be changed in transit. A value of **CONFIDENTIAL** means that the application requires the data to be transmitted in a fashion that prevents other entities from observing the contents of the transmission. In most cases, the presence of the **INTEGRAL** or **CONFIDENTIAL** flag indicates that the use of SSL is required.

The optional <login-config> element is used to configure the authentication method that should be used, the realm name that should be used for the application, and the attributes that are needed by the form login mechanism.

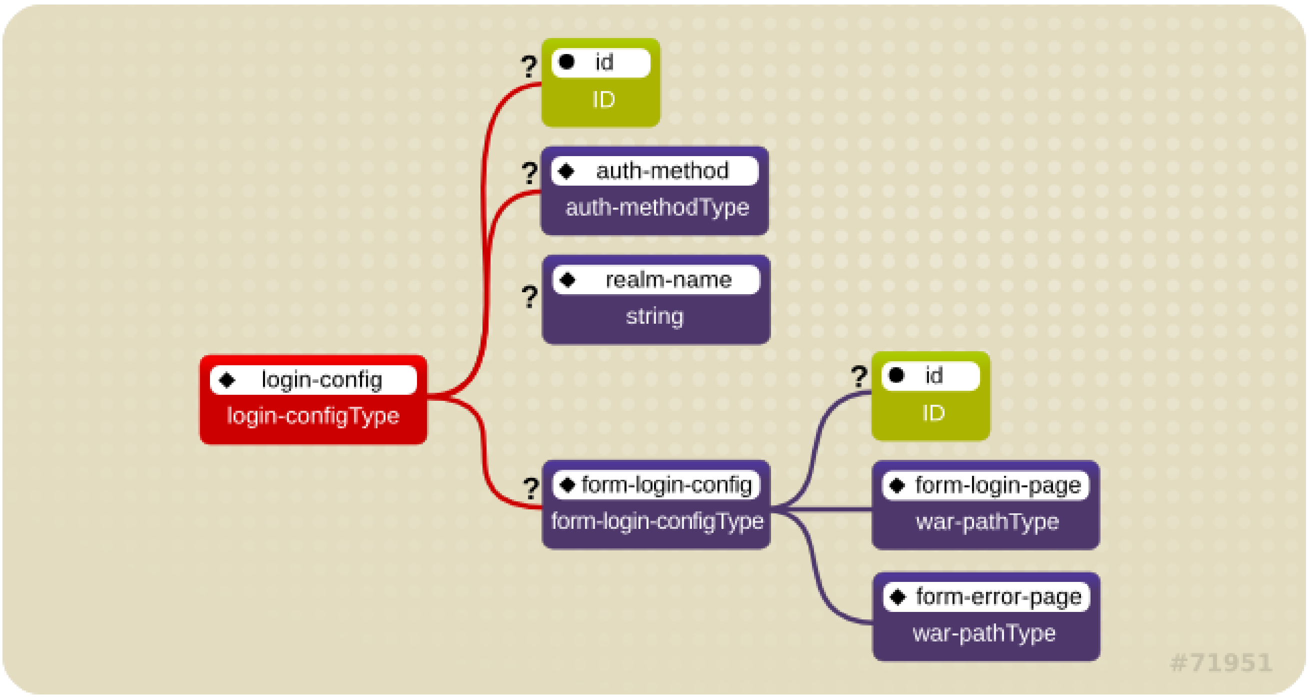

Figure 8.6. Web Login Configuration

The <auth-method> child element specifies the authentication mechanism for the web application. As a prerequisite to gaining access to any web resources that are protected by an authorization constraint, a user must have authenticated using the configured mechanism. Legal <auth-method> values are **BASIC**, **DIGEST**, **FORM**, **SPNEGO**, and **CLIENT-CERT**. The <realm-name> child element specifies the realm name to use in HTTP basic and digest authorization. The <form-login-config> child element specifies the log in as well as error pages that should be used in form-based log in. If the <auth-method> value is not **FORM**, then **form-login-config** and its child elements are ignored.

The following configuration example indicates that any URL lying under the web application's /**restricted** path requires an **AuthorizedUser** role. There is no required transport guarantee and the authentication method used for obtaining the user identity is BASIC HTTP authentication.

Example 8.6. web.xml Descriptor Fragment

```
<web-app>
    <security-constraint>
        <web-resource-collection>
            <web-resource-name>Secure Content</web-resource-name>
            <url-pattern>/restricted/*</url-pattern>
        </web-resource-collection>
        <auth-constraint>
            <role-name>AuthorizedUser</role-name>
        </auth-constraint>
        <user-data-constraint>
            <transport-guarantee>NONE</transport-guarantee>
        </user-data-constraint>
    </security-constraint>
    <!-- ... -->
    <login-config>
        <auth-method>BASIC</auth-method>
        <realm-name>The Restricted Zone</realm-name>
    </login-config>
    <!-- ... -->
    <security-role>
        <description>The role required to access restricted content </description>
        <role-name>AuthorizedUser</role-name>
    </security-role>
</web-app>
```

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8.2.8. Enable Form-based Authentication

Form-based authentication provides flexibility in defining a custom JSP/HTML page for log in, and a separate page to which users are directed if an error occurs during login.

Form-based authentication is defined by including **<auth-method>FORM</auth-method>** in the <login-config> element of the deployment descriptor, **web.xml**. The login and error pages are also defined in <login-config>, as follows:

```
<login-config>
  <auth-method>FORM</auth-method>
  <form-login-config>
    <form-login-page>/login.html</form-login-page>
    <form-error-page>/error.html</form-error-page>
  </form-login-config>
</login-config>
```

When a web application with form-based authentication is deployed, the web container uses **FormAuthenticator** to direct users to the appropriate page. JBoss EAP maintains a session pool so that authentication information does not need to be present for each request. When **FormAuthenticator** receives a request, it queries **org.apache.catalina.session.Manager** for an existing session. If no session exists, a new session is created. **FormAuthenticator** then verifies the credentials of the session.

NOTE

Each session is identified by a session ID, a 16 byte string generated from random values. These values are retrieved from **/dev/urandom** (Linux) by default, and hashed with MD5. Checks are performed at session ID creation to ensure that the ID created is unique.

Once verified, the session ID is assigned as part of a cookie, and then returned to the client. This cookie is expected in subsequent client requests and is used to identify the user session.

The cookie passed to the client is a name value pair with several optional attributes. The identifier attribute is called **JSESSIONID** . Its value is a hex-string of the session ID. This cookie is configured to be non-persistent. This means that on the client side it will be deleted when the browser exits. On the server side, sessions expire after 30 minutes of inactivity, at which time session objects and their credential information are deleted.

Say a user attempts to access a web application that is protected with form-based authentication. **FormAuthenticator** caches the request, creates a new session if necessary, and redirects the user to the login page defined in **login-config**. (In the previous example code, the login page is **login.html**.) The user then enters their user name and password in the HTML form provided. User name and password are passed to **FormAuthenticator** via the **j_security_check** form action.

The **FormAuthenticator** then authenticates the user name and password against the realm attached to the web application context. In JBoss Enterprise Application Platform, the realm is **JBossWebRealm**. When authentication is successful, **FormAuthenticator** retrieves the saved request from the cache and redirects the user to their original request.

NOTE

The server recognizes form authentication requests only when the URI ends with **/j_security_check** and at least the **j_username** and **j_password** parameters exist.

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CHAPTER 9. APPLICATION SECURITY

9.1. DATASOURCE SECURITY

9.1.1. About Datasource Security

Datasource security refers to encrypting or obscuring passwords for datasource connections. These passwords can be stored in plain text in configuration files, however this represents a security risk.

The preferred solution for datasource security is the use of either security domains or password vaults. Examples of each are included below. For more information, refer to the *Security Architecture* and other JBoss EAP security documentation.

Example 9.1. Security Domain Example

```
<security-domain name="DsRealm" cache-type="default">
  <authentication>
    <login-module code="ConfiguredIdentity" flag="required">
      <module-option name="userName" value="sa"/>
      <module-option name="principal" value="sa"/>
      <module-option name="password" value="sa"/>
    </login-module>
  </authentication>
</security-domain>
```

The DsRealm domain is referenced by a datasource like so:

```
<datasources>
  <datasource jndi-name="java:jboss/datasources/securityDs"
    pool-name="securityDs">
    <connection-url>jdbc:h2:mem:test;DB_CLOSE_DELAY=-1</connection-url>
      <driver>h2</driver>
      <new-connection-sql>select current_user()</new-connection-sql>
      <security>
        <security-domain>DsRealm</security-domain>
      </security>
    </datasource>
</datasources>
```

Example 9.2. Password Vault Example

```
<security>
  <user-name>admin</user-name>

<password>${VAULT::ds_ExampleDS::password::N2NhZDYzOTMtNWE0OS00ZGQ0LWE4MmEt
MWNlMDMyNDdmNmI2TElORV9CUkVBS3ZhdWx0}</password>
</security>
```

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9.2. EJB APPLICATION SECURITY

9.2.1. Security Identity

9.2.1.1. About EJB Security Identity

An EJB can specify an identity to use when invoking methods on other components. This is the EJB's *security identity* (also known as *invocation identity*).

By default, the EJB uses its own caller identity. The identity can alternatively be set to a specific security role. Using specific security roles is useful when you want to construct a segmented security model - for example, restricting access to a set of components to internal EJBs only.

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9.2.1.2. Set the Security Identity of an EJB

The security identity of the EJB is specified through the **<security-identity>** tag in the security configuration.

By default - if no **<security-identity>** tag is present - the EJB's own caller identity is used.

Example 9.3. Set the security identity of an EJB to be the same as its caller

This example sets the security identity for method invocations made by an EJB to be the same as the current caller's identity. This behavior is the default if you do not specify a **<security-identity>** element declaration.

```
<ejb-jar>
  <enterprise-beans>
  <session>
  <ejb-name>ASessionBean</ejb-name>
  <!-- ... -->
  <security-identity>
    <use-caller-identity/>
  </security-identity>
  </session>
  <!-- ... -->
  </enterprise-beans>
</ejb-jar>
```

Example 9.4. Set the security identity of an EJB to a specific role

To set the security identity to a specific role, use the **<run-as>** and **<role-name>** tags inside the **<security-identity>** tag.

```
<ejb-jar>
  <enterprise-beans>
  <session>
  <ejb-name>RunAsBean</ejb-name>
  <!-- ... -->
```

```
    <security-identity>
      <run-as>
      <description>A private internal role</description>
      <role-name>InternalRole</role-name>
      </run-as>
    </security-identity>
    </session>
    </enterprise-beans>
    <!-- ... -->
  </ejb-jar>
```

By default, when you use **<run-as>**, a principal named **anonymous** is assigned to outgoing calls. To assign a different principal, uses the **<run-as-principal>**.

```
<session>
    <ejb-name>RunAsBean</ejb-name>
    <security-identity>
        <run-as-principal>internal</run-as-principal>
    </security-identity>
</session>
```

NOTE

You can also use the **<run-as>** and **<run-as-principal>** elements inside a servlet element.

See also:

- Section 9.2.1.1, "About EJB Security Identity"
- Section A.6, "EJB Security Parameter Reference"

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9.2.2. EJB Method Permissions

9.2.2.1. About EJB Method Permissions

EJBs can restrict access to their methods to specific security roles.

The EJB **<method-permission>** element declaration specifies the roles that can invoke the EJB's interface methods. You can specify permissions for the following combinations:

- All home and component interface methods of the named EJB
- A specified method of the home or component interface of the named EJB
- A specified method within a set of methods with an overloaded name

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9.2.2.2. Use EJB Method Permissions

Overview

The **<method-permission>** element defines the logical roles that are allowed to access the EJB methods defined by **<method>** elements. Several examples demonstrate the syntax of the XML. Multiple method permission statements may be present, and they have a cumulative effect. The **<method-permission>** element is a child of the **<assembly-descriptor>** element of the **<ejb-jar>** descriptor.

The XML syntax is an alternative to using annotations for EJB method permissions.

Example 9.5. Allow roles to access all methods of an EJB

```
<method-permission>
  <description>The employee and temp-employee roles may access any method
  of the EmployeeService bean </description>
  <role-name>employee</role-name>
  <role-name>temp-employee</role-name>
  <method>
    <ejb-name>EmployeeService</ejb-name>
    <method-name>*</method-name>
  </method>
</method-permission>
```

Example 9.6. Allow roles to access only specific methods of an EJB, and limiting which method parameters can be passed.

```
<method-permission>
  <description>The employee role may access the findByPrimaryKey,
  getEmployeeInfo, and the updateEmployeeInfo(String) method of
  the AcmePayroll bean </description>
  <role-name>employee</role-name>
  <method>
 <ejb-name>AcmePayroll</ejb-name>
 <method-name>findByPrimaryKey</method-name>
  </method>
  <method>
 <ejb-name>AcmePayroll</ejb-name>
 <method-name>getEmployeeInfo</method-name>
  </method>
  <method>
 <ejb-name>AcmePayroll</ejb-name>
 <method-name>updateEmployeeInfo</method-name>
 <method-params>
   <method-param>java.lang.String</method-param>
 </method-params>
  </method>
</method-permission>
```

Example 9.7. Allow any authenticated user to access methods of EJBs

Using the **<unchecked/>** element allows any authenticated user to use the specified methods.

```
<method-permission>
  <description>Any authenticated user may access any method of the
  EmployeeServiceHelp bean</description>
  <unchecked/>
  <method>
 <ejb-name>EmployeeServiceHelp</ejb-name>
 <method-name>*</method-name>
  </method>
</method-permission>
```

Example 9.8. Completely exclude specific EJB methods from being used

```
<exclude-list>
  <description>No fireTheCTO methods of the EmployeeFiring bean may be
  used in this deployment</description>
  <method>
 <ejb-name>EmployeeFiring</ejb-name>
 <method-name>fireTheCTO</method-name>
  </method>
</exclude-list>
```

Example 9.9. A complete <assembly-descriptor> containing several<method-permission> blocks

```
<ejb-jar>
    <assembly-descriptor>
        <method-permission>
            <description>The employee and temp-employee roles may access any
                method of the EmployeeService bean </description>
            <role-name>employee</role-name>
            <role-name>temp-employee</role-name>
            <method>
                <ejb-name>EmployeeService</ejb-name>
                <method-name>*</method-name>
            </method>
        </method-permission>
        <method-permission>
            <description>The employee role may access the findByPrimaryKey,
                getEmployeeInfo, and the updateEmployeeInfo(String) method of
                the AcmePayroll bean </description>
            <role-name>employee</role-name>
            <method>
                <ejb-name>AcmePayroll</ejb-name>
                <method-name>findByPrimaryKey</method-name>
            </method>
            <method>
```

```
                <ejb-name>AcmePayroll</ejb-name>
                <method-name>getEmployeeInfo</method-name>
            </method>
            <method>
                <ejb-name>AcmePayroll</ejb-name>
                <method-name>updateEmployeeInfo</method-name>
                <method-params>
                    <method-param>java.lang.String</method-param>
                </method-params>
            </method>
        </method-permission>
        <method-permission>
            <description>The admin role may access any method of the
                EmployeeServiceAdmin bean </description>
            <role-name>admin</role-name>
            <method>
                <ejb-name>EmployeeServiceAdmin</ejb-name>
                <method-name>*</method-name>
            </method>
        </method-permission>
        <method-permission>
            <description>Any authenticated user may access any method of the
                EmployeeServiceHelp bean</description>
            <unchecked/>
            <method>
                <ejb-name>EmployeeServiceHelp</ejb-name>
                <method-name>*</method-name>
            </method>
        </method-permission>
        <exclude-list>
            <description>No fireTheCTO methods of the EmployeeFiring bean may be
                used in this deployment</description>
            <method>
                <ejb-name>EmployeeFiring</ejb-name>
                <method-name>fireTheCTO</method-name>
            </method>
        </exclude-list>
    </assembly-descriptor>
</ejb-jar>
```

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9.2.3. EJB Security Annotations

9.2.3.1. About EJB Security Annotations

EJB **javax.annotation.security** annotations are defined in JSR250.

EJBs use security annotations to pass information about security to the deployer. These include:

@DeclareRoles

Declares which roles are available.

@RunAs

Configures the propagated security identity of a component.

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9.2.3.2. Use EJB Security Annotations

Overview

You can use either XML descriptors or annotations to control which security roles are able to call methods in your Enterprise JavaBeans (EJBs). For information on using XML descriptors, refer to Section 9.2.2.2, “Use EJB Method Permissions” .

Any method values explicitly specified in the deployment descriptor override annotation values. If a method value is not specified in the deployment descriptor, those values set using annotations are used. The overriding granularity is on a per-method basis.

Annotations for Controlling Security Permissions of EJBs

@DeclareRoles

Use @DeclareRoles to define which security roles to check permissions against. If no @DeclareRoles is present, the list is built automatically from the @RolesAllowed annotation. For information about configuring roles, refer to the *Java EE 6 Tutorial* Specifying Authorized Users by Declaring Security Roles.

@RolesAllowed, @PermitAll, @DenyAll

Use **@RolesAllowed** to list which roles are allowed to access a method or methods. Use **@PermitAll** or **@DenyAll** to either permit or deny all roles from using a method or methods. For information about configuring annotation method permissions, refer to the *Java EE 6 Tutorial* Specifying Authorized Users by Declaring Security Roles.

@RunAs

Use **@RunAs** to specify a role a method uses when making calls from the annotated method. For information about configuring propagated security identities using annotations, refer to the *Java EE 6 Tutorial* Propagating a Security Identity (Run-As) .

Example 9.10. Security Annotations Example

```
@Stateless
@RolesAllowed({"admin"})
@SecurityDomain("other")
public class WelcomeEJB implements Welcome {
 @PermitAll
 public String WelcomeEveryone(String msg) {
  return "Welcome to " + msg;
 }
 @RunAs("tempemployee")
 public String GoodBye(String msg) {
     return "Goodbye, " + msg;
 }
 public String GoodbyeAdmin(String msg) {
    return "See you later, " + msg;
  }
}
```

In this code, all roles can access method **WelcomeEveryone**. The **GoodBye** method uses the **tempemployee** role when making calls. Only the **admin** role can access method **GoodbyeAdmin**, and any other methods with no security annotation.

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9.2.4. Remote Access to EJBs

9.2.4.1. About Remote Method Access

JBoss Remoting is the framework which provides remote access to EJBs, JMX MBeans, and other similar services. It works within the following transport types, with or without SSL:

Supported Transport Types

- Socket / Secure Socket
- RMI / RMI over SSL
- HTTP / HTTPS
- Servlet / Secure Servlet
- Bisocket / Secure Bisocket

WARNING

Red Hat recommends that you explicitly disable SSL in favor of TLSv1.1 or TLSv1.2 in all affected packages.

JBoss Remoting also provides automatic discovery via Multicast or JNDI.

It is used by many of the subsystems within JBoss EAP 6, and also enables you to design, implement, and deploy services that can be remotely invoked by clients over several different transport mechanisms. It also allows you to access existing services in JBoss EAP 6.

Data Marshalling

The Remoting system also provides data marshalling and unmarshalling services. Data marshalling refers to the ability to safely move data across network and platform boundaries, so that a separate system can perform work on it. The work is then sent back to the original system and behaves as though it were handled locally.

Architecture Overview

When you design a client application which uses Remoting, you direct your application to communicate with the server by configuring it to use a special type of resource locator called an **InvokerLocator**, which is a simple String with a URL-type format. The server listens for requests for remote resources on a **connector**, which is configured as part of the **remoting** subsystem. The **connector** hands the request off to a configured **ServerInvocationHandler**. Each **ServerInvocationHandler** implements a method **invoke(InvocationRequest)**, which knows how to handle the request.

The JBoss Remoting framework contains three layers that mirror each other on the client and server side.

JBoss Remoting Framework Layers

- The user interacts with the outer layer. On the client side, the outer layer is the **Client** class, which sends invocation requests. On the server side, it is the InvocationHandler, which is implemented by the user and receives invocation requests.
- The transport is controlled by the invoker layer.
- The lowest layer contains the marshaller and unmarshaller, which convert data formats to wire formats.

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9.2.4.2. About Remoting Callbacks

When a Remoting client requests information from the server, it can block and wait for the server to reply, but this is often not the ideal behavior. To allow the client to listen for asynchronous events on the server, and continue doing other work while waiting for the server to finish the request, your application can ask the server to send a notification when it has finished. This is referred to as a callback. One client can add itself as a listener for asynchronous events generated on behalf of another client, as well. There are two different choices for how to receive callbacks: pull callbacks or push callbacks. Clients check for pull callbacks synchronously, but passively listen for push callbacks.

In essence, a callback works by the server sending an **InvocationRequest** to the client. Your server-side code works the same regardless of whether the callback is synchronous or asynchronous. Only the client needs to know the difference. The server's InvocationRequest sends a **responseObject** to the client. This is the payload that the client has requested. This may be a direct response to a request or an event notification.

Your server also tracks listeners using an **m_listeners** object. It contains a list of all listeners that have been added to your server handler. The **ServerInvocationHandler** interface includes methods that allow you to manage this list.

The client handles pull and push callback in different ways. In either case, it must implement a callback handler. A callback handler is an implementation of interface **org.jboss.remoting.InvokerCallbackHandler**, which processes the callback data. After implementing the callback handler, you either add yourself as a listener for a pull callback, or implement a callback server for a push callback.

Pull Callbacks

For a pull callback, your client adds itself to the server's list of listeners using the **Client.addListener()** method. It then polls the server periodically for synchronous delivery of callback data. This poll is performed using the **Client.getCallbacks()**.

Push Callback

A push callback requires your client application to run its own InvocationHandler. To do this, you need to run a Remoting service on the client itself. This is referred to as a *callback server*. The callback server accepts incoming requests asynchronously and processes them for the requester (in this case, the server). To register your client's callback server with the main server, pass the callback server's **InvokerLocator** as the second argument to the **addListener** method.

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9.2.4.3. About Remoting Server Detection

Remoting servers and clients can automatically detect each other using JNDI or Multicast. A Remoting Detector is added to both the client and server, and a NetworkRegistry is added to the client.

The Detector on the server side periodically scans the InvokerRegistry and pulls all server invokers it has created. It uses this information to publish a detection message which contains the locator and subsystems supported by each server invoker. It publishes this message via a multicast broadcast or a binding into a JNDI server.

On the client side, the Detector receives the multicast message or periodically polls the JNDI server to retrieve detection messages. If the Detector notices that a detection message is for a newly-detected remoting server, it registers it into the NetworkRegistry. The Detector also updates the NetworkRegistry if it detects that a server is no longer available.

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9.2.4.4. Configure the Remoting Subsystem

Overview

JBoss Remoting has three top-level configurable elements: the worker thread pool, one or more connectors, and a series of local and remote connection URIs. This topic presents an explanation of each configurable item, example CLI commands for how to configure each item, and an XML example of a fully-configured subsystem. This configuration only applies to the server. Most people will not need to configure the Remoting subsystem at all, unless they use custom connectors for their own applications. Applications which act as Remoting clients, such as EJBs, need separate configuration to connect to a specific connector.

NOTE

The Remoting subsystem configuration is not exposed to the web-based Management Console, but it is fully configurable from the command-line based Management CLI. Editing the XML by hand is not recommended.

Adapting the CLI Commands

The CLI commands are formulated for a managed domain, when configuring the **default** profile. To configure a different profile, substitute its name. For a standalone server, omit the **/profile=default** part of the command.

Configuration Outside the Remoting Subsystem

There are a few configuration aspects which are outside of the **remoting** subsystem:

Network Interface

The network interface used by the **remoting** subsystem is the **public** interface defined in the **domain/configuration/domain.xml** or **standalone/configuration/standalone.xml**.

```
<interfaces>
  <interface name="management"/>
  <interface name="public"/>
  <interface name="unsecure"/>
</interfaces>
```

The per-host definition of the **public** interface is defined in the **host.xml** in the same directory as the **domain.xml** or **standalone.xml**. This interface is also used by several other subsystems. Exercise caution when modifying it.

```
<interfaces>
  <interface name="management">
    <inet-address value="${jboss.bind.address.management:127.0.0.1}"/>
  </interface>
  <interface name="public">
    <inet-address value="${jboss.bind.address:127.0.0.1}"/>
  </interface>
  <interface name="unsecure">
    <!-- Used for IIOP sockets in the standard configuration.
      To secure JacORB you need to setup SSL -->
    <inet-address value="${jboss.bind.address.unsecure:127.0.0.1}"/>
  </interface>
</interfaces>
```

socket-binding

The default socket-binding used by the **remoting** subsystem binds to TCP port 4447. Refer to the documentation about socket bindings and socket binding groups for more information if you need to change this.

Remoting Connector Reference for EJB

The EJB subsystem contains a reference to the remoting connector for remote method invocations. The following is the default configuration:

```
<remote connector-ref="remoting-connector" thread-pool-name="default"/>
```

Secure Transport Configuration

Remoting transports use StartTLS to use a secure (HTTPS, Secure Servlet, etc) connection if the client requests it. The same socket binding (network port) is used for secured and unsecured connections, so no additional server-side configuration is necessary. The client requests the secure or unsecured transport, as its needs dictate. JBoss EAP 6 components which use Remoting, such as EJBs, the ORB, and the JMS provider, request secured interfaces by default.

WARNING

StartTLS works by activating a secure connection if the client requests it, and otherwise defaulting to an unsecured connection. It is inherently susceptible to a *Man in the Middle* style exploit, wherein an attacker intercepts the client's request and modifies it to request an unsecured connection. Clients must be written to fail appropriately if they do not receive a secure connection, unless an unsecured connection actually is an appropriate fall-back.

Worker Thread Pool

The worker thread pool is the group of threads which are available to process work which comes in through the Remoting connectors. It is a single element **<worker-thread-pool>**, and takes several attributes. Tune these attributes if you get network timeouts, run out of threads, or need to limit memory usage. Specific recommendations depend on your specific situation. Contact Red Hat Global Support Services for more information.

Table 9.1. Worker Thread Pool Attributes

Attribute	Description	CLI Command
read-threads	The number of read threads to create for the remoting worker. Defaults to **1**.	**/profile=default/subsystem=remoting/:write-attribute(name=worker-read-threads,value=1)**
write-threads	The number of write threads to create for the remoting worker. Defaults to **1**.	**/profile=default/subsystem=remoting/:write-attribute(name=worker-write-threads,value=1)**
task-keepalive	The number of milliseconds to keep non-core remoting worker task threads alive. Defaults to **60**.	**/profile=default/subsystem=remoting/:write-attribute(name=worker-task-keepalive,value=60)**
task-max-threads	The maximum number of threads for the remoting worker task thread pool. Defaults to **16**.	**/profile=default/subsystem=remoting/:write-attribute(name=worker-task-max-threads,value=16)**
task-core-threads	The number of core threads for the remoting worker task thread pool. Defaults to **4**.	**/profile=default/subsystem=remoting/:write-attribute(name=worker-task-core-threads,value=4)**
task-limit	The maximum number of remoting worker tasks to allow before rejecting. Defaults to **16384**.	**/profile=default/subsystem=remoting/:write-attribute(name=worker-task-limit,value=16384)**

Connector

The connector is the main Remoting configuration element. Multiple connectors are allowed. Each consists of a element **<connector>** element with several sub-elements, as well as a few possible attributes. The default connector is used by several subsystems of JBoss EAP 6. Specific settings for the elements and attributes of your custom connectors depend on your applications, so contact Red Hat Global Support Services for more information.

Table 9.2. Connector Attributes

Attribute	Description	CLI Command
socket-binding	The name of the socket binding to use for this connector.	**/profile=default/subsystem=remoting/connector=remoting-connector/:write-attribute(name=socket-binding,value=remoting)**
authentication-provider	The Java Authentication Service Provider Interface for Containers (JASPIC) module to use with this connector. The module must be in the classpath.	**/profile=default/subsystem=remoting/connector=remoting-connector/:write-attribute(name=authentication-provider,value=myProvider)**
security-realm	Optional. The security realm which contains your application's users, passwords, and roles. An EJB or Web Application can authenticate against a security realm. **ApplicationRealm** is available in a default JBoss EAP 6 installation.	**/profile=default/subsystem=remoting/connector=remoting-connector/:write-attribute(name=security-realm,value=ApplicationRealm)**

Table 9.3. Connector Elements

Attribute	Description	CLI Command
sasl	Enclosing element for Simple Authentication and Security Layer (SASL) authentication mechanisms	**N/A**
properties	Contains one or more **<property>** elements, each with a **name** attribute and an optional **value** attribute.	**/profile=default/subsystem=remoting/connector=remoting-connector/property=myProp/:add(value=myPropValue)**

Outbound Connections

You can specify three different types of outbound connection:

- Outbound connection to a URI.
- Local outbound connection – connects to a local resource such as a socket.
- Remote outbound connection – connects to a remote resource and authenticates using a security realm.

All of the outbound connections are enclosed in an **<outbound-connections>** element. Each of these connection types takes an **outbound-socket-binding-ref** attribute. The outbound-connection takes a **uri** attribute. The remote outbound connection takes optional **username** and **security-realm** attributes to use for authorization.

Table 9.4. Outbound Connection Elements

Attribute	Description	CLI Command
outbound-connection	Generic outbound connection.	**/profile=default/subsystem=remoting/outbound-connection=my-connection/:add(uri=http://my-connection)**
local-outbound-connection	Outbound connection with a implicit local:// URI scheme.	**/profile=default/subsystem=remoting/local-outbound-connection=my-connection/:add(outbound-socket-binding-ref=remoting2)**
remote-outbound-connection	Outbound connections for remote:// URI scheme, using basic/digest authentication with a security realm.	**/profile=default/subsystem=remoting/remote-outbound-connection=my-connection/:add(outbound-socket-binding-ref=remoting,username=myUser,security-realm=ApplicationRealm)**

SASL Elements

Before defining the SASL child elements, you need to create the initial SASL element. Use the following command:

```
/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl:add
```

The child elements of the SASL element are described in the table below.

Table 9.5. SASL child elements

Attribute	Description	CLI Command
include-mechanisms	Contains a **value** attribute, which is a list of SASL mechanisms.	`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl:write-attribute(name=include-mechanisms,value=["DIGEST","PLAIN","GSSAPI"])`

Attribute	Description	CLI Command
qop	Contains a **value** attribute, which is a list of SASL Quality of protection values, in decreasing order of preference.	`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl:write-attribute(name=qop,value=["auth"])`
strength	Contains a **value** attribute, which is a list of SASL cipher strength values, in decreasing order of preference.	`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl:write-attribute(name=strength,value=["medium"])`
reuse-session	Contains a **value** attribute which is a boolean value. If true, attempt to reuse sessions.	`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl:write-attribute(name=reuse-session,value=false)`
server-auth	Contains a **value** attribute which is a boolean value. If true, the server authenticates to the client.	`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl:write-attribute(name=server-auth,value=false)`

policy	An enclosing element which contains zero or more of the following elements, which each take a single **value**.
	
	● forward-secrecy – whether mechanisms are required to implement forward secrecy (breaking into one session will not automatically provide information for breaking into future sessions)
	
	● no-active – whether mechanisms susceptible to non-dictionary
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:add`
		
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:write-attribute(name=forward-secrecy,value=true)`

Attribute	Description	CLI Command

	attacks are permitted. A value of **false** permits, and **true** denies.
	
	• no-anonymous – whether mechanisms that accept anonymous login are permitted. A value of **false** permits, and **true** denies.
	
	• no-dictionary – whether mechanisms susceptible to passive dictionary attacks are allowed. A value of **false** permits, and **true** denies.
	
	• no-plain-text – whether mechanisms which are susceptible to simple plain passive attacks are allowed. A value of **false** permits, and **true** denies.
	
	• pass-credentials – whether mechanisms which pass client credentials are allowed.
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:write-attribute(name=no-active,value=false)`
		
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:write-attribute(name=no-anonymous,value=false)`
		
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:write-attribute(name=no-dictionary,value=true)`
		
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:write-attribute(name=no-plain-text,value=false)`
		
		`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/sasl-policy=policy:write-attribute(name=pass-credentials,value=true)`

Attribute	Description	CLI Command
properties	Contains one or more **<property>** elements, each with a **name** attribute and an optional **value** attribute.	`/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/property=myprop:add(value=1)` `/profile=default/subsystem=remoting/connector=remoting-connector/security=sasl/property=myprop2:add(value=2)`

Example 9.11. Example Configurations

This example shows the default remoting subsystem that ships with JBoss EAP 6.

```
<subsystem xmlns="urn:jboss:domain:remoting:1.1">
   <connector name="remoting-connector" socket-binding="remoting" security-
realm="ApplicationRealm"/>
</subsystem>
```

This example contains many hypothetical values, and is presented to put the elements and attributes discussed previously into context.

```
<subsystem xmlns="urn:jboss:domain:remoting:1.1">
   <worker-thread-pool read-threads="1" task-keepalive="60" task-max-threads="16" task-core-
thread="4" task-limit="16384" write-threads="1" />
   <connector name="remoting-connector" socket-binding="remoting" security-
realm="ApplicationRealm">
      <sasl>
         <include-mechanisms value="GSSAPI PLAIN DIGEST-MD5" />
         <qop value="auth" />
         <strength value="medium" />
         <reuse-session value="false" />
         <server-auth value="false" />
         <policy>
            <forward-secrecy value="true" />
            <no-active value="false" />
            <no-anonymous value="false" />
            <no-dictionary value="true" />
            <no-plain-text value="false" />
            <pass-credentials value="true" />
         </policy>
         <properties>
            <property name="myprop1" value="1" />
            <property name="myprop2" value="2" />
         </properties>
```

```
        </sasl>
        <authentication-provider name="myprovider" />
        <properties>
            <property name="myprop3" value="propValue" />
        </properties>
    </connector>
    <outbound-connections>
        <outbound-connection name="my-outbound-connection" uri="http://myhost:7777/"/>
        <remote-outbound-connection name="my-remote-connection" outbound-socket-binding-
ref="my-remote-socket" username="myUser" security-realm="ApplicationRealm"/>
        <local-outbound-connection name="myLocalConnection" outbound-socket-binding-ref="my-
outbound-socket"/>
    </outbound-connections>
</subsystem>
```

Configuration Aspects Not Yet Documented

- JNDI and Multicast Automatic Detection

Report a bug

9.2.4.5. Use Security Realms with Remote EJB Clients

One way to add security to clients which invoke EJBs remotely is to use security realms. A security realm is a simple database of username/password pairs and username/role pairs. The terminology is also used in the context of web containers, with a slightly different meaning.

To authenticate a specific username/password pair that exists in a security realm against an EJB, follow these steps:

- Add a new security realm to the domain controller or standalone server.
- Add the following parameters to the **jboss-ejb-client.properties** file, which is in the classpath of the application. This example assumes the connection is referred to as **default** by the other parameters in the file.

  ```
  remote.connection.default.username=appuser
  remote.connection.default.password=apppassword
  ```

- Create a custom Remoting connector on the domain or standalone server, which uses your new security realm.
- Deploy your EJB to the server group which is configured to use the profile with the custom Remoting connector, or to your standalone server if you are not using a managed domain.

Report a bug

9.2.4.6. Add a New Security Realm

1. **Run the Management CLI.**
   Start the **jboss-cli.sh** or **jboss-cli.bat** command and connect to the server.

2. **Create the new security realm itself.**
   Run the following command to create a new security realm named **MyDomainRealm** on a domain controller or a standalone server.

   For a domain instance, use this command:

   ```
   /host=master/core-service=management/security-realm=MyDomainRealm:add()
   ```

   For a standalone instance, use this command:

   ```
   /core-service=management/security-realm=MyDomainRealm:add()
   ```

3. **Create the references to the properties file which will store information about the new role.**
   Run the following command to create a pointer a file named **myfile.properties**, which will contain the properties pertaining to the new role.

   NOTE

   The newly created properties file is not managed by the included **add-user.sh** and **add-user.bat** scripts. It must be managed externally.

   For a domain instance, use this command:

   ```
   /host=master/core-service=management/security-
   realm=MyDomainRealm/authentication=properties:add(path=myfile.properties)
   ```

   For a standalone instance, use this command:

   ```
   /core-service=management/security-
   realm=MyDomainRealm/authentication=properties:add(path=myfile.properties)
   ```

Result

Your new security realm is created. When you add users and roles to this new realm, the information will be stored in a separate file from the default security realms. You can manage this new file using your own applications or procedures.

Report a bug

9.2.4.7. Add a User to a Security Realm

1. **Run the add-user.sh or add-user.bat command.**
   Open a terminal and change directories to the ***EAP_HOME*/bin/** directory. If you run Red Hat Enterprise Linux or another UNIX-like operating system, run **add-user.sh**. If you run Microsoft Windows Server, run **add-user.bat**.

2. **Choose whether to add a Management User or Application User.**
   For this procedure, type **b** to add an Application User.

3. **Choose the realm the user will be added to.**
   By default, the only available realm is **ApplicationRealm**. If you have added a custom realm, you can type its name instead.

4. **Type the username, password, and roles, when prompted.**
   Type the desired username, password, and optional roles when prompted. Verify your choice by typing **yes**, or type **no** to cancel the changes. The changes are written to each of the properties files for the security realm.

Report a bug

9.2.4.8. About Remote EJB Access Using SSL Encryption

By default, the network traffic for Remote Method Invocation (RMI) of EJB2 and EJB3 Beans is not encrypted. In instances where encryption is required, Secure Sockets Layer (SSL) can be utilized so that the connection between the client and server is encrypted. Using SSL also has the added benefit of allowing the network traffic to traverse some firewalls, depending on the firewall configuration.

> **WARNING**
>
> Red Hat recommends that you explicitly disable SSL in favor of TLSv1.1 or TLSv1.2 in all affected packages.

Report a bug

9.3. JAX-RS APPLICATION SECURITY

9.3.1. Enable Role-Based Security for a RESTEasy JAX-RS Web Service

Summary

RESTEasy supports the @RolesAllowed, @PermitAll, and @DenyAll annotations on JAX-RS methods. However, it does not recognize these annotations by default. Follow these steps to configure the **web.xml** file and enable role-based security.

> **WARNING**
>
> Do not activate role-based security if the application uses EJBs. The EJB container will provide the functionality, instead of RESTEasy.

Procedure 9.1. Enable Role-Based Security for a RESTEasy JAX-RS Web Service

1. Open the **web.xml** file for the application in a text editor.

2. Add the following <context-param> to the file, within the **web-app** tags:

```
<context-param>
    <param-name>resteasy.role.based.security</param-name>
    <param-value>true</param-value>
</context-param>
```

3. Declare all roles used within the RESTEasy JAX-RS WAR file, using the <security-role> tags:

```
<security-role>
    <role-name>ROLE_NAME</role-name>
</security-role>
<security-role>
    <role-name>ROLE_NAME</role-name>
</security-role>
```

4. Authorize access to all URLs handled by the JAX-RS runtime for all roles:

```
<security-constraint>
    <web-resource-collection>
  <web-resource-name>Resteasy</web-resource-name>
  <url-pattern>/PATH</url-pattern>
    </web-resource-collection>
    <auth-constraint>
  <role-name>ROLE_NAME</role-name>
  <role-name>ROLE_NAME</role-name>
    </auth-constraint>
</security-constraint>
```

Result

Role-based security has been enabled within the application, with a set of defined roles.

Example 9.12. Example Role-Based Security Configuration

```
<web-app>

    <context-param>
  <param-name>resteasy.role.based.security</param-name>
  <param-value>true</param-value>
    </context-param>

    <servlet-mapping>
  <servlet-name>Resteasy</servlet-name>
  <url-pattern>/*</url-pattern>
    </servlet-mapping>

    <security-constraint>
  <web-resource-collection>
      <web-resource-name>Resteasy</web-resource-name>
      <url-pattern>/security</url-pattern>
  </web-resource-collection>
  <auth-constraint>
      <role-name>admin</role-name>
      <role-name>user</role-name>
  </auth-constraint>
    </security-constraint>
    <security-role>
  <role-name>admin</role-name>
    </security-role>
    <security-role>
  <role-name>user</role-name>
    </security-role>

</web-app>
```

Report a bug

9.3.2. Secure a JAX-RS Web Service using Annotations

Summary

This topic covers the steps to secure a JAX-RS web service using the supported security annotations

Procedure 9.2. Secure a JAX-RS Web Service using Supported Security Annotations

1. Enable role-based security. For more information, refer to: Section 9.3.1, "Enable Role-Based Security for a RESTEasy JAX-RS Web Service"

2. Add security annotations to the JAX-RS web service. RESTEasy supports the following annotations:

   @RolesAllowed

   Defines which roles can access the method. All roles should be defined in the **web.xml** file.

   @PermitAll

   Allows all roles defined in the **web.xml** file to access the method.

   @DenyAll

   Denies all access to the method.

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CHAPTER 10. THE SECURITY SUBSYSTEM

10.1. ABOUT THE SECURITY SUBSYSTEM

The **security** subsystem provides security infrastructure for applications. The subsystem uses a security context associated with the current request to expose the capabilities of the authentication manager, authorization manager, audit manager, and mapping manager to the relevant container.

The **security** subsystem is preconfigured by default, so security elements rarely need to be changed. The only security element that may need to be changed is whether to use *deep-copy-subject-mode*. In most cases, administrators will focus on the configuration of *security domains*.

Deep Copy Mode

See Section 10.3.2.1, “About Deep Copy Subject Mode” for details about deep copy subject mode.

Security Domain

A security domain is a set of *Java Authentication and Authorization Service (JAAS)* declarative security configurations which one or more applications use to control authentication, authorization, auditing, and mapping. Three security domains are included by default: **jboss-ejb-policy**, **jboss-web-policy**, and **other**. You can create as many security domains as you need to accommodate your application requirements.

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10.2. ABOUT THE STRUCTURE OF THE SECURITY SUBSYSTEM

The security subsystem is configured in the managed domain or standalone configuration file. Most of the configuration elements can be configured using the web-based management console or the console-based management CLI. The following is the XML representing an example security subsystem.

Example 10.1. Example Security Subsystem Configuration

```
<subsystem xmlns="urn:jboss:domain:security:1.2">
 <security-management>
  ...
 </security-management>
 <security-domains>
       <security-domain name="other" cache-type="default">
           <authentication>
               <login-module code="Remoting" flag="optional">
                   <module-option name="password-stacking" value="useFirstPass"/>
               </login-module>
               <login-module code="RealmUsersRoles" flag="required">
                   <module-option name="usersProperties"
value="${jboss.domain.config.dir}/application-users.properties"/>
                   <module-option name="rolesProperties"
value="${jboss.domain.config.dir}/application-roles.properties"/>
                   <module-option name="realm" value="ApplicationRealm"/>
                   <module-option name="password-stacking" value="useFirstPass"/>
               </login-module>
           </authentication>
       </security-domain>
       <security-domain name="jboss-web-policy" cache-type="default">
```

```
            <authorization>
                <policy-module code="Delegating" flag="required"/>
            </authorization>
        </security-domain>
        <security-domain name="jboss-ejb-policy" cache-type="default">
            <authorization>
                <policy-module code="Delegating" flag="required"/>
            </authorization>
        </security-domain>
    </security-domains>
    <vault>
     ...
    </vault>
</subsystem>
```

The **<security-management>**, **<subject-factory>**, **<security-properties>**, and **<vault>** elements are not present in the default configuration. The **<subject-factory>** and **<security-properties>** elements have been deprecated in JBoss EAP 6.1 onwards.

Report a bug

10.3. CONFIGURING THE SECURITY SUBSYSTEM

10.3.1. Configure the Security Subsystem

You can configure the security subsystem using the Management CLI or web-based Management Console.

Each top-level element within the security subsystem contains information about a different aspect of the security configuration. Refer to Section 10.2, "About the Structure of the Security Subsystem" for an example of security subsystem configuration.

<security-management>

This section overrides high-level behaviors of the security subsystem. It contains an optional setting **deep-copy-subject-mode**, that specifies whether to copy or link to security tokens, for additional thread safety.

<security-domains>

A container element which holds multiple security domains. A security domain may contain information about authentication, authorization, mapping, and auditing modules, as well as JASPI authentication and JSSE configuration. Your application would specify a security domain to manage its security information.

<security-properties>

Contains names and values of properties which are set on the java.security.Security class.

Report a bug

10.3.2. Security Management

10.3.2.1. About Deep Copy Subject Mode

If *deep copy subject mode* is disabled (the default), copying a security data structure makes a reference to the original, rather than copying the entire data structure. This behavior is more efficient, but is prone to data corruption if multiple threads with the same identity clear the subject by means of a flush or logout operation.

Deep copy subject mode causes a complete copy of the data structure and all its associated data to be made, as long as they are marked cloneable. This is more thread-safe, but less efficient.

Deep copy subject mode is configured as part of the security subsystem.

Report a bug

10.3.2.2. Enable Deep Copy Subject Mode

You can enable deep copy security mode from the web-based management console or the management CLI.

Procedure 10.1. Enable Deep Copy Security Mode from the Management Console

1. **Log into the Management Console.**
   For detailed instructions, see the section entitled *The Management Console* in the *Administration and Configuration Guide* for JBoss Enterprise Application Platform 6.x located on the Customer Portal at https://access.redhat.com/site/documentation/JBoss_Enterprise_Application_Platform/.

2. **Managed Domain: Select the appropriate profile.**
   In a managed domain, the security subsystem is configured per profile, and you can enable or disable the deep copy security mode independently in each profile.

   To select a profile, click **Configuration** at the top of the screen, and then select a profile from the **Profile** drop down box at the top left.

3. **Open the Security Subsystem configuration menu.**
   Expand the **Security** menu, then select **Security Subsystem**.

4. **Enable Deep Copy Subject mode.**
   Click **Edit**. Check the box beside **Deep Copy Subjects** to enable deep copy subject mode.

Enable Deep Copy Subject Mode Using the Management CLI

If you prefer to use the management CLI to enable this option, use one of the following commands.

Example 10.2. Managed Domain

```
/profile=full/subsystem=security/:write-attribute(name=deep-copy-subject-mode,value=TRUE)
```

Example 10.3. Standalone Server

```
/subsystem=security/:write-attribute(name=deep-copy-subject-mode,value=TRUE)
```

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10.3.3. Security Domains

10.3.3.1. About Security Domains

Security domains are part of the JBoss EAP 6 security subsystem. All security configuration is now managed centrally, by the domain controller of a managed domain, or by the standalone server.

A security domain consists of configurations for authentication, authorization, security mapping, and auditing. It implements *Java Authentication and Authorization Service (JAAS)* declarative security.

Authentication refers to verifying the identity of a user. In security terminology, this user is referred to as a *principal*. Although authentication and authorization are different, many of the included authentication modules also handle authorization.

Authorization is a process by which the server determines if an authenticated user has permission or privileges to access specific resources in the system or operation.

Security mapping refers to the ability to add, modify, or delete information from a principal, role, or attribute before passing the information to your application.

The auditing manager allows you to configure *provider modules* to control the way that security events are reported.

If you use security domains, you can remove all specific security configuration from your application itself. This allows you to change security parameters centrally. One common scenario that benefits from this type of configuration structure is the process of moving applications between testing and production environments.

Report a bug

10.3.3.2. CLI Operations Related to Security Domains

Example 10.4. flush-cache

This CLI command removes entries stored in the authentication cache for a security domain. A single entry can be flushed by using the principal argument with the username as the value. If no argument is passed to the operation, all entries are flushed. For more details about this operation, use the CLI command:

```
/subsystem=security/security-domain=other:read-operation-description(name=flush-cache)
```

Example 10.5. list-cached-principals

This CLI command lists the principals stored in the authentication cache for this security domain. For more details about this operation, use the CLI command:

```
/subsystem=security/security-domain=other:read-operation-description(name=list-cached-
principals)
```

Report a bug

CHAPTER 11. AUTHENTICATION AND AUTHORIZATION

11.1. KERBEROS AND SPNEGO INTEGRATION

11.1.1. About Kerberos and SPNEGO Integration

Kerberos is an authentication method that is designed for open network computing environments. It works on the basis of a ticket and authenticator to establish the identity of both the user and the server. It helps the two nodes communicating over a non secure environment to establish their identity to each other in a secured manner.

SPNEGO is an authentication method used by a client application to authenticate itself to the server. This technology is used when the client application and the server trying to communicate with each other are not sure of the authentication protocol the other supports. SPNEGO determines the common GSSAPI mechanisms between the client application and the server and then dispatches all further security operations to it.

Kerberos and SPNEGO Integration

In a typical setup, the user logs into a desktop which is governed by the Active Directory domain. The user then uses the web browser, either Firebox or Internet Explorer, to access a web application that uses JBoss Negotiation hosted on the JBoss EAP. The web browser transfers the desktop sign on information to the web application. JBoss EAP uses background GSS messages with the Active Directory or any Kerberos Server to validate the user. This enables the user to achieve a seamless SSO into the web application.

Report a bug

11.1.2. Desktop SSO using SPNEGO

To configure the desktop SSO using SPNEGO configure the following:

- Security Domain
- System Properties
- Web Application

Procedure 11.1. Configure Desktop SSO using SPNEGO

1. **Configure Security Domain**
   Configure the security domains to represent the identity of the server and to secure the web application.

   Example 11.1. Security Domain Configuration

   ```
   <security-domains>

       <security-domain name="host" cache-type="default">

         <authentication>

           <login-module code="Kerberos" flag="required">
   ```

```
            <module-option name="storeKey" value="true"/>

            <module-option name="useKeyTab" value="true"/>

            <module-option name="principal" value="host/testserver@MY_REALM"/>

            <module-option name="keyTab" value="/home/username/service.keytab"/>

            <module-option name="doNotPrompt" value="true"/>

            <module-option name="debug" value="false"/>

          </login-module>

        </authentication>

      </security-domain>


      <security-domain name="SPNEGO" cache-type="default">

        <authentication>

          <login-module code="SPNEGO"  flag="requisite">

            <module-option name="password-stacking" value="useFirstPass"/>

            <module-option name="serverSecurityDomain" value="host"/>

          </login-module>


          <!-- Login Module For Roles Search -->

        </security-domain>
```

2. **Setup the System Properties**
   If required, the system properties can be set in the domain model.

   Example 11.2. Configure System Properties

```
<system-properties>

      <property name="java.security.krb5.kdc" value="mykdc.mydomain"/>

      <property name="java.security.krb5.realm" value="MY_REALM"/>

    </system-properties>
```

3. **Configure Web Application**

It is not possible to override the authenticators, but it is possible to add the **NegotiationAuthenticator** as a valve to your jboss-web.xml descriptor to configure the web application.

NOTE

The valve requires the **security-constraint** and **login-config** to be defined in the web.xml file as this is used to decide which resources are secured. However, the chosen **auth-method** is overridden by this authenticator.

Example 11.3. Configure Web Application

```
<!DOCTYPE jboss-web PUBLIC
 "-//JBoss//DTD Web Application 2.4//EN"
 "http://www.jboss.org/j2ee/dtd/jboss-web_4_0.dtd">

 <jboss-web>

   <security-domain>SPNEGO</security-domain>

   <valve>

     <class-name>org.jboss.security.negotiation.NegotiationAuthenticator</class-name>

   </valve>

 </jboss-web>
```

The web application also requires a dependency defining in **META-INF/MANIFEST.MF** so that the JBoss Negotiation classes can be located.

Example 11.4. Define Dependency in META-INF/MANIFEST.MF

```
Manifest-Version: 1.0

Build-Jdk: 1.6.0_24

Dependencies: org.jboss.security.negotiation
```

Report a bug

11.1.3. Configure JBoss Negotiation for Microsoft Windows Domain

This section describes how to configure the accounts required for JBoss Negotiation to be used when JBoss EAP is running on a Microsoft Windows server, which is a part of the Active Directory domain.

In this section, the hostname that is used to access the server as is referred to as **{hostname}**, realm is referred to as **{realm}**, domain is referred to as **{domain}**, and the server hosting the JBoss EAP instance is referred to as **{machine_name}**.

Procedure 11.2. Configure JBoss Negotiation for Microsoft Windows Domain

1. **Clear Existing Service Principal Mappings**
   On a Microsoft Windows network some mappings are created automatically. Delete the automatically created mappings to map the identity of the server to the service principal for negotiation to take place correctly. The mapping enables the web browser on the client computer to trust the server and attempt SPNEGO. The client computer verifies with the domain controller for a mapping in the form of **HTTP{hostname}**.

   The following are the steps to delete the existing mappings:

   - List the mapping registered with the domain for the computer using the command, **setspn -L {machine_name}**.
   - Delete the existing mappings using the commands, **setspn -D HTTP/{hostname} {machine_name}** and **setspn -D host/{hostname} {machine_name}**.

2. Create a host user account.

   NOTE

   Ensure the host user name is different from the **{machine_name}**.

   In the rest of the section the host user name is referred to as **{user_name}**.

3. **Define the mapping between the{user_name} and {hostname}.**

   - Run the following command to configure the Service Principal Mapping, **ktpass -princ HTTP/{hostname}@{realm} -pass * -mapuser {domain}\{user_name}**.
   - Enter the password for the user name when prompted.

     NOTE

     Reset the password for the user name as it is a prerequisite for exporting the keytab.

   - Verify the mapping by running the following command, **setspn -L {user_name}**

4. **Export the keytab of the user to the server on which EAP JBoss is installed.**
   Run the following command to export the keytab, **ktab -k service.keytab -a HTTP/{hostname}@{realm}**.

   NOTE

   This command exports the ticket for the HTTP/{hostname} principal to the keytab **service.keytab**, which is used to configure the host security domain on JBoss.

5. Define the principal within the security domain as follows:

```
<module-option name="principal">HTTP/{hostname}@{realm}</module-option>
```

Report a bug

11.1.4. Kerberos Authentication for PicketLink IDP

The following sections explain how to set up Kerberos authentication for PicketLink IDP.

Procedure 11.3. Install JBoss EAP 6 and setup Kerberos

1. Download and install JBoss EAP 6. Refer to installation instructions in the Installation Guide.

2. Whether you are using Oracle Java or IBM Java, you must use unlimited JCE. Without unlimited JCE, the JBoss server cannot negotiate on the proper SPNEGO mechanism type (using 1.3.6.1.5.2.5, which is **GSS_IAKERB_MECHANISM**).

3. Use the example below to configure JBoss to use your desired Java version.

```
export JAVA_HOME=JDK/JRE_directory
```

Procedure 11.4. Test your Kerberos setup using JBoss Negotiation Toolkit

1. Use the JBoss Negotiation Toolkit available at Github

2. Modify the configuration files and use the **mvn clean install** command to build the project.

3. Copy the file **jboss-negotiation-toolkit/target/jboss-negotiation-toolkit.war** to **$JBOSS_HOME/standalone/deployments/**.

4. Verify that all the three sections pass through the JBoss Negotiation Toolkit.

Procedure 11.5. Set up PicketLink IDP

Changes to idp.war

The example provided uses the **idp.war** and **employee.war** archives, which can be located in the PicketLink Quickstarts repository. Modify the files in **idp.war** as described below.

1. Add **org.jboss.security.negotiation** module to **$JBOSS_HOME/standalone/deployments/idp.war/META-INF/jboss-deployment-structure.xml** because IDP is using the JBoss Negotiation module.

```
<jboss-deployment-structure>
  <deployment>
  <!-- Add picketlink module dependency -->
   <dependencies>
     <module name="org.picketlink" />
     <module name="org.jboss.security.negotiation" />
   </dependencies>
  </deployment>
</jboss-deployment-structure>
```

2. Add an additional valve **org.jboss.security.negotiation.NegotiationAuthenticator** for SPNEGO to **$JBOSS_HOME/standalone/deployments/idp.war/WEB-INF/jboss-web.xml**.

3. Change **security-domain** from **idp** to **SPNEGO** in **$JBOSS_HOME/standalone/deployments/idp.war/WEB-INF/jboss-web.xml** as follows:

```
<jboss-web>
  <security-domain>SPNEGO</security-domain>
  <context-root>idp</context-root>
    <valve>
      <class-
name>org.picketlink.identity.federation.bindings.tomcat.idp.IDPWebBrowserSSOValve</class
-name>
      <param>
        <param-name>passUserPrincipalToAttributeManager</param-name>
        <param-value>true</param-value>
      </param>
    </valve>
    <valve>
      <class-name>org.jboss.security.negotiation.NegotiationAuthenticator</class-name>
    </valve>
</jboss-web>
```

4. Add or change the security-role added to your principal by Kerberos server setup to **$JBOSS_HOME/standalone/deployments/idp.war/WEB-INF/web.xml**.

5. Modify the file **$JBOSS_HOME/standalone/deployments/idp.war/WEB-INF/picketlink.xml** as follows:

```
<PicketLink xmlns="urn:picketlink:identity-federation:config:2.1">
  <PicketLinkIDP xmlns="urn:picketlink:identity-federation:config:2.1">
  <IdentityURL>${idp.url::http://localhost:8080/idp/}</IdentityURL>
    <Trust>
     <Domains>redhat.com,localhost,amazonaws.com</Domains>
    </Trust>
  </PicketLinkIDP>
  <Handlers xmlns="urn:picketlink:identity-federation:handler:config:2.1">
      <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.SAML2IssuerTrustHandler" />
      <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.SAML2LogOutHandler" />
      <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.SAML2AuthenticationHandler" />
      <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.RolesGenerationHandler" />
  </Handlers>
  <!-- The configuration bellow defines a token timeout and a clock skew. Both  configurations
will be used during the SAML Assertion creation. This configuration is optional. It is defined
only to show you how to set the token timeout and clock skew configuration. -->
  <PicketLinkSTS xmlns="urn:picketlink:identity-federation:config:1.0" TokenTimeout="5000"
ClockSkew="0">
    <TokenProviders>
    <TokenProvider

ProviderClass="org.picketlink.identity.federation.core.saml.v1.providers.SAML11AssertionToke
nProvider"
       TokenType="urn:oasis:names:tc:SAML:1.0:assertion"
       TokenElement="Assertion" TokenElementNS="urn:oasis:names:tc:SAML:1.0:assertion"
/>
    <TokenProvider
```

```
ProviderClass="org.picketlink.identity.federation.core.saml.v2.providers.SAML20AssertionToke
nProvider"
       TokenType="urn:oasis:names:tc:SAML:2.0:assertion"
       TokenElement="Assertion" TokenElementNS="urn:oasis:names:tc:SAML:2.0:assertion"
/>
    </TokenProviders>
  </PicketLinkSTS>
</PicketLink>
```

6. Change **IdentityURL** to match the host name of server you are running IDP on.

7. Change **Trust** to contain the domain names trusted by the Identity Provider.

8. Modify the **employee.war**. Add or change security-roles added to your principal by Kerberos server setup to **$JBOSS_HOME/standalone/deployments/employee.war/WEB-INF/web.xml**.

9. Modify the **security domain** configuration in the file **$JBOSS_HOME/standalone/configuration/standalone.xml**. Role mapping configuration is the same as that in normal security domain configurations.

```
<security-domain name="host" cache-type="default">
  <authentication>
    <login-module code="Kerberos" flag="required">
      <module-option name="principal" value="HTTP/something.com@yourdomain.COM"/>
<module-option name="storeKey" value="true"/>
      <module-option name="useKeyTab" value="true"/>
      <module-option name="doNotPrompt" value="true"/>
      <module-option name="keyTab" value="/root/keytab"/>
    </login-module>
  </authentication>
</security-domain>
<security-domain name="SPNEGO" cache-type="default">
   <authentication>
     <login-module code="SPNEGO" flag="required">
        <module-option name="serverSecurityDomain" value="host"/>
     </login-module>
   </authentication>
</security-domain>
<security-domain name="sp" cache-type="default">
   <authentication>
     <login-module
     code="org.picketlink.identity.federation.bindings.jboss.auth.SAML2LoginModule"
      flag="required" />
   </authentication>
</security-domain>
```

NOTE

In case of using IBM JDK, options for Kerberos module are different. You must set the system property **jboss.security.disable.secdomain.option** to **true**. Refer to Section 11.2.2, "Configure Authentication in a Security Domain" for details. Update the login module to the following:

```
<login-module code="Kerberos" flag="required">
 <module-option name="principal" value="HTTP/something.com@yourdomain.COM"/>
 <module-option name="credsType" value="acceptor"/>
 <module-option name="useKeytab" value="file:///root/keytab"/>
</login-module>
```

Procedure 11.6. Verify Kerberos authentication setup for PicketLink IDP

1. Start JBoss EAP server using **$JBOSS_HOME/bin/standalone.sh**.
2. Setup your Kerberos system. There are a number of ways to do so. For example, using one of the following options:
   - FreeIPA: there are multiple configuration options. You must choose the one that is suitable to your setup.
   - ApacheDS
3. Setup your browser, for example Firefox, to use Kerberos. Follow the instructions provided here: https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/5/html/Deployment_Guide/sso-config-firefox.html
4. Verify that you are able to access the **http://YOUR_DOMAIN:8080/employee** from Firefox configured as mentioned above.

Report a bug

11.1.5. Login with Certificate with PicketLink IDP

Configure IDP to Support SSL

You can configure the PicketLink IDP to support SSL. The following procedure is an example demonstrating how to configure a web application as an IDP supporting SSL client authentication. There are two ways to configure the IDP to authenticate users:

- If SSL is being used, the server will ask the client for a certificate and use this certificate to authenticate the user.
- If no certificate is provided by the client, a form-based authentication is performed.

Report a bug

11.1.5.1. JBoss EAP 6 SSL Configuration

The first thing you must do is create the certificates - the keystore and truststore that will be used during the entire configuration procedure.

Procedure 11.7. Create the certificate, keystore, and truststore for your server

1. **Create a Certificate for Your Server**
   Use the following command to create a certificate for your server:

   ```
   keytool -genkey -alias server -keyalg RSA -keystore server.keystore -storepass change_it -
   validity 365
   ```

   The system prompts you for additional information. You must provide the values as required. The CN name of the certificate must be the same as your DNS server name. For example, in case of localhost you could use the following command:

   ```
   keytool -genkey -alias server -keystore server.keystore -storepass change_it -keypass
   password -dname
   "CN=localhost,OU=QE,O=example.com,L=Brno,C=CZ"
   ```

2. **Create the Client Certificate**
   You will use this client certificate to authenticate against the server when accessing a resource through SSL.

   ```
   keytool -genkey -alias client -keystore client.keystore -storepass change_it -validity 365 -
   keyalg RSA -keysize 2048 -storetype pkcs12
   ```

3. **Create the Truststore**
   Export the client's certificate and create a truststore by importing this certificate:

   ```
   keytool -exportcert -keystore client.keystore -storetype pkcs12 -storepass change_it -alias
   client -keypass change_it -file client.keystore
   keytool -import -file client.keystore -alias client -keystore client.truststore
   ```

4. **Change the JBoss EAP 6 Server Installation to Enable SSL**
   Add the following connector to the web subsystem to enable SSL:

   ```
   <connector name="https" protocol="HTTP/1.1" scheme="https" socket-binding="https"
   enable-lookups="false" secure="true">
     <ssl name="localhost-ssl" key-alias="server" password="change_it"
     certificate-key-file="${jboss.server.config.dir}/server.keystore"
     protocol="TLSv1"
     verify-client="want"
     ca-certificate-file="${jboss.server.config.dir}/client.truststore"/>
   </connector>
   ```

5. **Restart the Server**
   Restart the server and verify that it is responding on: https://localhost:8443

6. **Trust the Certificate**
   You will be prompted to trust the server certificate.

Configure the Client Certificate in your Browser

Before accessing the application, you must import the **client.keystore** to your browser. This file holds the client certificate. When you access the application, the browser prompts you to select the certificate you need to use to authenticate with the server. Select the desired certificate.

Security Domain Configuration

Add the following security domain to your server installation. If you're in standalone mode, you must add it to the **JBOSS_HOME/standalone/configuration/standalone.xml**:

```
 <security-domain name="idp" cache-type="default">
   <authentication>
   <login-module code="CertificateRoles" flag="optional">
   <module-option name="password-stacking" value="useFirstPass"/>
   <module-option name="securityDomain" value="idp"/>
   <module-option name="verifier" value="org.jboss.security.auth.certs.AnyCertVerifier"/>
   </login-module>

   <login-module
code="org.picketlink.identity.federation.bindings.jboss.auth.RegExUserNameLoginModule"
flag="optional">
   <module-option name="regex" value="CN=(.*?),"/>
   </login-module>

   <login-module code="UsersRoles" flag="required">
   <module-option name="password-stacking" value="useFirstPass"/>
   <module-option name="usersProperties" value="users.properties"/>
   <module-option name="rolesProperties" value="roles.properties"/>
   </login-module>
   </authentication>

   <jsse keystore-password="change_it" keystore-url="${jboss.server.config.dir}" truststore-
password="change_it" truststore-url="${jboss.server.config.dir}" client-auth="true"/>
</security-domain>
```

The configuration example above validates any provided certificate. If no certificate is provided or if the authentication fails, the procedure falls back to a user/password based authentication.

Regular Expression User Name Login Module

The Regular Expression User Name Login module can be used after Certificate Login Modules to extract a username, UID or other field from the principal name so that roles can be obtained from LDAP. The module has an option named **regex** which specifies the regular expression to be applied to the principal name, the result of which is passed on to the subsequent login module.

In this example, an input principal name of **UID=007, EMAILADDRESS=something@something, CN=James Bond, O=SpyAgency** would result in the output **UID=007**.

Example 11.5. Example of Regular Expression User Name Login Module

```
<login-module
code="org.picketlink.identity.federation.bindings.jboss.auth.RegExUserNameLoginModule"
flag="required">
  <module-option name="password-stacking" value="useFirstPass"/>
  <module-option name="regex" value="UID=(.*?),"/>
</login-module>
```

For further details about regular expressions, see **java.util.regex.Pattern** class documentation at http://docs.oracle.com/javase/7/docs/api/java/util/regex/Pattern.html.

Report a bug

11.2. AUTHENTICATION

11.2.1. About Authentication

Authentication refers to identifying a subject and verifying the authenticity of the identification. The most common authentication mechanism is a username and password combination. Other common authentication mechanisms use shared keys, smart cards, or fingerprints. The outcome of a successful authentication is referred to as a principal, in terms of Java Enterprise Edition declarative security.

JBoss EAP 6 uses a pluggable system of authentication modules to provide flexibility and integration with the authentication systems you already use in your organization. Each security domain may contain one or more configured authentication modules. Each module includes additional configuration parameters to customize its behavior. The easiest way to configure the authentication subsystem is within the web-based management console.

Authentication is not the same as authorization, although they are often linked. Many of the included authentication modules can also handle authorization.

Report a bug

11.2.2. Configure Authentication in a Security Domain

To configure authentication settings for a security domain, log into the management console and follow this procedure.

Procedure 11.8. Setup Authentication Settings for a Security Domain

1. **Open the security domain's detailed view.**

   a. Click the **Configuration** label at the top of the management console.

   b. Select the profile to modify from the **Profile** selection box at the top left of the Profile view.

   c. Expand the **Security** menu, and select **Security Domains**.

   d. Click the **View** link for the security domain you want to edit.

2. **Navigate to the Authentication subsystem configuration.**
   Select the **Authentication** label at the top of the view if it is not already selected.

   The configuration area is divided into two areas: **Login Modules** and **Details**. The login module is the basic unit of configuration. A security domain can include several login modules, each of which can include several attributes and options.

3. **Add an authentication module.**
   Click **Add** to add a JAAS authentication module. Fill in the details for your module.

   The **Code** is the class name of the module. The **Flag** setting controls how the module relates to other authentication modules within the same security domain.

   Explanation of the Flags

The Java Enterprise Edition 6 specification provides the following explanation of the flags for security modules. The following list is taken from http://docs.oracle.com/javase/6/docs/technotes/guides/security/jaas/JAASRefGuide.html#App Refer to that document for more detailed information.

Flag	Details
required	The LoginModule is required to succeed. If it succeeds or fails, authentication still continues to proceed down the LoginModule list.
requisite	LoginModule is required to succeed. If it succeeds, authentication continues down the LoginModule list. If it fails, control immediately returns to the application (authentication does not proceed down the LoginModule list).
sufficient	The LoginModule is not required to succeed. If it does succeed, control immediately returns to the application (authentication does not proceed down the LoginModule list). If it fails, authentication continues down the LoginModule list.
optional	The LoginModule is not required to succeed. If it succeeds or fails, authentication still continues to proceed down the LoginModule list.

4. **Edit authentication settings**
   After you have added your module, you can modify its **Code** or **Flags** by clicking **Edit** in the **Details** section of the screen. Be sure the **Attributes** tab is selected.

5. **Optional: Add or remove module options.**
   If you need to add options to your module, click its entry in the **Login Modules** list, and select the **Module Options** tab in the **Details** section of the page. Click the **Add** button, and provide the key and value for the option. Use the **Remove** button to remove an option.

Result

Your authentication module is added to the security domain, and is immediately available to applications which use the security domain.

The **jboss.security.security_domain** Module Option

By default, each login module defined in a security domain has the **jboss.security.security_domain** module option added to it automatically. This option causes problems with login modules which check to make sure that only known options are defined. The IBM Kerberos login module, **com.ibm.security.auth.module.Krb5LoginModule** is one of these.

You can disable the behavior of adding this module option by setting the system property to **true** when starting JBoss EAP 6. Add the following to your start-up parameters.

```
-Djboss.security.disable.secdomain.option=true
```

You can also set this property using the web-based Management Console. In a standalone server, you can set system properties in the **Profile** section of the configuration. In a managed domain, you can set system properties for each server group.

Report a bug

11.3. JAAS - JAVA AUTHENTICATION AND AUTHORIZATION SERVICE

11.3.1. About JAAS

JAAS is the Java Authentication and Authorization Service. It is part of the Java EE Spec, and allows for pluggable authentication and authorization to abstract applications from security providers.

The JAAS 1.0 API consists of a set of Java packages designed for user authentication and authorization. The API implements a Java version of the standard Pluggable Authentication Modules (PAM) framework and extends the Java 2 Platform access control architecture to support user-based authorization.

JAAS authentication is performed in a pluggable fashion. This permits Java applications to remain independent from underlying authentication technologies, and allows the security manager to work in different security infrastructures. Integration with a security infrastructure is achievable without changing the security manager implementation. You need only change the configuration of the authentication stack JAAS uses.

Refer to the Java EE JAAS Documentation for further information on JAAS.

The JBoss Enterprise Application Platform 6 security subsystem is based on the JAAS API.

Report a bug

11.3.2. JAAS Core Classes

The JAAS core classes can be broken down into three categories: common, authentication, and authorization. The following list presents only the common and authentication classes because these are the specific classes used to implement the functionality of the EAP security subsystem covered in this chapter.

These are the common classes:

- **Subject** (**javax.security.auth.Subject**)

These are the authentication classes:

- **Configuration** (**javax.security.auth.login.Configuration**)
- **LoginContext** (**javax.security.auth.login.LoginContext**)

These are the associated interfaces:

- **Principal** (**java.security.Principal**)
- **Callback** (**javax.security.auth.callback.Callback**)
- **CallbackHandler** (**javax.security.auth.callback.CallbackHandler**)
- **LoginModule** (**javax.security.auth.spi.LoginModule**)

Report a bug

11.3.3. Subject and Principal classes

To authorize access to resources, applications must first authenticate the request's source. The JAAS framework defines the term subject to represent a request's source. The **Subject** class is the central class in JAAS. A **Subject** represents information for a single entity, such as a person or service. It encompasses the entity's principals, public credentials, and private credentials. The JAAS API uses the existing Java 2 **java.security.Principal** interface to represent a principal, which is essentially a typed name.

During the authentication process, a subject is populated with associated identities, or principals. A subject may have many principals. For example, a person may have a name principal (John Doe), a social security number principal (123-45-6789), and a user name principal (johnd), all of which help distinguish the subject from other subjects. To retrieve the principals associated with a subject, two methods are available:

```
public Set getPrincipals() {...}
public Set getPrincipals(Class c) {...}
```

getPrincipals() returns all principals contained in the subject. **getPrincipals(Class c)** returns only those principals that are instances of class **c** or one of its subclasses. An empty set is returned if the subject has no matching principals.

Note that the **java.security.acl.Group** interface is a sub-interface of **java.security.Principal**, so an instance in the principals set may represent a logical grouping of other principals or groups of principals.

Report a bug

11.3.4. Subject Authentication

Subject Authentication requires a JAAS login. For a description of the JAAS Login Configuration file, refer to JAAS Login Configuration File in the Java documentation.

The login process consists of the following points:

1. An application instantiates a **LoginContext** and passes in the name of the login configuration and a **CallbackHandler** to populate the **Callback** objects, as required by the configuration **LoginModule**s.

2. The **LoginContext** consults a **Configuration** to load all the **LoginModules** included in the named login configuration. If no such named configuration exists the **other** configuration is used as a default.

3. The application invokes the **LoginContext.login** method.

4. The login method invokes each loaded **LoginModule**. As each **LoginModule** attempts to authenticate the subject, it invokes the handle method on the associated **CallbackHandler** to obtain the information required for the authentication process. The required information is passed to the handle method in the form of an array of **Callback** objects. Upon success, the **LoginModule**s associate relevant principals and credentials with the subject.

5. The **LoginContext** returns the authentication status to the application. Success is represented by a return from the login method. Failure is represented through a LoginException being thrown by the login method.

6. If authentication succeeds, the application retrieves the authenticated subject using the **LoginContext.getSubject** method.

7. After the scope of the subject authentication is complete, all principals and related information associated with the subject by the **login** method can be removed by invoking the **LoginContext.logout** method.

The **LoginContext** class provides the basic methods for authenticating subjects and offers a way to develop an application that is independent of the underlying authentication technology. The **LoginContext** consults a **Configuration** to determine the authentication services configured for a particular application. **LoginModule** classes represent the authentication services. Therefore, you can plug different login modules into an application without changing the application itself. The following code shows the steps required by an application to authenticate a subject.

```
CallbackHandler handler = new MyHandler();
LoginContext lc = new LoginContext("some-config", handler);

try {
    lc.login();
    Subject subject = lc.getSubject();
} catch(LoginException e) {
    System.out.println("authentication failed");
    e.printStackTrace();
}

// Perform work as authenticated Subject
// ...

// Scope of work complete, logout to remove authentication info
try {
    lc.logout();
} catch(LoginException e) {
    System.out.println("logout failed");
    e.printStackTrace();
}

// A sample MyHandler class
class MyHandler
    implements CallbackHandler
{
    public void handle(Callback[] callbacks) throws
        IOException, UnsupportedCallbackException
    {
        for (int i = 0; i < callbacks.length; i++) {
            if (callbacks[i] instanceof NameCallback) {
                NameCallback nc = (NameCallback)callbacks[i];
                nc.setName(username);
            } else if (callbacks[i] instanceof PasswordCallback) {
                PasswordCallback pc = (PasswordCallback)callbacks[i];
                pc.setPassword(password);
            } else {
                throw new UnsupportedCallbackException(callbacks[i],
                                                        "Unrecognized Callback");
            }
        }
    }
}
```

Developers integrate with an authentication technology by creating an implementation of the **LoginModule** interface. This allows an administrator to plug different authentication technologies into an application. You can chain together multiple **LoginModule**s to allow for more than one authentication technology to participate in the authentication process. For example, one **LoginModule** may perform user name/password-based authentication, while another may interface to hardware devices such as smart card readers or biometric authenticators.

The life cycle of a **LoginModule** is driven by the **LoginContext** object against which the client creates and issues the login method. The process consists of two phases. The steps of the process are as follows:

- The **LoginContext** creates each configured **LoginModule** using its public no-arg constructor.
- Each **LoginModule** is initialized with a call to its initialize method. The **Subject** argument is guaranteed to be non-null. The signature of the initialize method is: **public void initialize(Subject subject, CallbackHandler callbackHandler, Map sharedState, Map options)**
- The **login** method is called to start the authentication process. For example, a method implementation might prompt the user for a user name and password and then verify the information against data stored in a naming service such as NIS or LDAP. Alternative implementations might interface to smart cards and biometric devices, or simply extract user information from the underlying operating system. The validation of user identity by each **LoginModule** is considered phase 1 of JAAS authentication. The signature of the **login** method is **boolean login() throws LoginException** . A **LoginException** indicates failure. A return value of true indicates that the method succeeded, whereas a return value of false indicates that the login module should be ignored.
- If the **LoginContext**'s overall authentication succeeds, **commit** is invoked on each **LoginModule**. If phase 1 succeeds for a **LoginModule**, then the commit method continues with phase 2 and associates the relevant principals, public credentials, and/or private credentials with the subject. If phase 1 fails for a **LoginModule**, then **commit** removes any previously stored authentication state, such as user names or passwords. The signature of the **commit** method is: **boolean commit() throws LoginException** . Failure to complete the commit phase is indicated by throwing a **LoginException**. A return of true indicates that the method succeeded, whereas a return of false indicates that the login module should be ignored.
- If the **LoginContext**'s overall authentication fails, then the **abort** method is invoked on each **LoginModule**. The **abort** method removes or destroys any authentication state created by the login or initialize methods. The signature of the **abort** method is **boolean abort() throws LoginException** . Failure to complete the **abort** phase is indicated by throwing a **LoginException**. A return of true indicates that the method succeeded, whereas a return of false indicates that the login module should be ignored.
- To remove the authentication state after a successful login, the application invokes **logout** on the **LoginContext**. This in turn results in a **logout** method invocation on each **LoginModule**. The **logout** method removes the principals and credentials originally associated with the subject during the **commit** operation. Credentials should be destroyed upon removal. The signature of the **logout** method is: **boolean logout() throws LoginException** . Failure to complete the logout process is indicated by throwing a **LoginException**. A return of true indicates that the method succeeded, whereas a return of false indicates that the login module should be ignored.

When a **LoginModule** must communicate with the user to obtain authentication information, it uses a **CallbackHandler** object. Applications implement the CallbackHandler interface and pass it to the **LoginContext**, which send the authentication information directly to the underlying login modules.

Login modules use the **CallbackHandler** both to gather input from users, such as a password or smart card PIN, and to supply information to users, such as status information. By allowing the application to specify the **CallbackHandler**, underlying **LoginModule**s remain independent from the different ways applications interact with users. For example, a **CallbackHandler**'s implementation for a GUI application might display a window to solicit user input. On the other hand, a **CallbackHandler** implementation for a non-GUI environment, such as an application server, might simply obtain credential information by using an application server API. The CallbackHandler interface has one method to implement:

```
void handle(Callback[] callbacks)
    throws java.io.IOException,
           UnsupportedCallbackException;
```

The **Callback** interface is the last authentication class we will look at. This is a tagging interface for which several default implementations are provided, including the **NameCallback** and **PasswordCallback** used in an earlier example. A **LoginModule** uses a **Callback** to request information required by the authentication mechanism. **LoginModule**s pass an array of **Callback**s directly to the **CallbackHandler.handle** method during the authentication's login phase. If a **callbackhandler** does not understand how to use a **Callback** object passed into the handle method, it throws an **UnsupportedCallbackException** to abort the login call.

Report a bug

11.4. JAVA AUTHENTICATION SPI FOR CONTAINERS (JASPI)

11.4.1. About Java Authentication SPI for Containers (JASPI) Security

Java Authentication SPI for Containers (JASPI or JASPIC) is a pluggable interface for Java applications. It is defined in JSR-196 of the Java Community Process. Refer to http://www.jcp.org/en/jsr/detail?id=196 for details about the specification.

Report a bug

11.4.2. Configure Java Authentication SPI for Containers (JASPI) Security

To authenticate against a JASPI provider, add a **<authentication-jaspi>** element to your security domain. The configuration is similar to a standard authentication module, but login module elements are enclosed in a **<login-module-stack>** element. The structure of the configuration is:

Example 11.6. Structure of the authentication-jaspi element

```
<authentication-jaspi>
 <login-module-stack name="...">
   <login-module code="..." flag="...">
     <module-option name="..." value="..."/>
   </login-module>
 </login-module-stack>
 <auth-module code="..." login-module-stack-ref="...">
   <module-option name="..." value="..."/>
 </auth-module>
```

```
</authentication-jaspi>
```

The login module itself is configured in exactly the same way as a standard authentication module.

Because the web-based management console does not expose the configuration of JASPI authentication modules, you need to stop JBoss EAP 6 completely before adding the configuration directly to ***EAP_HOME*/domain/configuration/domain.xml** or ***EAP_HOME*/standalone/configuration/standalone.xml**.

Report a bug

11.5. AUTHORIZATION

11.5.1. About Authorization

Authorization is a mechanism for granting or denying access to a resource based on identity. It is implemented as a set of declarative security roles which can be added to principals.

JBoss EAP 6 uses a modular system to configure authorization. Each security domain may contain one or more authorization policies. Each policy has a basic module which defines its behavior. It is configured through specific flags and attributes. The easiest way to configure the authorization subsystem is by using the web-based management console.

Authorization is different from authentication, and usually happens after authentication. Many of the authentication modules also handle authorization.

Report a bug

11.5.2. Configure Authorization in a Security Domain

To configure authorization settings for a security domain, log into the management console and follow this procedure.

Procedure 11.9. Setup Authorization in a Security Domain

1. **Open the security domain's detailed view.**

   a. Click the **Configuration** label at the top of the management console.

   b. In a managed domain, select the profile to modify from the **Profile** drop down box at the top left.

   c. Expand the **Security** menu item, and select **Security Domains**.

   d. Click the **View** link for the security domain you want to edit.

2. **Navigate to the Authorization subsystem configuration.**
   Select the **Authorization** label at the top of the screen.

   The configuration area is divided into two areas: **Policies** and **Details**. The login module is the basic unit of configuration. A security domain can include several authorization policies, each of which can include several attributes and options.

3. **Add a policy.**
   Click **Add** to add a JAAS authorization policy module. Fill in the details for your module.

   The **Code** is the class name of the module. The **Flag** controls how the module relates to other authorization policy modules within the same security domain.

   Explanation of the Flags

   The Java Enterprise Edition 6 specification provides the following explanation of the flags for security modules. The following list is taken from http://docs.oracle.com/javase/6/docs/technotes/guides/security/jaas/JAASRefGuide.html#App Refer to that document for more detailed information.

Flag	Details
required	The LoginModule is required to succeed. If it succeeds or fails, authorization still continues to proceed down the LoginModule list.
requisite	LoginModule is required to succeed. If it succeeds, authorization continues down the LoginModule list. If it fails, control immediately returns to the application (authorization does not proceed down the LoginModule list).
sufficient	The LoginModule is not required to succeed. If it does succeed, control immediately returns to the application (authorization does not proceed down the LoginModule list). If it fails, authorization continues down the LoginModule list.
optional	The LoginModule is not required to succeed. If it succeeds or fails, authorization still continues to proceed down the LoginModule list.

4. **Edit authorization settings**
   After you have added your module, you can modify its **Code** or **Flags** by clicking **Edit** in the **Details** section of the screen. Be sure the **Attributes** tab is selected.

5. **Optional: Add or remove module options.**
   If you need to add options to your module, click its entry in the **Policies** list, and select the **Module Options** tab in the **Details** section of the page. Click **Add** and provide the key and value for the option. Use the **Remove** button to remove an option.

Result

Your authorization policy module is added to the security domain, and is immediately available to applications which use the security domain.

Report a bug

11.6. JAVA AUTHORIZATION CONTRACT FOR CONTAINERS (JACC)

11.6.1. About Java Authorization Contract for Containers (JACC)

Java Authorization Contract for Containers (JACC) is a standard which defines a contract between containers and authorization service providers, which results in the implementation of providers for use by containers. It was defined in JSR-115, which can be found on the Java Community Process website at http://jcp.org/en/jsr/detail?id=115. It has been part of the core Java Enterprise Edition (Java EE) specification since Java EE version 1.3.

JBoss EAP 6 implements support for JACC within the security functionality of the security subsystem.

Report a bug

11.6.2. Configure Java Authorization Contract for Containers (JACC) Security

To configure Java Authorization Contract for Containers (JACC), you need to configure your security domain with the correct module, and then modify your **jboss-web.xml** to include the correct parameters.

Add JACC Support to the Security Domain

To add JACC support to the security domain, add the **JACC** authorization policy to the authorization stack of the security domain, with the **required** flag set. The following is an example of a security domain with JACC support. However, the security domain is configured in the Management Console or Management CLI, rather than directly in the XML.

```
<security-domain name="jacc" cache-type="default">
    <authentication>
        <login-module code="UsersRoles" flag="required">
        </login-module>
    </authentication>
    <authorization>
        <policy-module code="JACC" flag="required"/>
    </authorization>
</security-domain>
```

Configure a Web Application to Use JACC

The **jboss-web.xml** is located in the **WEB-INF/** directory of your deployment, and contains overrides and additional JBoss-specific configuration for the web container. To use your JACC-enabled security domain, you need to include the **<security-domain>** element, and also set the **<use-jboss-authorization>** element to **true**. The following application is properly configured to use the JACC security domain above.

```
<jboss-web>
    <security-domain>jacc</security-domain>
    <use-jboss-authorization>true</use-jboss-authorization>
</jboss-web>
```

Configure an EJB Application to Use JACC

Configuring EJBs to use a security domain and to use JACC differs from Web Applications. For an EJB, you can declare *method permissions* on a method or group of methods, in the **ejb-jar.xml** descriptor. Within the **<ejb-jar>** element, any child **<method-permission>** elements contain information about JACC roles. Refer to the example configuration for more details. The **EJBMethodPermission** class is part of the Java Enterprise Edition 6 API, and is documented at http://docs.oracle.com/javaee/6/api/javax/security/jacc/EJBMethodPermission.html.

Example 11.7. Example JACC Method Permissions in an EJB

```
<ejb-jar>
  <assembly-descriptor>
    <method-permission>
      <description>The employee and temp-employee roles may access any method of the
EmployeeService bean </description>
      <role-name>employee</role-name>
      <role-name>temp-employee</role-name>
      <method>
        <ejb-name>EmployeeService</ejb-name>
        <method-name>*</method-name>
      </method>
    </method-permission>
  </assembly-descriptor>
</ejb-jar>
```

You can also constrain the authentication and authorization mechanisms for an EJB by using a security domain, just as you can do for a web application. Security domains are declared in the **jboss-ejb3.xml** descriptor, in the **<security>** child element. In addition to the security domain, you can also specify the **<run-as-principal>**, which changes the principal the EJB runs as.

Example 11.8. Example Security Domain Declaration in an EJB

```
<ejb-jar>
 <assembly-descriptor>
  <security>
    <ejb-name>*</ejb-name>
    <security-domain>myDomain</security-domain>
    <run-as-principal>myPrincipal</run-as-principal>
  </security>
  </assembly-descriptor>
</ejb-jar>
```

Report a bug

11.6.3. Fine Grained Authorization Using XACML

11.6.3.1. About Fine Grained Authorization and XACML

Fine Grained Authorization caters to the changing requirements and multiple variables involved in the decision making process, which becomes the basis of providing authorization for accessing a module. Hence, the process of Fine Grained Authorization is complex in itself.

JBoss uses XACML as a medium to achieve Fine Grained Authorization. XACML provides standards based solution to the complex nature of achieving Fine Grained Authorization. XACML defines a policy language and an architecture for decision making. The XACML architecture includes a Policy Enforcement Point (PEP), which intercepts any requests in a normal program flow, then asks a Policy

Decision Point (PDP) to make an access decision based on the policies associated with the PDP. The PDP evaluates the XACML request created by the PEP and runs through the policies to make one of the following access decisions:

- PERMIT - The access is approved.
- DENY - The access is denied.
- INDETERMINATE - There is an error at the PDP.
- NOTAPPLICABLE - There is some attribute missing in the request or there is no policy match.

The following are the features of the XACML:

- Oasis XACML v2.0 library
- JAXB v2.0 based object model
- ExistDB Integration for storing/retrieving XACML Policies and Attributes

Report a bug

11.6.3.2. Configure XACML for Fine Grained Authorization

The following is the procedure to configure XACML.

Procedure 11.10. Configure XACML

1. Download the library which is a single jar file.
2. **Create one or more policy files for XACML**
   - Under the **WEB-INF/classes**, create a **policies** directory to save all your policies.
   - Create a **policyConfig.xml** under **WEB-INF/classes** directory.

     The following are the two types of policy sets can be defined:

     - Role Permission Policy Sets (RPS)
     - Permission Policy Sets (PPS)

Example 11.9. Role Permission Policy Sets (RPS)

Employee

```
    <PolicySet xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    PolicySetId="RPS:employee:role"
    PolicyCombiningAlgId="urn:oasis:names:tc:xacml:1.0:policy-combining-
algorithm:permit-overrides">
    <Target>
    <Subjects>
    <Subject>
    <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:anyURI-equal">
    <AttributeValue
    DataType="http://www.w3.org/2001/XMLSchema#anyURI">employee</AttributeValue>
    <SubjectAttributeDesignator
    AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
    DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
    </SubjectMatch>
    </Subject>
    </Subjects>
    </Target>
    <!-- Use permissions associated with the employee role -->
    <PolicySetIdReference>PPS:employee:role</PolicySetIdReference>
    </PolicySet>
```

Manager

```
<PolicySet xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
PolicySetId="RPS:manager:role"
PolicyCombiningAlgId="urn:oasis:names:tc:xacml:1.0:policy-combining-algorithm:permit-
overrides">
<Target>
<Subjects>
<Subject>
<SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:anyURI-equal">
<AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#anyURI">manager</AttributeValue>
<SubjectAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
</SubjectMatch>
</Subject>
</Subjects>
</Target>
<!-- Use permissions associated with the manager role -->
<PolicySetIdReference>PPS:manager:role</PolicySetIdReference>
</PolicySet>
```

Example 11.10. Permission Policy Sets (PPS)

Employee

```
    <PolicySet xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
        PolicySetId="PPS:employee:role"
        PolicyCombiningAlgId="urn:oasis:names:tc:xacml:1.0:policy-combining-
algorithm:permit-overrides">
        <Target />
        <!-- Permissions specifically for the employee role -->
        <Policy PolicyId="Permissions:specifically:for:the:employee:role"
            RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-
algorithm:permit-overrides">
            <Target />
            <!-- Permission to create a purchase order -->
            <Rule RuleId="Permission:to:create:a:purchase:order" Effect="Permit">
                <Target>
                    <Resources>
                        <Resource>
                <ResourceMatch
                    MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                    <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">purchase order
                    </AttributeValue>
                    <ResourceAttributeDesignator
                        AttributeId="urn:oasis:names:tc:xacml:1.0:resource:resource-id"
DataType="http://www.w3.org/2001/XMLSchema#string" />
                </ResourceMatch>
            </Resource>
        </Resources>
        <Actions>
            <Action>
                <ActionMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-
equal">
                    <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">create</AttributeValue>
                    <ActionAttributeDesignator AttributeId="urn:action-id"
                        DataType="http://www.w3.org/2001/XMLSchema#string" />
                </ActionMatch>
            </Action>
        </Actions>
    </Target>
  </Rule>
</Policy>
<!-- HasPrivilegesOfRole Policy for employee role -->
<Policy PolicyId="Permission:to:have:employee:role:permissions"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-
algorithm:permit-overrides">
    <Target />
    <!-- Permission to have employee role permissions -->
    <Rule RuleId="Permission:to:have:employee:permissions" Effect="Permit">
        <Condition>
            <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:and">
                <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:anyURI-is-in">
                    <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#anyURI">employee</AttributeValue>
                    <ResourceAttributeDesignator
                        AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#anyURI" />
                </Apply>
                <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:anyURI-is-in">
                    <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#anyURI">urn:oasis:names:tc:xacml:2.0:a
ctions:hasPrivilegesOfRole
                    </AttributeValue>
                    <ActionAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id"
                        DataType="http://www.w3.org/2001/XMLSchema#anyURI" />
                </Apply>
            </Apply>
        </Condition>
    </Rule>
</Policy>
</PolicySet>
```

Manager

```
<PolicySet xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
        PolicySetId="PPS:manager:role"
        PolicyCombiningAlgId="urn:oasis:names:tc:xacml:1.0:policy-combining-
algorithm:permit-overrides">
        <Target />
        <!-- Permissions specifically for the manager role -->
        <Policy PolicyId="Permissions:specifically:for:the:manager:role"
            RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-
algorithm:permit-overrides">
            <Target />
            <!-- Permission to sign a purchase order -->
            <Rule RuleId="Permission:to:sign:a:purchase:order" Effect="Permit">
                <Target>
                    <Resources>
                        <Resource>
                            <ResourceMatch
                                MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                                <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">purchase order
                                </AttributeValue>
                                <ResourceAttributeDesignator
                                    AttributeId="urn:oasis:names:tc:xacml:1.0:resource:resource-id"
DataType="http://www.w3.org/2001/XMLSchema#string" />
                            </ResourceMatch>
                        </Resource>
                    </Resources>
                    <Actions>
                        <Action>
                            <ActionMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-
equal">
                                <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">sign</AttributeValue>
                                <ActionAttributeDesignator AttributeId="urn:action-id"
                                    DataType="http://www.w3.org/2001/XMLSchema#string" />
                            </ActionMatch>
                        </Action>
                    </Actions>
                </Target>
            </Rule>
        </Policy>
        <!-- HasPrivilegesOfRole Policy for manager role -->
    <Policy PolicyId="Permission:to:have:manager:role:permissions"
        RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-
algorithm:permit-overrides">
        <Target />
        <!-- Permission to have manager role permissions -->
        <Rule RuleId="Permission:to:have:manager:permissions" Effect="Permit">
            <Condition>
                <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:and">
                    <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:anyURI-is-in">
                        <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#anyURI">manager</AttributeValue>
                        <ResourceAttributeDesignator
                            AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
```

```
DataType="http://www.w3.org/2001/XMLSchema#anyURI" />
                    </Apply>
                    <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:anyURI-is-in">
                        <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#anyURI">urn:oasis:names:tc:xacml:2.0:a
ctions:hasPrivilegesOfRole
                        </AttributeValue>
                        <ActionAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id"
                            DataType="http://www.w3.org/2001/XMLSchema#anyURI" />
                    </Apply>
                </Apply>
            </Condition>
        </Rule>
    </Policy>
        <!-- Include permissions associated with employee role -->
        <PolicySetIdReference>PPS:employee:role</PolicySetIdReference>
    </PolicySet>
```

3. **Create a configuration file for the XACML engine.**
   A configuration file is created to configure the locators and mention the directories where the policies are saved.

Example 11.11. Configuration File

Configuration File Only Indicating The Directory Of The Policy Files.

```
    <ns:jbosspdp xmlns:ns="urn:jboss:xacml:2.0">
      <ns:Policies>
       <ns:PolicySet>
          <ns:Location>test/policies/rbac/</ns:Location>
        </ns:PolicySet>
      </ns:Policies>
      <ns:Locators>
        <ns:Locator
Name="org.jboss.security.xacml.locators.JBossRBACPolicySetLocator"/>
      </ns:Locators>
    </ns:jbosspdp>
```

Configuration File Defining the Policy Set

```
<ns:jbosspdp xmlns:ns="urn:jboss:xacml:2.0">
  <ns:Policies>
    <ns:PolicySet>
      <ns:Location>test/policies/rbac/employee-PPS-policyset.xml</ns:Location>
    </ns:PolicySet>
    <ns:PolicySet>
      <ns:Location>test/policies/rbac/manager-PPS-policyset.xml</ns:Location>
    </ns:PolicySet>
    <ns:PolicySet>
      <ns:Location>test/policies/rbac/employee-RPS-policyset.xml</ns:Location>
    </ns:PolicySet>
    <ns:PolicySet>
      <ns:Location>test/policies/rbac/manager-RPS-policyset.xml</ns:Location>
    </ns:PolicySet>
  </ns:Policies>
  <ns:Locators>
    <ns:Locator Name="org.jboss.security.xacml.locators.JBossRBACPolicySetLocator"/>
  </ns:Locators>
</ns:jbosspdp>
```

4. Create a Policy Decision Point (PDP) and pass it in the Configuration File.

5. In the Policy Enforcement Point (PEP), create an XACML request based on the context. Pass the XACML request to the PDP to get one of the following access decisions:

    - Permit
    - Deny
    - Indeterminate
    - Not Applicable

Example 11.12. Access Decisions

Permit condition

```
<Request
      xmlns="urn:oasis:names:tc:xacml:2.0:context:schema:os"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="urn:oasis:names:tc:xacml:2.0:context:schema:os
         access_control-xacml-2.0-context-schema-os.xsd">
<Subject>
<Attribute AttributeId="urn:oasis:names:tc:xacml:1.0:subject:subject-id"
 DataType="http://www.w3.org/2001/XMLSchema#string">
<AttributeValue>Anne</AttributeValue>
</Attribute>

<Attribute AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
 DataType="http://www.w3.org/2001/XMLSchema#anyURI">
<AttributeValue>manager</AttributeValue>
</Attribute>
</Subject>

<Resource>
<Attribute AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#anyURI">
<AttributeValue>manager</AttributeValue>
</Attribute>
</Resource>

<Action>
<Attribute AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id"
 DataType="http://www.w3.org/2001/XMLSchema#anyURI">
```

```
<AttributeValue>urn:oasis:names:tc:xacml:2.0:actions:hasPrivilegesOfRole</AttributeValue>

  </Attribute>
  </Action>
  </Request>
```

Deny Permission

```
  <Request xmlns="urn:oasis:names:tc:xacml:2.0:context:schema:os"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="urn:oasis:names:tc:xacml:2.0:context:schema:os
      access_control-xacml-2.0-context-schema-os.xsd">
    <Subject>
      <Attribute AttributeId="urn:oasis:names:tc:xacml:1.0:subject:subject-id"
        DataType="http://www.w3.org/2001/XMLSchema#string">
        <AttributeValue>Anne</AttributeValue>
      </Attribute>

      <Attribute AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
        DataType="http://www.w3.org/2001/XMLSchema#anyURI">
        <AttributeValue>manager</AttributeValue>
      </Attribute>
    </Subject>

    <Resource>
      <Attribute AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
        DataType="http://www.w3.org/2001/XMLSchema#anyURI">
        <AttributeValue>manager</AttributeValue>
      </Attribute>
    </Resource>

    <Action>
      <Attribute AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id"
        DataType="http://www.w3.org/2001/XMLSchema#anyURI">
        <AttributeValue>urn:nobody</AttributeValue>
      </Attribute>
    </Action>
  </Request>
```

Report a bug

11.7. SECURITY AUDITING

11.7.1. About Security Auditing

Security auditing refers to triggering events, such as writing to a log, in response to an event that happens within the security subsystem. Auditing mechanisms are configured as part of a security domain, along with authentication, authorization, and security mapping details.

Auditing uses *provider modules*. You can use one of the included ones, or implement your own.

Report a bug

11.7.2. Configure Security Auditing

To configure security auditing settings for a security domain, log into the management console and follow this procedure.

Procedure 11.11. Setup Security Auditing for a Security Domain

1. **Open the security domain's detailed view.**
   a. Click **Configuration** at the top of the screen.
   b. In a managed domain, select a profile to modify from the **Profile** selection box at the top left.
   c. Expand the **Security** menu and select **Security Domains**.
   d. Click **View** for the security domain you want to edit.
2. **Navigate to the Auditing subsystem configuration.**
   Select the **Audit** tab at the top of the screen.

   The configuration area is divided into two areas: **Provider Modules** and **Details**. The provider module is the basic unit of configuration. A security domain can include several provider modules each of which can include attributes and options.
3. **Add a provider module.**
   Click **Add**. Fill in the **Code** section with the classname of the provider module.
4. **Verify if your module is working**
   The goal of an audit module is to provide a way to monitor the events in the security subsystem. This monitoring can be done by means of writing to a log file, email notifications or any other measurable auditing mechanism.

   For example, JBoss EAP 6 includes the **LogAuditProvider** module by default. If enabled following the steps above, this audit module writes security notifications to a **audit.log** file in the **log** subfolder within the ***EAP_HOME*** directory.

   To verify if the steps above have worked in the context of the **LogAuditProvider**, perform an action that is likely to trigger a notification and then check the audit log file.

   For a full list of included security auditing provider modules, see here: Section A.4, “Included Security Auditing Provider Modules”
5. **Optional: Add, edit, or remove module options.**
   To add options to your module, click its entry in the **Modules** list, and select the **Module Options** tab in the **Details** section of the page. Click **Add**, and provide the key and value for the option.

   To edit an option that already exists, click **Remove** to remove it, and click **Add** to add it again with the correct options.

Result

Your security auditing module is added to the security domain, and is immediately available to applications which use the security domain.

Report a bug

11.7.3. New Security Properties

New system properties have been added to the security audit functionality for JBoss EAP versions 6.2.2 and later. These new properties mitigate security concerns surrounding plain text logging of web request components, particularly in scenarios involving BASIC or FORM based authentication.

The new properties allow greater control over which components of a web request are captured in audit logs (parameters, cookies, headers or attributes). These components can also be masked using the new properties.

The new properties are:

Table 11.1. New Security Properties

Name	Description	Possible values	Behavior	Default
org.jboss.security.web.audit	This property controls the granularity of the security auditing of web requests.	**off**, **headers**, **cookies**, **parameters**, **attributes**	Any component (or comma-separated group of components) specified will be audited out of web requests.	**headers,parameters**
org.jboss.security.web.audit.mask	This property can be used to specify a list of strings to be matched against headers, parameters, cookies, and attributes of web requests. Any element matching the specified masks will be excluded from security audit logging.	Any comma separated string indicating keys of headers, parameters, cookies, and attributes.	Currently, the matching of the masks is fuzzy rather than strict. For example, a mask of **authorization** will mask both the header called *authorization* and the parameter called *custom_authorization*. A future release may introduce strict masks.	j_password,authorization

Report a bug

11.8. SECURITY MAPPING

11.8.1. About Security Mapping

Security mapping allows you to combine authentication and authorization information after the authentication or authorization happens, but before the information is passed to your application.

You can map principals (authentication), roles (authorization), or credentials (attributes which are not principals or roles).

Role Mapping is used to add, replace, or remove roles to the subject after authentication.

Principal mapping is used to modify a principal after authentication.

Attribute mapping is used to convert attributes from an external system to be used by your application, and vice versa.

Report a bug

11.8.2. Configure Security Mapping in a Security Domain

To configure security mapping settings for a security domain, log into the management console and follow this procedure.

Procedure 11.12. Setup Security Mapping Settings in a Security Domain

1. **Open the security domain's detailed view.**
   a. Click the **Configuration** label at the top of the management console.
   b. In a managed domain, select a profile from the **Profile** selection box at the top left.
   c. Expand the **Security** menu, and select **Security Domains**.
   d. Click **View** for the security domain you want to edit.
2. **Navigate to the Mapping subsystem configuration.**
   Select the **Mapping** label at the top of the screen.

   The configuration area is divided into two areas: **Modules** and **Details**. The mapping module is the basic unit of configuration. A security domain can include several mapping modules, each of which can include several attributes and options.
3. **Add a security mapping module.**
   Click **Add**.

   Fill in the details for your module. The **Code** is the class name of the module. The **Type** field refers to the type of mapping this module performs. Allowed values are principal, role, attribute or credential.
4. **Edit a security mapping module**
   After you have added your module, you can modify its **Code** or **Type**.
   a. Select the **Attributes** tab.
   b. Click **Edit** in the **Details** section of the screen.
5. **Optional: Add, edit, or remove module options.**
   To add options to your module, click its entry in the **Modules** list, and select the **Module Options** tab in the **Details** section of the page. Click **Add**, and provide the key and value for the option.

   To edit an option that already exists, click **Remove** to remove it, and add it again with the new value.

Use the **Remove** button to remove an option.

Result

Your security mapping module is added to the security domain, and is immediately available to applications which use the security domain.

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11.9. USE A SECURITY DOMAIN IN YOUR APPLICATION

Overview

To use a security domain in your application, first you need to define the security domain in the server's configuration and then enable it for an application in the application's deployment descriptor. Then you must add the required annotations to the EJB that uses it. This topic covers the steps required to use a security domain in your application.

> **WARNING**
>
> If an application is part of a security domain that uses an authentication cache, user authentications for that application will also be available to other applications in that security domain.

Procedure 11.13. Configure Your Application to Use a Security Domain

1. **Define the Security Domain**
   You need to define the security domain in the server's configuration file, and then enable it for an application in the application's descriptor file.

   a. **Configure the security domain in the server's configuration file**
      The security domain is configured in the **security** subsystem of the server's configuration file. If the JBoss EAP 6 instance is running in a managed domain, this is the **domain/configuration/domain.xml** file. If the JBoss EAP 6 instance is running as a standalone server, this is the **standalone/configuration/standalone.xml** file.

      The **other**, **jboss-web-policy**, and **jboss-ejb-policy** security domains are provided by default in JBoss EAP 6. The following XML example was copied from the **security** subsystem in the server's configuration file.

      The **cache-type** attribute of a security domain specifies a cache for faster authentication checks. Allowed values are **default** to use a simple map as the cache, or **infinispan** to use an Infinispan cache.

```
<subsystem xmlns="urn:jboss:domain:security:1.2">
  <security-domains>
    <security-domain name="other" cache-type="default">
      <authentication>
        <login-module code="Remoting" flag="optional">
          <module-option name="password-stacking" value="useFirstPass"/>
        </login-module>
```

```
                <login-module code="RealmDirect" flag="required">
                    <module-option name="password-stacking" value="useFirstPass"/>
                </login-module>
            </authentication>
        </security-domain>
        <security-domain name="jboss-web-policy" cache-type="default">
            <authorization>
                <policy-module code="Delegating" flag="required"/>
            </authorization>
        </security-domain>
        <security-domain name="jboss-ejb-policy" cache-type="default">
            <authorization>
                <policy-module code="Delegating" flag="required"/>
            </authorization>
        </security-domain>
    </security-domains>
</subsystem>
```

You can configure additional security domains as needed using the Management Console or CLI.

b. **Enable the security domain in the application's descriptor file**
The security domain is specified in the **<security-domain>** child element of the **<jboss-web>** element in the application's **WEB-INF/jboss-web.xml** file. The following example configures a security domain named **my-domain**.

```
<jboss-web>
    <security-domain>my-domain</security-domain>
</jboss-web>
```

This is only one of many settings which you can specify in the **WEB-INF/jboss-web.xml** descriptor.

2. **Add the Required Annotation to the EJB**
You configure security in the EJB using the **@SecurityDomain** and **@RolesAllowed** annotations. The following EJB code example limits access to the **other** security domain by users in the **guest** role.

```
package example.ejb3;

import java.security.Principal;

import javax.annotation.Resource;
import javax.annotation.security.RolesAllowed;
import javax.ejb.SessionContext;
import javax.ejb.Stateless;

import org.jboss.ejb3.annotation.SecurityDomain;

/**
 * Simple secured EJB using EJB security annotations
 * Allow access to "other" security domain by users in a "guest" role.
 */
@Stateless
@RolesAllowed({ "guest" })
```

```
@SecurityDomain("other")
public class SecuredEJB {

   // Inject the Session Context
   @Resource
   private SessionContext ctx;

   /**
    * Secured EJB method using security annotations
    */
   public String getSecurityInfo() {
      // Session context injected using the resource annotation
      Principal principal = ctx.getCallerPrincipal();
      return principal.toString();
   }
}
```

For more code examples, see the **ejb-security** quickstart in the JBoss EAP 6 Quickstarts bundle, which is available from the Red Hat Customer Portal.

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CHAPTER 12. SINGLE SIGN ON (SSO)

12.1. ABOUT SINGLE SIGN ON (SSO) FOR WEB APPLICATIONS

Overview

Single Sign On (SSO) allows authentication to one resource to implicitly allow access to other resources.

Clustered and Non-Clustered SSO

Non-clustered SSO limits the sharing of access information to applications on the same virtual host. In addition, there is no resiliency in the event of a host failure. Clustered SSO data can be shared between applications in multiple hosts, and is resilient to failover. In addition, clustered SSO is able to receive requests from a load balancer.

How SSO Works

If a resource is unprotected, a user is not challenged to authenticate at all. If a user accesses a protected resource, the user is required to authenticate.

Upon successful authentication, the roles associated with the user are stored and used for authentication of all other associated resources.

If the user logs out of an application, or an application invalidates the session programmatically, all persisted authentication data is removed, and the process starts over.

A session timeout does not invalidate the SSO session if other sessions are still valid.

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12.2. ABOUT CLUSTERED SINGLE SIGN ON (SSO) FOR WEB APPLICATIONS

Single Sign On (SSO) is the ability for users to authenticate to a single web application, and by means of a successful authentication, will successfully authenticate to multiple other applications without needing to be prompted at each one. Clustered SSO stores the authentication information in a clustered cache. This allows for applications on multiple different servers to share the information, and also makes the information resilient to a failure of one of the hosts.

Some of the supported SSO mechanisms (for example, Kerberos, PicketLink SAML) need valves to work correctly. Valves have a similar function as the servlet filters, but they are processed before the container managed authentication. Valves for web applications can be defined in the **jboss-web.xml** deployment descriptor.

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12.3. CHOOSE THE RIGHT SSO IMPLEMENTATION

JBoss EAP 6 runs Java Enterprise Edition (EE) applications, which may be web applications, EJB applications, web services, or other types. Single Sign On (SSO) allows you to propagate security context and identity information between these applications. Several SSO solutions are available but choosing the right solution depends on your requirements.

Note that there is a distinct difference between a clustered web application and clustered SSO. A clustered web application is one which is distributed across the nodes of a cluster to spread the load of hosting that application. If marked as distributable, all new sessions, and changes to existing sessions are replicated to other members of the cluster. An application is marked as able to be distributed across cluster nodes with the <distributable/> tag in the **web.xml** deployment descriptor. Clustered SSO allows for replication of security context and identity information, regardless of whether or not the applications are themselves clustered. Although these technologies may be used together they are separate concepts.

Kerberos-Based Desktop SSO

If your organization already uses a Kerberos-based authentication and authorization system, such as Microsoft Active Directory, you can use the same systems to transparently authenticate to your enterprise applications running on JBoss EAP 6.

Non-Clustered Web Application SSO

If you are running multiple applications on a single instance and need to enable SSO session replication for those applications, non-clustered SSO will meet your requirements.

Clustered Web Application SSO

If you are running either a single application, or multiple applications, across a cluster and need to enable SSO session replication for those applications, clustered SSO will meet your requirements.

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12.4. USE SINGLE SIGN ON (SSO) IN A WEB APPLICATION

Overview

Single Sign On (SSO) capabilities are provided by the web and Infinispan subsystems. Use this procedure to configure SSO in web applications.

Prerequisites

- A configured security domain which handles authentication and access.
- The **infinispan** subsystem. By default, it is present in all the profiles for managed domain and standalone server.
- The **web cache-container** and SSO replicated-cache. The initial configuration files already contain the **web** cache-container, and some of the configurations already contain the SSO replicated-cache as well. Use the following commands to check for and enable the SSO replicated-cache. Note that these commands modify the **ha** profile of a managed domain. You can change the commands to use a different profile, or remove the /**profile=ha** portion of the command, for a standalone server.

Example 12.1. Check for theweb cache-container

The profiles and configurations mentioned above include the **web** cache-container by default. Use the following command to verify its presence. If you use a different profile, substitute its name instead of **ha**.

```
/profile=ha/subsystem=infinispan/cache-container=web/:read-
resource(recursive=false,proxies=false,include-runtime=false,include-defaults=true)
```

If the result is **success** the subsystem is present. Otherwise, you need to add it.

Example 12.2. Add the web cache-container

Use the following three commands to enable the **web** cache-container to your configuration. Modify the name of the profile as appropriate, as well as the other parameters. The parameters here are the ones used in a default configuration.

```
/profile=ha/subsystem=infinispan/cache-container=web:add(aliases=["standard-session-cache"],default-cache="repl",module="org.jboss.as.clustering.web.infinispan")
```

```
/profile=ha/subsystem=infinispan/cache-container=web/transport=TRANSPORT:add(lock-timeout=60000)
```

```
/profile=ha/subsystem=infinispan/cache-container=web/replicated-cache=repl:add(mode="ASYNC",batching=true)
```

Example 12.3. Check for the SSO replicated-cache

Run the following Management CLI command:

```
/profile=ha/subsystem=infinispan/cache-container=web/:read-resource(recursive=true,proxies=false,include-runtime=false,include-defaults=true)
```

Look for output like the following: **"sso" => {**

If you do not find it, the SSO replicated-cache is not present in your configuration.

Example 12.4. Add the SSO replicated-cache

```
/profile=ha/subsystem=infinispan/cache-container=web/replicated-cache=sso:add(mode="SYNC", batching=true)
```

Configure Clustered SSO for a Managed Domain

The **web** subsystem needs to be configured to use SSO. The following command enables SSO on the virtual server called **default-host**, and the cookie domain **domain.com**. The cache name is **sso**, and reauthentication is disabled.

```
/profile=ha/subsystem=web/virtual-server=default-host/sso=configuration:add(cache-container="web",cache-name="sso",reauthenticate="false",domain="domain.com")
```

Each application which will share the SSO information must be configured to use the same <security-domain> in its **jboss-web.xml** deployment descriptor and the same Realm in its **web.xml** configuration file.

Configure Clustered or Non-Clustered SSO for a Standalone Server

Configure **sso** under the web subsystem in the server profile. The **ClusteredSingleSignOn** version is used when attribute **cache-container** is present, otherwise standard **SingleSignOn** class is used.

Example 12.5. Example Non-Clustered SSO Configuration

```
/subsystem=web/virtual-server=default-host/sso=configuration:add(reauthenticate="false")
```

Invalidate a Session

An application can programmatically invalidate a session by invoking method **javax.servlet.http.HttpSession.invalidate()**.

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12.5. ABOUT KERBEROS

Kerberos is a network authentication protocol for client/server applications. It allows authentication across a non-secure network in a secure way, using secret-key symmetric cryptography.

Kerberos uses security tokens called tickets. To use a secured service, you need to obtain a ticket from the Ticket Granting Service (TGS), which is a service running on a server on the network. After obtaining the ticket, you request a Service Ticket (ST) from an Authentication Service (AS), which is another service running on the network. You then use the ST to authenticate to the service you want to use. The TGS and the AS both run inside an enclosing service called the Key Distribution Center (KDC).

Kerberos is designed to be used in a client-server environment, and is rarely used in Web applications or thin client environments. However, many organizations already use a Kerberos system for desktop authentication, and prefer to reuse their existing system rather than create a second one for their Web Applications. Kerberos is an integral part of Microsoft Active Directory, and is also used in many Red Hat Enterprise Linux environments.

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12.6. ABOUT SPNEGO

Simple and Protected GSS_API Negotiation Mechanism (SPNEGO) provides a mechanism for extending a Kerberos-based Single Sign On (SSO) environment for use in Web applications.

When an application on a client computer, such as a web browser, attempts to access a protect page on the web server, the server responds that authorization is required. The application then requests a service ticket from the Kerberos Key Distribution Center (KDC). After the ticket is obtained, the application wraps it in a request formatted for SPNEGO, and sends it back to the Web application, via the browser. The web container running the deployed Web application unpacks the request and authenticates the ticket. Upon successful authentication, access is granted.

SPNEGO works with all types of Kerberos providers, including the Kerberos service included in Red Hat Enterprise Linux and the Kerberos server which is an integral part of Microsoft Active Directory.

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12.7. ABOUT MICROSOFT ACTIVE DIRECTORY

Microsoft Active Directory is a directory service developed by Microsoft to authenticate users and computers in a Microsoft Windows domain. It is included as part of Microsoft Windows Server. The computer in the Microsoft Windows Server is referred to as the domain controller. Red Hat Enterprise Linux servers running the Samba service can also act as the domain controller in this type of network.

Active Directory relies on three core technologies which work together:

- Lightweight Directory Access Protocol (LDAP), for storing information about users, computers, passwords, and other resources.
- Kerberos, for providing secure authentication over the network.
- Domain Name Service (DNS) for providing mappings between IP addresses and host names of computers and other devices on the network.

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12.8. CONFIGURE KERBEROS OR MICROSOFT ACTIVE DIRECTORY DESKTOP SSO FOR WEB APPLICATIONS

Introduction

To authenticate your web or EJB applications using your organization's existing Kerberos-based authentication and authorization infrastructure, such as Microsoft Active Directory, you can use the JBoss Negotiation capabilities built into JBoss EAP 6. If you configure your web application properly, a successful desktop or network login is sufficient to transparently authenticate against your web application, so no additional login prompt is required.

Difference from Previous Versions of the Platform

There are a few noticeable differences between JBoss EAP 6 and earlier versions:

- Security domains are configured for each profile of a managed domain, or for each standalone server. They are not part of the deployment itself. The security domain a deployment should use is named in the deployment's **jboss-web.xml** or **jboss-ejb3.xml** file.
- Security properties are configured as part of a security domain. They are not part of the deployment.
- You can no longer override the authenticators as part of your deployment. However, you can add a NegotiationAuthenticator valve to your **jboss-web.xml** descriptor to achieve the same effect. The valve still requires the **<security-constraint>** and **<login-config>** elements to be defined in the **web.xml**. These are used to decide which resources are secured. However, the chosen auth-method will be overridden by the NegotiationAuthenticator valve in the **jboss-web.xml**.
- The **CODE** attributes in security domains now use a simple name instead of a fully-qualified class name. The following table shows the mappings between the classes used for JBoss Negotiation, and their classes.

Table 12.1. Login Module Codes and Class Names

Simple Name	Class Name	Purpose
Kerberos	com.sun.security.auth.module.Krb5LoginModule	Kerberos login module when using the Oracle JDK
	com.ibm.security.auth.module.Krb5LoginModule	Kerberos login module when using the IBM JDK

Simple Name	Class Name	Purpose
SPNEGO	org.jboss.security.negotiation.spnego.SPNEGOLoginModule	The mechanism which enables your Web applications to authenticate to your Kerberos authentication server.
AdvancedLdap	org.jboss.security.negotiation.AdvancedLdapLoginModule	Used with LDAP servers other than Microsoft Active Directory.
AdvancedAdLdap	org.jboss.security.negotiation.AdvancedADLoginModule	Used with Microsoft Active Directory LDAP servers.

JBoss Negotiation Toolkit

The **JBoss Negotiation Toolkit** is a debugging tool which is available for download from https://community.jboss.org/servlet/JiveServlet/download/16876-2-34629/jboss-negotiation-toolkit.war. It is provided as an extra tool to help you to debug and test the authentication mechanisms before introducing your application into production. It is an unsupported tool, but is considered to be very helpful, as SPNEGO can be difficult to configure for web applications.

Procedure 12.1. Setup SSO Authentication for your Web or EJB Applications

1. **Configure one security domain to represent the identity of the server. Set system properties if necessary.**
   The first security domain authenticates the container itself to the directory service. It needs to use a login module which accepts some type of static login mechanism, because a real user is not involved. This example uses a static principal and references a keytab file which contains the credential.

   The XML code is given here for clarity, but you should use the Management Console or Management CLI to configure your security domains.

```
<security-domain name="host" cache-type="default">
  <authentication>
    <login-module code="Kerberos" flag="required">
      <module-option name="storeKey" value="true"/>
      <module-option name="useKeyTab" value="true"/>
      <module-option name="principal" value="host/testserver@MY_REALM"/>
      <module-option name="keyTab" value="/home/username/service.keytab"/>
      <module-option name="doNotPrompt" value="true"/>
      <module-option name="debug" value="false"/>
    </login-module>
  </authentication>
</security-domain>
```

2. **Configure a second security domain to secure the web application or applications. Set system properties if necessary.**
   The second security domain is used to authenticate the individual user to the Kerberos or SPNEGO authentication server. You need at least one login module to authenticate the user, and another to search for the roles to apply to the user. The following XML code shows an example SPNEGO security domain. It includes an authorization module to map roles to individual users. You can also use a module which searches for the roles on the authentication server itself.

```
<security-domain name="SPNEGO" cache-type="default">
  <authentication>
    <!-- Check the username and password -->
    <login-module code="SPNEGO"  flag="requisite">
      <module-option name="password-stacking" value="useFirstPass"/>
      <module-option name="serverSecurityDomain" value="host"/>
    </login-module>
    <!-- Search for roles -->
    <login-module code="UsersRoles" flag="required">
      <module-option name="password-stacking" value="useFirstPass" />
      <module-option name="usersProperties" value="spnego-users.properties" />
      <module-option name="rolesProperties" value="spnego-roles.properties" />
    </login-module>
  </authentication>
</security-domain>
```

3. **Specify the security-constraint and login-config in the web.xml**
   The **web.xml** descriptor contain information about security constraints and login configuration. The following are example values for each.

```
<security-constraint>
  <display-name>Security Constraint on Conversation</display-name>
  <web-resource-collection>
    <web-resource-name>examplesWebApp</web-resource-name>
    <url-pattern>/*</url-pattern>
  </web-resource-collection>
  <auth-constraint>
  <role-name>RequiredRole</role-name>
  </auth-constraint>
</security-constraint>

<login-config>
  <auth-method>SPNEGO</auth-method>
  <realm-name>SPNEGO</realm-name>
</login-config>

<security-role>
  <description> role required to log in to the Application</description>
  <role-name>RequiredRole</role-name>
</security-role>
```

4. **Specify the security domain and other settings in the jboss-web.xml descriptor.**
   Specify the name of the client-side security domain (the second one in this example) in the **jboss-web.xml** descriptor of your deployment, to direct your application to use this security domain.

   You can no longer override authenticators directly. Instead, you can add the NegotiationAuthenticator as a valve to your **jboss-web.xml** descriptor, if you need to. The **<jacc-star-role-allow>** allows you to use the asterisk (*) character to match multiple role names, and is optional.

```
<jboss-web>
  <security-domain>SPNEGO</security-domain>
  <valve>
    <class-name>org.jboss.security.negotiation.NegotiationAuthenticator</class-name>
    </valve>
    <jacc-star-role-allow>true</jacc-star-role-allow>
</jboss-web>
```

5. **Add a dependency to your application'sMANIFEST.MF, to locate the Negotiation classes.**
   The web application needs a dependency on class **org.jboss.security.negotiation** to be added to the deployment's **META-INF/MANIFEST.MF** manifest, in order to locate the JBoss Negotiation classes. The following shows a properly-formatted entry.

   ```
   Manifest-Version: 1.0
   Build-Jdk: 1.6.0_24
   Dependencies: org.jboss.security.negotiation
   ```

   - As an alternative, add a dependency to your application by editing the **META-INF/jboss-deployment-structure.xml** file:

     ```
     <?xml version="1.0" encoding="UTF-8"?>
     <jboss-deployment-structure>
       <deployment>
         <dependencies>
      <module name='org.jboss.security.negotiation'/>
         </dependencies>
       </deployment>
     </jboss-deployment-structure>
     ```

Result

Your web application accepts and authenticates credentials against your Kerberos, Microsoft Active Directory, or other SPNEGO-compatible directory service. If the user runs the application from a system which is already logged into the directory service, and where the required roles are already applied to the user, the web application does not prompt for authentication, and SSO capabilities are achieved.

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12.9. CONFIGURE SPNEGO FALL BACK TO FORM AUTHENTICATION

Follow the procedure below to setup a SPNEGO fall back to form authentication.

Procedure 12.2. SPNEGO security with fall back to form authentication

1. **Set up SPNEGO**
   Refer the procedure described in Section 12.8, “Configure Kerberos or Microsoft Active Directory Desktop SSO for Web Applications”

2. **Modify web.xml**
   Add a **login-config** element to your application and setup the login and error pages in web.xml:

   ```
   <login-config>
       <auth-method>SPNEGO</auth-method>
       <realm-name>SPNEGO</realm-name>
           <form-login-config>
               <form-login-page>/login.jsp</form-login-page>
               <form-error-page>/error.jsp</form-error-page>
   ```

```
        </form-login-config>
    </login-config>
```

3. **Add web content**
   Add references of **login.html** and **error.html** to **web.xml**. These files are added to web application archive to the place specified in **form-login-config** configuration. For more information refer *Enable Form-based Authentication* section in the *Security Guide* for JBoss EAP 6. A typical **login.html** looks like this:

```
<html>
    <head>
        <title>Vault Form Authentication</title>
    </head>
    <body>
        <h1>Vault Login Page</h1>
        <p>
        <form method="post" action="j_security_check">
        <table>
            <tr>
                <td>Username</td><td>-</td>
                <td><input type="text" name="j_username"></td>
            </tr>
            <tr>
                <td>Password</td><td>-</td>
                <td><input type="password" name="j_password"></td>
            </tr>
            <tr>
                <td colspan="2"><input type="submit"></td>
            </tr>
        </table>
        </form>
        </p>
        <hr>
    </body>
</html>
```

NOTE

The fallback to FORM logic is only available in the case when no SPNEGO (or NTLM) tokens are present. As a result, a login form is not presented to the browser if the browser sends an NTLM token.

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CHAPTER 13. SINGLE SIGN-ON WITH SAML

13.1. ABOUT SECURITY TOKEN SERVICE (STS)

The Security Token Service generates and manages the security tokens. It does not issue tokens of a specific type. Instead, it defines generic interfaces that allows multiple token providers to be plugged in. As a result, it can be configured to deal with various types of token, as long as a token provider exists for each token type. It also specifies the format of the security token request and response messages.

A security token request message specifies the following:

- Type of the request, such as Issue, Renew, and so on.
- Type of the token.
- Lifetime of the issued token.
- Information about the service provider that requested the token.
- Information used to encrypt the generated token.

NOTE

Support for PKCS#11 tokens has been added to JBoss EAP from version 6.3.0.

EAP security realms can accept PKCS#11 keys and trust store definitions by using the ***provider*** attribute. The value specified in this parameter is passed to the relevant **KeyStore.getInstance("PKCS11")** calls and the key and trust store are initialized.

Configuration for this new support is beyond the scope of EAP documentation. Users who wish to utilize this feature should familiarize themselves with the correct installation of PKCS#11 hardware and software as well as the correct entries required in the **java.security** policy file. Oracle's *Java PKCs#11 Reference Guide* document may be a useful resource for this information.

The token request message is sent in the body of the SOAP message. All information related to the token request is enclosed in the **RequestSecurityToken** element. The sample request contains two other WS-Trust elements: **RequestType**, which specifies that this request is an Issue request, and **TokenType**, which specifies the type of the token to be issued.

The following is an example of the WS-Trust request message.

Example 13.1. WS-Trust security token request message

```
<S11:Envelope xmlns:S11=".." xmlns:wsu=".." xmlns:wst="..">
  <S11:Header>
    ...
  </S11:Header>
  <S11:Body wsu:Id="body">
    <wst:RequestSecurityToken Context="context">
      <wst:TokenType>http://www.tokens.org/SpecialToken</wst:TokenType>
      <wst:RequestType>
        http://docs.oasis-open.org/ws-sx/ws-trust/200512/Issue
      </wst:RequestType>
    </wst:RequestSecurityToken>
  </S11:Body>
</S11:Envelope>
```

The following is an example of a security token response.

Example 13.2. Security token response message

```
<wst:RequestSecurityTokenResponse Context="context" xmlns:wst=".." xmlns:wsu="..">
  <wst:TokenType>http://www.tokens.org/SpecialToken</wst:TokenType>
  <wst:RequestedSecurityToken>
    <token:SpecialToken xmlns:token="...">
      ARhjefhE2FEjneovi&@FHfeoveq3
    </token:SpecialToken>
  </wst:RequestedSecurityToken>
  <wst:Lifetime>
    <wsu:Created>...</wsu:Created>
    <wsu:Expires>...</wsu:Expires>
  </wst:Lifetime>
</wst:RequestSecurityTokenResponse>
```

In the example for the security token response, the **TokenType** element specifies the type of the issued token, while the **RequestedSecurityToken** element contains the token itself. The format of the token depends on the type of the token. The **Lifetime** element specifies when the token was created and when it expires.

Security Token Request Processing

The following are the steps in which the security token requests are processed:

- A client sends a security token request to **PicketLinkSTS**.
- **PicketLinkSTS** parses the request message, generating a JAXB object model.
- **PicketLinkSTS** reads the configuration file and creates the **STSConfiguration** object, if needed. Then it obtains a reference to the **WSTrustRequestHandler** from the configuration and delegates the request processing to the handler instance.
- The request handler uses the **STSConfiguration** to set default values when needed (for example, when the request doesn't specify a token lifetime value).
- The **WSTrustRequestHandler** creates the **WSTrustRequestContext**, setting the **JAXB** request object and the caller principal it received from **PicketLinkSTS**.
- The **WSTrustRequestHandler** uses the **STSConfiguration** to get the **SecurityTokenProvider** that must be used to process the request based on the type of the token that is being requested. Then it invokes the provider, passing the constructed **WSTrustRequestContext** as a parameter.
- The **SecurityTokenProvider** instance process the token request and stores the issued token in the request context.

- The **WSTrustRequestHandler** obtains the token from the context, encrypts it if needed, and constructs the WS-Trust response object containing the security token.
- **PicketLinkSTS** dictates the response generated by the request handler and returns it to the client.

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13.2. CONFIGURE SECURITY TOKEN SERVICE (STS)

The EAP Security Token Service (STS) defines several interfaces that provide extension points. Implementations can be plugged in via configuration, and the default values can be specified for some properties via configuration. All STS configurations are specified in the **picketlink.xml** file, which belongs in the **WEB-INF** directory of the deployed application. The following are the elements that can be configured in the **picketlink.xml** file.

NOTE

In the following text, a *service provider* refers to the Web service that requires a security token to be presented by its clients.

- **PicketLinkSTS**: This is the root element. It defines some properties that allows the STS administrator to set a the following default values:
    - **STSName**: A string representing the name of the security token service. If not specified, the default **PicketLinkSTS** value is used.
    - **TokenTimeout**: The token lifetime value in seconds. If not specified, the default value of 3600 (one hour) is used.
    - **EncryptToken**: A boolean specifying whether issued tokens are to be encrypted or not. The default value is false.
- **KeyProvider**: This element and all its sub elements are used to configure the keystore that are used by PicketLink STS to sign and encrypt tokens. Properties like the keystore location, its password, and the signing (private key) alias and password are all configured in this section.
- **RequestHandler**: This element specifies the fully qualified name of the **WSTrustRequestHandler** implementation to be used. If not specified, the default **org.picketlink.identity.federation.core.wstrust.StandardRequestHandler** is used.
- **TokenProvider**: This section specifies the **TokenProvider** implementations that must be used to handle each type of security token. In the example we have two providers - one that handles tokens of type **SpecialToken** and one that handles tokens of type **SAMLV2.0**. The **WSTrustRequestHandler** calls the **getProviderForTokenType**(String type) method of **STSConfiguration** to obtain a reference to the appropriate **TokenProvider**.
- **TokenTimeout**: This is used by the **WSTrustRequestHandler** when no Lifetime has been specified in the WS-Trust request. It creates a Lifetime instance that has the current time as the creation time and expires after the specified number of seconds.
- **ServiceProviders**: This section specifies the token types that must be used for each service provider (the Web service that requires a security token). When a WS-Trust request does not contain the token type, the **WSTrustRequestHandler** must use the service provider endpoint to find out the type of the token that must be issued.

- **EncryptToken**: This is used by the **WSTrustRequestHandler** to decide if the issued token must be encrypted or not. If true, the public key certificate (PKC) of the service provider is used to encrypt the token.

The following is an example of STS configuration.

Example 13.3. STS Configuration

```
<PicketLinkSTS xmlns="urn:picketlink:identity-federation:config:1.0"
        STSName="Test STS" TokenTimeout="7200" EncryptToken="true">
  <KeyProvider
ClassName="org.picketlink.identity.federation.bindings.tomcat.KeyStoreKeyManager">
    <Auth Key="KeyStoreURL" Value="keystore/sts_keystore.jks"/>
    <Auth Key="KeyStorePass" Value="testpass"/>
    <Auth Key="SigningKeyAlias" Value="sts"/>
    <Auth Key="SigningKeyPass" Value="keypass"/>
    <ValidatingAlias Key="http://services.testcorp.org/provider1" Value="service1"/>
    <ValidatingAlias Key="http://services.testcorp.org/provider2" Value="service2"/>
 </KeyProvider>

<RequestHandler>org.picketlink.identity.federation.core.wstrust.StandardRequestHandler</Request
Handler>
 <TokenProviders>
    <TokenProvider
ProviderClass="org.picketlink.test.identity.federation.bindings.wstrust.SpecialTokenProvider"
        TokenType="http://www.tokens.org/SpecialToken"/>
    <TokenProvider
ProviderClass="org.picketlink.identity.federation.api.wstrust.plugins.saml.SAML20TokenProvider"
        TokenType="http://docs.oasis-open.org/wss/oasis-wss-saml-token-profile-1.1#SAMLV2.0"/>
 </TokenProviders>
 <ServiceProviders>
  <ServiceProvider Endpoint="http://services.testcorp.org/provider1"
TokenType="http://www.tokens.org/SpecialToken"
        TruststoreAlias="service1"/>
  <ServiceProvider Endpoint="http://services.testcorp.org/provider2"
TokenType="http://docs.oasis-open.org/wss/oasis-wss-saml-token-profile-1.1#SAMLV2.0"
        TruststoreAlias="service2"/>
 </ServiceProviders>
</PicketLinkSTS>
```

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13.3. ABOUT PICKETLINK STS LOGIN MODULES

A PicketLink Login Module is typically configured as part of the security setup of a JEE container to use a Security Token Service for authenticating users. The STS may be collocated on the same container as the Login Module or be accessed remotely through Web Service calls or another technology. PicketLink Login Modules support non-PicketLink STS implementations through standard WS-Trust calls.

Types of STS Login Modules

The following are the different types of STS Login Modules.

STSIssuingLoginModule

- Calls the configured STS and requests for a security token. Upon successfully receiving the **RequestedSecurityToken**, it marks the authentication as successful.
- A call to STS typically requires authentication. This Login Module uses credentials from one of the following sources:
    - Its properties file, if the **useOptionsCredentials** module option is set to **true**.
    - Previous login module credentials if the **password-stacking**module option is set to **useFirstPass**.
    - From the configured **CallbackHandler** by supplying a Name and Password Callback.
- Upon successful authentication, the **SamlCredential** is inserted in the Subject's public credentials if one with the same Assertion is not found to be already present there.

STSValidatingLoginModule

- Calls the configured STS and validates an available security token.
- A call to STS typically requires authentication. This Login Module uses credentials from one of the following sources:
    - Its properties file, if the **useOptionsCredentials** module option is set to **true**.
    - Previous login module credentials if the **password-stacking** module option is set to **useFirstPass**.
    - From the configured **CallbackHandler** by supplying a Name and Password Callback.
- Upon successful authentication, the SamlCredential is inserted in the Subject's public credentials if one with the same Assertion is not found to be already present there.

SAML2STSLoginModule

- This Login Module supplies a **ObjectCallback** to the configured **CallbackHandler** and expects a **SamlCredential** object back. The Assertion is validated against the configured STS.
- If a user ID and SAML token are shared, this Login Module bypasses validation When stacked on top of another Login Module that is successfully authenticated.
- Upon successful authentication, the **SamlCredential** is inspected for a **NameID** and a multi-valued role attribute that is respectively set as the ID and roles of the user.

SAML2LoginModule

- This login module is used in conjunction with other components for SAML authentication and performs no authentication itself.
- The **SPRedirectFormAuthenticator** uses this login module in PicketLink's implementation of the SAML v2 HTTP Redirect Profile.
- The Tomcat authenticator valve performs authentication through redirecting to the identity provider and getting a SAML assertion.

- This login module is used to pass the user ID and roles to the JBoss security framework to be populated in the JAAS subject.

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13.4. CONFIGURE STSISSUINGLOGINMODULE

The **STSIssuingLoginModule** uses a user name and password to authenticate the user against an STS by retrieving a token.

Example 13.4. Configure STSIssuingLoginModule

```
<security-domain name="saml-issue-token">
   <authentication>
      <login-module
         code="org.picketlink.identity.federation.core.wstrust.auth.STSIssuingLoginModule"
flag="required">          <module-option name="configFile">./picketlink-sts-
client.properties</module-option>
        <module-option name="endpointURI">http://security_saml/endpoint</module-option>
      </login-module>
   </authentication>
   <mapping>
      <mapping-module

code="org.picketlink.identity.federation.bindings.jboss.auth.mapping.STSPrincipalMappingProvider"

         type="principal" />
      <mapping-module

code="org.picketlink.identity.federation.bindings.jboss.auth.mapping.STSGroupMappingProvider"
         type="role" />
   </mapping>
</security-domain>
```

Most configurations can switch to the configuration sited in the above example by:

- changing their declared security-domain
- specifying a Principal mapping provider
- specifying a RoleGroup mapping provider

The specified Principal mapping provider and the RoleGroup mapping provider results in an authenticated Subject being populated that enables coarse-grained and role-based authorization. After authentication, the Security Token is available and may be used to invoke other services by Single Sign-On.

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13.5. CONFIGURE STSVALIDATINGLOGINMODULE

The STSValidatingLoginModule uses a TokenCallback to ask the configured CallbackHandler an STS by retrieving a token.

Example 13.5. Configure STSValidatingLoginModule

```
<security-domain name="saml-validate-token">
  <authentication>
    <login-module
      code="org.picketlink.identity.federation.core.wstrust.auth.STSValidatingLoginModule"
flag="required">
      <module-option name="configFile">./picketlink-sts-client.properties</module-option>
      <module-option name="endpointURI">http://security_saml/endpoint</module-option>
    </login-module>
  </authentication>
  <mapping>
    <mapping-module

code="org.picketlink.identity.federation.bindings.jboss.auth.mapping.STSPrincipalMappingProvider"

      type="principal" />
    <mapping-module

code="org.picketlink.identity.federation.bindings.jboss.auth.mapping.STSGroupMappingProvider"
      type="role" />
  </mapping>
</security-domain>
```

The configuration cited in the example enables Single Sign-On for your applications and services. A token once issued, either by directly contacting the STS or through a token-issuing login module, can be used to authenticate against multiple applications and services by employing the setup provided in the example. Providing a Principal mapping provider and a RoleGroup mapping provider result in an authenticated Subject being populated that enables coarse-grained and role-based authorization. After authentication, the Security Token is available and can be used to invoke other services by Single Sign-On.

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13.6. STS CLIENT POOLING

The PicketLink provides a pool of STS clients on the server. This removes STS Client creation as a bottleneck.

Client pooling can be utilized from login modules that need an STS client to obtain SAML tickets.

Login Modules that can utilize STS client pooling:

- org.picketlink.identity.federation.core.wstrust.auth.STSIssuingLoginModule
- org.picketlink.identity.federation.core.wstrust.auth.STSValidatingLoginModule
- org.picketlink.trust.jbossws.jaas.JBWSTokenIssuingLoginModule

The default number of clients in the pool for each login module is configured via the **initialNumberOfClients** login module option.

The STSClientPoolFactory class **org.picketlink.identity.federation.bindings.stspool.STSClientPoolFactory** provides client pool functionality to applications.

Using STSClientPoolFactory

STS clients are inserted into sub pools using their configuration as a key. Obtain STSClientPool instance and then initialize a sub pool based on configuration, optionally with initial number of STS clients or rely on default number.

```
final STSClientPool pool = STSClientPoolFactory.getPoolInstance();
pool.createPool(20, stsClientConfig);
final STSClient client = pool.getClient(stsClientConfig);
```

When you are done with a client, you can return it to the pool like so:

```
pool.returnClient();
```

To check if a subpool already exists for a given configuration:

```
if (! pool.configExists(stsClientConfig) {
    pool.createPool(stsClientConfig);
}
```

When the PicketLink Federation subsystem is enabled, all client pools created for a deployment are destroyed automatically during the undeploy process. To manually destroy a pool:

```
pool.destroyPool(stsClientConfig);
```

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13.7. SAML WEB BROWSER BASED SSO

13.7.1. About SAML Web Browser Based SSO

PicketLink in JBoss EAP provides a platform to implement federated identity based services. This includes centralized identity services and Single Sign-On (SSO) for applications.

The SAML profile has support for both the HTTP/POST and the HTTP/Redirect bindings with centralized identity services to enable web SSO for your applications. The architecture for the SAML v2 based Web SSO follows the hub and spoke architecture of identity management. In this architecture an identity provider (IDP) acts as the central source (hub) for identity and role information to all the applications (Service Providers). The spokes are the service providers (SP).

IMPORTANT

If there are two or more SPs both pointing to the same IDP, the IDP does not distinguish between the different SPs. If you make requests to different SPs that point to the same IDP, the IDP handles the most recent request from an SP and sends back SAML assertion about the authenticated user. To get back to the an older SP request, you will need to reenter the SP URL in the browser.

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13.7.2. Setup SAML v2 based Web SSO

To setup SAML v2 based SSO you have to configure the following:

- Identity Provider: The Identity Provider is the authoritative entity responsible for authenticating an end user and asserting the identity for that user in a trusted fashion to trusted partners.
- Service Provider: The Service Provider relies on the Identity Provider to assert information about a user via an electronic user credential, leaving the service provider to manage access control and dissemination based on a trusted set of user credential assertions.

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13.7.3. Configure Identity Provider

The Identity Provider (IDP) is a JBoss EAP server instance.

Procedure 13.1. Configure Identity Provider (IDP)

1. **Configure the web application security for the IDP**
   Configure a web application as the Identity provider.

   NOTE

   The use of FORM based web application security is recommended as it gives you the ability to customize the login page.

   The following is an example of the **web.xml** configuration

   Example 13.6. web.xml Configuration for IDP

```
<display-name>IDP</display-name>
<description>IDP</description>
<!-- Define a security constraint that gives unlimited access to images -->
<security-constraint>
  <web-resource-collection>
  <web-resource-name>Images</web-resource-name>
  <url-pattern>/images/*</url-pattern>
</web-resource-collection>
</security-constraint>
<!-- Define a Security Constraint on this Application -->
<security-constraint>
  <web-resource-collection>
  <web-resource-name>IDP</web-resource-name>
  <url-pattern>/*</url-pattern>
</web-resource-collection>
  <auth-constraint>
  <role-name>manager</role-name>
</auth-constraint>
</security-constraint>
<!-- Define the Login Configuration for this Application -->
<login-config>
  <auth-method>FORM</auth-method>
  <realm-name>IDP Application</realm-name>
  <form-login-config>
    <form-login-page>/jsp/login.jsp</form-login-page>
    <form-error-page>/jsp/loginerror.jsp</form-error-page>
  </form-login-config>
</login-config>
<!-- Security roles referenced by this web application -->
<security-role>
 <description>
  The role that is required to log in to the IDP Application
 </description>
 <role-name>manager</role-name>
</security-role>
</web-app>
```

2. **Create Security Domain for IDP**
   Create a Security Domain with authentication and authorization mechanisms defined for the IDP. Refer to Section 11.9, "Use a Security Domain in Your Application" for further details.

3. **Configure the IDP Valves**
   Create a **jboss-web.xml** file in the **WEB-INF** directory of your IDP web application to configure the valves for the IDP. The following is an example of **jboss-web.xml** file.

   Example 13.7. jboss-web.xml File Configuration for IDP Valves

```
<jboss-web>
  <security-domain>idp</security-domain>
  <context-root>idp</context-root>
  <valve>
    <class-
name>org.picketlink.identity.federation.bindings.tomcat.idp.IDPWebBrowserSSOValve</clas
s-name>
  </valve>
</jboss-web>
```

4. **Configure the PicketLink Configuration File (picketlink.xml)**
   The following is an example of **picketlink.xml** configuration. In this configuration file you provide the URL that gets added as the issuer in the outgoing SAML2 assertions to the service providers and the IDP.

   Example 13.8. picketlink.xml Configuration

```
<PicketLink xmlns="urn:picketlink:identity-federation:config:2.1">
  <PicketLinkIDP xmlns="urn:picketlink:identity-federation:config:2.1">
    <IdentityURL>http://localhost:8080/idp/</IdentityURL>
  </PicketLinkIDP>
  <Handlers xmlns="urn:picketlink:identity-federation:handler:config:2.1">
    <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.SAML2IssuerTrustHandler"
/>
    <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.SAML2LogOutHandler" />
    <Handler
```

```
class="org.picketlink.identity.federation.web.handlers.saml2.SAML2AuthenticationHandler"
/>
    <Handler
class="org.picketlink.identity.federation.web.handlers.saml2.RolesGenerationHandler" />
  </Handlers>
</PicketLink>
```

By default, **picketlink.xml** is located in the **WEB-INF** directory of your IDP web application. However, you can configure a custom path to a **picketlink.xml** that is external to the application:

a. **Optional: Configuring a custom path topicketlink.xml**
   Add two paramaters to the valve element in your application's **WEB-INF/jboss-web.xml**: **configFile** specifying for the path to **picketlink.xml**, and **timerInterval** which specifies the interval in milliseconds to reload the configuration. For example:

```
<valve>
  <class-name>...</class-name>
    <param>
      <param-name>timerInterval</param-name>
      <param-value>5000</param-value>
    </param>
    <param>
      <param-name>configFile</param-name>
      <param-value>path-to/picketlink.xml</param-value>
    </param>
</valve>
```

5. **Declare dependencies on PicketLink module (META-INF/MANIFEST.MF, or jboss-deployment-structure.xml)**
   The web application also requires a dependency defining in **META-INF/MANIFEST.MF** or **jboss-deployment-structure.xml**, so that the PicketLink classes can be located.

Example 13.9. Define Dependency inMETA-INF/MANIFEST.MF

```
Manifest-Version: 1.0
    Build-Jdk: 1.6.0_24
    Dependencies: org.picketlink
```

Example 13.10. Define Dependency in META-INF/jboss-deployment-structure.xml

```
<jboss-deployment-structure>
  <deployment>
    <dependencies>
      <module name="org.picketlink" />
    </dependencies>
  </deployment>
</jboss-deployment-structure>
```

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13.7.4. Configure Service Provider using HTTP/REDIRECT Binding

The Service Provider (SP) can be a JBoss EAP server instance.

Procedure 13.2. Configure Service Provider (SP)

1. **Configure the Web Application Security For the SP**
   The web application to be configured as a SP should have FORM based security enabled in its **web.xml** file.

   Example 13.11. web.xml Configuration for SP

```
<display-name>SP</display-name>
<description>SP</description>
<!-- Define a security constraint that gives unlimited access to images -->
<security-constraint>
  <web-resource-collection>
    <web-resource-name>Images</web-resource-name>
    <url-pattern>/images/*</url-pattern>
  </web-resource-collection>
</security-constraint>
<!-- Define a Security Constraint on this Application -->
<security-constraint>
  <web-resource-collection>
    <web-resource-name>SP</web-resource-name>
    <url-pattern>/*</url-pattern>
  </web-resource-collection>
  <auth-constraint>
    <role-name>manager</role-name>
  </auth-constraint>
</security-constraint>
<!-- Define the Login Configuration for this Application -->
<login-config>
  <auth-method>FORM</auth-method>
  <realm-name>SP Application</realm-name>
  <form-login-config>
    <form-login-page>/jsp/login.jsp</form-login-page>
    <form-error-page>/jsp/loginerror.jsp</form-error-page>
  </form-login-config>
</login-config>
<!-- Security roles referenced by this web application -->
<security-role>
    <description>
   The role that is required to log in to the SP Application
  </description>
  <role-name>manager</role-name>
</security-role>
</web-app>
```

2. **Create Security Domain for SP**
   Create a Security Domain that uses **SAML2LoginModule**. Here is an example configuration:

```
<security-domain name="sp" cache-type="default">
  <authentication>
```

```
    <login-module
code="org.picketlink.identity.federation.bindings.jboss.auth.SAML2LoginModule"
flag="required"/>
   </authentication>
</security-domain>
```

3. **Configure the SP Valve**
   To configure the valve for the SP, create a **jboss-web.xml** in the **WEB-INF** directory of your SP web application.

   Example 13.12. jboss-web.xml File Configuration for SP Valves

   ```
   <jboss-web>
     <security-domain>sp</security-domain>
     <context-root>sales-post</context-root>
     <valve>
       <class-
   name>org.picketlink.identity.federation.bindings.tomcat.sp.ServiceProviderAuthenticator</cla
   ss-name>
     </valve>
   </jboss-web>
   ```

4. **Configure the PicketLink Configuration File (picketlink.xml)**
   The following is an example of **picketlink.xml** configuration for the SP. In this configuration file you provide the URL for the SP and for the IDP, with corresponding handlers for the SP.

   Example 13.13. picketlink.xml Configuration

   ```
   <PicketLink xmlns="urn:picketlink:identity-federation:config:2.1">
     <PicketLinkSP xmlns="urn:picketlink:identity-federation:config:2.1"
   ServerEnvironment="tomcat" BindingType="REDIRECT">
       <IdentityURL>${idp.url::http://localhost:8080/idp/}</IdentityURL>
       <ServiceURL>${sales-post.url::http://localhost:8080/sales-post/}</ServiceURL>
     </PicketLinkSP>
     <Handlers xmlns="urn:picketlink:identity-federation:handler:config:2.1">
       <Handler
   class="org.picketlink.identity.federation.web.handlers.saml2.SAML2LogOutHandler" />
       <Handler
   class="org.picketlink.identity.federation.web.handlers.saml2.SAML2AuthenticationHandler"
   />
       <Handler
   class="org.picketlink.identity.federation.web.handlers.saml2.RolesGenerationHandler" />
     </Handlers>
   </PicketLink>
   ```

   By default, **picketlink.xml** is located in the **WEB-INF** directory of your application. However, you can configure a custom path to a **picketlink.xml** that is external to the application:

   a. **Optional: Configuring a custom path topicketlink.xml**
      Add two paramaters to the valve element in your application's **WEB-INF/jboss-web.xml**: **configFile** specifying for the path to **picketlink.xml**, and **timerInterval** which specifies the interval in milliseconds to reload the configuration. For example:

```
<valve>
  <class-name>...</class-name>
    <param>
      <param-name>timerInterval</param-name>
      <param-value>5000</param-value>
    </param>
    <param>
      <param-name>configFile</param-name>
      <param-value>path-to/picketlink.xml</param-value>
    </param>
</valve>
```

5. **Declare dependencies on PicketLink module (META-INF/MANIFEST.MF, or jboss-deployment-structure.xml)**
   The web application also requires a dependency defining in **META-INF/MANIFEST.MF** or **jboss-deployment-structure.xml**, so that the PicketLink classes can be located.

   Example 13.14. Define Dependency in META-INF/MANIFEST.MF

   ```
   Manifest-Version: 1.0
       Build-Jdk: 1.6.0_24
       Dependencies: org.picketlink
   ```

   Example 13.15. Define Dependency in META-INF/jboss-deployment-structure.xml

   ```
   <jboss-deployment-structure>
     <deployment>
       <dependencies>
         <module name="org.picketlink" />
       </dependencies>
     </deployment>
   </jboss-deployment-structure>
   ```

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13.7.5. Setup SAML v2 based Web SSO using HTTP/POST Binding

HTTP/POST binding is the recommended binding for obtaining the web browser based SSO.

Procedure 13.3. Setup SAML v2 based Web SSO using HTTP/POST Binding

1. **Configure the Identity Provider (IDP).**
   The steps to configure IDP for HTTP/POST Binding are same as that of the HTTP/Redirect Binding. For more information on configuring the IDP, see Section 13.7.2, “Setup SAML v2 based Web SSO”

2. **Configure the Service Provider (SP)**
   The steps to configure SP for HTTP/POST Binding are the same as that of the HTTP/Redirect Binding, except for a single variation in the **picketlink.xml** file of the SP. Change **BindingType="REDIRECT"** to **BindingType="POST"**.

For more information on configuring the SP, see Section 13.7.4, “Configure Service Provider using HTTP/REDIRECT Binding”

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13.7.6. Configure Dynamic Account Chooser at a Service Provider

Prerequisites:

- Section 13.7.3, “Configure Identity Provider”
- Section 13.7.4, “Configure Service Provider using HTTP/REDIRECT Binding”

If a Service Provider (SP) is configured with multiple Identity Providers (IDPs), PicketLink can be configured to prompt the user to choose which IDP to use to authenticate their credentials.

Procedure 13.4. Configure Dynamic Account Chooser at a Service Provider

1. Configure the account chooser valve in **jboss-web.xml** in the **WEB-INF** directory of your SP web application.

   Example 13.16. jboss-web.xml File Configuration for SP Account Chooser

```
<jboss-web>
  <security-domain>sp</security-domain>
  <context-root>accountchooser</context-root>
  <valve>
    <class-
name>org.picketlink.identity.federation.bindings.tomcat.sp.AccountChooserValve</class-
name>
  </valve>
  <valve>
    <class-
name>org.picketlink.identity.federation.bindings.tomcat.sp.ServiceProviderAuthenticator</cla
ss-name>
  </valve>
</jboss-web>
```

   AccountChooserValve has the following configurable options:

   DomainName
   : The domain name to be used for the cookie that is sent to the user's browser.

   CookieExpiry
   : The cookie expiry in seconds. Default is **-1**, which means the cookie expires when the browser is closed.

   AccountIDPMapProvider
   : The fully-qualified name of the implementation for IDP Mapping. Default is a properties file **idpmap.properties** in the **WEB-INF** directory of your SP web application. This implementation must implement

org.picketlink.identity.federation.bindings.tomcat.sp.AbstractAccountChooserValve.AccountIDPMapProvider.

AccountChooserPage

The name of the HTML/JSP page for listing the different IDP accounts. Default is **/accountChooser.html**.

2. Define the mapping for the IDPs. By default, this is a properties file **idpmap.properties** in the **WEB-INF** directory of your SP web application.

   Example 13.17. **idpmap.properties** Configuration

   ```
   DomainA=http://localhost:8080/idp1/
   DomainB=http://localhost:8080/idp2/
   ```

3. Create a HTML page in your SP web application for the user to choose the IDP. By default, this file is **accountChooser.html**. The URL to each of IDP must have the parameter **idp** that specifies the name of the IDP listed in **idpmap.properties**.

   Example 13.18. **accountChooser.html** Configuration

   ```
   <html>
     ...
     <a href="?idp=DomainA">DomainA</a>
     <hr/>
     <a href="?idp=DomainB">DomainB</a>
     ...
   </html>
   ```

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13.7.7. Configuration of IDP-initiated SSO

Prerequisites:

- Section 13.7.3, "Configure Identity Provider"
- Section 13.7.4, "Configure Service Provider using HTTP/REDIRECT Binding"

Usually in PicketLink, the SP starts the flow by sending an authentication request to the IDP, which in turns sends an SAML response to SP with a valid assertion. This flow is called SP-initiated SSO. But the SAML 2.0 specs also defines another flow, called IDP-initiated or Unsolicited Response SSO. In this scenario, the SP does not initiate the authentication flow and receives an SAML response from the IDP. The flow starts on the IDP-side and once authenticated, the user can choose a specific SP from a list and then get redirected to its URL.

Walkthrough

1. User accesses the IDP.

2. The IDP seeing that there is neither SAML request nor response, assumes an IDP first scenario using SAML.

3. The IDP challenges the user to authenticate.

4. Upon authentication, the IDP shows the hosted section where the user gets a page that links to all the SP applications.

5. The user chooses an SP application.

6. The IDP redirects the user to the service provider with an SAML assertion in the query parameter, SAML response.

7. The SP checks the SAML assertion and provides access.

Configuration

No special configuration is necessary to get Unsolicited Responses supported, you can configure your IDP and SPs as usual. For more information about how to configure IDP and SP, refer to:

- Section 13.7.3, “Configure Identity Provider”
- Section 13.7.4, “Configure Service Provider using HTTP/REDIRECT Binding”

How to Use

Once the user is authenticated, the IDP shows a page with links to all service provider applications. A link will usually look like this:

```
<a href="http://localhost:8080/idp?SAML_VERSION=2.0&TARGET=http://localhost:8080/sales-
post/">Sales</a>
```

Note that the link above redirects the user to the IDP passing the TARGET query parameter, whose value is the URL to the target SP application. Once the user clicks the link above, the IDP extracts the TARGET parameter from the request, builds an SAML v2.0 response, and redirects the user to the target URL. When the user hits the SP, it is automatically authenticated.

You can use the SAML_VERSION query parameter to specify the SAML version that must be used by the IDP to create the SAML response. SAML_VERSION parameter can have the possible options as 2.0 and 1.1.

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13.8. CONFIGURE SAML GLOBAL LOGOUT PROFILE

A Global Logout initiated at one service provider logs out the user from the Identity Provider (IDP) and all the service providers.

NOTE

For a Global Logout to function appropriately ensure that you have only up to five Service Providers per Identity Provider.

Procedure 13.5. Configure Global Logout

1. **Configure picketlink-handlers.xml**

Add the **SAML2LogOutHandler** in the picketlink-handlers.xml.

2. **Configure Service Provider web page**
   Append **GLO=true** to the link at the end of your web page of the service provider.

   Example 13.19. Link to Global Logout

   ```
   <a href="?GLO=true">Click to Globally LogOut</a>
   ```

3. **Create a logout.jsp page**
   As part of the logout process, PicketLink will redirect the user to a **logout.jsp** page located in the root directory of your Service Provider application. Ensure that this page is created.

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CHAPTER 14. LOGIN MODULES

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14.1. USING MODULES

JBoss EAP 6 includes several bundled login modules suitable for most user management needs. JBoss EAP 6 can read user information from a relational database, an LDAP server, or flat files. In addition to these core login modules, JBoss EAP 6 provides other login modules that provide user information for very customized needs.

More login modules and their options can be found in Appendix A.1.

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14.1.1. Password Stacking

Multiple login modules can be chained together in a stack, with each login module providing both the credentials verification and role assignment during authentication. This works for many use cases, but sometimes credentials verification and role assignment are split across multiple user management stores.

Section 14.1.4, "Ldap Login Module" describes how to combine LDAP and a relational database, allowing a user to be authenticated by either system. Consider the case where users are managed in a central LDAP server but application-specific roles are stored in the application's relational database. The password-stacking module option captures this relationship.

To use password stacking, each login module should set the <module-option> **password-stacking** attribute to **useFirstPass**. If a previous module configured for password stacking has authenticated the user, all the other stacking modules will consider the user authenticated and only attempt to provide a set of roles for the authorization step.

When **password-stacking** option is set to **useFirstPass**, this module first looks for a shared user name and password under the property names javax.security.auth.login.name and javax.security.auth.login.password respectively in the login module shared state map.

If found, these properties are used as the principal name and password. If not found, the principal name and password are set by this login module and stored under the property names javax.security.auth.login.name and javax.security.auth.login.password respectively.

NOTE

When using password stacking, set all modules to be required. This ensures that all modules are considered, and have the chance to contribute roles to the authorization process.

Example 14.1. Password Stacking Sample

This management CLI example shows how password stacking could be used.

```
/subsystem=security/security-domain=pwdStack/authentication=classic/login-module=Ldap:add( \
  code=Ldap, \
  flag=required, \
  module-options=[ \
    ("password-stacking"=>"useFirstPass"), \
    ... Ldap login module configuration
  ])
/subsystem=security/security-domain=pwdStack/authentication=classic/login-
module=Database:add( \
  code=Database, \
  flag=required, \
  module-options=[ \
    ("password-stacking"=>"useFirstPass"), \
    ... Database login module configuration
  ])
```

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14.1.2. Password Hashing

Most login modules must compare a client-supplied password to a password stored in a user management system. These modules generally work with plain text passwords, but can be configured to support hashed passwords to prevent plain text passwords from being stored on the server side.

IMPORTANT

Red Hat JBoss Enterprise Application Platform Common Criteria certified release only supports SHA-256 for password hashing.

Example 14.2. Password Hashing

The following is a login module configuration that assigns unauthenticated users the principal name **nobody** and contains based64-encoded, SHA-256 hashes of the passwords in a **usersb64.properties** file. The **usersb64.properties** file is part of the deployment classpath.

```
/subsystem=security/security-domain=testUsersRoles:add
/subsystem=security/security-domain=testUsersRoles/authentication=classic:add
/subsystem=security/security-domain=testUsersRoles/authentication=classic/login-
module=UsersRoles:add( \
  code=UsersRoles, \
  flag=required, \
  module-options=[ \
    ("usersProperties"=>"usersb64.properties"), \
    ("rolesProperties"=>"test-users-roles.properties"), \
    ("unauthenticatedIdentity"=>"nobody"), \
    ("hashAlgorithm"=>"SHA-256"), \
    ("hashEncoding"=>"base64") \
  ])
```

hashAlgorithm

Name of the **java.security.MessageDigest** algorithm to use to hash the password. There is no default so this option must be specified to enable hashing. Typical values are **SHA-256**, **SHA-1** and **MD5**.

hashEncoding

String that specifies one of three encoding types: **base64**, **hex** or **rfc2617**. The default is **base64**.

hashCharset

Encoding character set used to convert the clear text password to a byte array. The platform default encoding is the default.

hashUserPassword

Specifies the hashing algorithm must be applied to the password the user submits. The hashed user password is compared against the value in the login module, which is expected to be a hash of the password. The default is **true**.

hashStorePassword

Specifies the hashing algorithm must be applied to the password stored on the server side. This is used for digest authentication, where the user submits a hash of the user password along with a request-specific tokens from the server to be compare. The hash algorithm (for digest, this would be **rfc2617**) is utilized to compute a server-side hash, which should match the hashed value sent from the client.

If you must generate passwords in code, the **org.jboss.security.auth.spi.Util** class provides a static helper method that will hash a password using the specified encoding. The following example produces a base64-encoded, MD5 hashed password.

```
String hashedPassword = Util.createPasswordHash("SHA-256",
 Util.BASE64_ENCODING, null, null, "password");
```

OpenSSL provides an alternative way to quickly generate hashed passwords at the command-line. The following example also produces a base64-encoded, SHA-256 hashed password. Here the password in plain text - **password** - is piped into the OpenSSL digest function then piped into another OpenSSL function to convert into base64-encoded format.

```
echo -n password | openssl dgst -sha256 -binary | openssl base64
```

In both cases, the hashed version of the password is the same: **XohImNooBHFR0OVvjcYpJ3NgPQ1qq73WKhHvch0VQtg=**. This value must be stored in the users' properties file specified in the security domain - **usersb64.properties** - in the example above.

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14.1.3. Unauthenticated Identity

Not all requests are received in an authenticated format. **unauthenticatedIdentity** is a login module configuration option that assigns a specific identity (guest, for example) to requests that are made with no associated authentication information. This can be used to allow unprotected servlets to invoke methods on EJBs that do not require a specific role. Such a principal has no associated roles and so can only access either unsecured EJBs or EJB methods that are associated with the unchecked permission constraint.

- **unauthenticatedIdentity**: This defines the principal name that should be assigned to requests that contain no authentication information.

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14.1.4. Ldap Login Module

Ldap login module is a **LoginModule** implementation that authenticates against a Lightweight Directory Access Protocol (LDAP) server. Use the **Ldap** login module if your user name and credentials are stored in an LDAP server that is accessible using a Java Naming and Directory Interface (JNDI) LDAP provider.

NOTE

If you wish to use LDAP with the SPNEGO authentication or skip some of the authentication phases while using an LDAP server, consider using the **AdvancedLdap** login module chained with the SPNEGO login module or only the **AdvancedLdap** login module.

Distinguished Name (DN)

In Lightweight Directory Access Protocol (LDAP), the distinguished name uniquely identifies an object in a directory. Each distinguished name must have a unique name and location from all other objects, which is achieved using a number of attribute-value pairs (AVPs). The AVPs define information such as common names, organization unit, among others. The combination of these values results in a unique string required by the LDAP.

NOTE

This login module also supports unauthenticated identity and password stacking.

The LDAP connectivity information is provided as configuration options that are passed through to the environment object used to create JNDI initial context. The standard LDAP JNDI properties used include the following:

java.naming.factory.initial

InitialContextFactory implementation class name. This defaults to the Sun LDAP provider implementation **com.sun.jndi.ldap.LdapCtxFactory**.

java.naming.provider.url

LDAP URL for the LDAP server.

java.naming.security.authentication

Security protocol level to use. The available values include **none**, **simple**, and **strong**. If the property is undefined, the behavior is determined by the service provider.

java.naming.security.protocol

Transport protocol to use for secure access. Set this configuration option to the type of service provider (for example, SSL). If the property is undefined, the behavior is determined by the service provider.

java.naming.security.principal

Specifies the identity of the Principal for authenticating the caller to the service. This is built from other properties as described below.

java.naming.security.credentials

Specifies the credentials of the Principal for authenticating the caller to the service. Credentials can take the form of a hashed password, a clear-text password, a key, or a certificate. If the property is undefined, the behavior is determined by the service provider.

For details of Ldap login module configuration options see Section A.1, "Included Authentication Modules".

NOTE

In certain directory schemas (e.g., Microsoft Active Directory), role attributes in the user object are stored as DNs to role objects instead of simple names. For implementations that use this schema type, roleAttributeIsDN must be set to **true**.

User authentication is performed by connecting to the LDAP server, based on the login module configuration options. Connecting to the LDAP server is done by creating an **InitialLdapContext** with an environment composed of the LDAP JNDI properties described previously in this section.

The Context.SECURITY_PRINCIPAL is set to the distinguished name of the user obtained by the callback handler in combination with the principalDNPrefix and principalDNSuffix option values, and the Context.SECURITY_CREDENTIALS property is set to the respective String password.

Once authentication has succeeded (**InitialLdapContext** instance is created), the user's roles are queried by performing a search on the **rolesCtxDN** location with search attributes set to the roleAttributeName and uidAttributeName option values. The roles names are obtaining by invoking the **toString** method on the role attributes in the search result set.

Example 14.3. LDAP Login Module Security Domain

This management CLI example shows how to use the parameters in a security domain authentication configuration.

```
/subsystem=security/security-domain=testLDAP:add(cache-type=default)
/subsystem=security/security-domain=testLDAP/authentication=classic:add
/subsystem=security/security-domain=testLDAP/authentication=classic/login-module=Ldap:add( \
  code=Ldap, \
  flag=required, \
  module-options=[ \
    ("java.naming.factory.initial"=>"com.sun.jndi.ldap.LdapCtxFactory"), \
    ("java.naming.provider.url"=>"ldap://ldaphost.jboss.org:1389/"), \
    ("java.naming.security.authentication"=>"simple"), \
    ("principalDNPrefix"=>"uid="), \
    ("principalDNSuffix"=>",ou=People,dc=jboss,dc=org"), \
    ("rolesCtxDN"=>"ou=Roles,dc=jboss,dc=org"), \
    ("uidAttributeID"=>"member"), \
    ("matchOnUserDN"=>true), \
    ("roleAttributeID"=>"cn"), \
    ("roleAttributeIsDN"=>false) \
  ])
```

The ***java.naming.factory.initial***, ***java.naming.factory.url*** and ***java.naming.security*** options in the testLDAP security domain configuration indicate the following conditions:

- The Sun LDAP JNDI provider implementation will be used

- The LDAP server is located on host **ldaphost.jboss.org** on port 1389
- The LDAP simple authentication method will be use to connect to the LDAP server.

The login module attempts to connect to the LDAP server using a Distinguished Name (DN) representing the user it is trying to authenticate. This DN is constructed from the passed principalDNPrefix, the user name of the user and the principalDNSuffix as described above. In Example 14.4, “LDIF File Example”, the user name **jsmith** would map to **uid=jsmith,ou=People,dc=jboss,dc=org**.

NOTE

The example assumes the LDAP server authenticates users using the **userPassword** attribute of the user's entry (**theduke** in this example). Most LDAP servers operate in this manner, however if your LDAP server handles authentication differently you must ensure LDAP is configured according to your production environment requirements.

Once authentication succeeds, the roles on which authorization will be based are retrieved by performing a subtree search of the **rolesCtxDN** for entries whose uidAttributeID match the user. If matchOnUserDN is true, the search will be based on the full DN of the user. Otherwise the search will be based on the actual user name entered. In this example, the search is under **ou=Roles,dc=jboss,dc=org** for any entries that have a **member** attribute equal to **uid=jsmith,ou=People,dc=jboss,dc=org**. The search would locate **cn=JBossAdmin** under the roles entry.

The search returns the attribute specified in the roleAttributeID option. In this example, the attribute is **cn**. The value returned would be **JBossAdmin**, so the **jsmith** user is assigned to the **JBossAdmin** role.

A local LDAP server often provides identity and authentication services, but is unable to use authorization services. This is because application roles do not always map well onto LDAP groups, and LDAP administrators are often hesitant to allow external application-specific data in central LDAP servers. The LDAP authentication module is often paired with another login module, such as the database login module, that can provide roles more suitable to the application being developed.

An LDAP Data Interchange Format (LDIF) file representing the structure of the directory this data operates against is shown in Example 14.4, “LDIF File Example”.

LDAP Data Interchange Format (LDIF)

Plain text data interchange format used to represent LDAP directory content and update requests. Directory content is represented as one record for each object or update request. Content consists of add, modify, delete, and rename requests.

Example 14.4. LDIF File Example

```
dn: dc=jboss,dc=org
objectclass: top
objectclass: dcObject
objectclass: organization
dc: jboss
o: JBoss

dn: ou=People,dc=jboss,dc=org
objectclass: top
objectclass: organizationalUnit
```

```
ou: People

dn: uid=jsmith,ou=People,dc=jboss,dc=org
objectclass: top
objectclass: uidObject
objectclass: person
uid: jsmith
cn: John
sn: Smith
userPassword: theduke

dn: ou=Roles,dc=jboss,dc=org
objectclass: top
objectclass: organizationalUnit
ou: Roles

dn: cn=JBossAdmin,ou=Roles,dc=jboss,dc=org
objectclass: top
objectclass: groupOfNames
cn: JBossAdmin
member: uid=jsmith,ou=People,dc=jboss,dc=org
description: the JBossAdmin group
```

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14.1.5. LdapExtended Login Module

Distinguished Name (DN)

In Lightweight Directory Access Protocol (LDAP), the distinguished name uniquely identifies an object in a directory. Each distinguished name must have a unique name and location from all other objects, which is achieved using a number of attribute-value pairs (AVPs). The AVPs define information such as common names, organization unit, among others. The combination of these values results in a unique string required by the LDAP.

The LdapExtended (**org.jboss.security.auth.spi.LdapExtLoginModule)** searches for the user to bind, as well as the associated roles, for authentication. The roles query recursively follows DNs to navigate a hierarchical role structure.

The LoginModule options include whatever options are supported by the chosen LDAP JNDI provider supports. Examples of standard property names are:

- Context.INITIAL_CONTEXT_FACTORY = "java.naming.factory.initial"
- Context.SECURITY_PROTOCOL = "java.naming.security.protocol"
- Context.PROVIDER_URL = "java.naming.provider.url"
- Context.SECURITY_AUTHENTICATION = "java.naming.security.authentication"
- Context.REFERRAL = "java.naming.referral"

Login module implementation logic follows the order below:

1. The initial LDAP server bind is authenticated using the bindDN and bindCredential properties.

The bindDN is a user with permissions to search both the baseCtxDN and rolesCtxDN trees for the user and roles. The user DN to authenticate against is queried using the filter specified by the baseFilter property.

2. The resulting userDN is authenticated by binding to the LDAP server using the userDN as the InitialLdapContext environment Context.SECURITY_PRINCIPAL. The Context.SECURITY_CREDENTIALS property is either set to the String password obtained by the callback handler.

3. If this is successful, the associated user roles are queried using the rolesCtxDN, roleAttributeID, roleAttributeIsDN, roleNameAttributeID, and roleFilter options.

NOTE

AdvancedLdap Login Module differs from LdapExtended Login Module in the following ways:

- The top level role is queried only for roleAttributeID and not for roleNameAttributeID.
- When the roleAttributeIsDN module property is set to false, the recursive role search is disabled even if the recurseRoles module option is set to true.

For details of LdapExtended login module options see Section A.1, “Included Authentication Modules” .

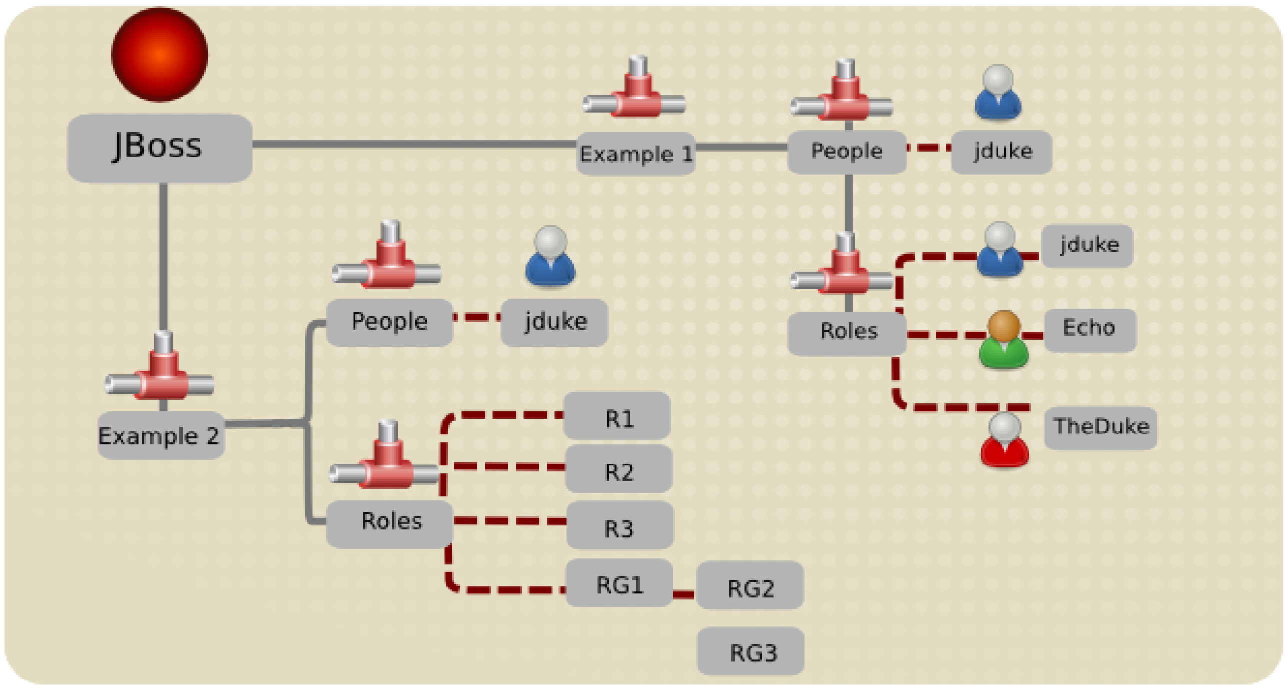

Figure 14.1. LDAP Structure Example

Example 14.5. Example 2 LDAP Configuration

```
version: 1
dn: o=example2,dc=jboss,dc=org
objectClass: top
objectClass: organization
o: example2
```

```
dn: ou=People,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: organizationalUnit
ou: People

dn: uid=jduke,ou=People,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: uidObject
objectClass: person
objectClass: inetOrgPerson
cn: Java Duke
employeeNumber: judke-123
sn: Duke
uid: jduke
userPassword:: dGhlZHVrZQ==

dn: uid=jduke2,ou=People,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: uidObject
objectClass: person
objectClass: inetOrgPerson
cn: Java Duke2
employeeNumber: judke2-123
sn: Duke2
uid: jduke2
userPassword:: dGhlZHVrZTI=

dn: ou=Roles,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: organizationalUnit
ou: Roles

dn: uid=jduke,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: groupUserEx
memberOf: cn=Echo,ou=Roles,o=example2,dc=jboss,dc=org
memberOf: cn=TheDuke,ou=Roles,o=example2,dc=jboss,dc=org
uid: jduke

dn: uid=jduke2,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: groupUserEx
memberOf: cn=Echo2,ou=Roles,o=example2,dc=jboss,dc=org
memberOf: cn=TheDuke2,ou=Roles,o=example2,dc=jboss,dc=org
uid: jduke2

dn: cn=Echo,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: groupOfNames
cn: Echo
description: the echo role
member: uid=jduke,ou=People,dc=jboss,dc=org

dn: cn=TheDuke,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: groupOfNames
```

```
objectClass: top
cn: TheDuke
description: the duke role
member: uid=jduke,ou=People,o=example2,dc=jboss,dc=org

dn: cn=Echo2,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: groupOfNames
cn: Echo2
description: the Echo2 role
member: uid=jduke2,ou=People,dc=jboss,dc=org

dn: cn=TheDuke2,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: TheDuke2
description: the duke2 role
member: uid=jduke2,ou=People,o=example2,dc=jboss,dc=org

dn: cn=JBossAdmin,ou=Roles,o=example2,dc=jboss,dc=org
objectClass: top
objectClass: groupOfNames
cn: JBossAdmin
description: the JBossAdmin group
member: uid=jduke,ou=People,dc=jboss,dc=org
```

The module configuration for this LDAP structure example is outlined in the following management CLI command.

```
/subsystem=security/security-domain=testLdapExample2/authentication=classic/login-
module=LdapExtended:add( \
  code=LdapExtended, \
  flag=required, \
  module-options=[ \
    ("java.naming.factory.initial"=>"com.sun.jndi.ldap.LdapCtxFactory"), \
    ("java.naming.provider.url"=>"ldap://ldaphost.jboss.org"), \
    ("java.naming.security.authentication"=>"simple"), \
    ("bindDN"=>"cn=Root,dc=jboss,dc=org"), \
    ("bindCredential"=>"secret1"), \
    ("baseCtxDN"=>"ou=People,o=example2,dc=jboss,dc=org"), \
    ("baseFilter"=>"(uid={0})"), \
    ("rolesCtxDN"=>"ou=Roles,o=example2,dc=jboss,dc=org"), \
    ("roleFilter"=>"(uid={0})"), \
    ("roleAttributeIsDN"=>"true"), \
    ("roleAttributeID"=>"memberOf"), \
    ("roleNameAttributeID"=>"cn") \
  ])
```

Example 14.6. Example 3 LDAP Configuration

```
dn: o=example3,dc=jboss,dc=org
```

```
objectclass: top
objectclass: organization
o: example3

dn: ou=People,o=example3,dc=jboss,dc=org
objectclass: top
objectclass: organizationalUnit
ou: People

dn: uid=jduke,ou=People,o=example3,dc=jboss,dc=org
objectclass: top
objectclass: uidObject
objectclass: person
objectClass: inetOrgPerson
uid: jduke
employeeNumber: judke-123
cn: Java Duke
sn: Duke
userPassword: theduke

dn: ou=Roles,o=example3,dc=jboss,dc=org
objectClass: top
objectClass: organizationalUnit
ou: Roles

dn: uid=jduke,ou=Roles,o=example3,dc=jboss,dc=org
objectClass: top
objectClass: groupUserEx
memberOf: cn=Echo,ou=Roles,o=example3,dc=jboss,dc=org
memberOf: cn=TheDuke,ou=Roles,o=example3,dc=jboss,dc=org
uid: jduke

dn: cn=Echo,ou=Roles,o=example3,dc=jboss,dc=org
objectClass: top
objectClass: groupOfNames
cn: Echo
description: the JBossAdmin group
member: uid=jduke,ou=People,o=example3,dc=jboss,dc=org

dn: cn=TheDuke,ou=Roles,o=example3,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: TheDuke
member: uid=jduke,ou=People,o=example3,dc=jboss,dc=org
```

The module configuration for this LDAP structure example is outlined in the following management CLI command.

```
/subsystem=security/security-domain=testLdapExample3/authentication=classic/login-
module=LdapExtended:add( \
  code=LdapExtended, \
flag=required, \
module-options=[ \
  ("java.naming.factory.initial"=>"com.sun.jndi.ldap.LdapCtxFactory"), \
  ("java.naming.provider.url"=>"ldap://ldaphost.jboss.org"), \
  ("java.naming.security.authentication"=>"simple"), \
  ("bindDN"=>"cn=Root,dc=jboss,dc=org"), \
  ("bindCredential"=>"secret1"), \
  ("baseCtxDN"=>"ou=People,o=example3,dc=jboss,dc=org"), \
  ("baseFilter"=>"(cn={0})"), \
  ("rolesCtxDN"=>"ou=Roles,o=example3,dc=jboss,dc=org"), \
  ("roleFilter"=>"(member={1})"), \
  ("roleAttributeID"=>"cn") \
])
```

Example 14.7. Example 4 LDAP Configuration

```
dn: o=example4,dc=jboss,dc=org
objectclass: top
objectclass: organization
o: example4

dn: ou=People,o=example4,dc=jboss,dc=org
objectclass: top
objectclass: organizationalUnit
ou: People

dn: uid=jduke,ou=People,o=example4,dc=jboss,dc=org
objectClass: top
objectClass: uidObject
objectClass: person
objectClass: inetOrgPerson
cn: Java Duke
employeeNumber: jduke-123
sn: Duke
uid: jduke
userPassword:: dGhlZHVrZQ==

dn: ou=Roles,o=example4,dc=jboss,dc=org
objectClass: top
objectClass: organizationalUnit
ou: Roles

dn: cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: RG1
member: cn=empty

dn: cn=RG2,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: RG2
member: cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org
```

```
member: uid=jduke,ou=People,o=example4,dc=jboss,dc=org

dn: cn=RG3,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: RG3
member: cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org

dn: cn=R1,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: R1
member: cn=RG2,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org

dn: cn=R2,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: R2
member: cn=RG2,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org

dn: cn=R3,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: R3
member: cn=RG2,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org
member: cn=RG3,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org

dn: cn=R4,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: R4
member: cn=RG3,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org

dn: cn=R5,ou=Roles,o=example4,dc=jboss,dc=org
objectClass: groupOfNames
objectClass: top
cn: R5
member: cn=RG3,cn=RG1,ou=Roles,o=example4,dc=jboss,dc=org
member: uid=jduke,ou=People,o=example4,dc=jboss,dc=org
```

The module configuration for this LDAP structure example is outlined in the code sample.

```
/subsystem=security/security-domain=testLdapExample4/authentication=classic/login-
module=LdapExtended:add( \
  code=LdapExtended, \
  flag=required, \
  module-options=[ \
    ("java.naming.factory.initial"=>"com.sun.jndi.ldap.LdapCtxFactory"), \
    ("java.naming.provider.url"=>"ldap://ldaphost.jboss.org"), \
    ("java.naming.security.authentication"=>"simple"), \
    ("bindDN"=>"cn=Root,dc=jboss,dc=org"), \
    ("bindCredential"=>"secret1"), \
    ("baseCtxDN"=>"ou=People,o=example4,dc=jboss,dc=org"), \
    ("baseFilter"=>"(cn={0})"), \
    ("rolesCtxDN"=>"ou=Roles,o=example4,dc=jboss,dc=org"), \
    ("roleFilter"=>"(member={1})"), \
    ("roleRecursion"=>"1"), \
    ("roleAttributeID"=>"memberOf") \
  ])
```

Example 14.8. Default Active Directory Configuration

The example below represents the configuration for a default Active Directory configuration.

Some Active Directory configurations may require searching against the Global Catalog on port 3268 instead of the usual port 389. This is most likely when the Active Directory forest includes multiple domains.

```
/subsystem=security/security-domain=AD_Default/authentication=classic/login-
module=LdapExtended:add( \
  code=LdapExtended, \
  flag=required, \
  module-options=[ \
    ("java.naming.provider.url"=>"ldap://ldaphost.jboss.org"), \
    ("bindDN"=>"JBOSS\searchuser"), \
    ("bindCredential"=>"password"), \
    ("baseCtxDN"=>"CN=Users,DC=jboss,DC=org"), \
    ("baseFilter"=>"(sAMAccountName={0})"), \
    ("rolesCtxDN"=>"CN=Users,DC=jboss,DC=org"), \
    ("roleFilter"=>"(sAMAccountName={0})"), \
    ("roleAttributeID"=>"memberOf"), \
    ("roleAttributeIsDN"=>"true"), \
    ("roleNameAttributeID"=>"cn"), \
    ("searchScope"=>"ONELEVEL_SCOPE"), \
    ("allowEmptyPasswords"=>"false") \
  ])
```

Example 14.9. Recursive Roles Active Directory Configuration

The example below implements a recursive role search within Active Directory. The key difference between this example and the default Active Directory example is that the role search has been replaced to search the member attribute using the DN of the user. The login module then uses the DN of the role to find groups of which the group is a member.

```
/subsystem=security/security-domain=AD_Recursive/authentication=classic/login-
module=LdapExtended:add( \
  code=LdapExtended, \
  flag=required, \
  module-options=[ \
    ("java.naming.provider.url"=>"ldap://ldaphost.jboss.org"), \
    ("java.naming.referral"=>"follow"), \
    ("bindDN"=>"JBOSS\searchuser"), \
    ("bindCredential"=>"password"), \
    ("baseCtxDN"=>"CN=Users,DC=jboss,DC=org"), \
    ("baseFilter"=>"(sAMAccountName={0})"), \
    ("rolesCtxDN"=>"CN=Users,DC=jboss,DC=org"), \
    ("roleFilter"=>"(member={1})"), \
    ("roleAttributeID"=>"cn"), \
    ("roleAttributeIsDN"=>"false"), \
    ("roleRecursion"=>"2"), \
    ("searchScope"=>"ONELEVEL_SCOPE"), \
    ("allowEmptyPasswords"=>"false") \
  ])
```

Report a bug

14.1.6. UsersRoles Login Module

UsersRoles login module is a simple login module that supports multiple users and user roles loaded from Java properties files. The default username-to-password mapping filename is **users.properties** and the default username-to-roles mapping filename is **roles.properties**.

For details of UsersRoles login module options see Section A.1, "Included Authentication Modules" .

This login module supports password stacking, password hashing, and unauthenticated identity.

The properties files are loaded during initialization using the initialize method thread context class loader. This means that these files can be placed on the classpath of the Java EE deployment (for example, into the **WEB-INF/classes** folder in the **WAR** archive), or into any directory on the server classpath. The primary purpose of this login module is to easily test the security settings of multiple users and roles using properties files deployed with the application.

Example 14.10. UsersRoles Login Module

```
/subsystem=security/security-domain=ejb3-sampleapp/authentication=classic/login-
module=UsersRoles:add( \
  code=UsersRoles, \
  flag=required, \
  module-options=[ \
    ("usersProperties"=>"ejb3-sampleapp-users.properties"), \
    ("rolesProperties"=>"ejb3-sampleapp-roles.properties") \
  ])
```

In Example 14.10, "UsersRoles Login Module", the **ejb3-sampleapp-users.properties** file uses a **username=password** format with each user entry on a separate line:

```
username1=password1
username2=password2
...
```

The **ejb3-sampleapp-roles.properties** file referenced in Example 14.10, “UsersRoles Login Module” uses the pattern **username=role1,role2,** with an optional group name value. For example:

```
username1=role1,role2,...
username1.RoleGroup1=role3,role4,...
username2=role1,role3,...
```

The user name.XXX property name pattern present in **ejb3-sampleapp-roles.properties** is used to assign the user name roles to a particular named group of roles where the **XXX** portion of the property name is the group name. The user name=... form is an abbreviation for user name.Roles=..., where the **Roles** group name is the standard name the **JBossAuthorizationManager** expects to contain the roles which define the permissions of users.

The following would be equivalent definitions for the **jduke** user name:

```
jduke=TheDuke,AnimatedCharacter
jduke.Roles=TheDuke,AnimatedCharacter
```

Report a bug

14.1.7. Database Login Module

The **Database** login module is a Java Database Connectivity-based (JDBC) login module that supports authentication and role mapping. Use this login module if you have your user name, password and role information stored in a relational database.

NOTE

This module supports password stacking, password hashing and unauthenticated identity.

The **Database** login module is based on two logical tables:

```
Table Principals(PrincipalID text, Password text)
Table Roles(PrincipalID text, Role text, RoleGroup text)
```

The **Principals** table associates the user **PrincipalID** with the valid password and the **Roles** table associates the user **PrincipalID** with its role sets. The roles used for user permissions must be contained in rows with a **RoleGroup** column value of **Roles**.

The tables are logical in that you can specify the SQL query that the login module uses. The only requirement is that the **java.sql.ResultSet** has the same logical structure as the **Principals** and **Roles** tables described previously. The actual names of the tables and columns are not relevant as the results are accessed based on the column index.

To clarify this notion, consider a database with two tables, **Principals** and **Roles**, as already declared. The following statements populate the tables with the following data:

- **PrincipalID java** with a **Password** of **echoman** in the **Principals** table
- **PrincipalID java** with a role named **Echo** in the **RolesRoleGroup** in the **Roles** table
- **PrincipalID java** with a role named **caller_java** in the **CallerPrincipalRoleGroup** in the **Roles** table

```
INSERT INTO Principals VALUES('java', 'echoman')
INSERT INTO Roles VALUES('java', 'Echo', 'Roles')
INSERT INTO Roles VALUES('java', 'caller_java', 'CallerPrincipal')
```

For details of Database login module options see Section A.1, “Included Authentication Modules” .

An example **Database login module** configuration could be constructed as follows:

```
CREATE TABLE Users(username VARCHAR(64) PRIMARY KEY, passwd VARCHAR(64))
CREATE TABLE UserRoles(username VARCHAR(64), role VARCHAR(32))
```

A corresponding login module configuration in a security domain:

```
/subsystem=security/security-domain=testDB/authentication=classic/login-module=Database:add( \
  code=Database, \
  flag=required, \
  module-options=[ \
    ("dsJndiName"=>"java:/MyDatabaseDS"), \
    ("principalsQuery"=>"select passwd from Users where username=?"), \
    ("rolesQuery"=>"select role, 'Roles' from UserRoles where username=?") \
  ])
```

Report a bug

14.1.8. Certificate Login Module

Certificate login module authenticates users based on X509 certificates. A typical use case for this login module is **CLIENT-CERT** authentication in the web tier.

This login module only performs authentication: you must combine it with another login module capable of acquiring authorization roles to completely define access to a secured web or EJB component. Two subclasses of this login module, **CertRolesLoginModule** and **DatabaseCertLoginModule** extend the behavior to obtain the authorization roles from either a properties file or database.

For details of **Certificate** login module options see Section A.1, “Included Authentication Modules” .

The **Certificate** login module needs a **KeyStore** to perform user validation. This is obtained from a JSSE configuration of linked security domain as shown in the following configuration fragment:

```
/subsystem=security/security-domain=trust-domain:add
/subsystem=security/security-domain=trust-domain/jsse=classic:add( \
  truststore={ \
    password=>pass1234, \
    url=>/home/jbosseap/trusted-clients.jks \
  })

/subsystem=security/security-domain=testCert:add
/subsystem=security/security-domain=testCert/authentication=classic:add
/subsystem=security/security-domain=testCert/authentication=classic/login-module=Certificate:add( \
  code=Certificate, \
  flag=required, \
  module-options=[ \
    ("securityDomain"=>"trust-domain"), \
  ])
```

Procedure 14.1. Secure Web Applications with Certificates and Role-based Authorization

This procedure describes how to secure a web application, such as the **user-app.war**, using client certificates and role-based authorization. In this example the **CertificateRoles** login module is used for authentication and authorization. Both the **trusted-clients.keystore** and the **app-roles.properties** require an entry that maps to the principal associated with the client certificate.

By default, the principal is created using the client certificate distinguished name, such as the DN specified in Example 14.11, “Certificate Example”.

1. **Declare Resources and Roles**
   Modify **web.xml** to declare the resources to be secured along with the allowed roles and security domain to be used for authentication and authorization.

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://java.sun.com/xml/ns/javaee"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_3_0.xsd"
        version="3.0">

        <security-constraint>
                <web-resource-collection>
                        <web-resource-name>Protect App</web-resource-name>
                        <url-pattern>/*</url-pattern>
                </web-resource-collection>
                <auth-constraint>
                        <role-name>Admin</role-name>
                </auth-constraint>
        </security-constraint>

        <login-config>
                <auth-method>CLIENT-CERT</auth-method>
                <realm-name>Secured area</realm-name>
        </login-config>

        <security-role>
                <role-name>Admin</role-name>
        </security-role>
</web-app>
```

2. **Specify the Security Domain**
   In the **jboss-web.xml** file, specify the required security domain.

```
<jboss-web>
  <security-domain>app-sec-domain</security-domain>
</jboss-web>
```

3. **Configure Login Module**

Define the login module configuration for the **app-sec-domain** domain you just specified using the management CLI.

```
[
/subsystem=security/security-domain=trust-domain:add
/subsystem=security/security-domain=trust-domain/jsse=classic:add( \
  truststore={ \
    password=>pass1234, \
    url=>/home/jbosseap/trusted-clients.jks \
  })

/subsystem=security/security-domain=app-sec-domain:add
/subsystem=security/security-domain=app-sec-domain/authentication=classic:add
/subsystem=security/security-domain=app-sec-domain/authentication=classic/login-
module=CertificateRoles:add( \
  code=CertificateRoles, \
  flag=required, \
  module-options=[ \
    ("securityDomain"=>"trust-domain"), \
    ("rolesProperties"=>"app-roles.properties") \
  ])
```

Example 14.11. Certificate Example

```
[conf]$ keytool -printcert -file valid-client-cert.crt
Owner: CN=valid-client, OU=Security QE, OU=JBoss, O=Red Hat, C=CZ
Issuer: CN=EAP Certification Authority, OU=Security QE, OU=JBoss, O=Red Hat, C=CZ
Serial number: 2
Valid from: Mon Mar 24 18:21:55 CET 2014 until: Tue Mar 24 18:21:55 CET 2015
Certificate fingerprints:
         MD5:  0C:54:AE:6E:29:ED:E4:EF:46:B5:14:30:F2:E0:2A:CB
         SHA1: D6:FB:19:E7:11:28:6C:DE:01:F2:92:2F:22:EF:BB:5D:BF:73:25:3D
         SHA256:
CD:B7:B1:72:A3:02:42:55:A3:1C:30:E1:A6:F0:20:B0:2C:0F:23:4F:7A:8E:2F:2D:FA:AF:55:3E:A7:9B
:2B:F4
         Signature algorithm name: SHA1withRSA
         Version: 3
```

The **trusted-clients.keystore** would need the certificate in Example 14.11, "Certificate Example" stored with an alias of **CN=valid-client, OU=Security QE, OU=JBoss, O=Red Hat, C=CZ**. The **app-roles.properties** must have the same entry. Since the DN contains characters that are normally treated as delimiters, you must escape the problem characters using a backslash ('\') as illustrated below.

```
# A sample app-roles.properties file
CN\=valid-client,\ OU\=Security\ QE,\ OU\=JBoss,\ O\=Red\ Hat,\ C\=CZ
```

Report a bug

14.1.9. Identity Login Module

Identity login module is a simple login module that associates a hard-coded user name to any subject authenticated against the module. It creates a **SimplePrincipal** instance using the name specified by the **principal** option.

NOTE

This module supports password stacking.

This login module is useful when you need to provide a fixed identity to a service, and in development environments when you want to test the security associated with a given principal and associated roles.

For details of Identity login module options see Section A.1, "Included Authentication Modules".

A sample security domain configuration is described below. It authenticates all users as the principal named **jduke** and assigns role names of **TheDuke**, and **AnimatedCharacter**:.

```
/subsystem=security/security-domain=testIdentity:add
/subsystem=security/security-domain=testIdentity/authentication=classic:add
/subsystem=security/security-domain=testIdentity/authentication=classic/login-module=Identity:add( \
  code=Identity, \
  flag=required, \
  module-options=[ \
    ("principal"=>"jduke"), \
    ("roles"=>"TheDuke,AnimatedCharacter") \
  ])
```

Report a bug

14.1.10. RunAs Login Module

RunAs login module is a helper module that pushes a **run as** role onto the stack for the duration of the login phase of authentication, then pops the **run as** role from the stack in either the commit or abort phase.

The purpose of this login module is to provide a role for other login modules that must access secured resources in order to perform their authentication (for example, a login module that accesses a secured EJB). **RunAs** login module must be configured ahead of the login modules that require a **run as** role established.

For details of RunAs login module options see Section A.1, "Included Authentication Modules".

Report a bug

14.1.10.1. RunAsIdentity Creation

In order for JBoss EAP 6 to secure access to EJB methods, the identity of the user must be known at the time the method call is made.

A user's identity in the server is represented either by a **javax.security.auth.Subject** instance or an **org.jboss.security.RunAsIdentity** instance. Both these classes store one or more principals that represent the identity and a list of roles that the identity possesses. In the case of the **javax.security.auth.Subject** a list of credentials is also stored.

In the <assembly-descriptor> section of the **ejb-jar.xml** deployment descriptor, you specify one or more roles that a user must have to access the various EJB methods. A comparison of these lists reveals whether the user has one of the roles necessary to access the EJB method.

Example 14.12. org.jboss.security.RunAsIdentity Creation

In the **ejb-jar.xml** file, you specify a <security-identity> element with a <run-as> role defined as a child of the <session> element.

```
<session>
  ...
  <security-identity>
    <run-as>
      <role-name>Admin</role-name>
    </run-as>
  </security-identity>
  ...
</session>
```

This declaration signifies that an **Admin** RunAsIdentity role must be created.

To name a principal for the **Admin** role, you define a **<run-as-principal>** element in the **jboss-ejb3.xml** file.

```

<jboss:ejb-jar
      xmlns="http://java.sun.com/xml/ns/javaee"
      xmlns:jboss="http://www.jboss.com/xml/ns/javaee"
      xmlns:s="urn:security:1.1"
      version="3.1" impl-version="2.0">
   <assembly-descriptor>
      <s:security>
         <ejb-name>WhoAmIBean</ejb-name>
         <s:run-as-principal>John</s:run-as-principal>
      </s:security>
   </assembly-descriptor>
</jboss:ejb-jar>
```

The **<security-identity>** element in both the **ejb-jar.xml** and **<security>** element in the **jboss-ejb3.xml** files are parsed at deployment time. The **<run-as>** role name and the **<run-as-principal>** name are then stored in the **org.jboss.metadata.ejb.spec.SecurityIdentityMetaData** class.

Example 14.13. Assigning multiple roles to a RunAsIdentity

You can assign more roles to RunAsIdentity by mapping roles to principals in the **jboss-ejb3.xml** deployment descriptor **<assembly-descriptor>** element group.

```

<jboss:ejb-jar xmlns:sr="urn:security-role"
      ...>
      <assembly-descriptor>
         ...
```

```
            <sr:security-role>
                <sr:role-name>Support</sr:role-name>
                <sr:principal-name>John</sr:principal-name>
                <sr:principal-name>Jill</sr:principal-name>
                <sr:principal-name>Tony</sr:principal-name>
            </sr:security-role>
        </assembly-descriptor>
    </jboss:ejb-jar>
```

In Example 14.12, “org.jboss.security.RunAsIdentity Creation”, the **<run-as-principal>** of **John** was created. The configuration in this example extends the **Admin** role, by adding the **Support** role. The new role contains extra principals, including the originally defined principal **John**.

The **<security-role>** element in both the **ejb-jar.xml** and **jboss-ejb3.xml** files are parsed at deployment time. The **<role-name>** and the **<principal-name>** data is stored in the **org.jboss.metadata.ejb.spec.SecurityIdentityMetaData** class.

Report a bug

14.1.11. Client Login Module

Client login module (**org.jboss.security.ClientLoginModule**) is an implementation of **LoginModule** for use by JBoss clients when establishing caller identity and credentials. This creates a new **SecurityContext** assigns it a principal and a credential and sets the **SecurityContext** to the **ThreadLocal** security context.

Client login module is the only supported mechanism for a client to establish the current thread's caller. Both stand-alone client applications, and server environments (acting as JBoss EJB clients where the security environment has not been configured to use the EAP security subsystem transparently) must use **Client** login module.

Note that this login module does not perform any authentication. It merely copies the login information provided to it into the server EJB invocation layer for subsequent authentication on the server. If you need to perform client-side authentication of users you would need to configure another login module in addition to the **Client** login module.

For details of Client login module options see Section A.1, “Included Authentication Modules” .

Report a bug

14.1.12. SPNEGO Login Module

SPNEGO login module (**org.jboss.security.negotiation.spnego.SPNEGOLoginModule**) is an implementation of **LoginModule** that establishes caller identity and credentials with a KDC. The module implements SPNEGO (Simple and Protected GSSAPI Negotiation mechanism) and is a part of the JBoss Negotiation project. This authentication can be used in the chained configuration with the **AdvancedLdap** login module to allow cooperation with an LDAP server.

For details of SPNEGO login module options see Section A.1, “Included Authentication Modules” .

The JBoss Negotiation module is not included as a standard dependency for deployed applications. To use the **SPNEGO** or **AdvancedLdap** login modules in your project, you must add the dependency manually by editing the **META-INF/jboss-deployment-structure.xml** deployment descriptor file.

Example 14.14. Add JBoss Negotiation Module as a Dependency

```
<jboss-deployment-structure>
  <deployment>
    <dependencies>
      <module name="org.jboss.security.negotiation" />
    </dependencies>
  </deployment>
</jboss-deployment-structure>
```

Report a bug

14.1.13. RoleMapping Login Module

RoleMapping login module supports mapping roles, that are the end result of the authentication process, to one or more declarative roles. For example, if the authentication process has determined that the user "A" has the roles "ldapAdmin" and "testAdmin", and the declarative role defined in the **web.xml** or **ejb-jar.xml** file for access is **admin**, then this login module maps the **admin** roles to the user **A**.

For details of **RoleMapping** login module options see Section A.1, "Included Authentication Modules" .

The **RoleMapping** login module must be defined as an optional module to a login module configuration as it alters mapping of the previously mapped roles.

Example 14.15. Defining mapped roles

```
/subsystem=security/security-domain=test-domain-2/:add
/subsystem=security/security-domain=test-domain-2/authentication=classic:add
/subsystem=security/security-domain=test-domain-2/authentication=classic/login-module=test-2-
lm/:add(\
flag=required,\
code=UsersRoles,\
module-options=[("usersProperties"=>"users.properties"),("rolesProperties"=>"roles.properties")]\
)
/subsystem=security/security-domain=test-domain-2/authentication=classic/login-module=test2-
map/:add(\
flag=optional,\
code=RoleMapping,\
module-options=[("rolesProperties"=>"rolesMapping-roles.properties")]\
)
```

Another example achieving the same result, but using the mapping module. This is the preferred method of role mapping:

Example 14.16. Preferred method of defining mapped roles

```
/subsystem=security/security-domain=test-domain-2/:add
```

```
/subsystem=security/security-domain=test-domain-2/authentication=classic:add
/subsystem=security/security-domain=test-domain-2/authentication=classic/login-module=test-2-lm/:add(\
flag=required,\
code=UsersRoles,\
module-options=[("usersProperties"=>"users.properties"),("rolesProperties"=>"roles.properties")]\
)
/subsystem=security/security-domain=test-domain-2/mapping=classic/mapping-module=test2-map/:add(\
code=PropertiesRoles,type=role,\
module-options=[("rolesProperties"=>"rolesMapping-roles.properties")]\
)
```

Example 14.17. Properties File used by a RoleMappingLoginModule

```
ldapAdmin=admin, testAdmin
```

If the authenticated subject contains role **ldapAdmin**, then the roles **admin** and **testAdmin** are added to or substitute the authenticated subject depending on the replaceRole property value.

Report a bug

14.1.14. bindCredential Module Option

The **bindCredential** module option is used to store the credentials for the DN and can be used by several login and mapping modules. There are several methods for obtaining the password.

Plaintext in a management CLI command.

The password for the **bindCredential** module may be provided in plaintext, in a management CLI command. For example: **("bindCredential"=>"secret1")**. For security reasons, the password should be encrypted using the JBoss EAP vault mechanism.

Use an external command.

To obtain the password from the output of an external command, use the format **{EXT}...** where the **...** is the external command. The first line of the command output is used as the password.

To improve performance, the **{EXTC[:expiration_in_millis]}** variant caches the password for a specified number of milliseconds. By default the cached password does not expire. If the value **0** (zero) is specified, the cached credentials do not expire.

The **EXTC** variant is only supported by the **LdapExtended** login module.

Example 14.18. Obtain a password from an external command

```
{EXT}cat /mysecretpasswordfile
```

Example 14.19. Obtain a password from an external file and cache it for 500 milliseconds

```
{EXTC:500}cat /mysecretpasswordfile
```

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14.2. CUSTOM MODULES

If the login modules bundled with the EAP security framework do not work with your security environment, you can write your own custom login module implementation. The **AuthenticationManager** requires a particular usage pattern of the **Subject** principals set. You must understand the JAAS Subject class's information storage features and the expected usage of these features to write a login module that works with the **AuthenticationManager**.

This section examines this requirement and introduces two abstract base **LoginModule** implementations that can help you implement custom login modules.

You can obtain security information associated with a **Subject** by using the following methods:

```
java.util.Set getPrincipals()
java.util.Set getPrincipals(java.lang.Class c)
java.util.Set getPrivateCredentials()
java.util.Set getPrivateCredentials(java.lang.Class c)
java.util.Set getPublicCredentials()
java.util.Set getPublicCredentials(java.lang.Class c)
```

For **Subject** identities and roles, EAP has selected the most logical choice: the principals sets obtained via **getPrincipals()** and **getPrincipals(java.lang.Class)**. The usage pattern is as follows:

- User identities (for example; user name, social security number, employee ID) are stored as **java.security.Principal** objects in the **SubjectPrincipals** set. The **Principal** implementation that represents the user identity must base comparisons and equality on the name of the principal. A suitable implementation is available as the **org.jboss.security.SimplePrincipal** class. Other **Principal** instances may be added to the **SubjectPrincipals** set as needed.

- Assigned user roles are also stored in the **Principals** set, and are grouped in named role sets using **java.security.acl.Group** instances. The **Group** interface defines a collection of **Principal**s and/or **Group**s, and is a subinterface of **java.security.Principal**.

- Any number of role sets can be assigned to a **Subject**.

- The EAP security framework uses two well-known role sets with the names **Roles** and **CallerPrincipal**.

  - The **Roles** group is the collection of **Principal**s for the named roles as known in the application domain under which the **Subject** has been authenticated. This role set is used by methods like the **EJBContext.isCallerInRole(String)**, which EJBs can use to see if the current caller belongs to the named application domain role. The security interceptor logic that performs method permission checks also uses this role set.

  - The **CallerPrincipal Group** consists of the single **Principal** identity assigned to the user in the application domain. The **EJBContext.getCallerPrincipal()** method uses the **CallerPrincipal** to allow the application domain to map from the operation environment identity to a user identity suitable for the application. If a **Subject** does not have a **CallerPrincipal Group**, the application identity is the same as operational environment identity.

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14.2.1. Subject Usage Pattern Support

To simplify correct implementation of the **Subject** usage patterns described in Section 14.2, "Custom Modules", EAP includes login modules that populate the authenticated **Subject** with a template pattern that enforces correct **Subject** usage.

AbstractServerLoginModule

The most generic of the two is the **org.jboss.security.auth.spi.AbstractServerLoginModule** class.

It provides an implementation of the **javax.security.auth.spi.LoginModule** interface and offers abstract methods for the key tasks specific to an operation environment security infrastructure. The key details of the class are highlighted in Example 14.20, "AbstractServerLoginModule Class Fragment". The JavaDoc comments detail the responsibilities of subclasses.

IMPORTANT

The **loginOk** instance variable is pivotal. This must be set to **true** if the log in succeeds, or **false** by any subclasses that override the log in method. If this variable is incorrectly set, the commit method will not correctly update the subject.

Tracking the log in phase outcomes allows login modules to be chained together with control flags. These control flags do not require the login modules to succeed as part of the authentication process.

Example 14.20. AbstractServerLoginModule Class Fragment

```
package org.jboss.security.auth.spi;
/**
 *  This class implements the common functionality required for a JAAS
 *  server-side LoginModule and implements the PicketBox standard
 *  Subject usage pattern of storing identities and roles. Subclass
 *  this module to create your own custom LoginModule and override the
 *  login(), getRoleSets(), and getIdentity() methods.
 */
public abstract class AbstractServerLoginModule
   implements javax.security.auth.spi.LoginModule
{
   protected Subject subject;
   protected CallbackHandler callbackHandler;
   protected Map sharedState;
   protected Map options;
   protected Logger log;

   /** Flag indicating if the shared credential should be used */
   protected boolean useFirstPass;
   /**
    * Flag indicating if the login phase succeeded. Subclasses that
    * override the login method must set this to true on successful
    * completion of login
    */
   protected boolean loginOk;

   // ...
```

```
/**
 * Initialize the login module. This stores the subject,
 * callbackHandler and sharedState and options for the login
 * session. Subclasses should override if they need to process
 * their own options. A call to super.initialize(...)  must be
 * made in the case of an override.
 *
 * <p>
 * The options are checked for the  <em>password-stacking</em> parameter.
 * If this is set to "useFirstPass", the login identity will be taken from the
 * <code>javax.security.auth.login.name</code> value of the sharedState map,
 * and the proof of identity from the
 * <code>javax.security.auth.login.password</code> value of the sharedState map.
 *
 * @param subject the Subject to update after a successful login.
 * @param callbackHandler the CallbackHandler that will be used to obtain the
 * the user identity and credentials.
 * @param sharedState a Map shared between all configured login module instances
 * @param options the parameters passed to the login module.
 */
public void initialize(Subject subject,
                       CallbackHandler callbackHandler,
                       Map sharedState,
                       Map options)
{
    // ...
}


/**
 *  Looks for javax.security.auth.login.name and
 *  javax.security.auth.login.password values in the sharedState
 *  map if the useFirstPass option was true and returns true if
 *  they exist. If they do not or are null this method returns
 *  false.
 *  Note that subclasses that override the login method
 *  must set the loginOk var to true if the login succeeds in
 *  order for the commit phase to populate the Subject. This
 *  implementation sets loginOk to true if the login() method
 *  returns true, otherwise, it sets loginOk to false.
 */
public boolean login()
    throws LoginException
{
    // ...
}

/**
 *  Overridden by subclasses to return the Principal that
 *  corresponds to the user primary identity.
 */
abstract protected Principal getIdentity();

/**
 *  Overridden by subclasses to return the Groups that correspond
 *  to the role sets assigned to the user. Subclasses should
```

```
     * create at least a Group named "Roles" that contains the roles
     * assigned to the user.  A second common group is
     * "CallerPrincipal," which provides the application identity of
     * the user rather than the security domain identity.
     *
     * @return Group[] containing the sets of roles
     */
    abstract protected Group[] getRoleSets() throws LoginException;
}
```

UsernamePasswordLoginModule

The second abstract base login module suitable for custom login modules is the **org.jboss.security.auth.spi.UsernamePasswordLoginModule**.

This login module further simplifies custom login module implementation by enforcing a string-based user name as the user identity and a **char[]** password as the authentication credentials. It also supports the mapping of anonymous users (indicated by a null user name and password) to a principal with no roles. The key details of the class are highlighted in the following class fragment. The JavaDoc comments detail the responsibilities of subclasses.

Example 14.21. UsernamePasswordLoginModule Class Fragment

```
package org.jboss.security.auth.spi;

/**
 * An abstract subclass of AbstractServerLoginModule that imposes a
 * an identity == String username, credentials == String password
 * view on the login process. Subclasses override the
 * getUsersPassword() and getUsersRoles() methods to return the
 * expected password and roles for the user.
 */
public abstract class UsernamePasswordLoginModule
    extends AbstractServerLoginModule
{
    /** The login identity */
    private Principal identity;
    /** The proof of login identity */
    private char[] credential;
    /** The principal to use when a null username and password are seen */
    private Principal unauthenticatedIdentity;

    /**
     * The message digest algorithm used to hash passwords. If null then
     * plain passwords will be used. */
    private String hashAlgorithm = null;

    /**
     *  The name of the charset/encoding to use when converting the
     * password String to a byte array. Default is the platform's
     * default encoding.
     */
     private String hashCharset = null;

    /** The string encoding format to use. Defaults to base64. */
```

```
private String hashEncoding = null;

// ...

/**
 *  Override the superclass method to look for an
 *  unauthenticatedIdentity property. This method first invokes
 *  the super version.
 *
 *  @param options,
 *  @option unauthenticatedIdentity: the name of the principal to
 *  assign and authenticate when a null username and password are
 *  seen.
 */
public void initialize(Subject subject,
                       CallbackHandler callbackHandler,
                       Map sharedState,
                       Map options)
{
    super.initialize(subject, callbackHandler, sharedState,
                     options);
    // Check for unauthenticatedIdentity option.
    Object option = options.get("unauthenticatedIdentity");
    String name = (String) option;
    if (name != null) {
        unauthenticatedIdentity = new SimplePrincipal(name);
    }
}

// ...

/**
 *  A hook that allows subclasses to change the validation of the
 *  input password against the expected password. This version
 *  checks that neither inputPassword or expectedPassword are null
 *  and that inputPassword.equals(expectedPassword) is true;
 *
 *  @return true if the inputPassword is valid, false otherwise.
 */
protected boolean validatePassword(String inputPassword,
                                   String expectedPassword)
{
    if (inputPassword == null || expectedPassword == null) {
        return false;
    }
    return inputPassword.equals(expectedPassword);
}

/**
 *  Get the expected password for the current username available
 * via the getUsername() method. This is called from within the
 * login() method after the CallbackHandler has returned the
 * username and candidate password.
 *
 * @return the valid password String
 */
```

```
        abstract protected String getUsersPassword()
            throws LoginException;
    }
```

Subclassing Login Modules

The choice of sub-classing the **AbstractServerLoginModule** versus **UsernamePasswordLoginModule** is based on whether a string-based user name and credentials are usable for the authentication technology you are writing the login module for. If the string-based semantic is valid, then subclass **UsernamePasswordLoginModule**, otherwise subclass **AbstractServerLoginModule**.

Subclassing Steps

The steps your custom login module must execute depend on which base login module class you choose. When writing a custom login module that integrates with your security infrastructure, you should start by sub-classing **AbstractServerLoginModule** or **UsernamePasswordLoginModule** to ensure that your login module provides the authenticated **Principal** information in the form expected by the EAP security manager.

When sub-classing the **AbstractServerLoginModule**, you must override the following:

- **void initialize(Subject, CallbackHandler, Map, Map)**: if you have custom options to parse.
- **boolean login()**: to perform the authentication activity. Be sure to set the **loginOk** instance variable to true if log in succeeds, false if it fails.
- **Principal getIdentity()**: to return the **Principal** object for the user authenticated by the **log()** step.
- **Group[] getRoleSets()**: to return at least one **Group** named **Roles** that contains the roles assigned to the **Principal** authenticated during **login()**. A second common **Group** is named **CallerPrincipal** and provides the user's application identity rather than the security domain identity.

When sub-classing the **UsernamePasswordLoginModule**, you must override the following:

- **void initialize(Subject, CallbackHandler, Map, Map)**: if you have custom options to parse.
- **Group[] getRoleSets()**: to return at least one **Group** named **Roles** that contains the roles assigned to the **Principal** authenticated during **login()**. A second common **Group** is named **CallerPrincipal** and provides the user's application identity rather than the security domain identity.
- **String getUsersPassword()**: to return the expected password for the current user name available via the **getUsername()** method. The **getUsersPassword()** method is called from within **login()** after the **callbackhandler** returns the user name and candidate password.

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14.2.2. Custom LoginModule Example

The following information will help you to create a custom Login Module example that extends the **UsernamePasswordLoginModule** and obtains a user's password and role names from a JNDI lookup.

At the end of this section you will have created a custom JNDI context login module that will return a user's password if you perform a lookup on the context using a name of the form **password/<username>** (where **<username>** is the current user being authenticated). Similarly, a lookup of the form **roles/<username>** returns the requested user's roles. In Example 14.22, "JndiUserAndPassLoginModule Custom Login Module" is the source code for the **JndiUserAndPassLoginModule** custom login module.

Note that because this extends the JBoss **UsernamePasswordLoginModule**, the **JndiUserAndPassLoginModule** obtains the user's password and roles from the JNDI store. The **JndiUserAndPassLoginModule** does not interact with the JAAS LoginModule operations.

Example 14.22. JndiUserAndPassLoginModule Custom Login Module

```
package org.jboss.book.security.ex2;

import java.security.acl.Group;
import java.util.Map;
import javax.naming.InitialContext;
import javax.naming.NamingException;
import javax.security.auth.Subject;
import javax.security.auth.callback.CallbackHandler;
import javax.security.auth.login.LoginException;
import org.jboss.logging.Logger;
import org.jboss.security.SimpleGroup;
import org.jboss.security.SimplePrincipal;
import org.jboss.security.auth.spi.UsernamePasswordLoginModule;
/**
 * An example custom login module that obtains passwords and roles for a user from a JNDI
lookup.
 *
 * @author Scott.Stark@jboss.org
 */
public class JndiUserAndPassLoginModule extends UsernamePasswordLoginModule {
  /** The JNDI name to the context that handles the password/username lookup */
  private String userPathPrefix;
  /** The JNDI name to the context that handles the roles/username lookup */
  private String rolesPathPrefix;
  private static Logger log = Logger.getLogger(JndiUserAndPassLoginModule.class);
  /**
   * Override to obtain the userPathPrefix and rolesPathPrefix options.
   */
  @Override
  public void initialize(Subject subject, CallbackHandler callbackHandler, Map sharedState, Map
options) {
    super.initialize(subject, callbackHandler, sharedState, options);
    userPathPrefix = (String) options.get("userPathPrefix");
    rolesPathPrefix = (String) options.get("rolesPathPrefix");
  }
  /**
   * Get the roles the current user belongs to by querying the rolesPathPrefix + '/' +
super.getUsername() JNDI location.
   */
  @Override
  protected Group[] getRoleSets() throws LoginException {
    try {
      InitialContext ctx = new InitialContext();
      String rolesPath = rolesPathPrefix + '/' + super.getUsername();
```

```
            String[] roles = (String[]) ctx.lookup(rolesPath);
            Group[] groups = { new SimpleGroup("Roles") };
            log.info("Getting roles for user=" + super.getUsername());
            for (int r = 0; r < roles.length; r++) {
              SimplePrincipal role = new SimplePrincipal(roles[r]);
              log.info("Found role=" + roles[r]);
              groups[0].addMember(role);
            }
            return groups;
          } catch (NamingException e) {
            log.error("Failed to obtain groups for user=" + super.getUsername(), e);
            throw new LoginException(e.toString(true));
          }
        }
        /**
         * Get the password of the current user by querying the userPathPrefix + '/' +
      super.getUsername() JNDI location.
         */
        @Override
        protected String getUsersPassword() throws LoginException {
          try {
            InitialContext ctx = new InitialContext();
            String userPath = userPathPrefix + '/' + super.getUsername();
            log.info("Getting password for user=" + super.getUsername());
            String passwd = (String) ctx.lookup(userPath);
            log.info("Found password=" + passwd);
            return passwd;
          } catch (NamingException e) {
            log.error("Failed to obtain password for user=" + super.getUsername(), e);
            throw new LoginException(e.toString(true));
          }
        }
      }
```

Example 14.23. Definition of security-ex2 security domain with the newly-created custom login module

```
/subsystem=security/security-domain=security-ex2/:add
/subsystem=security/security-domain=security-ex2/authentication=classic:add
/subsystem=security/security-domain=security-ex2/authentication=classic/login-module=ex2/:add(\
flag=required,\
code=org.jboss.book.security.ex2.JndiUserAndPassLoginModule,\
module-options=[("userPathPrefix"=>"/security/store/password"),\
("rolesPathPrefix"=>"/security/store/roles")]\
)
```

The choice of using the **JndiUserAndPassLoginModule** custom login module for the server side authentication of the user is determined by the login configuration for the example security domain. The EJB JAR **META-INF/jboss-ejb3.xml** descriptor sets the security domain. For a web application it is part of the **WEB-INF/jboss-web.xml** file.

Example 14.24. **jboss-ejb3.xml** Example

```
<?xml version="1.0"?>
<jboss:ejb-jar xmlns:jboss="http://www.jboss.com/xml/ns/javaee"
xmlns="http://java.sun.com/xml/ns/javaee" xmlns:s="urn:security" version="3.1" impl-
version="2.0">
  <assembly-descriptor>
    <s:security>
      <ejb-name>*</ejb-name>
      <s:security-domain>security-ex2</s:security-domain>
    </s:security>
  </assembly-descriptor>
</jboss:ejb-jar>
```

Example 14.25. **jboss-web.xml example**

```
<?xml version="1.0"?>
<jboss-web>
    <security-domain>security-ex2</security-domain>
</jboss-web>
```

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CHAPTER 15. ROLE-BASED SECURITY IN APPLICATIONS

15.1. JAVA AUTHENTICATION AND AUTHORIZATION SERVICE (JAAS)

Java Authentication and Authorization Service (JAAS) is a security API which consists of a set of Java packages designed for user authentication and authorization. The API is a Java implementation of the standard Pluggable Authentication Modules (PAM) framework. It extends the Java Enterprise Edition access control architecture to support user-based authorization.

In JBoss EAP 6, JAAS only provides declarative role-based security. For more information about declarative security, refer to Section 8.2, "Declarative Security".

JAAS is independent of any underlying authentication technologies, such as Kerberos or LDAP. You can change your underlying security structure without changing your application. You only need to change the JAAS configuration.

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15.2. ABOUT JAVA AUTHENTICATION AND AUTHORIZATION SERVICE (JAAS)

The security architecture of JBoss EAP 6 is comprised of the security configuration subsystem, and application-specific security configurations which are included in several configuration files within the application.

Domain, Server Group, and Server Specific Configuration

Server groups (in a managed domain) and servers (in a standalone server) include the configuration for security domains. A security domain includes information about a combination of authentication, authorization, mapping, and auditing modules, with configuration details. An application specifies which security domain it requires, by name, in its **jboss-web.xml**.

Application-specific Configuration

Application-specific configuration takes place in one or more of the following four files.

Table 15.1. Application-Specific Configuration Files

File	Description
ejb-jar.xml	The deployment descriptor for an Enterprise JavaBean (EJB) application, located in the **META-INF** directory of the archive. Use the**ejb-jar.xml** to specify roles and map them to principals, at the application level. You can also limit specific methods and classes to certain roles. It is also used for other EJB-specific configuration not related to security.

File	Description
web.xml	The deployment descriptor for a Java Enterprise Edition (EE) web application. Use the **web.xml** to declare the resource and transport constraints for the application, such as limiting the type of HTTP requests that are allowed. You can also configure simple web-based authentication in this file. It is also used for other application-specific configuration not related to security. The security domain the application uses for authentication and authorization is defined in **jboss-web.xml**.
jboss-ejb3.xml	Contains JBoss-specific extensions to the **ejb-jar.xml** descriptor.
jboss-web.xml	Contains JBoss-specific extensions to the **web.xml** descriptor.

NOTE

The **ejb-jar.xml** and **web.xml** are defined in the Java Enterprise Edition (Java EE) specification. The **jboss-ejb3.xml** provides JBoss-specific extensions for the **ejb-jar.xml**, and the **jboss-web.xml** provides JBoss-specific extensions for the **web.xml**.

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15.3. USE ROLE-BASED SECURITY IN SERVLETS

To add security to a servlet, you map each servlet to a URL pattern, and create security constraints on the URL patterns which need to be secured. The security constraints limit access to the URLs to roles. The authentication and authorization are handled by the security domain specified in the WAR's **jboss-web.xml**.

Prerequisites

Before you use role-based security in a servlet, the security domain used to authenticate and authorize access needs to be configured in the JBoss EAP 6 container.

Procedure 15.1. Add Role-Based Security to Servlets

1. **Add mappings between servlets and URL patterns.**
   Use **<servlet-mapping>** elements in the **web.xml** to map individual servlets to URL patterns. The following example maps the servlet called **DisplayOpResult** to the URL pattern **/DisplayOpResult**.

```
<servlet-mapping>
    <servlet-name>DisplayOpResult</servlet-name>
    <url-pattern>/DisplayOpResult</url-pattern>
```

```
</servlet-mapping>
```

2. **Add security constraints to the URL patterns.**
   To map the URL pattern to a security constraint, use a **<security-constraint>**. The following example constrains access from the URL pattern /**DisplayOpResult** to be accessed by principals with the role **eap_admin**. The role needs to be present in the security domain.

```
<security-constraint>
 <display-name>Restrict access to role eap_admin</display-name>
 <web-resource-collection>
  <web-resource-name>Restrict access to role eap_admin</web-resource-name>
  <url-pattern>/DisplayOpResult/*</url-pattern>
 </web-resource-collection>
 <auth-constraint>
  <role-name>eap_admin</role-name>
 </auth-constraint>
</security-constraint>

<security-role>
  <role-name>eap_admin</role-name>
</security-role>


<login-config>
    <auth-method>BASIC</auth-method>
</login-config>
```

   You need to specify the authentication method, which can be any of the following: **BASIC, FORM, DIGEST, CLIENT-CERT, SPNEGO.** This example uses **BASIC** authentication.

3. **Specify the security domain in the WAR's jboss-web.xml**
   Add the security domain to the WAR's **jboss-web.xml** in order to connect the servlets to the configured security domain, which knows how to authenticate and authorize principals against the security constraints. The following example uses the security domain called **acme_domain**.

```
<jboss-web>
 ...
 <security-domain>acme_domain</security-domain>
 ...
</jboss-web>
```

Example 15.1. Example web.xml with Role-Based Security Configured

```
<web-app xmlns="http://java.sun.com/xml/ns/javaee"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_3_0.xsd"
         version="3.0">
```

```
<display-name>Use Role-Based Security In Servlets</display-name>

<welcome-file-list>
  <welcome-file>/index.jsp</welcome-file>
</welcome-file-list>

<servlet-mapping>
    <servlet-name>DisplayOpResult</servlet-name>
    <url-pattern>/DisplayOpResult</url-pattern>
</servlet-mapping>

<security-constraint>
  <display-name>Restrict access to role eap_admin</display-name>
    <web-resource-collection>
      <web-resource-name>Restrict access to role eap_admin</web-resource-name>
      <url-pattern>/DisplayOpResult/*</url-pattern>
      </web-resource-collection>
      <auth-constraint>
        <role-name>eap_admin</role-name>
      </auth-constraint>
    </security-constraint>

    <security-role>
      <role-name>eap_admin</role-name>
    </security-role>

    <login-config>
        <auth-method>BASIC</auth-method>
    </login-config>

</web-app>
```

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15.4. USE A THIRD-PARTY AUTHENTICATION SYSTEM IN YOUR APPLICATION

You can integrate third-party security systems with JBoss EAP 6. These types of systems are usually token-based. The external system performs the authentication and passes a token back to the Web application through the request headers. This is often referred to as *perimeter authentication*. To configure perimeter authentication in your application, add a custom authentication valve. If you have a valve from a third-party provider, be sure it is in your classpath and follow the examples below, along with the documentation for your third-party authentication module.

NOTE

The location for configuring valves has changed in JBoss EAP 6. There is no longer a **context.xml** deployment descriptor. Valves are configured directly in the **jboss-web.xml** descriptor instead. The **context.xml** is now ignored.

Example 15.2. Basic Authentication Valve

```
<jboss-web>
  <valve>
    <class-name>org.jboss.security.negotiation.NegotiationAuthenticator</class-name>
  </valve>
</jboss-web>
```

This valve is used for Kerberos-based SSO. It also shows the most simple pattern for specifying a third-party authenticator for your Web application.

Example 15.3. Custom Valve With Header Attributes Set

```
<jboss-web>
  <valve>
    <class-name>org.jboss.web.tomcat.security.GenericHeaderAuthenticator</class-name>
    <param>
      <param-name>httpHeaderForSSOAuth</param-name>
      <param-value>sm_ssoid,ct-remote-user,HTTP_OBLIX_UID</param-value>
    </param>
    <param>
      <param-name>sessionCookieForSSOAuth</param-name>
      <param-value>SMSESSION,CTSESSION,ObSSOCookie</param-value>
    </param>
  </valve>
</jboss-web>
```

This example shows how to set custom attributes on your valve. The authenticator checks for the presence of the header ID and the session key, and passes them into the JAAS framework which drives the security layer, as the username and password value. You need a custom JAAS login module which can process the username and password and populate the subject with the correct roles. If no header values match the configured values, regular form-based authentication semantics apply.

Writing a Custom Authenticator

Writing your own authenticator is out of scope of this document. However, the following Java code is provided as an example.

Example 15.4. GenericHeaderAuthenticator.java

```
/*
 * JBoss, Home of Professional Open Source.
 * Copyright 2006, Red Hat Middleware LLC, and individual contributors
 * as indicated by the @author tags. See the copyright.txt file in the
 * distribution for a full listing of individual contributors.
 *
 * This is free software; you can redistribute it and/or modify it
 * under the terms of the GNU Lesser General Public License as
 * published by the Free Software Foundation; either version 2.1 of
 * the License, or (at your option) any later version.
 *
 * This software is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
 * Lesser General Public License for more details.
 *
 * You should have received a copy of the GNU Lesser General Public
 * License along with this software; if not, write to the Free
 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */

package org.jboss.web.tomcat.security;

import java.io.IOException;
import java.security.Principal;
import java.util.StringTokenizer;

import javax.management.JMException;
import javax.management.ObjectName;
import javax.servlet.http.Cookie;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

import org.apache.catalina.Realm;
import org.apache.catalina.Session;
import org.apache.catalina.authenticator.Constants;
import org.apache.catalina.connector.Request;
import org.apache.catalina.connector.Response;
import org.apache.catalina.deploy.LoginConfig;
import org.jboss.logging.Logger;

import org.jboss.as.web.security.ExtendedFormAuthenticator;

/**
 * JBAS-2283: Provide custom header based authentication support
 *
 * Header Authenticator that deals with userid from the request header Requires
 * two attributes configured on the Tomcat Service - one for the http header
 * denoting the authenticated identity and the other is the SESSION cookie
 *
 * @author <a href="mailto:Anil.Saldhana@jboss.org">Anil Saldhana</a>
 * @author <a href="mailto:sguilhen@redhat.com">Stefan Guilhen</a>
 * @version $Revision$
 * @since Sep 11, 2006
 */
public class GenericHeaderAuthenticator extends ExtendedFormAuthenticator {
  protected static Logger log = Logger
      .getLogger(GenericHeaderAuthenticator.class);

  protected boolean trace = log.isTraceEnabled();

  // JBAS-4804: GenericHeaderAuthenticator injection of ssoid and
  // sessioncookie name.
  private String httpHeaderForSSOAuth = null;
private String sessionCookieForSSOAuth = null;

/**
 * <p>
 * Obtain the value of the <code>httpHeaderForSSOAuth</code> attribute. This
 * attribute is used to indicate the request header ids that have to be
 * checked in order to retrieve the SSO identity set by a third party
 * security system.
 * </p>
 *
 * @return a <code>String</code> containing the value of the
 *         <code>httpHeaderForSSOAuth</code> attribute.
 */
public String getHttpHeaderForSSOAuth() {
  return httpHeaderForSSOAuth;
}

/**
 * <p>
 * Set the value of the <code>httpHeaderForSSOAuth</code> attribute. This
 * attribute is used to indicate the request header ids that have to be
 * checked in order to retrieve the SSO identity set by a third party
 * security system.
 * </p>
 *
 * @param httpHeaderForSSOAuth
 *            a <code>String</code> containing the value of the
 *            <code>httpHeaderForSSOAuth</code> attribute.
 */
public void setHttpHeaderForSSOAuth(String httpHeaderForSSOAuth) {
  this.httpHeaderForSSOAuth = httpHeaderForSSOAuth;
}

/**
 * <p>
 * Obtain the value of the <code>sessionCookieForSSOAuth</code> attribute.
 * This attribute is used to indicate the names of the SSO cookies that may
 * be present in the request object.
 * </p>
 *
 * @return a <code>String</code> containing the names (separated by a
 *         <code>','</code>) of the SSO cookies that may have been set by a
 *         third party security system in the request.
 */
public String getSessionCookieForSSOAuth() {
  return sessionCookieForSSOAuth;
}

/**
 * <p>
 * Set the value of the <code>sessionCookieForSSOAuth</code> attribute. This
 * attribute is used to indicate the names of the SSO cookies that may be
 * present in the request object.
 * </p>
 *
 * @param sessionCookieForSSOAuth
 *            a <code>String</code> containing the names (separated by a
 *            <code>','</code>) of the SSO cookies that may have been set by
 *            a third party security system in the request.
 */
public void setSessionCookieForSSOAuth(String sessionCookieForSSOAuth) {
  this.sessionCookieForSSOAuth = sessionCookieForSSOAuth;
}

/**
 * <p>
 * Creates an instance of <code>GenericHeaderAuthenticator</code>.
 * </p>
 */
public GenericHeaderAuthenticator() {
  super();
}

public boolean authenticate(Request request, HttpServletResponse response,
    LoginConfig config) throws IOException {
  log.trace("Authenticating user");

  Principal principal = request.getUserPrincipal();
  if (principal != null) {
    if (trace)
      log.trace("Already authenticated '" + principal.getName() + "'");
    return true;
  }

  Realm realm = context.getRealm();
  Session session = request.getSessionInternal(true);

  String username = getUserId(request);
  String password = getSessionCookie(request);

  // Check if there is sso id as well as sessionkey
  if (username == null || password == null) {
    log.trace("Username is null or password(sessionkey) is null:fallback to form auth");
    return super.authenticate(request, response, config);
  }
  principal = realm.authenticate(username, password);

  if (principal == null) {
    forwardToErrorPage(request, response, config);
    return false;
  }

  session.setNote(Constants.SESS_USERNAME_NOTE, username);
  session.setNote(Constants.SESS_PASSWORD_NOTE, password);
  request.setUserPrincipal(principal);

  register(request, response, principal, HttpServletRequest.FORM_AUTH,
      username, password);
  return true;
}
```

```
/**
 * Get the username from the request header
 *
 * @param request
 * @return
 */
protected String getUserId(Request request) {
  String ssoid = null;
  // We can have a comma-separated ids
  String ids = "";
  try {
    ids = this.getIdentityHeaderId();
  } catch (JMException e) {
    if (trace)
      log.trace("getUserId exception", e);
  }
  if (ids == null || ids.length() == 0)
    throw new IllegalStateException(
        "Http headers configuration in tomcat service missing");

  StringTokenizer st = new StringTokenizer(ids, ",");
  while (st.hasMoreTokens()) {
    ssoid = request.getHeader(st.nextToken());
    if (ssoid != null)
      break;
  }
  if (trace)
    log.trace("SSOID-" + ssoid);
  return ssoid;
}

/**
 * Obtain the session cookie from the request
 *
 * @param request
 * @return
 */
protected String getSessionCookie(Request request) {
  Cookie[] cookies = request.getCookies();
  log.trace("Cookies:" + cookies);
  int numCookies = cookies != null ? cookies.length : 0;

  // We can have comma-separated ids
  String ids = "";
  try {
    ids = this.getSessionCookieId();
    log.trace("Session Cookie Ids=" + ids);
  } catch (JMException e) {
    if (trace)
      log.trace("checkSessionCookie exception", e);
  }
  if (ids == null || ids.length() == 0)
    throw new IllegalStateException(
        "Session cookies configuration in tomcat service missing");

  StringTokenizer st = new StringTokenizer(ids, ",");
```

```
    while (st.hasMoreTokens()) {
      String cookieToken = st.nextToken();
      String val = getCookieValue(cookies, numCookies, cookieToken);
      if (val != null)
        return val;
    }
    if (trace)
      log.trace("Session Cookie not found");
    return null;
  }

  /**
   * Get the configured header identity id in the tomcat service
   *
   * @return
   * @throws JMException
   */
  protected String getIdentityHeaderId() throws JMException {
    if (this.httpHeaderForSSOAuth != null)
      return this.httpHeaderForSSOAuth;
    return (String) mserver.getAttribute(new ObjectName(
        "jboss.web:service=WebServer"), "HttpHeaderForSSOAuth");
  }

  /**
   * Get the configured session cookie id in the tomcat service
   *
   * @return
   * @throws JMException
   */
  protected String getSessionCookieId() throws JMException {
    if (this.sessionCookieForSSOAuth != null)
      return this.sessionCookieForSSOAuth;
    return (String) mserver.getAttribute(new ObjectName(
        "jboss.web:service=WebServer"), "SessionCookieForSSOAuth");
  }

  /**
   * Get the value of a cookie if the name matches the token
   *
   * @param cookies
   *          array of cookies
   * @param numCookies
   *          number of cookies in the array
   * @param token
   *          Key
   * @return value of cookie
   */
  protected String getCookieValue(Cookie[] cookies, int numCookies,
      String token) {
    for (int i = 0; i < numCookies; i++) {
      Cookie cookie = cookies[i];
      log.trace("Matching cookieToken:" + token + " with cookie name="
          + cookie.getName());
      if (token.equals(cookie.getName())) {
        if (trace)
```

```
            log.trace("Cookie-" + token + " value=" + cookie.getValue());
          return cookie.getValue();
        }
      }
      return null;
    }
  }
```

Report a bug

CHAPTER 16. MIGRATION

16.1. CONFIGURE APPLICATION SECURITY CHANGES

Configure security for basic authentication

In previous versions of JBoss EAP, properties files placed in the ***EAP_HOME*/server/*SERVER_NAME*/conf/** directory were on classpath and could be easily found by the **UsersRolesLoginModule**. In JBoss EAP 6, the directory structure has changed. Properties files must be packaged within the application to make them available in the classpath.

IMPORTANT

You must stop the server before editing the server configuration file for your change to be persisted on server restart.

To configure security for basic authentication, add a new security domain under **security-domains** to the **standalone/configuration/standalone.xml** or the **domain/configuration/domain.xml** server configuration file:

```
<security-domain name="example">
    <authentication>
        <login-module code="UsersRoles" flag="required">
            <module-option name="usersProperties"
                    value="${jboss.server.config.dir}/example-users.properties"/>
            <module-option name="rolesProperties"
                    value="${jboss.server.config.dir}/example-roles.properties"/>
        </login-module>
    </authentication>
</security-domain>
```

If the JBoss EAP 6 instance is running as a standalone server, **${jboss.server.config.dir}** refers to the ***EAP_HOME*/standalone/configuration/** directory. If the instance is running in a managed domain, **${jboss.server.config.dir}** refers to the ***EAP_HOME*/domain/configuration/** directory.

Modify security domain names

In JBoss EAP 6, security domains no longer use the prefix **java:/jaas/** in their names.

- For Web applications, you must remove this prefix from the security domain configurations in the **jboss-web.xml**.
- For Enterprise applications, you must remove this prefix from the security domain configurations in the **jboss-ejb3.xml** file. This file has replaced the **jboss.xml** in JBoss EAP 6.

Report a bug

APPENDIX A. REFERENCE

A.1. INCLUDED AUTHENTICATION MODULES

The following authentication modules are included in JBoss EAP 6. Some of these handle authorization as well as authentication. These usually include the word **Role** within the **Code** name.

When you configure these modules, use the **Code** value or the full (package qualified) name to refer to the module.

Authentication Modules

Table A.1. **RealmDirect**

Code	**RealmDirect**
Class	**org.jboss.as.security.RealmDirectLoginModule**
Description	A login module implementation to interface directly with the security realm. This login module allows all interactions with the backing store to be delegated to the realm removing the need for any duplicate and synchronized definitions. Used for remoting calls and management interface.

Table A.2. **RealmDirect** Module Options

Option	Type	Default	Description
realm	string	**ApplicationRealm**	Name of the desired realm.

Table A.3. **Client**

Code	**Client**
Class	**org.jboss.security.ClientLoginModule**
Description	This login module is designed to establish caller identity and credentials when JBoss EAP 6 is acting as a client. It should never be used as part of a security domain used for server authentication.

Table A.4. **Client** Module Options

Option	Type	Default	Description
multi-threaded	**true** or **false**	**false**	Set to true if each thread has its own principal and credential storage. Set to false to indicate that all threads in the VM share the same identity and credential.
password-stacking	**useFirstPass** or **false**	**false**	Set to **useFirstPass** to indicate that this login module should look for information stored in the **LoginContext** to use as the identity. This option can be used when stacking other login modules with this one.
restore-login-identity	**true** or **false**	**false**	Set to true if the identity and credential seen at the start of the **login()** method should be restored after the **logout()** method is invoked.

Table A.5. **Remoting**

Code	**Remoting**

Class	**org.jboss.as.security.remoting.RemotingLoginModule**
Description	This login module is used to check if the request currently being authenticated is a request received over a Remoting connection, and if so the identity that was created during the Remoting authentication process is used and associated with the current request. If the request did not arrive over a Remoting connection this module does nothing and allows the JAAS based login to continue to the next module.

Table A.6. **Remoting** Module Options

Option	Type	Default	Description
password-stacking	**useFirstPass** or **false**	**false**	A value of **useFirstPass** indicates that this login module should first look to the information stored in the **LoginContext** for the identity. This option can be used when stacking other login modules with this one.
principalClass	A fully-qualified classname.	none	A **Principal** implementation class which contains a constructor that takes String arguments for the principal name.
unauthenticatedIdentity	A principal name.	none	Defines the principal name assigned to requests which contain no authentication information. This can allow unprotected servlets to invoke methods on EJBs that do not require a specific role. Such a principal has no associated roles and can only access unsecured EJBs or EJB methods that are associated with the **unchecked permission** constraint.

Table A.7. **Certificate**

Code	**Certificate**

Class	**org.jboss.security.auth.spi.BaseCertLoginModule**
Description	This login module is designed to authenticate users based on **X509 Certificates**. A use case for this is **CLIENT-CERT** authentication of a web application.

Table A.8. **Certificate** Module Options

Option	Type	Default	Description
securityDomain	string	**other**	Name of the security domain that has the JSSE configuration for the truststore holding the trusted certificates.
verifier	class	none	The class name of the **org.jboss.security.auth.certs.X509CertificateVerifier** to use for verification of the login certificate.

Table A.9. **CertificateRoles**

Code	**CertificateRoles**
Class	**org.jboss.security.auth.spi.CertRolesLoginModule**
Description	This login module extends the Certificate login module to add role mapping capabilities from a properties file. It takes all of the same options as the Certificate login module, and adds the following options.

Table A.10. **CertificateRoles** Module Options

Option	Type	Default	Description

Option	Type	Default	Description
rolesProperties	string	**roles.properties**	The name of the resource or file containing the roles to assign to each user. The role properties file must be in the format **username=role1,role2** where the username is the DN of the certificate, escaping any **=** (equals) and space characters. The following example is in the correct format: `CN\=unit-tests-client,\ OU\=Red\ Hat\ Inc.,\ O\=Red\ Hat\ Inc.,\ ST\=North\ Carolina,\ C\=US`
defaultRolesProperties	string	**defaultRoles.properties**	Name of the resource or file to fall back to if the **rolesProperties** file cannot be found.
roleGroupSeparator	A single character.	**.** (a single period)	Which character to use as the role group separator in the **rolesProperties** file.

Table A.11. **Database**

Code	**Database**
Class	**org.jboss.security.auth.spi.DatabaseServerLoginModule**
Description	A JDBC-based login module that supports authentication and role mapping. It is based on two logical tables, with the following definitions. ● **Principals: PrincipalID (text), Password (text)** ● **Roles: PrincipalID (text), Role (text), RoleGroup (text)**

Table A.12. **Database** Module Options

Option	Type	Default	Description
digestCallback	A fully-qualified classname	none	The class name of the **DigestCallback** implementation that includes pre/post digest content like salts for hashing the input password. Only used if **hashAlgorithm** has been specified.
dsJndiName	A JNDI resource	**java:/DefaultDS**	The name of the JNDI resource storing the authentication information. This option is required.
hashAlgorithm	String	Use plain passwords	The message digest algorithm used to hash passwords. Supported algorithms depend on the Java Security Provider, but the following are supported: **MD5**, **SHA-1**, and **SHA-256**.
hashCharset	String	The platform's default encoding	The name of the charset/encoding to use when converting the password String to a byte array. This includes all supported Java charset names.
hashEncoding	String	Base64	The string encoding format to use.
ignorePassword Case	boolean	false	A flag indicating if the password comparison should ignore case.
inputValidator	A fully-qualified classname	none	The instance of the InputValidator implementation used to validate the username and password supplied by the client.
principalsQuery	prepared SQL statement	**select Password from Principals where PrincipalID=?**	The prepared SQL query to obtain the information about the principal.
rolesQuery	prepared SQL statement	none	The prepared SQL query to obtain the information about the roles. It should be equivalent to **select Role, RoleGroup from Roles where PrincipalID=?**, where Role is the role name and the RoleGroup column value should always be either **Roles** with a capital **R** or **CallerPrincipal**.
storeDigestCall back	A fully-qualified classname	none	The class name of the **DigestCallback** implementation that includes pre/post digest content like salts for hashing the store/expected password. Only used if **hashStorePassword** or **hashUserPassword** is **true** and **hashAlgorithm** has been specified.

Option	Type	Default	Description
suspendResume	boolean	true	Whether any existing JTA transaction should be suspended during database operations.
throwValidatorError	boolean	false	A flag that indicates whether validation errors should be exposed to clients or not
transactionManagerJndiName	JNDI Resource	java:/TransactionManager	The JNDI name of the transaction manager used by the login module.

Table A.13. **DatabaseCertificate**

Code	**DatabaseCertificate**
Class	**org.jboss.security.auth.spi.DatabaseCertLoginModule**
Description	This login module extends the Certificate login module to add role mapping capabilities from a database table. It has the same options plus these additional options:

Table A.14. **DatabaseCertificate** Module Options

Option	Type	Default	Description
dsJndiName	A JNDI resource	**java:/DefaultDS**	The name of the JNDI resource storing the authentication information. This option is required.
rolesQuery	prepared SQL statement	**select Role,RoleGroup from Roles where PrincipalID=?**	SQL prepared statement to be executed in order to map roles. It should be an equivalent to **select Role, RoleGroup from Roles where PrincipalID=?**, where Role is the role name and the RoleGroup column value should always be either **Roles** with a capital **R** or **CallerPrincipal**.
suspendResume	**true** or **false**	**true**	Whether any existing JTA transaction should be suspended during database operations.

Table A.15. **Identity**

Code	**Identity**
Class	**org.jboss.security.auth.spi.IdentityLoginModule**
Description	Associates the principal specified in the module options with any subject authenticated against the module. The type of Principal class used is **org.jboss.security.SimplePrincipal**. If no principal option is specified a principal with the name of **guest** is used.

Table A.16. **Identity** Module Options

Option	Type	Default	Description
principal	String	**guest**	The name to use for the principal.
roles	comma-separated list of strings	none	A comma-delimited list of roles which will be assigned to the subject.

Table A.17. **Ldap**

Code	**Ldap**
Class	**org.jboss.security.auth.spi.LdapLoginModule**
Description	Authenticates against an LDAP server, when the username and password are stored in an LDAP server that is accessible using a JNDI LDAP provider. Many of the options are not required, because they are determined by the LDAP provider or the environment.

Table A.18. **Ldap** Module Options

Option	Type	Default	Description
java.naming.factory.initial	class name	**com.sun.jndi.ldap.LdapCtxFactory**	**InitialContextFactory** implementation class name.
java.naming.provider.url	**ldap://** URL	If the value of **java.naming.security.protocol** is **SSL**, **ldap://localhost:636**, otherwise **ldap://localhost:389**	URL for the LDAP server.

Option	Type	Default	Description
java.naming.security .authentication	**none**, **simple**, or the name of a SASL mechanism	**simple**	The security level to use to bind to the LDAP server.
java.naming.security .protocol	transport protocol	If unspecified, determined by the provider.	The transport protocol to use for secure access, such as SSL or TLS.
java.naming.security .principal	string	none	The name of the principal for authenticating the caller to the service. This is built from other properties described below.
java.naming.security .credentials	credential type	none	The type of credential used by the authentication scheme. Some examples include hashed password, clear-text password, key, or certificate. If this property is unspecified, the behavior is determined by the service provider.
principalDNPrefix	string		Prefix added to the username to form the user DN. You can prompt the user for a username and build the fully-qualified DN by using the **principalDNPrefix** and **principalDNSuffix**.
principalDNSuffix	string		Suffix added to the username to form the user DN. You can prompt the user for a username and build the fully-qualified DN by using the **principalDNPrefix** and **principalDNSuffix**.

Option	Type	Default	Description
useObjectCredential	**true** or **false**	false	Whether the credential should be obtained as an opaque Object using the **org.jboss.security.auth.callback.ObjectCallback** type of Callback rather than as a **char[]** password using a JAAS PasswordCallback. This allows for passing **non-char[]** credential information to the LDAP server.
rolesCtxDN	fully-qualified DN	none	The fully-qualified DN for the context to search for user roles.
userRolesCtxDNAttributeName	attribute	none	The attribute in the user object that contains the DN for the context to search for user roles. This differs from **rolesCtxDN** in that the context to search for a user's roles may be unique for each user.
roleAttributeID	attribute	**roles**	Name of the attribute containing the user roles.
roleAttributeIsDN	**true** or **false**	**false**	Whether or not the **roleAttributeID** contains the fully-qualified DN of a role object. If false, the role name is taken from the value of the **roleNameAttributeId** attribute of the context name. Certain directory schemas, such as Microsoft Active Directory, require this attribute to be set to **true**.

Option	Type	Default	Description
roleNameAttributeID	attribute	**name**	Name of the attribute within the **roleCtxDN** context which contains the role name. If the **roleAttributeIsDN** property is set to **true**, this property is used to find the role object's name attribute.
uidAttributeID	attribute	**uid**	Name of the attribute in the **UserRolesAttributeDN** that corresponds to the user ID. This is used to locate the user roles.
matchOnUserDN	**true** or **false**	**false**	Whether or not the search for user roles should match on the user's fully-distinguished DN or the username only. If **true**, the full user DN is used as the match value. If **false**, only the username is used as the match value against the **uidAttributeName** attribute.
allowEmptyPasswords	**true** or **false**	**false**	Whether to allow empty passwords. Most LDAP servers treat empty passwords as anonymous login attempts. To reject empty passwords, set this to **false**.

Table A.19. **LdapExtended**

Code	**LdapExtended**
Class	**org.jboss.security.auth.spi.LdapExtLoginModule**

Description	An alternate LDAP login module implementation that uses searches to locate the bind user and associated roles. The roles query recursively follows DNs to navigate a hierarchical role structure. It uses the same **java.naming** options as the Ldap module, and uses the following options instead of the other options of the Ldap module. The authentication happens in 2 steps: 1. An initial bind to the LDAP server is done using the bindDN and **bindCredential** options. The **bindDN** is a LDAP user with the ability to search both the baseCtxDN and **rolesCtxDN** trees for the user and roles. The user DN to authenticate against is queried using the filter specified by the **baseFilter** attribute. 2. The resulting user DN is authenticated by binding to the LDAP server using the user DN as the **InitialLdapContext** environment **Context.SECURITY_PRINCIPAL**. The **Context.SECURITY_CREDENTIALS** property is set to the String password obtained by the callback handler.

Table A.20. **LdapExtended** Module Options

Option	Type	Default	Description
baseCtxDN	fully-qualified DN	none	The fixed DN of the top-level context to begin the user search.
bindCredential	string, optionally encrypted	none	See the *JBoss EAP Application Security Guide* for more information.
bindDN	fully-qualified DN	none	The DN used to bind against the LDAP server for the user and roles queries. This DN needs read and search permissions on the **baseCtxDN** and **rolesCtxDN** values.

Option	Type	Default	Description
baseFilter	LDAP filter string	none	A search filter used to locate the context of the user to authenticate. The input username or **userDN** obtained from the login module callback is substituted into the filter anywhere a **{0}** expression is used. A common example for the search filter is **(uid={0})**.
rolesCtxDN	fully-qualified DN	none	The fixed DN of the context to search for user roles. This is not the DN where the actual roles are, but the DN where the objects containing the user roles are. For example, in a Microsoft Active Directory server, this is the DN where the user account is.
roleFilter	LDAP filter string	none	A search filter used to locate the roles associated with the authenticated user. The input username or **userDN** obtained from the login module callback is substituted into the filter anywhere a **{0}** expression is used. The authenticated **userDN** is substituted into the filter anywhere a **{1}** is used. An example search filter that matches on the input username is **(member={0})**. An alternative that matches on the authenticated **userDN** is **(member={1})**.

Option	Type	Default	Description
roleAttributeIsDN	**true** or **false**	**false**	Whether or not the **roleAttributeID** contains the fully-qualified DN of a role object. If false, the role name is taken from the value of the **roleNameAttributeId** attribute of the context name. Certain directory schemas, such as Microsoft Active Directory, require this attribute to be set to **true**.
defaultRole	Role name	none	A role included for all authenticated users
parseRoleNameFromDN	**true** or **false**	**false**	A flag indicating if the DN returned by a query contains the roleNameAttributeID. If set to **true**, the DN is checked for the roleNameATtributeID. If set to **false**, the DN is not checked for the roleNameAttributeID. This flag can improve the performance of LDAP queries.
parseUsername	**true** or **false**	**false**	A flag indicating if the DN is to be parsed for the username. If set to **true**, the DN is parsed for the username. If set to **false** the DN is not parsed for the username. This option is used together with usernameBeginString and usernameEndString.
usernameBeginString	string	none	Defines the string which is to be removed from the start of the DN to reveal the username. This option is used together with **usernameEndString**.

Option	Type	Default	Description
usernameEndString	string	none	Defines the string which is to be removed from the end of the DN to reveal the username. This option is used together with **usernameBeginString**.
roleNameAttributeID	attribute	**name**	Name of the attribute within the **roleCtxDN** context which contains the role name. If the **roleAttributeIsDN** property is set to **true**, this property is used to find the role object's name attribute.
distinguishedNameAttribute	attribute	**distinguishedName**	The name of the attribute in the user entry that contains the DN of the user. This may be necessary if the DN of the user itself contains special characters (backslash for example) that prevent correct user mapping. If the attribute does not exist, the entry's DN is used.
roleRecursion	integer	**0**	The numbers of levels of recursion the role search will go below a matching context. Disable recursion by setting this to **0**.
searchTimeLimit	integer	**10000** (10 seconds)	The timeout in milliseconds for user or role searches.
searchScope	One of: **OBJECT_SCOPE, ONELEVEL_SCOPE, SUBTREE_SCOPE**	**SUBTREE_SCOPE**	The search scope to use.
allowEmptyPasswords	**true** or **false**	**false**	Whether to allow empty passwords. Most LDAP servers treat empty passwords as anonymous login attempts. To reject empty passwords, set this to false.

Option	Type	Default	Description
referralUserAttributeIDToCheck	attribute	none	If you are not using referrals, this option can be ignored. When using referrals, this option denotes the attribute name which contains users defined for a certain role (for example, **member**), if the role object is inside the referral. Users are checked against the content of this attribute name. If this option is not set, the check will always fail, so role objects cannot be stored in a referral tree.

Table A.21. **RoleMapping**

Code	**RoleMapping**
Class	**org.jboss.security.auth.spi.RoleMappingLoginModule**
Description	Maps a role which is the end result of the authentication process to a declarative role. This module must be flagged as **optional** when you add it to the security domain.

Table A.22. **RoleMapping** Module Options

Option	Type	Default	Description
rolesProperties	The fully-qualified file path and name of a properties file or resource	**none**	The fully-qualified file path and name of a properties file or resource which maps roles to replacement roles. The format is **original_role=role1,role2,role3**
replaceRole	**true** or **false**	**false**	Whether to add to the current roles, or replace the current roles with the mapped ones. Replaces if set to **true**.

NOTE

The **rolesProperties** module option is required for RoleMapping.

Table A.23. **RunAs**

Code	**RunAs**
Class	**org.jboss.security.auth.spi.RunAsLoginModule**
Description	A helper module that pushes a **run as** role onto the stack for the duration of the login phase of authentication, and pops the **run as** role off the stack in either the commit or abort phase. This login module provides a role for other login modules that must access secured resources in order to perform their authentication, such as a login module which accesses a secured EJB. **RunAsLoginModule** must be configured before the login modules that require a **run as** role to be established.

Table A.24. **RunAs** Options

Option	Type	Default	Description
roleName	role name	**nobody**	The name of the role to use as the **run as** role during the login phase.
principalName	principal name	**nobody**	Name of the principal to use as the **run as** principal during login phase. If not specified a default of **nobody** is used.
principalClass	A fully-qualified classname.	none	A **Principal** implementation class which contains a constructor that takes String arguments for the principal name.

Table A.25. **Simple**

Code	**Simple**
Class	**org.jboss.security.auth.spi.SimpleServerLoginModule**

Description	A module for quick setup of security for testing purposes. It implements the following simple algorithm: ● If the password is null, authenticate the user and assign an identity of **guest** and a role of **guest**. ● Otherwise, if the password is equal to the user, assign an identity equal to the username and both **admin** and **guest** roles. ● Otherwise, authentication fails.

Simple Module Options

The **Simple** module has no options.

Table A.26. **ConfiguredIdentity**

Code	**ConfiguredIdentity**
Class	**org.picketbox.datasource.security.ConfiguredIdentityLoginModule**
Description	Associates the principal specified in the module options with any subject authenticated against the module. The type of Principal class used is **org.jboss.security.SimplePrincipal**.

Table A.27. **ConfiguredIdentity** Module Options

Option	Type	Default	Description
username	string	none	The username for authentication.

Option	Type	Default	Description
password	encrypted string	""	The password to use for authentication. To encrypt the password, use the module directly at the command line. `java org.picketbox.datasource.security.SecureIdentityLoginModule *password_to_encrypt*` Paste the result of this command into the module option's value field. The default value is an empty string.
principal	Name of a principal	**none**	The principal which will be associated with any subject authenticated against the module.

Table A.28. **SecureIdentity**

Code	**SecureIdentity**
Class	**org.picketbox.datasource.security.SecureIdentityLoginModule**
Description	This module is provided for legacy purposes. It allows you to encrypt a password and then use the encrypted password with a static principal. If your application uses **SecureIdentity**, consider using a password vault mechanism instead.

Table A.29. **SecureIdentity** Module Options

Option	Type	Default	Description
username	string	none	The username for authentication.

Option	Type	Default	Description
password	encrypted string	""	The password to use for authentication. To encrypt the password, use the module directly at the command line. `java org.picketbox.datasource.security.SecureIdentityLoginModule *password_to_encrypt*` Paste the result of this command into the module option's value field. The default value is an empty string.
managedConnectionFactoryName	JCA resource	none	The name of the JCA connection factory for your datasource.

Table A.30. **PropertiesUsers**

Code	**PropertiesUsers**
Class	**org.jboss.security.auth.spi.PropertiesUsersLoginModule**
Description	Uses a properties file to store usernames and passwords for authentication. No authorization (role mapping) is provided. This module is only appropriate for testing.

Table A.31. **SimpleUsers**

Code	**SimpleUsers**
Class	**org.jboss.security.auth.spi.SimpleUsersLoginModule**
Description	This login module stores the username and clear-text password using ***module-option***. ***module-option***'s ***name*** and ***value*** attributes specify a username and password. It is included for testing only, and is not appropriate for a production environment.

Table A.32. **LdapUsers**

Code	**LdapUsers**
Class	**org.jboss.security.auth.spi.LdapUsersLogin Module**
Description	The **LdapUsers** module is superseded by the **ExtendedLDAP** and **AdvancedLdap** modules.

Table A.33. **Kerberos**

Code	**Kerberos**
Class	**com.sun.security.auth.module.Krb5LoginMo dule**. In the IBM JDK the classname is **com.ibm.security.auth.module.Krb5LoginMo dule**.
Description	Performs Kerberos login authentication, using GSSAPI. This module is part of the security framework from the API provided by Sun Microsystems. Details can be found at http://docs.oracle.com/javase/7/docs/jre/api/security/jaas/spec/com/sun/security/auth/module/Krb5LoginModule.html. This module needs to be paired with another module which handles the authentication and roles mapping.

Table A.34. **Kerberos** Module Options

Option	Type	Default	Description
storekey	**true** or **false**	false	Whether or not to add the **KerberosKey** to the subject's private credentials.
doNotPrompt	**true** or **false**	false	If set to **true**, the user is not prompted for the password if credentials cannot be obtained from the cache, the keytab, or through shared state.
useTicketCache	Boolean value of **true** or **false** .	false	If **true**, the TGT is obtained from the ticket cache. If **false**, the ticket cache is not used.

Option	Type	Default	Description
ticketcache	A file or resource representing a Kerberos ticket cache. If this is set, ***useTicketCache*** must also be set to **true**, otherwise a configuration error will be returned.	The default depends on which operating system you use. ● Red Hat Enterprise Linux / Solaris: **/tmp/krb5cc_*uid***, using the numeric UID value of the operating system. ● Microsoft Windows Server: uses the Local Security Authority (LSA) API to find the ticketcache.	The location of the ticket cache.
useKeyTab	**true** or **false**	false	Whether to obtain the principal's key from a key table file.
keytab	A file or resource representing a Kerberos keytab.	the location in the operating system's Kerberos configuration file, or **/home/*user*/krb5.keytab**	The location of the key table file.
principal	string	none	The name of the principal. This can either be a simple user name or a service name such as **host/testserver.acme.com**. Use this instead of obtaining the principal from the key table, or when the key table contains more than one principal.

Option	Type	Default	Description
useFirstPass	**true** or **false**	false	Whether to retrieve the username and password from the module's shared state, using **javax.security.auth.login.name** and **javax.security.auth.login.password** as the keys. If authentication fails, no retry attempt is made.
tryFirstPass	**true** or **false**	false	Same as **useFirstPass**, but if authentication fails, the module uses the **CallbackHandler** to retrieve a new username and password. If the second authentication fails, the failure is reported to the calling application.
storePass	**true** or **false**	false	Whether to store the username and password in the module's shared state. This does not happen if the keys already exist in the shared state, or if authentication fails.
clearPass	**true** or **false**	false	Set this to **true** to clear the username and password from the shared state after both phases of authentication complete.

Table A.35. **SPNEGO**

Code	**SPNEGO**
Class	**org.jboss.security.negotiation.spnego.SPNEGOLoginModule**
Description	Allows SPNEGO authentication to a Microsoft Active Directory server or other environment which supports SPNEGO. SPNEGO can also carry Kerberos credentials. This module needs to be paired with another module which handles authentication and role mapping.

Table A.36. **SPNEGO** Module Options

Option	Type	Default	Description
serverSecurityDomain	**string**	**null**.	Defines the domain that is used to retrieve the identity of the server service through the kerberos login module. This property must be set.
removeRealmFromPrincipal	**boolean**	**false**	Specifies that the Kerberos realm should be removed from the principal before further processing.
usernamePasswordDomain	**string**	**null**	Specifies another security domain within the configuration that should be used as a failover login when Kerberos fails.

Table A.37. **AdvancedLdap**

Code	**AdvancedLdap**
Class	**org.jboss.security.negotiation.AdvancedLdapLoginModule**
Description	A module which provides additional functionality, such as SASL and the use of a JAAS security domain.

Table A.38. **AdvancedLdap** Module Options

Option	Type	Default	Description
bindAuthentication	string	none	The type of SASL authentication to use for binding to the directory server.
java.naming.provider.url	**string**	If the value of **java.naming.security.protocol** is **SSL**, **ldap://localhost:686**, otherwise **ldap://localhost:389**	The URI of the directory server.
baseCtxDN	fully-qualified DN	none	The distinguished name to use as the base for searches.

Option	Type	Default	Description
baseFilter	String representing a LDAP search filter.	none	The filter to use to narrow down search results.
roleAttributeID	String value representing an LDAP attribute.	none	The LDAP attribute which contains the names of authorization roles.
roleAttributeIsDN	**true** or **false**	**false**	Whether the role attribute is a Distinguished Name (DN).
roleNameAttributeID	String representing an LDAP attribute.	none	The attribute contained within the **RoleAttributeId** which contains the actual role attribute.
recurseRoles	**true** or **false**	**false**	Whether to recursively search the **RoleAttributeId** for roles.
referralUserAttributeIDToCheck	attribute	none	If you are not using referrals, this option can be ignored. When using referrals, this option denotes the attribute name which contains users defined for a certain role (for example, **member**), if the role object is inside the referral. Users are checked against the content of this attribute name. If this option is not set, the check will always fail, so role objects cannot be stored in a referral tree.

Table A.39. **AdvancedADLdap**

Code	**AdvancedADLdap**
Class	**org.jboss.security.negotiation.AdvancedADLoginModule**
Description	This module extends the **AdvancedLdap** login module, and adds extra parameters that are relevant to Microsoft Active Directory.

Table A.40. **UsersRoles**

Code	**UsersRoles**
Class	**org.jboss.security.auth.spi.UsersRolesLoginModul**
Description	A simple login module that supports multiple users and user roles stored in two different properties files.

Table A.41. **UsersRoles** Module Options

Option	Type	Default	Description
usersProperties	Path to a file or resource.	**users.properties**	The file or resource which contains the user-to-password mappings. The format of the file is ***username=password***
rolesProperties	Path to a file or resource.	**roles.properties**	The file or resource which contains the user-to-role mappings. The format of the file is **username=role1,role2,role3**
password-stacking	**useFirstPass** or **false**	**false**	A value of **useFirstPass** indicates that this login module should first look to the information stored in the **LoginContext** for the identity. This option can be used when stacking other login modules with this one.

Option	Type	Default	Description
hashAlgorithm	String representing a password hashing algorithm.	**none**	The name of the **java.security.MessageDigest** algorithm to use to hash the password. There is no default so this option must be explicitly set to enable hashing. When **hashAlgorithm** is specified, the clear text password obtained from the **CallbackHandler** is hashed before it is passed to **UsernamePasswordLoginModule.validatePassword** as the **inputPassword** argument. The password stored in the **users.properties** file must be comparably hashed.
hashEncoding	**base64** or **hex**	**base64**	The string format for the hashed password, if hashAlgorithm is also set.
hashCharset	string	The default encoding set in the container's runtime environment	The encoding used to convert the clear-text password to a byte array.
unauthenticatedIdentity	principal name	none	Defines the principal name assigned to requests which contain no authentication information. This can allow unprotected servlets to invoke methods on EJBs that do not require a specific role. Such a principal has no associated roles and can only access unsecured EJBs or EJB methods that are associated with the **unchecked permission** constraint.

Custom Authentication Modules

Authentication modules are implementations of **javax.security.auth.spi.LoginModule**. Refer to the API documentation for more information about creating a custom authentication module.

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A.2. INCLUDED AUTHORIZATION MODULES

The following modules provide authorization services.

Code	Class
DenyAll	org.jboss.security.authorization.modules.AllDenyAuthorizationModule
PermitAll	org.jboss.security.authorization.modules.AllPermitAuthorizationModule
Delegating	org.jboss.security.authorization.modules.DelegatingAuthorizationModule
Web	org.jboss.security.authorization.modules.web.WebAuthorizationModule
JACC	org.jboss.security.authorization.modules.JACCAuthorizationModule
XACML	org.jboss.security.authorization.modules.XACMLAuthorizationModule

AllDenyAuthorizationModule

This is a simple authorization module that always denies an authorization request. No configuration options are available.

AllPermitAuthorizationModule

This is a simple authorization module that always permits an authorization request. No configuration options are available.

DelegatingAuthorizationModule

This is the default authorization module that delegates decision making to the configured delegates.

WebAuthorizationModule

This is the default web authorization module with the default Tomcat authorization logic (permit all).

JACCAuthorizationModule

This module enforces JACC semantics using two delegates (WebJACCPolicyModuleDelegate for web container authorization requests and EJBJACCPolicyModuleDelegate for EJB container requests). No configuration options available.

XACMLAuthorizationModule

This module enforces XACML authorization using two delegates for web and EJB containers (WebXACMLPolicyModuleDelegate and EJBXACMLPolicyModuleDelegate). It creates a PDP object based on registered policies and evaluates web or EJB requests against it.

AbstractAuthorizationModule

This is the base authorization module which has to be overridden and provides a facility for delegating to other authorization modules.

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A.3. INCLUDED SECURITY MAPPING MODULES

The following security mapping roles are provided in JBoss EAP 6.

Code	Class
PropertiesRoles	**org.jboss.security.mapping.providers.role.PropertiesRolesMappingProvider**
SimpleRoles	**org.jboss.security.mapping.providers.role.SimpleRolesMappingProvider**
DeploymentRoles	**org.jboss.security.mapping.providers.DeploymentRolesMappingProvider**
DatabaseRoles	**org.jboss.security.mapping.providers.role.DatabaseRolesMappingProvider**
LdapRoles	**org.jboss.security.mapping.providers.role.LdapRolesMappingProvider**
LdapAttributes	**org.jboss.security.mapping.providers.attribute.LdapAttributeMappingProvider**

DeploymentRolesMappingProvider

A Role Mapping Module that takes into consideration a principal to roles mapping that can be done in **jboss-web.xml** and **jboss-app.xml** deployment descriptors.

Example A.1. Example

```
<jboss-web>
...
  <security-role>
      <role-name>Support</role-name>
      <principal-name>Mark</principal-name>
      <principal-name>Tom</principal-name>
  </security-role>
...
</jboss-web>
```

org.jboss.security.mapping.providers.DeploymentRoleToRolesMappingProvider

A Role to Roles Mapping Module that takes into consideration a principal to roles mapping that can be done in the deployment descriptors **jboss-web.xml** and **jboss-app.xml**. In this case principal-name denotes role to map other roles.

Example A.2. Example

```
<jboss-web>
...
  <security-role>
    <role-name>Employee</role-name>
    <principal-name>Support</principal-name>
    <principal-name>Sales</principal-name>
  </security-role>
...
</jboss-web>
```

Which means that each principal having role Support or Sales will also have role Employee assigned.

org.jboss.security.mapping.providers.OptionsRoleMappingProvider

Role Mapping Provider that picks up the roles from the options and then appends them to the passed Group. Takes the properties style mapping of role name (key) with a comma separated list of roles (values).

org.jboss.security.mapping.providers.principal.SimplePrincipalMappingProvider

A principal mapping provider that takes in a SimplePrincipal and converts into SimplePrincipal with a different principal name.

DatabaseRolesMappingProvider

A MappingProvider that reads roles from a database.

Options:

- **dsJndiName**: JNDI name of data source used to map roles to the user.
- **rolesQuery**: This option should be a prepared statement equivalent to "select RoleName from Roles where User=?" ? is substituted with current principal name.
- **suspendResume**: Boolean - To suspend and later resume transaction associated with current thread while performing search for roles.
- **transactionManagerJndiName**: JNDI name of Transaction mamager (default is java:/TransactionManager)

LdapRolesMappingProvider

A mapping provider that assigns roles to an user using a LDAP server to search for the roles.

Options:

- **bindDN**: The DN used to bind against the LDAP server for the user and roles queries. This DN needs read and search permissions on the baseCtxDN and rolesCtxDN values.

- **bindCredential**: The password for the bindDN. This can be encrypted if the jaasSecurityDomain is specified.
- **rolesCtxDN**: The fixed DN of the context to search for user roles. This is not the DN where the actual roles are, but the DN where the objects containing the user roles are. For example, in a Microsoft Active Directory server, this is the DN where the user account is.
- **roleAttributeID**: The LDAP attribute which contains the names of authorization roles.
- **roleAttributeIsDN**: Whether or not the **roleAttributeID** contains the fully-qualified DN of a role object. If false, the role name is taken from the value of the **roleNameAttributeId** attribute of the context name. Certain directory schemas, such as Microsoft Active Directory, require this attribute to be set to **true**.
- **roleNameAttributeID**: Name of the attribute within the **roleCtxDN** context which contains the role name. If the **roleAttributeIsDN** property is set to **true**, this property is used to find the role object's name attribute.
- **parseRoleNameFromDN**: A flag indicating if the DN returned by a query contains the roleNameAttributeID. If set to **true**, the DN is checked for the roleNameATtributeID. If set to **false**, the DN is not checked for the roleNameAttributeID. This flag can improve the performance of LDAP queries.
- **roleFilter**: A search filter used to locate the roles associated with the authenticated user. The input username or **userDN** obtained from the login module callback is substituted into the filter anywhere a **{0}** expression is used. The authenticated **userDN** is substituted into the filter anywhere a **{1}** is used. An example search filter that matches on the input username is **(member={0})**. An alternative that matches on the authenticated **userDN** is **(member={1})**.
- **roleRecursion**: The numbers of levels of recursion the role search will go below a matching context. Disable recursion by setting this to **0**.
- **searchTimeLimit**: The timeout in milliseconds for the user/role searches. Defaults to 10000 (10 seconds).
- **searchScope**: The search scope to use.

PropertiesRolesMappingProvider

A MappingProvider that reads roles from a properties file in the following format: username=role1,role2,...

Options:

- **rolesProperties**: Properties formatted file name. Expansion of JBoss variables can be used in form of **${jboss.variable}**.

SimpleRolesMappingProvider

A simple MappingProvider that reads roles from the options map. The option attribute name is the name of principal to assign roles to and the attribute value is the comma separated role names to assign to the principal.

Example A.3. Example

```
<module-option name="JavaDuke" value="JBossAdmin,Admin"/>
<module-option name="joe" value="Users"/>
```

org.jboss.security.mapping.providers.attribute.DefaultAttributeMappingProvider

Checks module and locates principal name from mapping context to create attribute e-mail address from module option named principalName + ".email" and maps it to the given principal.

LdapAttributeMappingProvider

Maps attributes from LDAP to the subject. The options include whatever options your LDAP JNDI provider supports.

Example A.4. Examples of standard property names include:

```
Context.INITIAL_CONTEXT_FACTORY = "java.naming.factory.initial"
Context.SECURITY_PROTOCOL = "java.naming.security.protocol"
Context.PROVIDER_URL = "java.naming.provider.url"
Context.SECURITY_AUTHENTICATION = "java.naming.security.authentication"
```

Options:

- **bindDN**: The DN used to bind against the LDAP server for the user and roles queries. This DN needs read and search permissions on the baseCtxDN and rolesCtxDN values.
- **bindCredential**: The password for the bindDN. This can be encrypted if the jaasSecurityDomain is specified.
- **baseCtxDN**: The fixed DN of the context to start the user search from.
- **baseFilter**: A search filter used to locate the context of the user to authenticate. The input username or **userDN** as obtained from the login module callback is substituted into the filter anywhere a **{0}** expression is used. This substituion behavior comes from the standard __**DirContext.search(Name, String, Object[], SearchControls cons)**__ method. An common example search filter is **(uid={0})**.
- **searchTimeLimit**: The timeout in milliseconds for the user/role searches. Defaults to 10000 (10 seconds).
- **attributeList**: A comma-separated list of attributes for the user. For example, mail,cn,sn,employeeType,employeeNumber.
- **jaasSecurityDomain**: The JaasSecurityDomain to use to decrypt the **java.naming.security.principal**. The encrypted form of the password is that returned by the **JaasSecurityDomain#encrypt64(byte[])** method. The **org.jboss.security.plugins.PBEUtils** can also be used to generate the encrypted form.

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A.4. INCLUDED SECURITY AUDITING PROVIDER MODULES

JBoss EAP 6 provides one security auditing provider.

Code	Class
LogAuditProvider	org.jboss.security.audit.providers.LogAuditProvider

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A.5. JBOSS-WEB.XML CONFIGURATION REFERENCE

Introduction

The **jboss-web.xml** and **web.xml** deployment descriptors are both placed in the deployment's **WEB-INF** directory. The **jboss-web.xml** is a web application deployment descriptor for JBoss EAP which contains additional configuration options for additional features of JBoss Web. This descriptor can be used to override the settings from **web.xml** descriptor and to set JBoss EAP specific settings.

Mapping Global Resources to WAR Requirements

Many of the available settings map requirements set in the application's **web.xml** to local resources. The explanations of the **web.xml** settings can be found at http://docs.oracle.com/cd/E13222_01/wls/docs81/webapp/web_xml.html.

For instance, if the **web.xml** requires **jdbc/MyDataSource**, the **jboss-web.xml** may map the global datasource **java:/DefaultDS** to fulfill this need. The WAR uses the global datasource to fill its need for **jdbc/MyDataSource**.

Table A.42. Common Top-Level Attributes of jboss-web.xml

Attribute	Description
servlet	The servlet element specifies servlet specific bindings.
max-active-sessions	Determines the max number of active sessions allowed. If the number of sessions managed by the session manager exceeds this value and **passivation** is enabled, the excess will be passivated based on the configured **passivation-min-idle-time** If set to -1, means no limit.
replication-config	The **replication-config** element is used for configuring session replication in the **jboss-web.xml** file.
passivation-config	The **passivation-config** element is used for configuring session passivation in the **jboss-web.xml** file.
distinct-name	The **distinct-name** element specifies the EJB 3 distinct name for the web application.
data-source	A mapping to a **data-source** required by the **web.xml**.

Attribute	Description
context-root	The root context of the application. The default value is the name of the deployment without the **.war** suffix.
virtual-host	The name of the HTTP virtual-host the application accepts requests from. It refers to the contents of the HTTP **Host** header.
annotation	Describes an annotation used by the application. Refer to <annotation> for more information.
listener	Describes a listener used by the application. Refer to <listener> for more information.
session-config	This element fills the same function as the **<session-config>** element of the **web.xml** and is included for compatibility only.
valve	Describes a valve used by the application. Refer to <valve> for more information.
overlay	The name of an overlay to add to the application.
security-domain	The name of the security domain used by the application. The security domain itself is configured in the web-based management console or the management CLI.
security-role	This element fills the same function as the **<security-role>** element of the **web.xml** and is included for compatibility only.
jacc-star-role-allow	The **jacc-star-role-allow** element specifies whether the jacc permission generating agent in the web layer needs to generate a **WebResourcePermission** permission such that the jacc provider can make a decision as to bypass authorization or not.
use-jboss-authorization	If this element is present and contains the case insensitive value "true", the JBoss web authorization stack is used. If it is not present or contains any value that is not "true", then only the authorization mechanisms specified in the Java Enterprise Edition specifications are used. This element is new to JBoss EAP 6.

Attribute	Description
disable-audit	Set this boolean element to **false** to enable and **true** to disable web auditing. Web security auditing is not part of the Java EE specification. This element is new to JBoss EAP 6.
disable-cross-context	If **false**, the application is able to call another application context. Defaults to **true**.
enable-websockets	Set this element to **true** in **jboss-web.xml** to specify if websockets access should be enabled for the web application.

The following elements each have child elements.

<annotation>

Describes an annotation used by the application. The following table lists the child elements of an **<annotation>**.

Table A.43. Annotation Configuration Elements

Attribute	Description
class-name	Name of the class of the annotation
servlet-security	The element, such as **@ServletSecurity**, which represents servlet security.
run-as	The element, such as **@RunAs**, which represents the run-as information.
multipart-config	The element, such as **@MultiPart**, which represents the multipart-config information.

<listener>

Describes a listener. The following table lists the child elements of a **<listener>**.

Table A.44. Listener Configuration Elements

Attribute	Description
class-name	Name of the class of the listener

Attribute	Description
listener-type	List of **condition** elements, which indicate what kind of listener to add to the Context of the application. Valid choices are: CONTAINER Adds a ContainerListener to the Context. LIFECYCLE Adds a LifecycleListener to the Context. SERVLET_INSTANCE Adds an InstanceListener to the Context. SERVLET_CONTAINER Adds a WrapperListener to the Context. SERVLET_LIFECYCLE Adds a WrapperLifecycle to the Context.
module	The name of the module containing the listener class.
param	A parameter. Contains two child elements, **<param-name>** and **<param-value>**.

<valve>

Describes a valve of the application. Similar to the <listener>, has class-name, module and param elements.

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A.6. EJB SECURITY PARAMETER REFERENCE

Table A.45. EJB security parameter elements

Element	Description
<security-identity>	Contains child elements pertaining to the security identity of an EJB.
<use-caller-identity />	Indicates that the EJB uses the same security identity as the caller.
<run-as>	Contains a **<role-name>** element.
<run-as-principal>	If present, indicates the principal assigned to outgoing calls. If not present, outgoing calls are assigned to a principal named **anonymous**.

Element	Description
<role-name>	Specifies the role the EJB should run as.
<description>	Describes the role named in **<role-name>** .

Example A.5. Security identity examples

This example shows each tag described in Table A.45, "EJB security parameter elements". They can also be used inside a **<session>**.

```
<ejb-jar>
  <enterprise-beans>
    <session>
      <ejb-name>ASessionBean</ejb-name>
      <security-identity>
        <use-caller-identity/>
      </security-identity>
    </session>
    <session>
      <ejb-name>RunAsBean</ejb-name>
      <security-identity>
        <run-as>
          <description>A private internal role</description>
          <role-name>InternalRole</role-name>
        </run-as>
      </security-identity>
    </session>
  <session>
  <ejb-name>RunAsBean</ejb-name>
  <security-identity>
  <run-as-principal>internal</run-as-principal>
  </security-identity>
  </session>
  </enterprise-beans>
</ejb-jar>
```

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APPENDIX B. REVISION HISTORY

Revision 6.4.0-11	**Tuesday April 14 2015**	**Lucas Costi**

Red Hat JBoss Enterprise Application Platform 6.4.0.GA