

OpenAM 11.0.0 Installation Guide

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Software release date: November 08, 2013

Publication date: October 25, 2013

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Abstract

Guide showing you how to install OpenAM. OpenAM provides open source Authentication, Authorization, Entitlement and Federation software.



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Preface

This guide shows you how to install core OpenAM services for access and federation management. Unless you are planning a throwaway evaluation or test installation, read the *Release Notes* before you get started.

1. Who Should Use this Guide

This guide is written for anyone installing OpenAM to manage and to federate access to web applications and web based resources.

This guide covers the install, upgrade, and removal (a.k.a. uninstall) procedures that you theoretically perform only once per version. This guide aims to provide you with at least some idea of what happens behind the scenes when you perform the steps.

You do not need to be an OpenAM wizard to learn something from this guide, though a background in access management and maintaining web application software can help. You do need some background in managing services on your operating systems and in your application servers. You can nevertheless get started with this guide, and then learn more as you go along.

2. Formatting Conventions

Some items are formatted differently from other text, like filenames, **commands**, and literal values.

```
$ echo Command line sessions are formatted with lines folded for easier reading.  
In HTML documents click the [-] image for a flat, copy-paste version. Click  
the [+] image for an expanded, line-wrapped version. > /dev/null
```

In many cases, sections pertaining to UNIX, GNU/Linux, Mac OS X, BSD, and so forth are marked (UNIX). Sections pertaining to Microsoft Windows might be marked (Windows). To avoid repetition, however, file system directory names are often given only in UNIX format as in `/path/to/server`, even if the text applies to `C:\path\to\server` as well.

Absolute path names usually begin with the placeholder `/path/to/`, which might translate to `/opt/`, `C:\Program Files\`, or somewhere else on your system. Unless you install from native packages, you create this location before you install.

```
class Test {  
    public static void main(String [] args) {  
        System.out.println("This is a program listing.");  
    }  
}
```

3. Accessing Documentation Online

Core documentation, such as what you are now reading, aims to be technically accurate and complete with respect to the software documented. Core documentation therefore follows a three-phase review process designed to eliminate errors. The review process help to ensure that documentation you get with a stable release is technically accurate and complete.

Fully reviewed, published core documentation is available at docs.forgerock.org.

In-progress documentation can be found at each project site under the Developer Community projects page.

The ForgeRock Community Wikis provide additional documentation. We encourage you to join the community, so that you can update the Wikis, too.

4. Joining the ForgeRock Community

After you sign up to join the ForgeRock community, you can edit the Community Wikis, and also log bugs and feature requests in the issue tracker.

If you have a question regarding a project but cannot find an answer in the project documentation or Wiki, browse to the Developer Community page for the project, where you can find details on joining the project mailing lists, and find links to mailing list archives. You can also suggest updates to documentation through the ForgeRock docs mailing list.

The Community Wikis describe how to check out and build source code. Should you want to contribute a patch, test, or feature, or want to author part of the core documentation, first have a look on the ForgeRock site at how to get involved.

Chapter 1. Preparing For Installation

This chapter covers prerequisites for installing OpenAM software, including how to prepare your application server to run OpenAM, how to prepare directory services to store configuration data, and how to prepare an identity repository to handle OpenAM identities.

Note

If a Java Security Manager is enabled for your application server, add permissions before installing OpenAM.

1.1. Preparing a Fully-Qualified Domain Name

OpenAM requires that you provide the fully-qualified domain name (FQDN) when you configure it. Before you set up OpenAM, be sure that your system has an FQDN such as `openam.example.com`. For evaluation purposes, you can give your system an alias using the `/etc/hosts` file on UNIX systems or `%SystemRoot%\system32\drivers\etc\hosts` on Windows. For deployment, make sure the FQDN is properly assigned for example using DNS.

Do not use the `localhost` domain for OpenAM, not even for testing purposes. OpenAM relies on browser cookies, which are returned based on domain name. Furthermore, use a domain name that contains at least 2 . (dot) characters, such as `openam.example.com`.

1.2. Preparing a Java Environment

OpenAM software depends on a Java runtime environment. Check the output of **java -version** to make sure your the version is supported according to the *Release Notes* section on *Java Requirements*.

1.2.1. Settings For Sun/Oracle Java Environments

When using a Sun or Oracle Java environment set at least the following options.

`-server`

Use `-server` rather than `-client`.

`-XX:MaxPermSize=256m`

Set the permanent generation size to 256 MB.

`-Xmx1024m` (minimum)

OpenAM requires at least a 1 GB heap. Higher volume and higher performance deployments require additional heap space.

For additional JVM tuning recommendations, see *Java Virtual Machine Settings*.

1.2.2. Settings For IBM Java Environments

When using an IBM Java environment set at least the following options.

-DamCryptoDescriptor.provider=IBMJCE

-DamKeyGenDescriptor.provider=IBMJCE

Use the IBM Java Cryptography Extensions.

-Xmx1024m (minimum)

OpenAM requires at least a 1 GB heap. Higher volume and higher performance deployments require additional heap space.

1.3. Setting Maximum File Descriptors

If you use the embedded OpenDJ directory, make sure OpenDJ has enough file descriptors. OpenDJ needs to be able to open many files, especially when handling many client connections. Linux systems in particular often set a limit of 1024 per user, which is too low for OpenDJ.

OpenDJ should have access to use at least 64K (65536) file descriptors. The embedded OpenDJ directory runs inside the OpenAM process space. When running OpenAM as user openam on a Linux system that uses `/etc/security/limits.conf` to set user limits, you can set soft and hard limits by adding these lines to the file.

```
openam soft nofile 65536
openam hard nofile 131072
```

```
$ ulimit -n
65536
```

The example above assumes the system has enough file descriptors overall. You can verify the new soft limit the next time you log in as user openam with the **ulimit -n** command.

You can check the Linux system overall maximum as follows.

```
$ cat /proc/sys/fs/file-max
204252
```

If the overall maximum is too low, you can increase it as follows.

1. As superuser, edit `/etc/sysctl.conf` to set the kernel parameter `fs.file-max` to a higher maximum.

2. Run the **sysctl -p** command to reload the settings in `/etc/sysctl.conf`.
3. Read `/proc/sys/fs/file-max` again to confirm that it now corresponds to the new maximum.

1.4. Preparing a Configuration Data Store

OpenAM stores configuration, session, and token data in an LDAP directory service. This data is private to OpenAM. In other words, OpenAM controls this data and other applications should access it, if necessary, only through OpenAM.

OpenAM ships with an embedded OpenDJ directory server that you can install as part of the OpenAM configuration process. You can use the embedded directory server to simplify evaluation. By default OpenAM installs the embedded directory alongside configuration settings under the `$HOME` of the user running OpenAM, and runs the embedded directory in the same memory space as OpenAM. Before deploying OpenAM in production, measure the impact of using the embedded directory not only for relatively static configuration data, but also for volatile session and token data. Your tests should subject OpenAM to the same load patterns you expect in production. If it looks like a better choice to use an external directory service, then use one of the supported external configuration stores listed in the *Release Notes*, such as OpenDJ.

With the embedded OpenDJ directory and the default configuration settings, OpenAM connects as directory super user, bypassing access control evaluation because OpenAM manages the directory as its private store. Be aware that failover and replication can not be controlled when using the embedded store.

OpenAM now supports the use of the Core Token Service (CTS), with tokens that can be stored in the local or external directory store. For more information, see the chapter on *Configuring the Core Token Service*.

With an external directory service, the directory administrator can require OpenAM to connect with normal application credentials. In that case, the directory administrator must grant OpenAM specific access.

Tip

If you are the directory administrator, and do not yet know directory services very well, take some time to read the documentation for your directory server, especially the documentation covering directory schema and covering how to configure access to directory data.

- OpenAM requires specific directory schema definitions for the object classes and attribute types that describe its data. For the configuration store, the directory administrator should let OpenAM update the directory schema at configuration time.

These access rights are only required during configuration, and only if the directory administrator does not add the OpenAM directory schema definitions manually.

To grant the required access with OpenDJ for example, first add a global access control instruction (ACI) permitting the OpenAM user to modify schema definitions as in the following example where the OpenAM entry has DN `uid=openam,ou=admins,dc=example,dc=com`.

```
global-aci: (target = "ldap:///cn=schema")(targetattr = "attributeTypes ||
objectClasses")(version 3.0;acl "Modify schema"; allow (write)(userdn = "
ldap:///uid=openam,ou=admins,dc=example,dc=com");)
```

Also give the OpenAM user privileges to modify the schema and write to subentries such as the schema entry. Set the following attributes on the OpenAM user entry.

```
ds-privilege-name: subentry-write
ds-privilege-name: update-schema
```

See the OpenDJ documentation about [Configuring Privileges & Access Control](#) for a more in-depth explanation of how access is configured for OpenDJ.

- When OpenAM connects to an external directory service to store its data, it requires both read and write access.

With OpenDJ for example, add following ACIs to the configuration base Distinguished Name (DN) entry. Adjust them as necessary if the OpenAM user DN differs from `uid=openam,ou=admins,dc=example,dc=com`.

```
aci: (targetattr="*)(version 3.0;acl "Allow entry search"; allow (
search, read)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)
aci: (targetattr="*)(version 3.0;acl "Modify config entry"; allow (write)(
userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)
aci: (targetcontrol="2.16.840.1.113730.3.4.3")(version 3.0;acl "Allow
persistent search"; allow (search, read)(userdn = "ldap:///uid=openam
,ou=admins,dc=example,dc=com");)
aci: (version 3.0;acl "Add config entry"; allow (add)(userdn = "ldap:///
uid=openam,ou=admins,dc=example,dc=com");)
aci: (version 3.0;acl "Delete config entry"; allow (delete)(userdn = "ldap:///
uid=openam,ou=admins,dc=example,dc=com");)
```

In addition, the directory administrator should index the following attributes used by OpenAM.

Table 1.1. Configuration Data Store Indexes

Attribute	Indexes Required
coreTokenDate01	equality
coreTokenDate02	equality
coreTokenDate03	equality
coreTokenDate04	equality
coreTokenDate05	equality
coreTokenExpirationDate	ordering
coreTokenInteger01	equality
coreTokenInteger02	equality
coreTokenInteger03	equality
coreTokenInteger04	equality
coreTokenInteger05	equality
coreTokenInteger06	equality
coreTokenInteger07	equality
coreTokenInteger08	equality
coreTokenInteger09	equality
coreTokenInteger10	equality
coreTokenString01	equality
coreTokenString02	equality
coreTokenString03	equality
coreTokenString04	equality
coreTokenString05	equality
coreTokenString06	equality
coreTokenString07	equality
coreTokenString08	equality
coreTokenString09	equality
coreTokenString10	equality
coreTokenString11	equality
coreTokenString12	equality
coreTokenString13	equality
coreTokenString14	equality
coreTokenString15	equality

Attribute	Indexes Required
coreTokenUserId	equality
iplanet-am-user-federation-info-key	equality
sun-fm-saml2-nameid-infokey	equality
sunxmlkeyvalue	equality, substring

1.5. Preparing an Identity Repository

OpenAM stores user identity data in one or more identity repositories. In many deployments OpenAM connects to existing LDAP directory services for user identity data. OpenAM is designed therefore to share data in an identity repository with other applications.

OpenAM ships with an embedded OpenDJ directory server that you can install as part of the OpenAM configuration process. In deployments where you will only ever have a few users to manage and do not need to share identity data with other applications, you can use the embedded store as your identity repository and avoid the additional overhead of maintaining a separate directory service. If OpenAM will share identity data with other applications, or if you expect to have lots of users, then connect OpenAM to an external identity repository. See the *Release Notes* for a list of supported external identity repositories.

When OpenAM connects to an external identity repository, the administrator must give OpenAM the following access rights.

- OpenAM requires specific directory schema definitions for the object classes and attribute types that describe its data. The directory administrator can find these definitions in the `ldif` directory found inside the full `.zip` delivery.

If the directory administrator chooses instead to have OpenAM update the directory schema at configuration time, then the directory administrator must grant OpenAM access.

To grant this access right with OpenDJ for example, first add a global ACI permitting the OpenAM user to modify schema definitions as in the following example where the OpenAM entry has DN `uid=openam,ou=admins,dc=example,dc=com`.

```
global-aci: (target = "ldap:///cn=schema")(targetattr = "attributeTypes ||  
objectClasses")(version 3.0;acl "Modify schema"; allow (write)(userdn = "  
ldap:///uid=openam,ou=admins,dc=example,dc=com"));
```

Also give the OpenAM user privileges to modify the schema and write to subentries such as the schema entry. Set the following attributes on the OpenAM user entry.

```
ds-privilege-name: subentry-write  
ds-privilege-name: update-schema
```

- Allow OpenAM to read directory schema.

With OpenDJ for example, keep the default "User-Visible Schema Operational Attributes" global ACI.

- When OpenAM connects to an external identity repository, it requires access to read and potentially to update data.

To grant the access rights with OpenDJ for example, add following ACIs to the configuration base DN entry. Adjust them as necessary if the OpenAM user DN differs from uid=openam,ou=admins,dc=example,dc=com.

```
aci: (targetattr="* || aci")(version 3.0;acl "Allow identity modification";  
  allow (write)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)  
aci: (targetattr!="userPassword|authPassword")(version 3.0;  
  acl "Allow identity search"; allow (search, read)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)  
aci: (targetcontrol="2.16.840.1.113730.3.4.3")(version 3.0;acl "Allow persistent search"; allow (search, read)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)  
aci: (version 3.0;acl "Add identity"; allow (add)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)  
aci: (version 3.0;acl "Delete identity"; allow (delete)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=com");)
```

- Allow the OpenAM user to reset other users' passwords.

To grant this privilege in OpenDJ for example, set the following attribute on the OpenAM user entry.

```
ds-privilege-name: password-reset
```

In addition for external directory services, the directory administrator should index the following attributes used by OpenAM.

Table 1.2. Identity Repository Indexes

Attribute	Indexes Required
iplanet-am-user-federation-info-key	equality
sun-fm-saml2-nameid-infokey	equality

1.6. Obtaining OpenAM Software

Download OpenAM releases from one of the following locations:

- *Enterprise Downloads* has the latest stable version of OpenAM, including a .zip file with all of the OpenAM components, the .war file, OpenAM tools, the configurator, policy agents, OpenIG, and documentation. Make sure you review the Software License and Subscription Agreement presented before you download OpenAM files.
- *Builds* has the nightly build, including a .zip file with all of the OpenAM components, the .war file, OpenAM tools, the configurator, policy agents, and the .NET Fedlet. Be aware that this is the working version of the trunk and should not be used in a production environment.
- *Archives* has old versions of OpenAM and policy agents. It includes the full .zip file with all of the OpenAM components, the server .war file, OpenAM tools, the configurator, policy agents, the WSS policy agents, and the .NET Fedlet for all previous releases.

For each release of the OpenAM core services, you can download the entire package as a .zip file, only the OpenAM .war file, or only the administrative tools as a .zip archive. The Archives also have only the OpenAM source code used to build the release.

After you download the .zip file, create a new openam folder, and unzip the .zip file to access the content:

```
$ cd ~/Downloads
$ mkdir openam ; cd openam
$ unzip ~/Downloads/OpenAM-11.0.0.zip
```

When you unzip the archive of the entire package, you get ldif, license, and legal directories in addition to the following files.

ClientSDK-11.0.0.jar

The OpenAM Java client SDK library

ExampleClientSDK-CLI-11.0.0.zip

The .zip file containing the Java client SDK command-line examples, and .jar files needed to run the examples

ExampleClientSDK-WAR-11.0.0.war

The .war file containing Java client SDK examples in a web application

IDPDiscovery-11.0.0.war

The IDP discovery .war file, deployed as a service to service providers that must discover which identity provider corresponds to a SAML 2.0 request

For details, see *Deploying the Identity Provider Discovery Service*.

Fedlet-11.0.0.zip

The .zip that contains the lightweight service provider implementations that you can embed in your Java EE or ASP.NET applications to enable it to use federated access management

OpenAM-11.0.0.war

The deployable .war file

OpenAM-DistAuth-11.0.0.war

The deployable .war file for distributed authentication

OpenAM-ServerOnly-11.0.0.war

The deployable .war file when you want to deploy OpenAM server without the OpenAM console

SSOAdminTools-11.0.0.zip

The .zip file that contains tools to manage OpenAM from the command line

SSOConfiguratorTools-11.0.0.zip

The .zip file that contains tools to configure OpenAM from the command line

1.7. Preparing Apache Tomcat

OpenAM examples often use Apache Tomcat as the deployment container. Tomcat is installed on `openam.example.com`, and listens on the default ports, with no Java Security Manager enabled. The script `/etc/init.d/tomcat` manages the service at system startup and shutdown. This script assumes you run OpenAM as the user `openam`.

OpenAM core services require a minimum JVM heap size of 1 GB, and a permanent generation size of 256 MB. See Section 1.2, “Preparing a Java Environment” for details.

```
#!/bin/sh
#
# tomcat
#
# chkconfig: 345 95 5
# description: Manage Tomcat web application container
CATALINA_HOME="/path/to/tomcat"
export CATALINA_HOME
JAVA_HOME="/path/to/jdk"
export JAVA_HOME
CATALINA_OPTS="-server -Xmx1024m -XX:MaxPermSize=256m"
export CATALINA_OPTS

case "${1}" in
start)
    /bin/su openam -c "${CATALINA_HOME}/bin/startup.sh"
```

```
exit ${?}
;;
stop)
/bin/su openam -c "${CATALINA_HOME}/bin/shutdown.sh"
exit ${?}
;;
*)
echo "Usage: $0 { start | stop }"
exit 1
;;
esac
```

1.8. Preparing GlassFish v2

Before you deploy OpenAM, update the JVM options as described in Section 1.2, “Preparing a Java Environment”. The settings are accessible in the administration console under Application Server > JVM Settings > JVM Options.

In addition, after downloading the OpenAM server .war file, edit the application configuration to make sure that classes from OpenAM libraries are loaded before GlassFish bundled libraries.

1. Extract the OpenAM server .war file content to a working directory.

```
$ mkdir /tmp/openam ; cd /tmp/openam
$ jar -xf ~/Downloads/openam.war
```

2. Add a WEB-INF/sun-web.xml file to set class-loading delegation to false.

```
$ vi WEB-INF/sun-web.xml
$ cat WEB-INF/sun-web.xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE sun-web-app PUBLIC
"-//Sun Microsystems, Inc.//DTD Application Server 9.0 Servlet 2.5//EN"
"http://www.sun.com/software/appserver/dtds/sun-web-app_2_5-0.dtd">
<sun-web-app error-url="">
  <class-loader delegate="false"/>
</sun-web-app>
```

3. Pack the updated .war file to deploy.

```
$ jar -cf ../openam.war *
```

4. Deploy the updated .war file in place of the server .war file delivered with the release.

1.9. Preparing OpenAM & JBoss 4 or 5

OpenAM must be able to store its configuration between restarts. If you plan to deploy OpenAM as a single archive file, then unpack the .war, edit WEB-INF/classes/bootstrap.properties to set the configuration.dir property to the location where OpenAM has write access to store its configuration.


```
$ mkdir openam
$ cd openam
$ jar -xf ~/Downloads/openam/OpenAM-11.0.0.war
$ vi WEB-INF/classes/bootstrap.properties
$ grep ^config WEB-INF/classes/bootstrap.properties
configuration.dir=/home/jboss-user/openam
```

Also, OpenAM .jar libraries that conflict with JBoss libraries must be loaded first. Add a WEB-INF/jboss-web.xml to ensure this happens. (If you deploy the exploded .war, you also need to add this file.)

```
$ vi WEB-INF/jboss-web.xml
$ cat WEB-INF/jboss-web.xml
```

```
<!DOCTYPE jboss-web PUBLIC
"-//JBoss//DTD Web Application 5.0//EN"
"http://www.jboss.org/j2ee/dtd/jboss-web_5_0.dtd">
<jboss-web>
  <class-loading java2ClassLoadingCompliance='true'>
    <loader-repository>
      jbia.loader.loader=opensso
      <loader-repository-config>java2ParentDelegaton=true</loader-repository-config>
    </loader-repository>
  </class-loading>
</jboss-web>
```

Repack the .war file that you can then deploy.

```
$ jar -cf ../openam.war *
```

Before you deploy OpenAM, update the JVM options as described in Section 1.2, “Preparing a Java Environment”.

1.10. Preparing OpenAM & JBoss AS 7 / EAP 6

Some preparation is required to deploy OpenAM on JBoss AS 7 / EAP 6.

The following instructions provide guidance for both standalone and domain deployments. OpenAM must be able to store its configuration between restarts. The procedures listed here are workarounds for JBoss AS 7.1.2 / 7.1.3, and the corresponding versions of JBoss EAP (6.0.0, 6.0.1). Workarounds are also needed for JBoss EAP 6.1.0/6.1.1. To identify the versions of JBoss EAP that have been built from JBoss AS, see the following article on *JBoss Enterprise Application Platform Component Details*.

Once JBoss has been configured, you can then prepare OpenAM for deployment, by making a few changes to the contents of the OpenAM .war archive.

- Procedure 1.1, “To Prepare JBoss AS 7.1.0 / 7.1.1”
- Procedure 1.2, “Alternative Method: To Prepare JBoss EAP 6.0.0 and 6.0.1”

- Procedure 1.3, “To Prepare JBoss EAP 6.1.0 and 6.1.1”
- Procedure 1.4, “To Prepare JBoss for OpenAM”
- Procedure 1.5, “To Prepare OpenAM for JBoss”

Procedure 1.1. To Prepare JBoss AS 7.1.0 / 7.1.1

For JBoss AS 7.1.0 / 7.1.1, you need to make changes to the `module.xml` file in the `/path/to/jboss/modules/sun/jdk/main` directory, as well as changes to a configuration file associated with JBoss standalone or domain modes.

1. Stop JBoss
2. Update the `module.xml` file associated with the container. You can find this file a directory such as `/path/to/jboss/modules/sun/jdk/main`.
3. In the same `module.xml` file, add the Sun x509 security module path (`sun/security/x509`).

The following example shows an excerpt of the revised file for JBoss AS 7.1.0.

```
<path name="com/sun/security/auth"/>
<path name="com/sun/security/auth/login"/>
<path name="com/sun/security/auth/module"/>
<path name="sun/security/x509"/> <!-- path added here -->
<path name="sun/misc"/>
```

4. When using **ssoadm** or the distributed authentication service (DAS), also add the following path to the aforementioned `module.xml` file.

```
<path name="com/sun/org/apache/xerces/internal/dom" />
```

5. Disable modules that conflict with OpenAM REST libraries. All jaxrs references need to be removed from the configuration. The file that you modify depends on whether you are running JBoss in standalone or domain mode.
 - The following example is based on JBoss 7.1.0 standalone mode. Remember to remove all subsystems and extension tags associated with `urn:jboss:domain:jaxrs:1.0`.

```
$ vi /path/to/jboss/standalone/configuration/standalone.xml
<extension module="org.jboss.as.ejb3"/>
- <extension module="org.jboss.as.jaxrs"/>
....
- <subsystem xmlns="urn:jboss:domain:jaxrs:1.0"/>
<subsystem xmlns="urn:jboss:domain:jca:1.1">
```

- The following example is based on JBoss 7.1.0 for a managed domain.

```
$ vi /path/to/jboss7/domain/configuration/domain.xml
<extension module="org.jboss.as.ejb3"/>
- <extension module="org.jboss.as.jaxrs"/>
....
- <subsystem xmlns="urn:jboss:domain:jaxrs:1.0"/>
<subsystem xmlns="urn:jboss:domain:jca:1.1">
```

6. In either the standalone.xml or domain.xml files, you will also need to delete org.jboss.as.webservices references. Depending on the file, this includes one or more groups of subsystem lines such as:

```
<subsystem xmlns="urn:jboss:domain:webservices:1.1"/>
....
</subsystem>
```

7. You are now ready to prepare OpenAM as described in Procedure 1.5, "To Prepare OpenAM for JBoss".

Procedure 1.2. Alternative Method: To Prepare JBoss EAP 6.0.0 and 6.0.1

JBoss EAP 6.0.0 and 6.0.1 are built from JBoss AS 7.1.2 and 7.1.3, respectively. The same techniques described in the Procedure 1.1, "To Prepare JBoss AS 7.1.0 / 7.1.1" section work here as well. One alternative method is available, as described in this section.

1. Stop JBoss.
2. Update the openam.war before deploying OpenAM.
 1. Create a temporary directory and expand the openam.war.

```
$ mkdir /tmp/openam ; cd /tmp/openam
$ jar xvf /path/to/OpenAM-11.0.0.war
```

2. Create a new jboss-deployment-structure.xml file in the WEB-INF subdirectory so that it appears as follows, and save the change.

```
$ vi WEB-INF/jboss-deployment-structure.xml
```

```
<?xml version="1.0" encoding="UTF-8"?>
<jboss-deployment-structure xmlns="urn:jboss:deployment-structure:1.2">
  <deployment>
    <exclusions>
      <module name="sun.jdk" />
    </exclusions>
    <exclude-subsystems>
      <subsystem name="jaxrs" />
      <subsystem name="webservices" />
    </exclude-subsystems>
  </dependencies>
```

```
<module name="sun.jdk" >
  <imports>
    <exclude-set>
      <path name="com/sun/org/apache/xml/internal/security/transforms/implementations"/>
    </exclude-set>
    </imports>
  </module>
  <system>
    <paths>
      <path name="sun/security/x509" />
      <path name="com/sun/org/apache/xpath/internal" />
      <path name="com/sun/org/apache/xerces/internal/dom" />
      <path name="com/sun/org/apache/xml/internal/utils" />
    </paths>
  </system>
</dependencies>
</deployment>
</jboss-deployment-structure>
```

3. Rebuild the openam.war file.

```
$ jar cvf ../openam.war *
```

3. You will want to make at least one more change to the openam.war file before deployment, as described in Procedure 1.5, “To Prepare OpenAM for JBoss”.
4. You do not need to make any of the other changes to XML files described in this section. As JBoss EAP 6.0.0 and 6.0.1 was built from JBoss AS 7.1.2 and AS 7.1.3, respectively, this procedure may also work on those versions of JBoss.

Procedure 1.3. To Prepare JBoss EAP 6.1.0 and 6.1.1

1. For JBoss EAP 6.1.0 / 6.1.1, follow Step 5 and Step 6 from Procedure 1.1, “To Prepare JBoss AS 7.1.0 / 7.1.1”.
2. However, you still need to review Procedure 1.4, “To Prepare JBoss for OpenAM” and Procedure 1.5, “To Prepare OpenAM for JBoss” to make sure the JVM and directories are configured appropriately.

Procedure 1.4. To Prepare JBoss for OpenAM

The default JBoss settings for JVM do not give sufficient memory to OpenAM. This procedure documents one method that you can use to modify JBoss. Other methods described in *JBoss Main Documentation Page*.

1. Stop JBoss.
2. Open an appropriate JBoss configuration file. This procedure describes the use of the standalone.conf file in the /path/to/jboss/bin directory for JBoss in standalone mode.

3. Check the JVM settings associated with JAVA_OPTS. For JBoss AS 7.1.0 and AS 7.1.1, you should change the JVM heap size to -Xmx1024m. The default JVM heap size and permanent generation settings for later versions of JBoss may already exceed recommended values (-Xmx1024m, -XX:MaxPermSize=256m).
4. Set the following JVM JAVA_OPTS setting in the same file.

```
-Dorg.apache.tomcat.util.http.ServerCookie.ALWAYS_ADD_EXPIRES=true
```

Make sure that headers include the Expires attribute rather than only Max-Age, as some versions of Internet Explorer do not support Max-Age.

5. Now deploy the openam.war file into the appropriate JBoss deployment directory. The directory varies depending on whether you are running in standalone or domain mode.
6. You do not need to make any of the other changes to XML files described in this section. As JBoss EAP 6.0.0 and 6.0.1 was built from JBoss AS 7.1.2 and AS 7.1.3, respectively, this procedure may also work on those versions of JBoss.

Procedure 1.5. To Prepare OpenAM for JBoss

To take full advantage of JBoss with OpenAM, you should make a couple of changes to the OpenAM war file. One problem is that JBoss will deploy applications from different temporary directories every time you restart the container, which would require reconfiguring OpenAM. To avoid this issue, take the following steps:

1. If you have not already done so, create a temporary directory and expand the openam.war.

```
$ cd /tmp
$ mkdir /tmp/openam ; cd /tmp/openam
$ jar xvf ~/Downloads/OpenAM-11.0.0.war
```

2. Update the # configuration.dir= line in the bootstrap.properties file so that it appears as follows, and save the change.

```
$ vi WEB-INF/classes/bootstrap.properties
# This property should also be used when the system user that
# is running the web/application server process does not have
# a home directory. i.e. System.getProperty("user.home") returns
# null.

configuration.dir=$HOME/openamJboss
```

3. Rebuild the openam.war file.

```
$ jar cvf ../openam.war *
```

1.11. Preparing Jetty

When you deploy OpenAM, make sure you start Jetty with enough memory.

```
$ cd /path/to/jetty
$ java -server -Xmx1024m -XX:MaxPermSize=256m -jar start.jar
```

For details on the JVM options to use, see Section 1.2, “Preparing a Java Environment”.

1.12. Preparing Oracle WebLogic

Before you deploy OpenAM, update the JVM options as described in Section 1.2, “Preparing a Java Environment”.

In addition, edit the WebLogic domain configuration to allow basic authentication credentials to be passed back to OpenAM.

By default WebLogic attempts to resolve authentication credentials itself. When you change the WebLogic domain configuration, you make sure that OpenAM OAuth 2.0 providers receive basic authentication credentials for OAuth 2.0 grants that rely on basic authentication.

1. Stop WebLogic server.
2. Edit the WebLogic domain configuration, `/path/to/wlsdomain/config/config.xml`, setting `<enforce-valid-basic-auth-credentials>` to `false` in the `<security-configuration>` element.

```
<security-configuration>
  <enforce-valid-basic-auth-credentials>false</enforce-valid-basic-auth-credentials>
</security-configuration>
```

3. Start WebLogic server.

1.13. Preparing IBM WebSphere

Before you deploy OpenAM, use the Administrator console to update JVM options as described in Section 1.2, “Preparing a Java Environment”.

In addition, configure WebSphere to load classes from OpenAM bundled libraries before loading classes from libraries delivered with WebSphere. The following steps must be completed after you deploy OpenAM into WebSphere.

1. In WebSphere administration console, browse to Application > Application Type > WebSphere enterprise applications > *OpenAM Name* > Class loading and update detection.
2. Set Class loader order > Classes loaded with local class loader first (parent last).
3. Set WAR class loader policy > Single class loader for application.
4. Save your work.

Furthermore when using IBM Java, add the JAXP Reference Implementation .jar into the OpenAM .war file before deploying the .war into WebSphere as this required library is missing otherwise.

1. Unpack the OpenAM .war file.

```
$ mkdir /tmp/openam  
$ cd /tmp/openam/  
$ jar -xf ~/Downloads/openam/OpenAM-11.0.0.war
```

2. Add the JAXP Reference Implementation .jar in WEB-INF/lib/.

```
$ wget http://repo1.maven.org/maven2/com/sun/xml/parsers/jaxp-ri/1.4.5/jaxp-ri-1.4.5.jar  
$ mv jaxp-ri-1.4.5.jar WEB-INF/lib/
```

3. Pack up the OpenAM .war file to deploy in WebSphere.

```
$ jar -cf ../openam.war *
```

4. Deploy the new .war file.

In this case the .war file to deploy is /tmp/openam.war.

Chapter 2. Installing OpenAM Core Services

This chapter covers tasks required for a full install of OpenAM server with or without OpenAM Console.

This chapter does not cover installation for enforcing policies on resource servers. To manage access to resources on other servers, you can use OpenIG or OpenAM policy agents.

OpenIG is a high-performance reverse proxy server with specialized session management and credential replay functionality. It can function as a standards-based policy enforcement point.

OpenAM policy agents provide policy enforcement on supported web servers and Java EE containers, and are tightly integrated with OpenAM. See the *OpenAM Web Policy Agent Installation Guide*, or *OpenAM Java EE Policy Agent Installation Guide* for instructions on installing OpenAM policy agents in supported web servers and Java EE application containers.

Table 2.1. Deciding How To Install OpenAM

If you want to...	Then see...
Install quickly for evaluation using default settings	Procedure 2.1, "To Deploy OpenAM" and Procedure 2.2, "To Configure OpenAM With Defaults" Alternatively, follow the full example in the <i>Getting Started</i> guide.
Install OpenAM server and console, choosing settings	Procedure 2.1, "To Deploy OpenAM" and Procedure 2.4, "To Configure OpenAM"
Erase the configuration and start over	Procedure 2.3, "To Delete an OpenAM Configuration Before Redeploying"
Add an OpenAM server to a site	Procedure 2.1, "To Deploy OpenAM", and Procedure 2.5, "To Add a Server to a Site"
Install OpenAM server only (no console)	Table 2.2, "Determine Which War File to Deploy", Procedure 2.1, "To Deploy OpenAM", and Procedure 2.6, "To Deploy OpenAM Core Server (No Console)"
Install ssoadm for CLI configuration	<i>Installing OpenAM Tools</i> , or OpenAM ssoadm.jsp in the <i>Administration Guide</i>
Perform a command-line install	<i>To Set Up Configuration Tools</i>
Install OpenAM in your DMZ	<i>Installing OpenAM Distributed Authentication</i>
Skin OpenAM for your organization	<i>Customizing the OpenAM End User Pages</i>

If you want to...

Uninstall OpenAM

Then see...*Removing OpenAM Software*

Select the .war file based on the type of deployment you need, as defined in the following table.

Table 2.2. Determine Which War File to Deploy

If you want to...**Use...**

Install an OpenAM server including OpenAM-11.0.0.war
OpenAM Console

Install OpenAM server without OpenAM OpenAM-ServerOnly-11.0.0.war
Console

Install OpenAM distributed authentication OpenAM-DistAuth-11.0.0.war
UI

Procedure 2.1. To Deploy OpenAM

The OpenAM-11.0.0.war file contains OpenAM server with OpenAM Console. How you deploy the .war file depends on your web application container.

1. Deploy the .war file on your container.

For example, copy the file to deploy on Apache Tomcat.

```
$ cp OpenAM-11.0.0.war /path/to/tomcat/webapps/openam.war
```

You change the file name to openam.war when deploying in Tomcat so that the deployment URI is /openam.

It can take several seconds for OpenAM to be deployed in your container.

2. Browse to the initial configuration screen, for example at `http://openam.example.com:8080/openam`.

Configuration Options

Please select a configuration option.

Default Configuration

Enter only the passwords for the default administrator and the agent accessor. All other data is configured using default parameters. This option should be used primarily for evaluation or development purposes.

Create Default Configuration

Custom Configuration

Allows you to specify all configuration parameters including the type of data store, encryption properties, user data store, etc. This option has the most flexibility in setting up your installation.

Create New Configuration

Procedure 2.2. To Configure OpenAM With Defaults

The default configuration option configures the embedded OpenDJ server using default ports—if the ports are already in use, OpenAM uses free ports—as both configuration store and identity store.

The default configuration sets the cookie domain based on the fully qualified domain name of the system. For an FQDN `openam.example.com`, the cookie domain is set to `.example.com`.

Configuration settings are saved to the home directory of the user running the web application container in a directory named after the deployment URI. In other words if OpenAM is deployed under `/openam`, then the configuration is saved under `$HOME/openam/`.

1. In the initial configuration screen, click **Create Default Configuration** under **Default Configuration**.
2. Provide different passwords for the default OpenAM administrator, `amadmin`, and default Policy Agent users.

OpenAM Configurator

Default Configuration Option

Use this option for a quick setup. Only the super user name and agent user name are required. All other configuration parameters are defaulted for you. The user and agent passwords must be different values.

* Indicates required field

Default User [amAdmin]

* Password ☒ OK

* Confirm Password

Default Policy Agent [UrlAccessAgent]

* Password ☒ OK

* Confirm Password

Create Configuration Cancel

3. When the configuration completes, click **Proceed to Login**, and then login as the OpenAM administrator with the first of the two passwords you provided.

Sign in to OpenAM

User Name:

amadmin

Password:

LOG IN

After successful login, OpenAM redirects you to OpenAM Console.



Procedure 2.3. To Delete an OpenAM Configuration Before Redeploying

If you are unhappy with your configuration and want to start over from the beginning, follow these steps.

1. Stop the OpenAM web application to clear the configuration held in memory.

The following example shuts down Tomcat for example.

```
$ /path/to/tomcat/bin/shutdown.sh
Password:
Using CATALINA_BASE:   /path/to/tomcat
Using CATALINA_HOME:   /path/to/tomcat
```

```
Using CATALINA_TMPDIR: /path/to/tomcat/temp
Using JRE_HOME:        /path/to/jdk/jre
Using CLASSPATH:
    /path/to/tomcat/bin/bootstrap.jar:/path/to/tomcat/bin/tomcat-juli.jar
```

2. Delete OpenAM configuration files, by default under the \$HOME of the user running the web application container.

```
$ rm -rf $HOME/openam $HOME/.openamcfg
```

When using the internal OpenAM configuration store, this step deletes the embedded directory server and all of its contents. This is why you stop the application server before removing the configuration.

If you use an external configuration store, also delete the entries under the configured OpenAM suffix (by default dc=openam,dc=forgerock,dc=org).

3. Restart the OpenAM web application.

The following example starts the Tomcat container.

```
$ /path/to/tomcat/bin/startup.sh
Password:
Using CATALINA_BASE:   /path/to/tomcat
Using CATALINA_HOME:   /path/to/tomcat
Using CATALINA_TMPDIR: /path/to/tomcat/temp
Using JRE_HOME:        /path/to/jdk/jre
Using CLASSPATH:
    /path/to/tomcat/bin/bootstrap.jar:/path/to/tomcat/bin/tomcat-juli.jar
```

Procedure 2.4. To Configure OpenAM

1. In the initial configuration screen, click Create New Configuration under Custom Configuration.
2. Provide a password having at least 8 characters for the OpenAM Administrator, amadmin.

3. Make sure the server settings are valid for your configuration.

Server URL

Provide a valid URL to the base of your OpenAM web container, including a fully qualified domain name (FQDN).

In a test environment, you can fake the FQDN by adding it to your `/etc/hosts` as an alias. The following excerpt shows lines from the `/etc/hosts` file on a Linux system where OpenAM is installed.

```
127.0.0.1 localhost.localdomain localhost
::1 localhost6.localdomain6 localhost6
127.0.1.1 openam openam.example.com
```

Cookie Domain

Starts with a dot (.).

Platform Locale

Supported locales include en_US (English), de (German), es (Spanish), fr (French), ja (Japanese), ko (Korean), zh_CN (Simplified Chinese), and zh_TW (Traditional Chinese).

Configuration Directory

Location on server for OpenAM configuration files. OpenAM must be able to write to this directory.

4. In the Configuration Store screen, you can accept the defaults to allow OpenAM to store configuration data in an embedded directory. The embedded directory can be configured separately to replicate data for high availability if necessary.

The screenshot shows the 'OpenAM Configurator' window with the 'Custom Configuration Option' tab selected. The left sidebar lists steps: 1. General, 2. Server Settings, 3. Configuration Store (selected), 4. User Store, 5. Site Configuration, 6. Agent Information, and 7. Summary. The main content area is titled 'Step 3: Configuration Data Store Settings' and includes a note: 'If no other OpenAM instance already exists in the environment, then choose First Instance. If one or more OpenAM instances already exist in the environment, choose Add to Existing Deployment.' Below this is a radio button selection: 'First Instance' (selected) and 'Add to Existing Deployment?'. A section titled 'Configuration Store Details' contains the following fields: 'Configuration Data Store' (radio buttons for 'OpenAM' (selected) and 'OpenDJ or Oracle Directory Server Enterprise Edition'), 'SSL/TLS Enabled' (checkbox), 'Host Name' (text field with 'localhost'), 'Port' (text field with '50389'), 'Admin Port' (text field with '4444'), 'JMX Port' (text field with '1689'), 'Encryption Key' (text field with 'In7xColck4UrbDHZLjhiHvu1UP9H'), and 'Root Suffix' (text field with 'dc=openam,dc=forgerock,dc=org'). A legend indicates that an asterisk (*) denotes a required field. At the bottom are 'Previous', 'Next', and 'Cancel' buttons.

You can also add this OpenAM installation to an existing deployment, providing the URL of the site. See Procedure 2.5, “To Add a Server to a Site” for details.

Alternatively, if you already manage an OpenDJ or DSEE deployment, you can choose to store OpenAM configuration data in your existing directory service. You must, however, create the suffix to store configuration data on the directory server before you configure OpenAM. OpenAM does not create the suffix when you use an external configuration store.

When you create a new OpenAM custom configuration that uses an external LDAP directory server for the configuration data store, you must use a root suffix DN with at least two domain components, such as dc=example,dc=com.

5. In the User Store screen, you configure where OpenAM looks for user identities.

OpenAM must have write access to the directory service you choose, as it adds to the directory schema needed to allow OpenAM to manage access for users in the user store.

OpenAM Configurator

Custom Configuration Option

1. General
2. Server Settings
3. Configuration Store
4. **User Store**
5. Site Configuration
6. Agent Information
7. Summary

Step 4: User Data Store Settings

You can use the data store that comes with the OpenAM configuration data store, or you can use a different user data store. A good practice for setting up production environments is to use an external user data store, one that is different than the OpenAM user data store. Please note that Policy Service and LDAP Authentication Module shall be configured to use the Directory Administrator DN and Password provided here.

☐ OpenAM User Data Store
☒ Other User Data Store

* Indicates required field

User Store Details

* User Data Store Type
☐ Oracle Directory Server Enterprise Edition
☒ OpenDJ
☐ Active Directory with Host and Port
☐ AD with Domain Name
☐ Active Directory Application Mode
☐ IBM Tivoli Directory Server

* SSL/TLS Enabled ☐

* Directory Name

* Port ☒ OK

* Root Suffix

* Login ID

* Password ☒ OK

User Data Store Type

If you have a directory service already provisioned with users in a supported user data store, then select that type of directory from the options available.

SSL/TLS Enabled

To use a secure connection, check this box, then make sure the Port you define corresponds to the port on which the directory listens for StartTLS or SSL connections. When using this option you also need to make sure the trust store used by the JVM running OpenAM has the necessary certificates installed.

Directory Name

FQDN for the host housing the directory service

Port

LDAP directory port. The default for LDAP and LDAP with StartTLS to protect the connection is port 389. The default for LDAP over SSL is port 636. Your directory service might use a different port.

Root Suffix

Base distinguished name (DN) where user data are stored

Login ID

Directory administrator user DN. The administrator must be capable of updating schema and user data.

Password

Password for the directory administrator user

6. In the Site Configuration screen, you can set up OpenAM as part of a site where the load is balanced across multiple OpenAM servers.

If you have a site configuration with a load balancer, you can enable session high availability persistence and failover. OpenAM then stores sessions across server restarts, so that users do not have to login again.

If you then add additional servers to this OpenAM site, OpenAM performs *session failover*, storing session data in a directory service that is shared by different OpenAM servers. The shared storage means that if an OpenAM server fails, other OpenAM servers in the site have access to the user's session data and can serve requests about that user. As a result the user does not have to log in again. If session failover is important for your deployment, also follow the instructions in *Setting Up OpenAM Session Failover*.

OpenAM Configurator

Custom Configuration Option

1. General
2. Server Settings
3. Configuration Store
4. User Store
5. Site Configuration
6. Agent Information
7. Summary

Step 5: Site Configuration

Will this instance be deployed behind a load balancer as part of a site configuration?

☐ No
☒ Yes

* Indicates required field

Site Configuration Details

This is the first instance of OpenAM, and no site configurations currently exist. To create a new site configuration, provide the following information

* Site Name ☒ OK

* Load Balancer URL ☒ OK

Enable Session HA Persistence and Failover ☒ ☒ OK

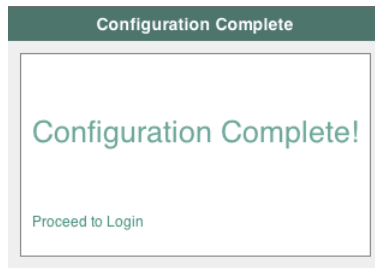
Previous Next Cancel

It is possible to set up a site after initial installation and configuration. Doing so is described in the chapter on *Setting Up OpenAM Session Failover*.

7. In the Agent Information screen, provide a password having at least 8 characters to be used by policy agents to connect to OpenAM.

8. Check the summary screen, and if necessary click Previous to return to earlier screens if necessary to fix configuration errors.

After you click Create Configuration in the summary screen, configuration proceeds, logging progress that you can read in your browser and later in the installation log. The process ends, and OpenAM shows the Proceed to Login prompt.



9. When the configuration completes, click Proceed to Login, and then login as the OpenAM administrator, `amadmin`.

Sign in to OpenAM

User Name:

Password:

LOG IN

After login, OpenAM redirects you to the OpenAM Console page.



You can also access OpenAM Console by browsing to the Console URL, such as `http://openam.example.com:8080/openam/console`.

-
10. Restrict permissions to the configuration directory (by default `$HOME/openam`, where `$HOME` corresponds to the user who runs the web container). Prevent other users from accessing files in the configuration directory.

Procedure 2.5. To Add a Server to a Site

High availability requires redundant servers in case of failure. With OpenAM, you configure an OpenAM site with multiple servers in a pool behind a load balancing service that exposes a single URL as an entry point to the site.

Follow these steps to configure a server to belong to an existing site.

1. In the initial configuration screen, under Custom Configuration click Create New Configuration.
2. In the first screen, enter the same password entered for the OpenAM Administrator, `amadmin`, when you configured the first server in the site.
3. Configure server settings as required.

The cookie domain should be identical to that of the first server in the site.

4. In the configuration store screen, select Add to Existing Deployment, and enter as the Server URL the URL of the first OpenAM server in the site.

The directory used to store configuration data should belong to the same directory service used for this purpose by other OpenAM servers in the site. If you use the embedded OpenDJ directory server, for example, you can have the configurator set up data replication with embedded directory servers used by other servers in the site.

Settings for the user store are then shared with the existing server, so the corresponding wizard screen is skipped.

5. In the site configuration screen, select Yes and enter the same site configuration details as you did for the first server in the site.

Settings for agent information are also shared with the existing server, so the corresponding wizard screen is skipped.

6. In the summary screen, verify the settings you chose, and then click Create Configuration.
7. When the configuration process finishes, click Proceed to Login, and then login as the OpenAM administrator to access OpenAM Console.

Procedure 2.6. To Deploy OpenAM Core Server (No Console)

You can deploy OpenAM server without OpenAM console by performing the following steps.

1. Deploy the `OpenAM-ServerOnly-11.0.0.war` file in your container.

For example, copy the file to deploy on Apache Tomcat.

```
$ cp OpenAM-ServerOnly-11.0.0.war /path/to/tomcat/webapps/coreonly.war
```

2. Browse to the configuration application, such as `http://openam.example.com:8080/coreonly/`, and configure OpenAM core services as in Procedure 2.4, “To Configure OpenAM”.
3. After configuration, restrict permissions to the configuration directory, such as `$HOME/coreonly/` where `$HOME` corresponds to the user who runs the web container. Prevent other users from accessing files in the configuration directory.

Chapter 3. Installing OpenAM Tools

OpenAM tools are found in .zip files where you unpacked the archive of the entire package, such as ~/Downloads/openam.

SSOAdminTools-11.0.0.zip

Administration tools: **ampassword**, **ssoadm** and **amverifyarchive**

See Procedure 3.1, “To Set Up Administration Tools”.

SSOConfiguratorTools-11.0.0.zip

Configuration and upgrade tools, alternatives to using the GUI configuration wizard

See Procedure 3.2, “To Set Up Configuration Tools”.

Procedure 3.1. To Set Up Administration Tools

1. Make sure OpenAM is installed and running before proceeding.
2. Make sure the JAVA_HOME environment variable is properly set.

```
$ echo $JAVA_HOME  
/path/to/jdk
```

3. Create a file system directory to unpack the tools.

```
$ mkdir -p /path/to/openam-tools/admin
```

4. Unpack the tools.

```
$ cd /path/to/openam-tools/admin  
$ unzip ~/Downloads/openam/SSOAdminTools-11.0.0.zip
```

5. If you use IBM Java, add -D"amCryptoDescriptor.provider=IBMJCE" and -D"amKeyGenDescriptor.provider=IBMJCE" options to the **setup** or **setup.bat** script before you install the tools.

The options should be set for the **java** command at the end of the script.

```
$ tail setup  
CLASSPATH="$CLASSPATH:resources"  
  
$JAVA_HOME/bin/java -D"load.config=yes" -D"help.print=$help_print" \  
-D"path.AMConfig=$path_AMConfig" \  
-D"path.debug=$path_debug" \  
-D"path.log=$path_log" \  
-D"amCryptoDescriptor.provider=IBMJCE" \  
-D"amKeyGenDescriptor.provider=IBMJCE" \  

```

```
-cp "$CLASSPATH" \
com.sun.identity.tools.bundles.Main
```

6. Run the **setup** utility (**setup.bat** on Windows), providing the path to the directory where OpenAM configuration files are located, and where you want debug and log information to be located.

```
$ ./setup
Path to config files of OpenAM server [/home/mark/openam]:
Debug Directory [/path/to/openam-tools/admin/debug]:
Log Directory [/path/to/openam-tools/admin/log]:
The scripts are properly setup under directory:
/path/to/openam-tools/admin/openam
Debug directory is /path/to/openam-tools/admin/debug.
Log directory is /path/to/openam-tools/admin/log.
The version of this tools.zip is: version and date
The version of your server instance is: OpenAM version and date
```

After setup, the tools are located under a directory named after the instance of OpenAM.

```
$ ls openam/bin/
ampassword amverifyarchive ssoadm
```

On Windows, these files are .bat scripts.

7. If you use IBM Java, add `-D"amCryptoDescriptor.provider=IBMJCE"` and `-D"amKeyGenDescriptor.provider=IBMJCE"` options to the **ssoadm** or **ssoadm.bat** script before using the script.

The options should be set before the call to `com.sun.identity.cli.CommandManager` at the end of the script.

```
$ tail -3 /path/to/openam-tools/admin/openam/bin/ssoadm
-D"amCryptoDescriptor.provider=IBMJCE" \
-D"amKeyGenDescriptor.provider=IBMJCE" \
com.sun.identity.cli.CommandManager "$@"
```

8. Check that **ssoadm** works properly.

```
$ echo password > /tmp/pwd.txt
$ chmod 400 /tmp/pwd.txt
$ cd /path/to/openam-tools/admin/openam/bin/
$ ./ssoadm list-servers -u amadmin -f /tmp/pwd.txt

http://openam.example.com:8080/openam
```

The **ssoadm** commands can also be run from `ssoadm.jsp` in OpenAM, for example at `http://openam.example.com:8080/openam/ssoadm.jsp`, once the page has been enabled as described in the section on OpenAM `ssoadm.jsp` in the *Administration Guide*.

Not all of the sub-commands available through the **ssoadm** command are available on the `ssoadm.jsp` web page.

9. If you connect to OpenAM over SSL (HTTPS), the **ssoadm** by default tries to trust the certificate based on the CA certificates in the Java cacerts truststore. This might not work for your deployment.

If the SSL certificate configured for the container where you deployed OpenAM was not signed by a recognized CA then the SSL connection process fails. For example, if you used a self-signed certificate as described in the *Administration Guide* procedure, *To Set Up OpenAM With HTTPS on Tomcat*, then the **ssoadm** command cannot trust that certificate by default. To allow the **ssoadm** command to trust the certificate, edit the **ssoadm** (**ssoadm.bat** on Windows) script as follows.

Add two additional options to the **java** command in the script to identify the proper trust store and trust store password, depending on how you set up SSL. The following example points to the key store in which Tomcat holds the self-signed certificate that it presents when establishing an HTTPS connection.

```
-D"javax.net.ssl.trustStore=/path/to/tomcat/conf/keystore.jks"  
-D"javax.net.ssl.trustStorePassword=changeit"
```

If the **ssoadm** command cannot access the server key store in this way, set up your own trust store and import the server certificate using the Java **keytool** command.

10. If you have deployed OpenAM in a site configuration, edit the **ssoadm** (**ssoadm.bat** on Windows) script to map the site URL to the OpenAM server URL.

To do this, set a `com.iplanet.am.naming.map.site.to.server` system property option of the **java** command in the script. The option takes the following form.

```
-D"com.iplanet.am.naming.map.site.to.server=lb-url=openam-url[,  
other-lb-url=openam-url ...]"
```

The property maps each *lb-url* key to an *openam-url* value, where *lb-url* is the URL to a site load balancer and *openam-url* is the URL to the OpenAM server against which you set up the **ssoadm** command.

The **ssoadm** command is dependent on the OpenAM server against which you set it up, so always map site load balancer URLs to that server's *openam-url*.

For example, if your site is behind `https://lb.example.com:443/openam`, and the OpenAM server against which you set up the **ssoadm** is at `http://openam.example.com:8080/openam`, then add the following property to the **java** command (all on one line without spaces).

```
-D"com.ipplanet.am.naming.map.site.to.server=  
https://lb.example.com:443/openam=http://openam.example.com:8080/openam"
```

Repeat this step for each OpenAM server in your site configuration. You can install all your instances of **ssoadm** on the same host, but in each case the command should manage only one OpenAM server.

Procedure 3.2. To Set Up Configuration Tools

1. Make sure the `JAVA_HOME` environment variable is properly set.

```
$ echo $JAVA_HOME  
/path/to/jdk
```

2. Unpack the tools from where you unzipped OpenAM.

```
$ cd /path/to/openam-tools/config  
$ unzip ~/Downloads/openam/SSOConfiguratorTools-11.0.0.zip  
Archive: ~/Downloads/openam/SSOConfiguratorTools-11.0.0.zip  
  inflating: README  
  inflating: sampleconfiguration  
  inflating: sampleupgrade  
extracting: openam-configurator-tool-11.0.0.jar  
extracting: openam-upgrade-tool-11.0.0.jar  
  inflating: license.txt
```

Set up configuration files based on the `sampleconfiguration` example, and then apply the configuration to a deployed OpenAM `.war` file using the following command.

```
$ java -jar openam-configurator-tool-11.0.0.jar -f config.file
```

The *config.file* is set up by default to use the embedded data store with OpenAM installed on `server1.example.com`. You must edit the file before using it, as described in the *OpenAM Reference* for **configurator.jar**.

Chapter 4. Installing OpenAM Distributed Authentication

You can minimize the exposure of OpenAM to the Internet. It is a relatively standard practice to protect an enterprise network with a pair of firewalls. Systems that require external access are placed between the firewalls in a semi-secure area known as a demilitarized zone (DMZ). You can deploy a small subset of OpenAM as the login interface in a DMZ. That subset is known as the distributed authentication service (DAS). Logins through the DAS are forwarded through the internal firewall to the OpenAM core server. For more information see the OpenAM Administration Guide section on *Protecting Network Access*.

To deploy the DAS securely, select a system in your DMZ. Then take the following general steps:

1. Make sure the cookie domain for the DAS is configured in OpenAM under Configuration > System > Platform.
2. Make sure the realms used have a Realm/DNS alias for the DAS configured in OpenAM under Access Control > *Realm Name* > General.
3. Deploy the OpenAM-DistAuth-11.0.0.war file into your web application container.

How you deploy the DAS .war file depends on your web application container. The procedure in this section shows how to deploy on Apache Tomcat.

4. Configure the DAS UI to access OpenAM core services.
5. Configure your firewall to allow end user access to the DAS.

Firewall configuration is not described here.

Important

The DAS relies on the classic OpenAM UI. If you customize the end user pages, follow the procedures for the classic UI described in *Customizing the OpenAM End User Pages*.

Procedure 4.1. To Deploy the DAS on Tomcat

1. Copy the OpenAM-DistAuth-11.0.0.war file into the webapps/ directory.

```
cp ~/Downloads/openam/OpenAM-DistAuth-11.0.0.war  
/path/to/tomcat/webapps
```

-
2. Check that you see the initial DAS configuration screen in your browser.

Procedure 4.2. To Configure the DAS

1. Configure the DAS using the agent profile to connect to OpenAM.

Configuring DistAuth Application
Please provide the OpenAM Server Information.

Server Protocol:	<input type="text" value="http"/>
Server Host:	<input type="text" value="openam.example.com"/>
Server Port:	<input type="text" value="8080"/>
Server Deployment URI:	<input type="text" value="/openam"/>
DistAuth Server Protocol:	<input type="text" value="http"/>
DistAuth Server Host:	<input type="text" value="openam.example.com"/>
DistAuth Server Port:	<input type="text" value="8080"/>
DistAuth Server Deployment URI:	<input type="text" value="/das"/>
DistAuth Cookie Name:	<input type="text" value="AMDistAuthCookie"/>
OpenAM LB Cookie Name:	<input type="text" value="amlbcookie"/>
DistAuth LB Cookie Name:	<input type="text" value="DistAuthLBCookieName"/>
DistAuth LB Cookie Value:	<input type="text" value="DistAuthLBCookieValue"/>
Debug directory	<input type="text" value="/home/openam/das/debug"/>
Debug level	<input type="text" value="error"/>
Encryption Key	<input type="text" value="+w9w1grtQXph3536Aqa4ZiZ4vNFdOrY5M"/>
Application user name	<input type="text" value="UrlAccessAgent"/>
Application user password	<input type="password" value="*****"/>
Confirm Application user password	<input type="password" value="*****"/>

Most DAS configuration choices require no clarification. Hints for equivocal parameters follow.

Debug Level

Default is error. Other options include error, warning, message, and off.

Encryption Key

Do not change the password encryption key.

Application User Name

The DAS uses this identity, such as UrlAccessAgent, to authenticate to OpenAM.

Application User Password

The DAS uses this password to authenticate to OpenAM.

2. Login through the DAS to access OpenAM services.

For testing, you can login as user demo, password changeit.

demo

First Name:	<input type="text"/>
* Last Name:	<input type="text" value="demo"/>
* Full Name:	<input type="text" value="demo"/>
Password:	<input type="password"/> Edit
Email Address:	<input type="text"/>
Telephone Number:	<input type="text"/>
Home Address:	<input type="text"/>
Password Reset Options:	Edit
Universal ID:	id=demo,ou=user,dc=openam,dc=forgerock,dc=org

When the `/openam/idm/EndUser` page is inside the firewall, and therefore not visible to users outside, redirect the browser after successful login to a page that exists. One way to do this is to use the `goto` parameter in the URL.

```
https://das.example.com/das/UI/Login?goto=absolute-successful-redirect-URL
```

On successful login, your browser stores an `AMDistAuthConfig` cookie that identifies the DAS.

3. Restrict permissions to the configuration for the DAS under the `$HOME/FAMDistAuth` directory of the user who runs the web container where you deployed the service.

The configuration file name ends in `AMDistAuthConfig.properties`.

If you deploy multiple DAS servers, you can configure them to forward requests to each other based on the `AMDistAuthConfig` cookie by setting the `com.sun.identity.distauth.cluster` property in this file. The following example lines are wrapped to fit on the page, but you put the entire property on a single line in the configuration file.

```
com.sun.identity.distauth.cluster=  
http://das.example.com:8080/das/UI/Login,  
http://das2.example.com:8080/das/UI/Login
```

4. If your deployment includes multiple OpenAM servers, then edit the DAS configuration file, `$HOME/FAMDistAuth/*AMDistAuthConfig.properties`, to include `X-Forwarded-For` in the list of `openam.retained.http.request.-headers`.

Example: `openam.retained.http.request.headers=X-DSAMEVersion,X-Forwarded-For`

This ensures the authoritative OpenAM authentication server gets the client IP address in this header of the forwarded HTTP request. You can also add the header to the list for the `openam.retained.http.headers` property to have OpenAM copy the header to the response.

5. Some application servers such as JBoss 7 mount the content of the deployed .war file in a temporary location that can change on restart. To make sure that the DAS can find its bootstrap configuration in this case, specify the path to the bootstrap configuration file as a Java runtime option for the DAS, as in the following example. The property to set is `openam.das.bootstrap.file`.

```
-Dopenam.das.bootstrap.file=/home/openam/FAMDistAuth/AMDistAuthConfig.properties
```

You must make sure that the value of the option corresponds to the path to the correct `AMDistAuthConfig.properties` file.

Chapter 5. Customizing the OpenAM End User Pages

When you deploy OpenAM to protect your web-based applications, users can be redirected to OpenAM pages for login and logout. ForgeRock provides pages localized for English, French, German, Spanish, Japanese, Korean, Simplified Chinese, and Traditional Chinese, but you might require additional language support for your organization.

Also, by default the end user pages have ForgeRock styling and branding. You likely want to change at least the images to reflect your organization. You might want to have different page customizations for different realms as well. This chapter address how to get started customizing OpenAM end user pages for your organizations and supported locales.

Note

There is an evolving alternative UI available for OpenAM, known informally as the XUI. You can enable XUI in OpenAM Console under Configuration > Authentication > Core > Global Attributes, by selecting XUI Interface Enabled and saving your work. See Section 5.3, “Configuring the XUI” for more.

To customize the classic UI, first you copy the pages to customize to the proper location, and then you customize the files themselves.

Note

Case mismatch can cause failures in the UI lookup for some systems. To ensure lookup success and for consistency, use lowercase names for your customized directories. All of the default directories are already lowercase.

Classic UI images described in this chapter are located in `/path/to/tomcat/webapps/openam/images/`, and CSS in `/path/to/tomcat/webapps/openam/css/`. If you choose to modify images for your deployment, you can maintain the sizes to avoid having to customize page layout extensively.

5.1. Updating the Classic UI

When developing with a web container that deploys OpenAM in a temporary location, such as JBoss or Jetty, restarting the container can overwrite your changes with the deployable `.war` content. For those web containers, you should also prepare a deployable `.war` containing your changes, and redeploy that file to check your work.

Tip

For production deployment you must package your changes in a custom OpenAM deployable .war file. To create a deployable .war, unpack the OpenAM .war file from ~/Downloads/openam into a staging directory, apply your changes in the staging directory, and use the **jar** command to prepare the deployable .war.

The procedures below describe how to update a deployed version of OpenAM, so that you can see your changes without redeploying the application. This approach works for development as long as your web container does not overwrite changes.

- Procedure 5.1, “To Copy the Pages to Customize For the Top-Level Realm”
- Procedure 5.2, “To Copy the Pages to Customize For Another Realm”
- Procedure 5.3, “To Customize Files You Copied”

Procedure 5.1. To Copy the Pages to Customize For the Top-Level Realm

Rather than changing the default pages, customize your own copy.

1. Change to the config/auth directory where you deployed OpenAM.

```
$ cd /path/to/tomcat/webapps/openam/config/auth
```

2. Copy the default files and optionally the localized files to *suffix[_locale]/html*, where *suffix* is the value of the RDN of the configuration suffix, such as openam if you use the default configuration suffix dc=openam,dc=forgerock,dc=org, and the optional *locale* is, for example, jp for Japanese, or zh_CN for Simplified Chinese.

The following example copies the files for the Top-Level Realm (/) for a custom French locale.

```
$ mkdir -p openam/html
$ cp -r default/* openam/html
$ mkdir -p openam_fr/html
$ cp -r default_fr/* openam_fr/html
```

See *How OpenAM Looks Up UI files* for details.

Procedure 5.2. To Copy the Pages to Customize For Another Realm

As for the top-level realm, customize your own copy rather than the default pages.

1. Change to the config/auth directory where you deployed OpenAM.

```
$ cd /path/to/tomcat/webapps/openam/config/auth
```

2. Depending on which locale you want to customize, copy the default files and optionally the localized files to *suffix[_locale]/services/realm/html*, where *suffix* is the value of the RDN of the configuration suffix, which is *openam* if you use the default configuration suffix *dc=openam,dc=forgerock,dc=org*.

The following example copies the files for a custom French locale and a realm named *ventes*.

```
$ mkdir -p openam/html/ventes/html
$ cp -r default/* openam/services/ventes/html
$ mkdir -p openam_fr/services/ventes/html
$ cp -r default_fr/* openam_fr/services/ventes/html
```

Procedure 5.3. To Customize Files You Copied

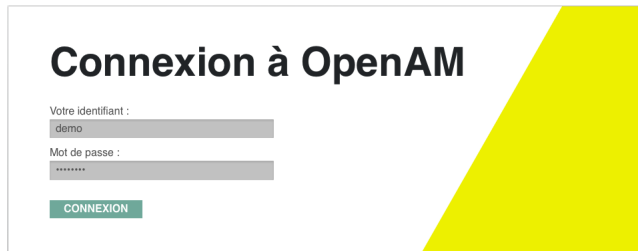
The *.jsp* files from the *default/* directory reference the images used in the OpenAM pages, and retrieve localized text from the *.xml* files. Thus you customize appearance through the *.jsp* files, being careful not to change the functionality itself. You customize the localized text through the *.xml* files.

1. Modify appearance if you must by editing the *.jsp*, image, and CSS files without changing any of the JSP tags that govern how the pages work.
2. Modify the localized text, using UTF-8 without escaped characters, by changing only the original text strings in the *.xml* files.

For example, to change the text in the default OpenAM login screen in the top-level realm for the French locale, edit *openam_fr/html/DataStore.xml*.

3. If necessary, restart OpenAM or the web container to test the changes you have made.

The following screen shot shows a customized French login page where the string *Nom d'utilisateur* has been replaced with the string *Votre identifiant*, and the string *Mot de passe* has been replaced with the string *Votre mot de passe* in *openam_fr/html/DataStore.xml*.



5.2. How OpenAM Looks Up UI Files

This section provides a more complete description of how OpenAM looks up UI files.

OpenAM uses the following information to look up the UI files.

Configuration suffix RDN

When you set up the OpenAM to store its configuration in a directory server, you provide the distinguished name of the configuration suffix, by default `dc=openam,dc=forgerock,dc=org`, therefore, the relative distinguished name attribute value is `openam`.

Client (browser) locale language

The client can specify a locale, which can consist of both a language and a territory, such as `en_GB` for British English. The language in this case is `en`.

Client (browser) locale territory

If the client local is `en_GB`, then the territory in this case is `GB`.

Platform locale language

The platform locale, defined for the platform where OpenAM runs, can also consist of both a language and a territory, such as `hu_HU`. In this example the platform locale language is `hu` for Hungarian.

Platform locale territory

If the platform locale is `hu_HU`, the platform locale territory is `HU` for Hungary.

Realm

Realms can be nested. OpenAM uses the nesting as necessary to look for files specific to a sub-realm before looking in the parent realm.

For all realms below the top level realm, OpenAM adds a `services` directory before the realm to the search path.

Client name

Client names identify the type of client. The default, `html`, is the only client name used unless client detection mode is enabled. When client detection mode is enabled, the client name can be different for mobile clients, for example.

File name

File names are not themselves localized. Thus `Login.jsp` has the same name for all locales, for example.

OpenAM tries first to find the most specific file for the realm and local requested, gradually falling back on less specific alternatives, then on other locales. The first and most specific location as follows.

```
suffix_client-locale-language_client-locale-territory/services/realm/client-name/file-name
```

Example 5.1. UI File Lookup

OpenAM looks up `Login.jsp` in the following order for a realm named `realm`, with the browser requesting `en_GB` locale, the platform locale being `hu_HU`, and the configuration suffix named `o=openam`. The client name used in this example is the generic client name `html`.

```
openam_en_GB/services/realm/html/Login.jsp
openam_en_GB/services/realm/Login.jsp
openam_en_GB/services/html/Login.jsp
openam_en_GB/services/Login.jsp
openam_en_GB/html/Login.jsp
openam_en_GB/Login.jsp
openam_en/services/realm/html/Login.jsp
openam_en/services/realm/Login.jsp
openam_en/services/html/Login.jsp
openam_en/services/Login.jsp
openam_en/html/Login.jsp
openam_en/Login.jsp
openam_hu_HU/services/realm/html/Login.jsp
openam_hu_HU/services/realm/Login.jsp
openam_hu_HU/services/html/Login.jsp
openam_hu_HU/services/Login.jsp
openam_hu_HU/html/Login.jsp
openam_hu_HU/Login.jsp
openam_hu/services/realm/html/Login.jsp
openam_hu/services/realm/Login.jsp
openam_hu/services/html/Login.jsp
openam_hu/services/Login.jsp
openam_hu/html/Login.jsp
openam_hu/Login.jsp
openam/services/realm/html/Login.jsp
openam/services/realm/Login.jsp
openam/services/html/Login.jsp
openam/services/Login.jsp
openam/html/Login.jsp
openam/Login.jsp
default_en_GB/services/realm/html/Login.jsp
```

```
default_en_GB/services/realm/Login.jsp
default_en_GB/services/html/Login.jsp
default_en_GB/services/Login.jsp
default_en_GB/html/Login.jsp
default_en_GB/Login.jsp
default_en/services/realm/html/Login.jsp
default_en/services/realm/Login.jsp
default_en/services/html/Login.jsp
default_en/services/Login.jsp
default_en/html/Login.jsp
default_en/Login.jsp
default_hu_HU/services/realm/html/Login.jsp
default_hu_HU/services/realm/Login.jsp
default_hu_HU/services/html/Login.jsp
default_hu_HU/services/Login.jsp
default_hu_HU/html/Login.jsp
default_hu_HU/Login.jsp
default_hu/services/realm/html/Login.jsp
default_hu/services/realm/Login.jsp
default_hu/services/html/Login.jsp
default_hu/services/Login.jsp
default_hu/html/Login.jsp
default_hu/Login.jsp
default/services/realm/html/Login.jsp
default/services/realm/Login.jsp
default/services/html/Login.jsp
default/services/Login.jsp
default/html/Login.jsp
default/Login.jsp
```

5.3. Configuring the XUI

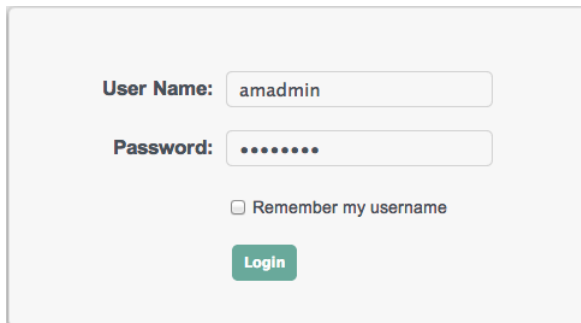
XUI is a new, still evolving UI for OpenAM, based on the Backbone.js JavaScript Model-View-Controller (MVC) framework, Handlebars.js for templating the "View" in the MVC framework, Underscore.js for the JavaScript-related utility functions, and a programmable LESS CSS, working with the OpenAM REST API.

Interface Stability: Internal (not supported)

XUI is not supported for production use.

The main XUI configuration file is based on LESS CSS; for more information, see *LESS, the Dynamic Stylesheet Language*. If desired, you can incorporate additional LESS CSS features in the XUI, above and beyond what is shown in the themeConfig.json file described in this section.

If you want to test the XUI, the first step is to enable it on the login screen. To do so, login to the OpenAM console as the administrator, and browse to Configuration > Authentication > Core > XUI Interface > Enabled. The next time you start OpenAM, you will see the following screen:



User Name: amadmin

Password:

☐ Remember my username

Login

The look and feel of this login screen and user profile page are defined by the main XUI configuration file, `themeConfig.json`. You can find this file in the `/path/to/openam/webapps/XUI` directory.

You can customize the settings in the `themeConfig.json` file. For more information on each parameter in this file, see the Reference Guide chapter on *XUI Configuration Parameters*.

If desired, you can create themes for different realms. This assumes that you have already configured a realm named `realm1`. For more information, see *Configuring Realms* in the OpenAM Administration Guide.

Now to create a theme for the second realm, open the `themeConfig.json` file in a text editor. Make a copy of all lines between the left curly bracket `{` after the `themes` parameter, and the corresponding right curly bracket `}` towards the end of the file.

```
{
  "themes": [
    {
      "name": "default",
      "path": "",
      "realms": [".*"],
      "regex": true,
      . . .
      "footer": {
        "mailto": "info@forgerock.com",
        "phone": "+47 2150108"
      }
    }
  ]
}
```

For a new realm named `realm1`, the revised `themeConfig.json` file should look similar to:

```
{
```

```
"themes": [
  {
    "name": "default",
    "path": "",
    "realms": [".*"],
    "regex": true,

    . . .

    "footer": {
      "mailto": "info@forgerock.com",
      "phone": "+47 2150108"
    }
  },
  {
    "name": "realm1",
    "path": "path/to/realm1/",
    "realms": ["realm1.*"],
    "regex": true,

    . . .

    "footer": {
      "mailto": "info@example.com",
      "phone": "+1 555 555 5555"
    }
  }
]
}
```

Be careful with the syntax. Do not forget the comma between realms. If in doubt about your JSON syntax, refer to a validation tool such as *The JSON Validator*.

If you want to keep a parameter used in the default realm, just delete it from the later realm. Except for the following parameters, realm parameters inherit values from the default: name, path, realms, and regex.

When configuring new or revised parameters, keep the following tips in mind:

- The path to the directory with custom realm settings require a trailing forward slash /.
- Logos may require custom height and width parameters.
- Each of the lessVars parameters are based on variables defined in files in the /path/to/webapps/openam/XUI/css/user directory.
- After making changes, use available tools to make sure the file uses correct JSON syntax.
- Each realm after the default requires at least the name, path, realms, and regex parameters.

When testing different options, make sure to clear the browser cache on a regular basis. Otherwise, changes that you have made may not be shown in your browser.

Chapter 6. Configuring the Core Token Service (CTS)

The Core Token Service (CTS) provides token storage for a several components within OpenAM, including sessions, OAuth and SAML. CTS tokens for sessions represent an authenticated user. The CTS is set up in a generalized token storage format, suitable for sessions, as well as persistence in OAuth 2.0 and SAML tokens.

The CTS relies on a directory service such as OpenDJ to store tokens. By default, the CTS uses the same directory service as is set up for OpenAM's configuration data store. The configuration and policy data in the configuration data store normally change slowly. In contrast, CTS tokens are as volatile as the user sessions they represent. This chapter describes how to set up the CTS in a separate data store within the OpenDJ directory service.

To set up CTS in a separate data store, you have to set up indexes to allow OpenAM to search the data in an efficient manner, Access Control Instructions (ACIs) to give a user Create, Read, Update, and Delete (CRUD) privileges, and schema definitions that prevent OpenDJ from rejecting the data as invalid. But first, you should configure basic parameters for the CTS token data store.

6.1. CTS Configuration Parameters

If you have previously configured CTS, be prepared. Before making any changes, disable client access to OpenAM. The actions taken in this screen may eliminate existing CTS session, OAuth 2.0, and SAML tokens.

To access the main CTS configuration page from the console, select Configuration > Servers and Sites > Default Server Settings > CTS. The options that appear in the screenshot that follows are detailed in the *Reference* document. You can set a root suffix for CTS tokens for either the default embedded or an external token store. If you select Default Token Store, OpenAM will use the embedded configuration data store for CTS tokens."

Note

If desired, you could make these changes from the command line with the **ssoadm update-server-cfg** command, as described in the Reference Guide.

CTS Configuration Parameters

Edit server-default [Save](#) [Reset](#) [Back to Servers and Sites](#)

[CTS Token Store](#) [External Store Configuration](#) * Indicates required field

CTS Token Store

☐ Default Token Store
☒ External Token Store

* Root Suffix:

[Back to top](#)

External Store Configuration

* SSL/TLS Enabled: ☒

* Directory Name:

* Port:

* Login Id:

* Password:

* Max Connections:

* Heartbeat:

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Plausible options have been entered in the figure. If the External Token Store is selected, entries are required in all text boxes. The options shown in the figure are:

- Root Suffix
ou=tokenex,dc=openam,dc=forgerock,dc=org
- SSL/TLS Enabled
enabled (assumes communications using StartTLS over port 389)
- Directory Name
opendj-cts.example.org
- Port
389
- Login Id
cn=Directory Manager
- Password
- Max Connections
20 (arbitrary number)
- Heartbeat
10 (default)

Navigate to Configuration > Servers and Sites > Default Server Settings > CTS. Any options that you change under this tab are inherited as defaults by individual servers. To confirm, make a change, and then navigate to Configuration > Servers and Sites > [Server Name] > CTS.

6.2. Preparing an OpenDJ Directory Service for CTS

OpenAM stores volatile CTS token data in an LDAP directory service. To make that possible, you need to set up the associated data store indexes, which allow OpenAM to search CTS token data in an efficient manner.

You can add the CTS schema with a command such as the following:

```
$ /path/to/openssl/bin/ldapmodify --port 389 --bindDN "cn=Directory Manager" \  
--bindPassword password --filename cts-add-schema.ldif
```

Table 6.1. CTS Data Store Indexes

Attribute	Indexes Required
coreTokenDate01	equality
coreTokenDate02	equality
coreTokenDate03	equality
coreTokenDate04	equality
coreTokenDate05	equality
coreTokenExpirationDate	ordering
coreTokenInteger01	equality
coreTokenInteger02	equality
coreTokenInteger03	equality
coreTokenInteger04	equality
coreTokenInteger05	equality
coreTokenInteger06	equality
coreTokenInteger07	equality
coreTokenInteger08	equality
coreTokenInteger09	equality
coreTokenInteger10	equality
coreTokenString01	equality
coreTokenString02	equality
coreTokenString03	equality
coreTokenString04	equality

Attribute	Indexes Required
coreTokenString05	equality
coreTokenString06	equality
coreTokenString07	equality
coreTokenString08	equality
coreTokenString09	equality
coreTokenString10	equality
coreTokenString11	equality
coreTokenString12	equality
coreTokenString13	equality
coreTokenString14	equality
coreTokenString15	equality
coreTokenUserId	equality

6.3. CTS Access Control Instructions

Now you can set up a user with access to CTS tokens in the data store. Specifically, you will need to configure a user such as `openam` with Create, Read, Update, and Delete (CRUD) privileges. For the given Root Suffix and user name, you might have a User DN of `uid=openam,ou=admins,dc=example,dc=org`. In brief, ACI attributes are formatted with the following syntax:

```
targets(version 3.0;acl "name";permissions subjects;)
```

The following entries give an `openam` user CRUD privileges with the noted User DN, for an external directory service:

```
aci: (version 3.0;acl "Add config entry"; allow (add)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=org");)
aci: (targetattr="*)(version 3.0;acl "Allow entry search"; allow (search, read)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=org");)
aci: (targetattr="*)(version 3.0;acl "Modify config entry"; allow (write)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=org");)
aci: (version 3.0;acl "Delete config entry"; allow (delete)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=org");)
aci: (targetcontrol="2.16.840.1.113730.3.4.3")(version 3.0;acl "Allow persistent search"; allow (search, read)(userdn = "ldap:///uid=openam,ou=admins,dc=example,dc=org");)
```

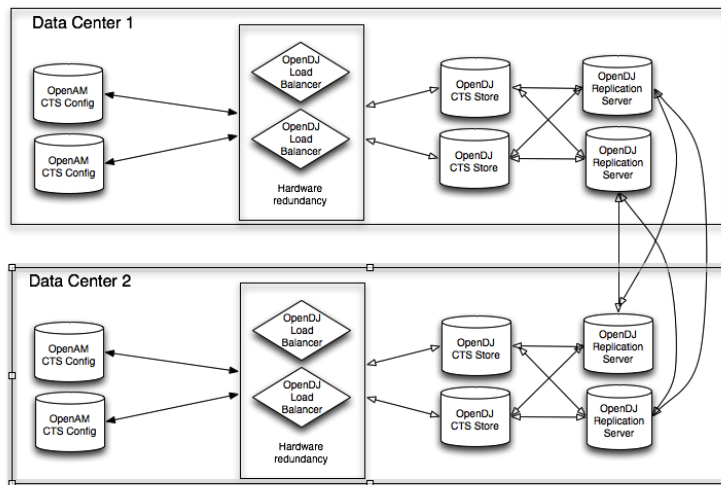
For detailed information on ACIs, with details on how you can use the **ldapmodify** and **dsconfig** commands to manage them, see the OpenDJ chapter on *Configuring Privileges & Access Control*.

6.4. CTS Deployment Scenario

One objective with CTS deployments is to avoid single points of failure (SPOF). Options to avoid SPOFs include:

- Isolating the directory service from OpenAM in separate external servers such as OpenDJ.
- Configuring multiple directory stores for CTS, set up with load balancer(s).
- Adding separate servers for data store replication. For more information on how this is done with OpenDJ, see the OpenDJ documentation on *Stand-alone Replication Servers*.
- Setting up redundancy in the load balancer connections between OpenAM and the external data store.

A relatively simplified method for configuring a CTS deployment is depicted here:



For clarity, the diagram does not include options that may be appropriate for a production deployment such as firewalls and OpenAM agents.

6.5. Managing CTS Tokens

There are five properties associated with token encryption, compression, and token lifetimes. The three that are associated with encryption and compression are disabled by default. The properties are as follows:

- `com.sun.identity.session.repository.enableEncryption`

Supports encryption of CTS tokens.

- `com.sun.identity.session.repository.enableCompression`

Enables GZip-based compression of CTS tokens.

- `com.sun.identity.session.repository.enableAttributeCompression`

Supports compression over and above the GZip-based compression of CTS tokens.

- `com.sun.identity.session.repository.cleanupRunPeriod`

Specifies a minimum CTS token lifetime. If there is no activity in the specified time period, the token is erased. Default: 300 seconds. (Under Default Server Settings > Advanced, this property is set to 400 seconds.)

- `com.sun.identity.session.repository.healthCheckRunPeriod`

Sets a period of time when requests are sent to make sure the current instance of OpenAM is running. Default: 60 seconds.

To enable the encryption / compression options, navigate to Configuration > Servers and Sites > Default Server Settings > Advanced. In the Advanced Properties window, you should see these entries in the Property Name column with the corresponding value in the Property Value column. To enable them, change false to true in the Property Value column associated with the desired property, and click Save.

Note

If you choose to enable compression, set both `com.sun.identity.session.repository.enableCompression` and `com.sun.identity.session.repository.enableAttributeCompression` to true. They work well together.

6.6. General Recommendations for CTS Configuration

As might be expected, the biggest driver in CTS replication is the bandwidth between data stores. When data stores are connected via a WAN, that bandwidth may be insufficient to replicate updated tokens without delay. With that in mind, OpenAM supports options for token compression that can minimize the the load from CTS.

If you are deploying on a single site, and want CTS replication limited to that site, the default configuration store may be sufficient. If your needs go beyond a higher-level performance threshold, you may want to move the CTS token storage to one or more dedicated systems. Alternatively, if you need global replication of user session CTS tokens, that also justifies a move to dedicated systems as you need that extra level of control over how much replication is taking place.

CTS generally cause much more replication traffic than less volatile configuration data. Therefore, in high volume deployments you can move CTS data to dedicated, properly sized directory servers to improve performance. In addition, token compression as discussed in Section 6.5, “Managing CTS Tokens”, is disabled by default. When enabled, token compression can reduce load requirements on the network connection between data stores.

While not recommended for high volume deployments, it is possible to use CTS in production within the default internal OpenDJ configuration store. That assumes a small scale deployment with a relatively simple topology.

The CTS is configured to work with a single OpenDJ directory server. That is a potential SPOF. to address that issue, set up a load balancer between OpenAM and the OpenDJ directory service used for the CTS. Redundant load balancers are preferred. If one instance of OpenDJ fails, the load balancer would redirect CTS requests to another instance of OpenDJ with a copy of the CTS tokens.

Once configured, the OpenDJ directory service replicates CTS data transmitted from OpenAM servers to connected OpenDJ servers. The amount of replication traffic can be significant, especially if replication proceeds over a WAN. You can limit this replication traffic by separating OpenDJ instances into directory and replication servers.

Chapter 7. Setting Up OpenAM Session Failover

This chapter covers setting up SFO when using multiple instances of OpenAM in a site configuration for high availability. The basic idea followed here is that you configure load balancing to be sticky, based on the value of an OpenAM cookie, `amlbcookie`, different for each OpenAM server. Should that server become unavailable, the load balancer fails client requests over to another OpenAM server. The other OpenAM server must then fail over the user session associated with the client.

SFO relies on a shared, highly available Core Token Service (CTS) to store user session data. The service is shared with other OpenAM servers in the same OpenAM site. When the OpenAM server where a user authenticated goes down, other servers in the site read user session information from the CTS, so the user with a valid session does not have to login again. When the original OpenAM server becomes available again, it can also read session information from the CTS, and can carry on serving users with active sessions.

This chapter includes these procedures.

- Procedure 7.1, “To Configure a Site with a First OpenAM Server”
- Procedure 7.2, “To Configure Site Load Balancing”
- Procedure 7.3, “To Configure Session Failover After Installation”

Procedure 7.1. To Configure a Site with a First OpenAM Server

Before you set up SFO, first configure OpenAM in a site configuration with a load balancer as the entry point to the site. The most expedient way to configure the site is to set it up during the initial OpenAM configuration. However, you may already have a working instance before realizing that multiple instances are necessary. The following steps walk you through setting up the site configuration for the first OpenAM server.

Once you have set up a site for the first OpenAM server, see *To Add a Server to a Site* for instructions on configuring subsequent servers in the site.

1. Login to OpenAM Console as `amadmin`, and then browse to Configuration > Servers and Sites > Sites.
2. Click New, and on the New Site page enter the site name, and set the Primary URL to the load balancer URL that is the entry point for the site, such as `https://lb.example.com/openam`.

The site URL is the URL to the load balancer in front of your OpenAM servers in the site. For example, if your load balancer listens for HTTPS on host `lb.example.com` and port 443, with OpenAM under `/openam`, then your site URL is `https://lb.example.com/openam`.

3. Click Save to keep the site configuration.
4. Under Configuration > Servers and Sites > Server, click the link to the server configuration.
5. On the server configuration General tab page, set the Parent Site to the name of the site you just created, and then click Save to keep your changes.

At this point the server is part of the site you have configured.

Procedure 7.2. To Configure Site Load Balancing

If you did not set up the site during initial configuration, first follow the instructions in Procedure 7.1, “To Configure a Site with a First OpenAM Server”, and then follow all the steps below.

1. For each OpenAM server in the site, select Configuration > Servers and Sites > Servers > *Server Name*, and then set Parent Site to the site you created before saving your work.
2. In an OpenAM site, the server that authenticated a user is the server that continues to manage that user's session, unless the server is no longer available. Therefore, you should use sticky load balancing. To do so, configure your load balancer to inspect the value of the `amlbcookie` so that it can determine which OpenAM server should receive the client request.

As your load balancer depends on the `amlbcookie` value, on each OpenAM server console in the site, select Configuration > Servers and Sites > Servers > *Server Name* > Advanced, makes sure that `com.ipplanet.am.-lbcookie.value` is unique. By default the value of the `amlbcookie` is set to the server ID for the OpenAM instance.

Note

When using SSL, the approach requires that you either terminate SSL on the load balancer and re-encrypt traffic from the load balancer to the OpenAM servers.

If you must change `amlbcookie` values to make them unique, then your changes take effect after you restart the OpenAM server. (To check, login to the console and check the cookie value in your browser.)

3. Restart each OpenAM server or the web containers where the OpenAM servers run so that all configuration changes take effect.

Procedure 7.3. To Configure Session Failover After Installation

Session failover requires a site configuration with one or more servers and OpenDJ as a configuration store (embedded or external).

If you did not configure session persistence and availability during initial configuration, first complete the steps in Procedure 7.2, “To Configure Site Load Balancing”, and then follow these steps.

1. In the OpenAM console for one of the servers in the site, under Configuration > Global, click Session.
2. Under Secondary Configuration Instance, click New.

If the server is not part of a site, or if you are not using OpenDJ server, the New button is grayed out.

3. In the Add Sub Configuration page, check that the Name is set to the name of the site.
4. Activate the Session Persistence and High Availability Failover Enabled option.
5. Click Add to save your work.

Chapter 8. Removing OpenAM Software

This chapter shows you how to uninstall OpenAM core software. See the *OpenAM Web Policy Agent 3.3.0 Installation Guide* or *OpenAM Java EE Policy Agent 3.3.0 Installation Guide* for instructions on removing OpenAM agents.

Procedure 8.1. To Remove OpenAM Core Software

After you have deployed and configured OpenAM core services, you have at least two, perhaps three or four, locations where OpenAM files are stored on your system.

You remove the internal OpenAM configuration store when you follow the procedure below. If you used an external configuration store, you can remove OpenAM configuration data after removing all the software.

1. Shut down the web application container in which you deployed OpenAM.

```
$ /etc/init.d/tomcat stop
Password:
Using CATALINA_BASE:   /path/to/tomcat
Using CATALINA_HOME:   /path/to/tomcat
Using CATALINA_TMPDIR: /path/to/tomcat/temp
Using JRE_HOME:        /path/to/jdk/jre
Using CLASSPATH:       /path/to/tomcat/bin/bootstrap.jar:
                        /path/to/tomcat/bin/tomcat-juli.jar
```

2. Unconfigure OpenAM by removing configuration files found in the \$HOME directory of the user running the web application container.

For a full install of OpenAM core services, configuration files include the following.

- The configuration directory, by default \$HOME/openam. If you did not use the default configuration location, then check in the OpenAM console under Configuration > Servers and Sites > *Server Name* > General > System > Base installation directory.
- The hidden file that points to the configuration directory.

For example, if you are using Apache Tomcat as the web container, this file could be \$HOME/.openamcfg/AMConfig_path_to_tomcat_webapps_openam_ OR \$HOME/.openssocfg/AMConfig_path_to_tomcat_webapps_openam_.

```
$ rm -rf $HOME/openam $HOME/.openamcfg
```

or

```
$ rm -rf $HOME/openam $HOME/.openssocfg
```

Note

At this point, you can restart the web container and configure OpenAM anew if you only want to start over with a clean configuration rather than removing OpenAM completely.

If you used an external configuration store you must also remove the configuration manually from your external directory server. The default base DN for the OpenAM configuration is `dc=openam,dc=forgerock,dc=org`.

3. Undeploy the OpenAM web application.

For example, if you are using Apache Tomcat as the web container, remove the `.war` file and expanded web application from the container.

```
$ cd /path/to/tomcat/webapps/  
$ rm -rf openam.war openam/
```

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