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About EPM System

Oracle Enterprise Performance Management System products form a comprehensive enterprisewide system that integrates modular suites of financial management and planning applications with the most comprehensive business intelligence capabilities for reporting and analysis. Major components of EPM System products:

- Oracle Hyperion Foundation Services
- Oracle Essbase
- Oracle Hyperion Financial Management
- Oracle Hyperion Planning
- Oracle Hyperion Reporting and Analysis

For information about the products and components in each of these product families, see Oracle Enterprise Performance Management System Installation Start Here.

Assumed Knowledge

This guide is for system administrators who configure, secure, and manage EPM System components. It assumes the following knowledge:

- A strong understanding of your organization’s security infrastructure, including the following:
  - Directory servers; for example, Oracle Internet Directory, Sun Java System Directory Server, and Microsoft Active Directory
  - Use of Secure Socket Layer (SSL) to secure communication channels
Access Management Systems, for example, Oracle Access Manager, and SiteMinder

Single sign-on (SSO) infrastructure; for example, Kerberos

Knowledge of EPM System security concepts that are relevant to your organization

Security Infrastructure Components

EPM System integrates several security components to ensure robust application security. When integrated into a secure infrastructure, EPM System delivers a highly secure suite of applications that ensures data and access security. The infrastructure components that you can use to secure EPM System include:

- An optional access management system; for example, Oracle Access Manager to provide SSO access to EPM System components
- Use of an integrated SSO infrastructure; for example, Kerberos.

You can use Kerberos authentication with the access management system (SiteMinder) to ensure that Windows users can transparently log in to SiteMinder and EPM System components.

- Use of Secure Socket Layer (SSL) to secure communication channels among EPM System components and clients

User Authentication

User authentication enables single sign-on (SSO) functionality across EPM System components by validating the login information of each user to determine authenticated users. User authentication, along with component-specific authorization, grants the user access to EPM System components. The process of granting authorization is called provisioning.

Authentication Components

The following sections describe the components that support SSO:

- “Native Directory” on page 12
- “External User Directories” on page 13

Native Directory

Native Directory refers to the relational database that Oracle Hyperion Shared Services uses to support provisioning and to store seed data such as default user accounts.

Native Directory functions:

- Maintain and manage the default EPM System user accounts
- Store all EPM System provisioning information (relationships among users, groups, and roles)

External User Directories

User directories refer to corporate user and identity management systems that are compatible with EPM System components.

EPM System components are supported on several user directories, including LDAP-based user directories; for example, Oracle Internet Directory, Sun Java System Directory Server (formerly SunONE Directory Server), and Microsoft Active Directory. Relational databases also are supported as user directories. User directories other than Native Directory are referred to as external user directories throughout this document. See Oracle Enterprise Performance Management Products—Supported Platforms Matrices for a list of supported user directories.

From Shared Services Console, you can configure many external user directories as the source for EPM System users and groups. Each EPM System user must have a unique account in a configured user directory. Generally, EPM System users are assigned to groups to facilitate provisioning.

Default EPM System Single Sign-on

EPM System supports SSO across EPM System web applications by allowing authenticated users from an application to seamlessly navigate to other applications without reentering credentials. SSO is implemented by integrating a common security environment that handles user authentication and provisioning (role-based authorization) across EPM System components.

The default SSO process is depicted in the following illustration.
1. Through a browser, users access an EPM System component login screen and enter a user name and password. The EPM System component queries the configured user directories (including Native Directory) to verify user credentials. Upon finding the matching user account in a user directory, the search is terminated, and the user’s information is returned to the EPM System component.

Access is denied if no user account is found in any configured user directory.

2. Using the retrieved user information, the EPM System component queries Native Directory to obtain provisioning details for the user.

3. EPM System component checks the Access Control List (ACL) in the component to determine the application artifacts that the user can access.

Upon receiving provisioning information from Native Directory, the EPM System component is made available to the user. At this point, SSO is enabled for all EPM System components for which the user is provisioned.

Single Sign-on from Access Management Systems

To further secure EPM System components, you can implement a supported access management system such as Oracle Access Manager or SiteMinder, which can provide authenticated user credentials to EPM System components and control access based on predefined access privileges.

SSO from security agents is available for EPM System web applications only. In this scenario, EPM System components use the user information provided by the security agent to determine access permissions of users. To enhance security, Oracle recommends that direct access to servers be blocked by firewalls so all requests are routed through an SSO portal.
SSO from access management systems is supported by accepting authenticated user credentials through an acceptable SSO mechanism. See “Supported SSO Methods” on page 49. The access management system authenticates users and passes the login name to EPM System. EPM System verifies the login name against configured user directories.

See these topics.

- “Single Sign-on from Oracle Access Manager” on page 51
- “OracleAS Single Sign-on” on page 53
- “SiteMinder SSO” on page 63
- “Kerberos Single Sign-on” on page 66

The illustrated concept:

1. Using a browser, users request access to a resource protected by an access management system, for example; Oracle Access Manager, or SiteMinder.

   **Note:** EPM System components are defined as resources protected by the access management system.

   The access management system intercepts the request and presents a login screen. Users enter a user name and password, which are validated against configured user directories in the access management system to verify user authenticity. EPM System components are also configured to work with these user directories.

   Information about the authenticated user is passed to the EPM System component, which accepts the information as valid.
The access management system passes the user’s login name (value of Login Attribute) to the EPM System component using an acceptable SSO mechanism. See “Supported SSO Methods” on page 49.

2. To verify user credentials, the EPM System component tries to locate the user in a user directory. If a matching user account is found, then user information is returned to the EPM System component. EPM System security sets the SSO token that enables SSO across EPM System components.

3. Using the retrieved user information, the EPM System component queries Native Directory to obtain provisioning details for the user.

Upon receiving user provisioning information, the EPM System component is made available to the user. SSO is enabled for all EPM System components for which the user is provisioned.

**Provisioning (Role-Based Authorization)**

EPM System security determines user access to applications using the concept of roles. Roles are permissions that determine user access to application functions. Some EPM System components enforce object-level ACLs to further refine user access to their artifacts, such as reports and members.

Each EPM System component provides several default roles tailored to various business needs. Each application belonging to an EPM System component inherits these roles. Predefined roles from the applications registered with Shared Services are available from Shared Services Console. You may also create additional roles that aggregate the default roles to suit specific requirements. These roles are used for provisioning. The process of granting users and groups specific roles belonging to EPM System applications and their resources is called provisioning.

Native Directory and configured user directories are sources for user and group information for the provisioning process. You can browse and provision users and groups from all configured user directories from Shared Services Console. You can also use application-specific aggregated roles created in Native Directory in the provisioning process.

An illustrated overview of the authorization process:
1. After a user is authenticated, EPM System component queries user directories to determine the user’s groups.

2. The EPM System component uses group and user information to retrieve the user’s provisioning data from Shared Services. The component uses this data to determine which resources a user can access.

   Product-specific provisioning tasks, such as setting product-specific access control, are completed for each product. This data is combined with provisioning data to determine the product access for users.

Role-based provisioning of EPM System products uses these concepts.

**Roles**

A role is a construct (similar to an access control list) that defines the access permissions granted to users and groups to perform functions on EPM System resources. A role is a combination of resource or resource types (what users can access, for example, a report) and actions that users can perform on the resource (for example, view and edit).

Access to EPM System application resources is restricted. Users can access them only after a role that provides access is assigned to the user or to the group to which the user belongs. Access restrictions based on roles enable administrators to control and manage application access.

**Global Roles**

Global roles, which are Shared Services roles that span multiple products, enable users to perform certain tasks across EPM System products. For example, the Shared Services Administrator can provision users for all EPM System applications.
Predefined Roles

Predefined roles are built-in roles in EPM System products. You cannot delete them. Each application instance belonging to an EPM System product inherits the predefined roles of the product. These roles, for each application, are registered with Shared Services when you create the application.

Aggregated Roles

Aggregated roles, also known as custom roles, aggregate multiple predefined roles belonging to an application. An aggregated role can contain other aggregated roles. For example, a Shared Services Administrator or Provisioning Manager can create an aggregated role that combines the Planner and View User roles of a Planning application. Aggregating roles can simplify the administration of applications that has several granular roles. Global Shared Services roles can be included in aggregated roles. You cannot create an aggregated role that spans applications or products.

Users

User directories store information about the users who can access EPM System products. Both the authentication and the authorization processes use user information. You can create and manage Native Directory users only from Shared Services Console.

Users from all configured user directories are visible from Shared Services Console. These users can be individually provisioned to grant access rights on the EPM System applications registered with Shared Services. Oracle does not recommend provisioning individual users.

Default EPM System Administrator

An administrator account, with default name admin, is created in Native Directory during the deployment process. This is the most powerful EPM System account and should be used only to set up a System Administrator, who is the Information Technology expert tasked with managing EPM System security and environment.

The user name and password of EPM System Administrator is set during Foundation Services deployment. Because this account cannot be subjected to corporate account password policies, Oracle recommends that it be deactivated after creating a System Administrator account.

Generally, the default EPM System Administrator account is used to perform these tasks:

- Configure the corporate directory as an external user directory. See Chapter 4, “Configuring User Directories.”
- Create a System Administrator account by provisioning a corporate Information Technology expert with the Shared Services Administrator role. See “Provisioning Users and Groups” in the Oracle Enterprise Performance Management System User Security Administration Guide.
System Administrator

The System Administrator is typically a corporate Information Technology expert who has read, write, and execute access rights to all servers involved in an EPM System deployment.

Generally, the System Administrator performs these tasks:

- Disable the default EPM System Administrator account.
- Create at least one Functional Administrator.
- Set the security configuration for EPM System using the Shared Services Console.
- Optionally configure user directories as an external user directory.
- Monitor EPM System by periodically running the Log Analysis tool.

The tasks that Functional Administrators perform are described in this guide.

Procedures to create a Functional Administrator:

- Configure the corporate directory as an external user directory. See Chapter 4, “Configuring User Directories.”
- Provision a user or group with the required roles to create a Functional Administrator. See “Provisioning Users and Groups” in the Oracle Enterprise Performance Management System User Security Administration Guide.

The Functional Administrator must be provisioned with these roles:

- LCM Administrator role of Shared Services
- Administrator and Provisioning Manager role of each deployed EPM System component

Functional Administrators

The Functional Administrator is a corporate user who is an EPM System expert. Typically, this user is defined in the corporate directory that is configured in Shared Services as an external user directory.

Functional Administrator performs EPM System administration tasks such as creating other Functional Administrators, setting up delegated administration, creating and provisioning applications and artifacts, and setting up EPM System auditing. The tasks that Functional Administrators perform are described in the Oracle Enterprise Performance Management System User Security Administration Guide.

Groups

Groups are containers for users or other groups. You can create and manage Native Directory groups from Shared Services Console. Groups from all configured user directories are displayed in Shared Services Console. You can provision these groups to grant permissions for EPM System products registered with Shared Services.
Launching Shared Services Console

You use a menu option in Oracle Hyperion Enterprise Performance Management Workspace to access Shared Services Console.

To launch Shared Services Console:

1. Go to:

   http://web_server_name:port_number/workspace

   In the URL, web_server_name indicates the name of the computer where the web server used by Foundation Services is running, and port_number indicates the web server port; for example, http://myWebserver:19000/workspace.

   **Note:** If you are accessing EPM Workspace in secure environments, use https (not http) as the protocol and the secure web server port number. For example, use a URL such as: https://myWebserver:19043/workspace.

2. Click Launch Application.

   **Note:** Pop-up blockers may prevent EPM Workspace from opening.

3. In Logon, enter your user name and password.

   Initially, the only user who can access Shared Services Console is the EPM System Administrator whose user name and password were specified during the deployment process.

4. Click Log On.

5. Select Navigate, then Administrator, and then Shared Services Console.
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Assumptions

- You have determined the deployment topology and identified the communication links that are to be secured using SSL.
- You have obtained the required certificates from a Certificate Authority (CA), either a well-known CA or your own, or created self-signed certificates. See “Required Certificates” on page 23.
- You are familiar with SSL concepts and procedures such as importing certificates.
  
  See “Information Sources” on page 21 for a list of reference documents.

Information Sources

SSL-enabling EPM System requires that you prepare components such as the application server, web server, databases, and user directories to communicate using SSL. This document assumes that you are familiar with the tasks involved in SSL-enabling these components.

- **Oracle WebLogic Server**: See “Configuring SSL” in the *Securing WebLogic Server Guide*.
- **Oracle HTTP Server**: See the following topics in the *Oracle HTTP Server Administrator’s Guide*:
  - Managing Security
Enabling SSL for Oracle HTTP Server

- User Directories: See the documentation from the user directory vendor. Useful links:
  - Oracle Internet Directory: See Oracle Internet Directory Administrator’s Guide
  - Active Directory: See these documents:
    - Microsoft Windows Server 2008 Active Directory documentation
    - Microsoft Windows Server 2003 Active Directory documentation
  - Novell eDirectory: Novell eDirectory documentation

- Databases: See the documentation from the database vendor.

- Internet Information Services: See How to Implement SSL in IIS.

Location References

This document refers to the following installation and deployment locations:

- MIDDLEWARE_HOME refers to the location of middleware components such as WebLogic Server, and, optionally, one or more EPM_ORACLE_HOME. The MIDDLEWARE_HOME is defined during EPM System product installation. The default MIDDLEWARE_HOME directory is Oracle/Middleware.

- EPM_ORACLE_HOME refers to the installation directory containing the files required to support EPM System products. EPM_ORACLE_HOME resides within MIDDLEWARE_HOME. The default EPM_ORACLE_HOME is MIDDLEWARE_HOME/EPMSYSTEM11R1; for example, Oracle/Middleware/EPMSYSTEM11R1.

  EPM System products are installed in the EPM_ORACLE_HOME/products directory; for example, Oracle/Middleware/EPMSYSTEM11R1/products.

  Additionally, during EPM System product configuration, some products deploy components to MIDDLEWARE_HOME/user_projects/epmsystem1; for example, Oracle/Middleware/user_projects/epmsystem1.

- EPM_ORACLE_INSTANCE denotes a location that is defined during the configuration process where some products deploy components. The default location of EPM_ORACLE_INSTANCE is MIDDLEWARE_HOME/user_projects/epmsystem1; for example, Oracle/Middleware/user_projects/epmsystem1.

About SSL-Enabling EPM System Products

The EPM System deployment process automatically deploys Oracle's EPM System products to work in both SSL and non-SSL modes.

While specifying the common setting for EPM System, you specify whether to SSL-enable all server-to-server communication in your deployment.
Selecting SSL settings during the deployment process does not automatically configure your environment for SSL. It only sets a flag in the Oracle Hyperion Shared Services Registry to indicate that all EPM System components that use the Shared Services Registry must use the secure protocol (HTTPS) for server-to-server communication. You must complete additional procedures to SSL-enable your environment. These procedures are discussed in this document.

**Supported SSL Scenarios**

The following SSL scenarios are supported:

- SSL termination at the SSL offloader. See “Terminating SSL at the SSL Offloader” on page 24.

**Note:** This document assumes that you are using WebLogic Server to host Java web applications. If you are using WebSphere, refer to WebSphere documentation for information on SSL-enabling WebSphere application server and IBM HTTP Server plug-in.

**Required Certificates**

SSL communication uses certificates to establish trust between components. Oracle recommends that you use certificates from well-known third-party CAs to SSL-enable EPM System in a production environment.

**Note:** EPM System supports the use of wildcard certificates, which can secure multiple subdomains with one SSL certificate. Using a wildcard certificate can reduce management time and cost.

If you are using wildcard certificates to encrypt communication, you must disable host-name verification in WebLogic Server.

You require the following certificates for each server that hosts EPM System components:

- A root CA certificate

**Note:** You need not install a root CA certificate in the Java keystore if you are using certificates from a well-known third-party CA whose root certificate is already installed in the Java keystore.

Firefox and Internet Explorer are preloaded with certificates of well-known third-party CAs. If you are acting as your own CA, you must import your CA root certificate into the keystore used by the clients accessed from such browsers. For example, if you are acting as your own CA, Oracle Hyperion Web Analysis clients cannot establish an SSL handshake with the server if your CA root certificate is not available to the browser from which Web Analysis is accessed.
- Signed certificates for each Oracle HTTP Server in your deployment
- A signed certificate for WebLogic Server host machine. Managed servers on this machine can also use this certificate
- Two certificates for the SSL offloader/load balancer. One of these certificates is for external communication and the other is for internal communication

## Terminating SSL at the SSL Offloader

### Subtopics
- Deployment Architecture
- Assumptions
- Configuring EPM System
- Testing the Deployment

## Deployment Architecture

In this scenario, SSL is used to secure the communication link between EPM System clients (for example, a browser) and an SSL Offloader. The illustrated concept:
Assumptions

Subtopics

- SSL Offloader and Load Balancer
- Virtual Hosts

SSL Offloader and Load Balancer

A fully configured SSL offloader with a load balancer must be present in the deployment environment.

The load balancer must be configured to forward all requests received by the virtual hosts to Oracle HTTP Servers.

Virtual Hosts

SSL terminated at SSL offloader configuration uses two server aliases; for example, epm.myCompany.com and empinternal.myCompany.com, on the SSL offloader/load balancer, one for external communication between the offloader and browsers, and the other for internal communication among EPM System servers. Ensure that the server aliases point to the IP address of the machine, and that they are resolvable through DNS.

A signed certificate to support external communication between the offloader and browsers (through epm.myCompany.com) must be installed on the offloader/load balancer.

Configuring EPM System

The default deployment of EPM System components supports SSL termination at the SSL offloader. No additional action is required.

While configuring EPM System, ensure that the logical address for web applications point to the alias (for example, empinternal.myCompany.com) that was created for internal communication. See the following information sources to install and configure EPM System:

- Oracle Enterprise Performance Management System Installation and Configuration Guide
- Oracle Enterprise Performance Management System Installation Start Here
- Oracle Enterprise Performance Management System Installation and Configuration Troubleshooting Guide

Testing the Deployment

After completing the deployment process, verify that everything works by connecting to the secure EPM Workspace URL:

https://virtual_host_external:SSL_PORT/workspace/index.jsp
For example, https://epm.myCompany.com:443/workspace/index.jsp where 443 is the SSL port.

Full SSL Deployment of EPM System

Subtopics
- Deployment Architecture
- Assumptions
- Configuring EPM System for Full SSL

Deployment Architecture

In full SSL mode, communication across all securable channels is secured using SSL. This EPM System deployment scenario is the most secure.

The illustrated concept:

Note: Not all EPM System components can be SSL-enabled. Typically, back-end servers—for example, Oracle Hyperion Strategic Finance Server, and Financial Management Server—cannot be SSL-enabled.
Assumptions

Subtopics

- Databases
- EPM System
- SSL Offloader and Load Balancer

Databases

The database servers and clients are SSL-enabled. See your database documentation for information on SSL-enabling the database server and client.

EPM System

EPM System components, including WebLogic Server and Oracle HTTP Server, are installed and deployed. Further, your EPM System environment has been tested to ensure that everything is working in non-SSL mode. See the following information sources:

- Oracle Enterprise Performance Management System Installation and Configuration Guide
- Oracle Enterprise Performance Management System Installation Start Here
- Oracle Enterprise Performance Management System Installation and Configuration Troubleshooting Guide

If you plan to SSL-enable the database connections, during the configuration process, you must select the Advanced Options link on each database configuration screen, and then specify the required settings, which include the following:

- Select Use secure connection to the database (SSL) and enter a secure database URL; for example, jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCPS)(HOST=myDBhost)(PORT=1529)(CONNECT_DATA=(SERVICE_NAME=myDBhost.myCompany.com)))

- Trusted Keystore
- Trusted Keystore Password
See the *Oracle Enterprise Performance Management System Installation and Configuration Guide* for details.

**SSL Offloader and Load Balancer**

A fully configured SSL offloader with a load balancer must be present in the deployment environment.

Full SSL configuration uses two server aliases, for example, `epm.myCompany.com` and `empinternal.myCompany.com`, on the SSL offloader. One is for external communication between the offloader and browsers, and the other is for internal communication among EPM System servers. Ensure that the server aliases point to the IP address of the machine and that they are resolvable through DNS.

The load balancer must be configured to forward all requests received by the virtual hosts to Oracle HTTP Servers.

The two signed certificates—one to support external communication between the offloader and browsers (through `epm.myCompany.com`), and the other to support internal communication (through `empinternal.myCompany.com`) among applications—must be installed on the offloader/load balancer. Oracle recommends that these certificates be tied to server aliases to prevent the exposure of server names and to enhance security.
Reconfiguring EPM System Common Settings

During this process, you select the settings that force EPM System components to use SSL communication.

To reconfigure EPM System for SSL:

1. **Launch Oracle Hyperion Enterprise Performance Management System Configurator.**

2. **On Select the EPM Oracle Instance to which the configuration will be applied, complete these steps:**
   a. In **EPM Oracle instance name**, enter the instance name that you used while originally configuring EPM System components.
   b. Click Next.

3. **On the Configuration screen, complete these steps:**
   a. Clear Uncheck All.
   b. Expand **Hyperion Foundation** configuration task, and then select **Configure Common Settings**.
   c. Click Next.

4. **In Configure Common Settings, complete these steps:**

   **Caution!** Before selecting the settings to use SSL to communicate with the email server, ensure that the email server is configured for SSL.
Configure Common Settings:

- **Select Use SSL for Java web application server communication (requires manual configuration)** to specify that EPM System should use SSL for communication.

- **Optional:** Enter information in **Mail Server Host** and **Port**. To support SSL communication, you must specify the secure port used by the SMTP mail server.

- **Optional:** To support SSL communication with the SMTP mail server, select **Use SSL to communicate with mail server**.

- Select or enter settings in the remaining fields.

- **Click Next**.

5. **Click Next** on subsequent EPM System Configurator screens.

6. When the deployment process is complete, the Summary screen is displayed. Click **Finish**.

### Optional: Installing Root CA Certificate for WebLogic Server

The root certificates of most well-known third-party CAs are already installed in the Sun and JRockit JVM keystores. Complete the procedures in this section if you are not using certificates from a well-known third-party CA (not recommended). Default JVM keystore locations:

- **Sun JVM keystore:** `MIDDLEWARE_HOME/jdk160_35/jre/lib/security/cacerts`
- **JRockit JVM keystore:** `MIDDLEWARE_HOME/jrockit_160_37/jre/lib/security/cacerts`

To install the root CA certificate:

1. **Copy the root CA certificate into a local directory on the machine where WebLogic Server is installed.**

2. **From a console,** change directory to `MIDDLEWARE_HOME/jdk160_35/jre/bin`. 

---

30 SSL-Enabling EPM System Components
3. Execute a keytool command such as the following to install the signed certificate into the Sun JVM keystore:

```
keytool -import -alias ALIAS -file CA_CERT_FILE -keystore KEYSTORE -storepass KEYSTORE_PASSWORD -trustcacerts
```

For example, you can use the following command to add a certificate CAcert.crt stored in the current directory into the Sun JVM keystore with Blister as the certificate alias in the keystore. A default storepass (changeit) is assumed.

```
keytool -import -alias Blister -file CAcert.crt -keystore ../lib/security/cacerts -storepass changeit -trustcacerts
```

**Note:** The preceding command and example use some of the syntax for importing certificates using keytool. See keytool documentation for a complete list of import syntax.

4. Execute a command such as the following to install the root CA certificate into the JRockit JVM keystore:

```
keytool -import -alias ALIAS -file CERT_FILE -keystore KEYSTORE -storepass KEYSTORE_PASSWORD -trustcacerts
```

For example, you can use the following command to add a certificate CAcert.crt stored in the current directory into the JRockit JVM keystore with Blister as the certificate alias. A default storepass (changeit) is assumed.

```
keytool -import -alias Blister -file CAcert.crt -keystore MIDDLEWARE_HOME/jrockit_160_37/jre/lib/security/cacerts -storepass changeit -trustcacerts
```

**Note:** Ensure that you replace MIDDLEWARE_HOME with the directory path.

### Installing Certificate on the WebLogic Server

The default WebLogic Server installation uses a demo certificate to support SSL. Oracle recommends that you install a certificate from a well-known third-party to strengthen the security of your environment.

On each machine that hosts WebLogic Server, use a tool (for example, keytool) to create a custom keystore to store the signed certificate for WebLogic Server and EPM System web components.

1. From a console, change directory to MIDDLEWARE_HOME/jdk160_35/jre/bin.
2. Execute a keytool command such as the following to create the custom keystore (identified by the -keystore directive in the command) in an existing directory:

```
keytool -genkey -dname "cn=myserver, ou=EPM, o=myCompany, c=US" -alias epm_ssl -keypass password -keystore C:\oracle\Middleware\EPMSYSTEM11R1\ssl\keystore -storepass password -validity 365 -keyalg RSA
```

**Note:** The common name (cn) that you set must match the server name. If you use fully qualified domain name (FQDN) as the cn, you must use the FQDN while deploying web components.
3 Generate a certificate request.

```bash
keytool -certreq -alias epm_ssl -file C:/certs/epmssl_csr -keypass password -storetype jks -keystore C:\oracle\Middleware\EPMSyste11R1\ssl\keystore -storepass password
```

4 Obtain a signed certificate for the WebLogic Server machine.

5 Import the signed certificate into the keystore:

```bash
keytool -import -alias epm_ssl -file C:/certs/epmssl_crt -keypass password -keystore C:\Oracle\Middleware\EPMSyste11R1\ssl\keystore -storepass password
```

**Configuring WebLogic Server**

After deploying EPM System web components, you must configure them for SSL communication.

➢ To configure the web components for SSL:

1 **Start the WebLogic Server by executing a file stored in MIDDLEWARE_HOME/user_projects/domains/EPMSyste/bin:**
   - startWebLogic.cmd (Windows)
   - startWebLogic.sh (UNIX)

2 **Launch the WebLogic Server Administration Console by accessing the following URL:**

   ```
   http://SERVER_NAME:Port/console
   ```

   For example, to access the WebLogic Server console deployed to the default port on myServer, you should use http://myServer:7001/console.

3 **On the Welcome screen, enter the WebLogic Server administrator user name and password that you specified in EPM System Configurator.**

4 **In Change Center, click Lock & Edit.**

5 **In the left pane of the console, expand Environment, and then select Servers.**

6 **In the Summary of Servers screen, click the name of the server that you want to SSL-enable.**

   For example, to SSL-enable Foundation Services components, you work with the EPMServer0 server.

7 **Clear Listen Port Enabled to disable the HTTP listen port.**

8 **Ensure that SSL Listen Port Enabled is selected.**

9 **In SSL Listen Port, enter the SSL listen port where this server should listen for requests.**

10 **To specify the identity and trust keystores to use, select Keystores to open the Keystores tab.**

11 **Click Change.**

12 **Select an option:**

   - **Custom Identity and Custom Trust** if you are not using a server certificate from a well-known third-party CA
- **Custom Identity and Java Standard Trust** if you are using a server certificate from a well-known third-party CA

13. Click Save.

14. In **Custom Identity Keystore**, enter the path of the keystore where the signed WebLogic Server certificate is installed.

15. In **Custom Identity Keystore Type**, enter **jks**.

16. In **Custom Identity Keystore Passphrase** and **Confirm Custom Identity Keystore Passphrase**, enter the keystore password.

17. If you selected **Custom Identity and Custom Trust** in **Keystores**:

   a. In **Custom Trust Keystore**, enter the path of the custom keystore where the root certificate of the CA that signed your server certificate is available.

   b. In **Custom Trust Keystore Type**, enter **jks**.

   c. In **Custom Trust Keystore Passphrase** and **Confirm Custom Trust Keystore Passphrase**, enter the keystore password.

18. Click Save.


   a. Select **SSL**.

   b. In **Private Key Alias**, enter the alias that you specified while importing the signed WebLogic Server certificate.

   c. In **Private Key Passphrase** and **Confirm Private Key Passphrase**, enter the password to be used to retrieve the private key.

   d. Click Save.

20. Complete step 6 through step 19 for each managed server belonging to this host.

21. In **Change Center**, click **Activate Changes**.

**Oracle HTTP Server Procedures**

**Subtopics**

- **Creating a Wallet and Installing Certificate for Oracle HTTP Server**
- **SSL-Enabling Oracle HTTP Server**

**Creating a Wallet and Installing Certificate for Oracle HTTP Server**

A default wallet is automatically installed with Oracle HTTP Server. You must configure a real wallet for each Oracle HTTP Server in your deployment.

➢ To create and install Oracle HTTP Server certificate:

1. On each machine that hosts Oracle HTTP Server, launch the Wallet Manager.
Windows: Select Start, then All Programs, Oracle-OHxxxxx, then Integrated Management Tools, and then Wallet Manager.

xxxxxx is the Oracle HTTP Server instance number.

UNIX: Execute MIDDLEWARE_HOME/ohs/bin/owm to launch the Wallet Manager from the command line.

**Note:** The Wallet Manager requires a graphical environment.

2 Create a new, empty Wallet.
   a. In Oracle Wallet Manager, select Wallet, and then New.
   b. Click Yes to create a default wallet directory, or No to create the Wallet file in a location of your choice.
   c. In Wallet Password and Confirm Password on the New Wallet screen, enter the password that you want to use.
   d. Click OK.
   e. In the confirmation dialog box, click No.

3 Optional: If you are not using a CA that is known to Oracle HTTP Server, import the root CA certificate into the Wallet.
   a. In Oracle Wallet Manager, right-click Trusted Certificates and select Import Trusted Certificate.
   b. Browse and select the root CA certificate.
   c. Select Open.

4 Create a certificate request.
   b. In Create Certificate Request, enter the required information.
      For the common name, enter the fully qualified server alias; for example, epm.myCompany.com or epminternal.myCompany.com, available in the hosts file on your system.
   c. Click OK.
   d. In the confirmation dialog box, click OK.
   e. Right-click the certificate request that you created, and then select Export Certificate Request.
   f. Specify a name for the certificate request file.

5 Using the certificate request files, obtain signed certificates from the CA.

6 Import signed certificates.
   a. In Oracle Wallet Manager, right-click the certificate request that was used to obtain the signed certificate, and then select Import User Certificate.
b. In Import Certificate, click **OK** to import the certificate from a file.

c. In Import Certificate, select the Certificate file, and then click **Open**.

7  **Save the Wallet to a convenient location**; for example, `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/keystores/epmsystem`.

8  **Select Wallet,** and then **Auto Login** to activate auto login.

**SSL-Enabling Oracle HTTP Server**

After reconfiguring the web server on each machine that hosts Oracle HTTP Server, update Oracle HTTP Server configuration file by replacing the location of the default Wallet with the location of the wallet that you created.

➢ To configure Oracle HTTP Server for SSL:

1  **Reconfigure the web server on each Oracle HTTP Server host machine in your deployment.**

   a. Start EPM System Configurator for the instance.

   b. In the configuration task selection screen, complete these steps, and then click **Next**.

      i. Clear the selection from **Uncheck All**.

      ii. Expand **Hyperion Foundation** task group, and then select **Configure Web Server**.

   c. In **Configure Web Server**, click **Next**.

   d. In **Confirmation**, click **Next**.

   e. In **Summary**, click **Finish**.

2  **Update the configuration settings of each Oracle HTTP Server in your deployment.**

   a. Using a text editor, open `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/ssl.conf`.

   b. Locate the `SSLWallet` directive and change its value so that it points to the wallet where you installed the certificate. If you created the wallet in

      `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/keystores/epmsystem`, your `SSLWallet` directive may be as follows:

      ```
      SSLWallet "${ORACLE_INSTANCE}/config/${COMPONENT_TYPE}/${COMPONENT_NAME}/keystores/epmsystem"
      ```

   c. Save and close `ssl.conf`.

3  **Update mod_wl_ohs.conf on each Oracle HTTP Server in your deployment.**

   a. Using a text editor, open `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/mod_wl_ohs.conf`.

   b. Ensure that the `WLSSLWallet` directive points to the Oracle Wallet where the SSL certificate is stored.

      ```
      WLSSLWallet MIDDLEWARE_HOME/ohs/bin/wallets/myWallet
      ```

      For example, `C:/Oracle/Middleware/ohs/bin/wallets/myWallet`

   c. Save and close `mod_wl_ohs.conf`.
Restarting Servers and EPM System

Restart all servers in the deployment, and then start EPM System on each server.

Testing the Deployment

After completing the SSL deployment, verify that everything works.

To test your deployment:

1. Using a browser, access the secure EPM Workspace URL:
   - If you used `epm.myCompany.com` as the server alias for external communication and
     `4443` as the SSL port, the EPM Workspace URL is
     `https://epm.myCompany.com:4443/workspace/index.jsp`

2. On the Logon screen, enter a user name and password.

3. Click Log On.

4. Verify that you can securely access the deployed EPM System components.

Configuring SSL-Enabled External User Directories

Subtopics

- Assumptions
- Import the Root CA Certificate
- Configure External User Directories

Assumptions

- The external user directories that you plan to configure in Shared Services Console are SSL-enabled.
- If you did not use a certificate from a well-known third-party CA to SSL-enable the user directory, you have a copy of the root certificate of the CA that signed the server certificate.

Import the Root CA Certificate

If you did not use a certificate from a well-known third-party CA to SSL-enable the user directory, then you must import the root certificate of the CA that signed the server certificate into the following keystores:

Use a tool, such as keytool, to import the root CA certificate.

- All EPM System servers:
  - Sun JVM keystore: `MIDDLEWARE_HOME/jdk160_35/jre/lib/security/cacerts`
  - JRockit JVM keystore: `MIDDLEWARE_HOME/jrockit_160_37/jre/lib/security/cacerts`
The keystore used by the JVM on each EPM System component host machine. By default, EPM System components use the following keystore:

MIDDLEWARE_HOME/jdk160_35/jre/lib/security/cacerts

Configure External User Directories

You configure user directories using the Shared Services Console. While configuring user directories, you must select the SSL Enabled option that instructs EPM System security to use the secure protocol to communicate with the user directory. You can SSL-enable a connection between EPM System security and LDAP-enabled user directories; for example, Oracle Internet Directory and Microsoft Active Directory.


Terminating SSL at the Web Server

Subtopics

- Deployment Architecture
- Assumptions
- Configuring EPM System
- Testing the Deployment

Deployment Architecture

In this scenario, SSL is used to secure the communication link between EPM System clients (for example, a browser) and Oracle HTTP Server. The illustrated concept:
Assumptions

This configuration uses two server aliases; for example, epm.myCompany.com and empinternal.myCompany.com, on the web server, one for external communication between the web server and browsers, and the other for internal communication among EPM System servers. Ensure that the server aliases point to the IP address of the machine, and that they are resolvable through DNS.

A signed certificate to support external communication with browsers (for example, through epm.myCompany.com) must be installed on the web server (where the virtual host that supports secure external communication is defined). This virtual host should terminate SSL and forward HTTP requests to the Oracle HTTP Server.

Configuring EPM System

The default deployment of EPM System components supports SSL termination at the web server. No additional action is required.

While configuring EPM System, ensure that the logical web applications point to the virtual host (for example, empinternal.myCompany.com) that was created for internal communication. See the following information sources to install and configure EPM System:

- Oracle Enterprise Performance Management System Installation and Configuration Guide
Testing the Deployment

After completing the deployment process, verify that everything works by connecting to the secure EPM Workspace URL:

https://virtual_host_external:SSL_PORT/workspace/index.jsp

For example, https://epm.myCompany.com:443/workspace/index.jsp where 443 is the SSL port.

Enabling Encryption for Financial Reporting Studio

To configure Oracle Hyperion Financial Reporting Studio for encrypted RMI communication, add the following to the JVM startup parameters (shell script files in UNIX servers) or JVMOption Windows registry entries (Windows servers).

-Djavax.net.ssl.trustStore=TRUSTSTORE_LOCATION

Replace TRUSTSTORE_LOCATION with the absolute location of the keystore where you installed the CA root certificate.

The registry location for adding this parameter for Financial Reporting Studio on a Windows server is HKEY_LOCAL_MACHINE\SOFTWARE\Hyperion Solutions\Hyperion Reports \HReports\JVM.

The location for adding JVM parameters for Financial Reporting is HKEY_LOCAL_MACHINE \SOFTWARE\Hyperion Solutions\FinancialReporting0\HyS9FRReports.

SSL for Essbase

Subtopics

- Overview
- Default Deployment
- Required Certificates and Their Location
- Essbase and SSL-Enabled EPM System
- Installing and Deploying Essbase Components
- Using Trusted Third-Party CA Certificates for Essbase
- Establishing a Per-Session SSL Connection

Overview

Essbase supports one-way SSL only, in which the Essbase instance (server and agent) is secured using certificates.
This section explains the procedures for replacing the default certificates that are used to secure communication between an Essbase instance and components such as MaxL, Oracle Essbase Administration Services Server, Oracle Essbase Studio Server, Oracle Hyperion Provider Services, Foundation Services, Planning, Financial Management, and Shared Services Registry.

**Default Deployment**

Essbase can be deployed to work in SSL and non-SSL modes. Essbase Agent listens on a non-secure port; it also can be configured to listen on a secure port. All connections accessing the secure port are treated as SSL connections. If a client connects to the Essbase Agent on the non-SSL port, the connection is treated as a non-SSL connection. Components can establish concurrent non-SSL and SSL connections to an Essbase Agent.

You can control SSL on a per-session basis by specifying the secure protocol and port when you log in. See “Establishing a Per-Session SSL Connection” on page 47.

If SSL is enabled, all communication within an Essbase instance is encrypted to ensure data security.

Default deployments of Essbase components in secure mode uses self-signed certificates to enable SSL communication, mainly for testing purposes. Oracle recommends that you use certificates from well-known third-party CAs to SSL-enable Essbase in production environments.
Typically, an Oracle Wallet stores the certificate that enables SSL communication with clients that use Essbase RTC (C APIs) and a Java keystore stores the certificate that enables SSL communication with components that utilize JAPI for communication. To establish SSL communication, Essbase clients and tools store the root certificate of the CA that signed the Essbase Server and Agent certificates. See “Required Certificates and Their Location” on page 41.

**Required Certificates and Their Location**

Oracle recommends the use of certificates from well-known third-party CAs to SSL-enable Essbase in a production environment. You may use the default self-signed certificates for test purposes.

**Note:** Essbase supports the use of wildcard certificates, which can secure multiple subdomains with one SSL certificate. Using a wildcard certificate can reduce management time and cost.

Wildcard certificates cannot be used if host-name check is enabled.

You require the following certificates:

- A root CA certificate.

Components that use Essbase RTC (C APIs) to establish a connection to Essbase require that the root CA certificate be stored in Oracle Wallet. Components that use JAPI to establish a connection require that the root CA certificate be stored in a Java keystore. The required certificates and their locations are indicated in the following table.

**Note:** You may not need to install root CA certificate if you are using certificates from a well-known third-party CA whose root certificate is already installed in Oracle Wallet.

- Signed certificate for Essbase Server and Essbase Agent.

<table>
<thead>
<tr>
<th>Component</th>
<th>Keystore</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>MaxL</td>
<td>Oracle Wallet</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td>Administration Services Server</td>
<td>Oracle Wallet</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td>Provider Services</td>
<td>Oracle Wallet</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td>EPM System Database</td>
<td>Oracle Wallet</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td>Essbase Studio Server</td>
<td>Java Keystore</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td>Planning</td>
<td>- Oracle Wallet</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td></td>
<td>- Java Keystore</td>
<td>Root CA certificate</td>
</tr>
<tr>
<td>Financial Management</td>
<td>Java Keystore</td>
<td>Root CA certificate</td>
</tr>
</tbody>
</table>
Essbase and SSL-Enabled EPM System

Securing EPM System using SSL does not SSL-enable Essbase.

The only setting that affects an Essbase instance that is deployed with SSL-enabled EPM System is the JDBC connection setting stored in the Shared Services Registry. If EPM System web components are configured to use a secure JDBC connection to communicate with the Foundation Services database, the Shared Services Registry contains a secure JDBC connection string. In this scenario, manually install the root CA certificate used by Essbase on the database server.

See your database documentation for information on SSL-enabling the database server and client.

Installing and Deploying Essbase Components

The configuration process enables you to select a secure agent port (default is 6423), which you can change when configuring Essbase. By default, the deployment process installs the required self-signed certificates to create a functional secure deployment for testing.

The Oracle Hyperion Enterprise Performance Management System Installer installs an Oracle Wallet and self-signed certificate within `ARBOR_PATH` on the machine that hosts the Essbase instance if Oracle HTTP Server is installed. In single host deployments, all Essbase components share this certificate.

<table>
<thead>
<tr>
<th>Component1</th>
<th>Keystore</th>
<th>Certificate2</th>
</tr>
</thead>
</table>
| Essbase (Server and Agent)3 | • Oracle Wallet  
   • Java Keystore | • Root CA certificate  
   • Signed certificate for Essbase Server and Agent |
| Shared Services Repository | | |

1You need only one instance of the keystore to support multiple components that use similar keystore.
2Multiple components can use a root certificate installed in a keystore.
3Certificates must be installed in the default Oracle Wallet and in the Java keystore.
Using Trusted Third-Party CA Certificates for Essbase

Subtopics

- Creating Certificate Requests and Obtaining Certificates
- Obtaining and Installing Root CA Certificate
- Installing Signed Certificates
- Updating Default Settings

Creating Certificate Requests and Obtaining Certificates

Generate a certificate request to obtain a certificate for the server that hosts Essbase Server and Essbase Agent. A certificate request contains encrypted information specific to your Distinguished Name (DN). You submit the certificate request to a signing authority to obtain an SSL certificate.

You use a tool such as keytool or Oracle Wallet Manager to create a certificate request. For detailed information on creating a certificate request, see the documentation for the tool that you are using.

If you are using keytool, use a command such as the following to create a certificate request:

```
keytool -certreq -alias essbase_ssl -file C:/certs/essabse_server_csr -keypass password
-storetype jks -keystore C:\oracle\Middleware\EPMSystem11R1\Essbase_ssl\keystore
-storepass password
```

Obtaining and Installing Root CA Certificate

The root CA certificate verifies the validity of the certificate that is used to support SSL. It contains the public key against which the private key that was used to sign the certificate is matched to verify the certificate. You can obtain the root CA certificate from the certificate authority that signed your SSL certificates.

Install the root certificate of the CA that signed the Essbase Server certificate on clients that connect to the Essbase Server or Agent. Ensure that the root certificate is installed in the keystore appropriate for the client. See “Required Certificates and Their Location” on page 41.

**Note:** Multiple components can use a root CA certificate installed on a server machine.

Oracle Wallet

Refer to Table 1, “Required Certificates and Their Locations” for a list of components that require the CA root certificate in an Oracle Wallet. You can create a wallet or install the certificate in the demo wallet where the default self-signed certificate is installed.

See Oracle Wallet Manager documentation for detailed procedures to create wallets and to import the root CA certificate.
Java Keystore

Refer to Table 1, “Required Certificates and Their Locations” for a list of components that require the root CA certificate in an Java keystore. You can add the certificate into the keystore where the default self-signed certificate is installed or create a keystore for storing the certificate.

**Note:** The root CA certificates of many well-known third-party CAs are already installed in the Java keystore.

Refer to the documentation of the tool that you are using for detailed instructions. If you are using keytool, use a command, such as the following, to import the root certificate:

```
keytool -import -alias blister_CA -file c:/certs/CA.crt -keypass password -trustcacerts -keystore C:\Oracle\Middleware\EPMSystem11R1\Essbase_ssl\keystore -storepass password
```

Installing Signed Certificates

You install the signed SSL certificates on the server that hosts Essbase Server and Essbase Agent. Components that use Essbase RTC (C APIs) to establish a connection to Essbase Server or Agent require that the certificate be stored in an Oracle Wallet with the root CA certificate. Components that use JAPI to establish a connection to Essbase Server or Agent require that the root CA certificate and signed SSL certificate be stored in a Java keystore. For detailed procedures, see these information sources:

- Oracle Wallet Manager documentation
- Documentation or online help for the tool; for example, keytool, that you use to import the certificate

If you are using keytool, use a command, such as the following, to import the certificate:

```
keytool -import -alias essbase_ssl -file C:/certs/essbase_ssl_crt -keypass password -keystore C:\Oracle\Middleware\EPMSystem11R1\Essbase_ssl\keystore -storepass password
```

Updating Default Settings

**Subtopics**

- Updating Essbase SSL Settings
- Customizing SSL Properties of JAPI Clients
- Available Cipher Suites for Components that Use Essbase C APIs

You customize the SSL settings for components that use C APIs (Essbase Server and clients) by specifying their value in `essbase.cfg`.

You customize Essbase Server SSL settings by specifying their value in `essbase.cfg`.
Updating Essbase SSL Settings

Edit `essbase.cfg` to customize Essbase SSL settings, such as:

- Setting to enable secure mode
- Setting to enable clear mode
- Preferred mode to communicate with clients (used by clients only)
- Secure port
- Cipher suites
- Oracle Wallet path

To update `essbase.cfg`:

1. **Using a text editor, open** `EPM_ORACLE_INSTANCE/EssbaseServer/essbaseserver1/bin/essbase.cfg`.

2. **Enter settings as needed.** Default Essbase settings are implied. If you need to change the default behavior, add the settings for the custom behavior in `essbase.cfg`. For example, `EnableClearMode` is enforced by default, by which Essbase Server is enabled to communicate over nonencrypted channel. To turn off Essbase Server's ability to communicate over unencrypted channel, you should specify `EnableClearMode FALSE` in `essbase.cfg`. See Table 2.

### Table 2  Essbase SSL Settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
</table>
| EnableClearMode²      | Enables unencrypted communication between Essbase applications and Essbase Agent. If this property is set to FALSE, Essbase does not handle non-SSL requests.  
**Default:** EnableClearMode TRUE  
**Example:** EnableClearMode FALSE |
| EnableSecureMode      | Enables SSL encrypted communication between Essbase clients and Essbase Agent. This property must be set to TRUE to support SSL.  
**Default:** FALSE  
**Example:** EnableSecureMode TRUE |
| SSLCipherSuites       | A list of cipher suites, in order of preference, to use for SSL communication. See “Available Cipher Suites for Components that Use Essbase C APIs” on page 47. Essbase Agent uses one of these cipher suites for SSL communication. The first cipher suite in the list is accorded the highest priority when the agent chooses a cipher suit.  
**Default:** SSL_RSA_WITH_RC4_128_MD5  
**Example:** SSLCipherSuites SSL_RSA_WITH_AES_256_CBC_SHA, SSL_RSA_WITH_DES_CBC_SHA |
| AgentSecurePort       | The secure port at which the agent listens.  
**Default:** 6423  
**Example:** AgentSecurePort 16001 |
<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WalletPath</td>
<td>Location of the Oracle Wallet (fewer than 1,024 characters) that stores the root CA certificate and signed certificate.</td>
</tr>
<tr>
<td></td>
<td><strong>Default:</strong> ARBORPATH/bin/wallet</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> WalletPath/usr/local/wallet</td>
</tr>
<tr>
<td>ClientPreferredMode³</td>
<td>The mode (Secure or Clear) for the client session. If this property is set to Secure, SSL mode is used for all sessions.</td>
</tr>
<tr>
<td></td>
<td>If this property is set to Clear, transport is chosen based on whether the client login request contains the secure transport keyword. See “Establishing a Per-Session SSL Connection” on page 47.</td>
</tr>
<tr>
<td></td>
<td><strong>Default:</strong> CLEAR</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> ClientPreferredMode  SECURE</td>
</tr>
</tbody>
</table>

³The default value is enforced if the property is missing from essbase.cfg.
²Essbase becomes nonoperational if EnableClearMode and EnableSecureMode are set to FALSE.
³Clients use this setting to determine whether they should establish a secure or nonsecure connection with Essbase.

3 Save and close essbase.cfg.

### Customizing SSL Properties of JAPI Clients

Several default properties are predefined for the Essbase components that rely on JAPI. The default properties can be overridden by including properties in essbase.properties.

**Note:** Only a few of the SSL properties identified in Table 3 are externalized in essbase.properties. You should add the properties that are not externalized.

To update SSL properties of JAPI clients:

1. **Using a text editor, open** EPM_ORACLE_HOME/common/EssbaseJavaAPI/11.1.2.0/bin/essbase.properties.

2. **Update properties as needed.** See Table 3 for description of customizable JAPI client properties.

   If a desired property is not included in essbase.properties, add it.

#### Table 3 Default SSL properties for JAPI Clients

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>olap.server.ssl.alwaysSecure</td>
<td>Sets the mode that clients should use against all Essbase instances. Change this property value to true to enforce SSL mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Default:</strong> false</td>
</tr>
<tr>
<td>olap.server.ssl.securityHandler</td>
<td>Package name for handling the protocol. You can change this value to indicate another handler.</td>
</tr>
<tr>
<td></td>
<td><strong>Default:</strong> java.protocol.handler.pkgs</td>
</tr>
<tr>
<td>olap.server.ssl.securityProvider</td>
<td>Oracle uses the Sun SSL protocol implementation. You can change this value to indicate another provider.</td>
</tr>
<tr>
<td></td>
<td><strong>Default:</strong> com.sun.net.ssl.internal.www.protocol</td>
</tr>
</tbody>
</table>
### Available Cipher Suites for Components that Use Essbase C APIs

These cipher suites are supported by the SSL implementation on Essbase Server:

- SSL_RSA_WITH_AES_256_CBC_SHA
- SSL_RSA_WITH_AES_128_CBC_SHA
- SSL_RSA_WITH_3DES_EDE_CBC_SHA
- SSL_RSA_WITH_DES_CBC_SHA
- SSL_RSA_WITH_RC4_128_SHA
- SSL_RSA_WITH_RC4_128_MD5

### Establishing a Per-Session SSL Connection

Essbase components; for example, MaxL, can control SSL at session level by connecting to Essbase Agent using secure as the transport keyword. For example, you can establish a secure connection between MaxL and Essbase Agent by executing one of the following commands from a MaxL Console:

```plaintext
login admin welcome1 on hostA:PORT:secure
```

Per-session control takes priority over configuration settings specified in `essbase.cfg`. If no transport keyword is specified, Essbase clients use the value set for `ClientPreferredMode` to determine whether to initiate a secure connection with Essbase. If the `ClientPreferredMode` setting is not set to secure, the communication occurs over a nonsecure channel.
In This Chapter

- Supported SSO Methods ................................................................. 49
- Single Sign-on from Oracle Access Manager ........................... 51
- OracleAS Single Sign-on .............................................................. 53
- Protecting EPM System Products for SSO ................................. 59
- SiteMinder SSO ........................................................................... 63
- Kerberos Single Sign-on .............................................................. 66
- Configuring the EPM System for SSO .......................................... 80
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Supported SSO Methods

Subtopics

- HTTP Header
- Custom Login Class
- HTTP Authorization Header
- Get Remote User from HTTP Request

SSO requires that the web identity management solution pass the login name of authenticated users to EPM System products. You can use the following standard EPM System methods to integrate EPM System with commercial and custom web-based SSO solutions.

- “HTTP Header” on page 50
- “Custom Login Class” on page 50
- “HTTP Authorization Header” on page 51
- “Get Remote User from HTTP Request” on page 51

Caution! As a security measure, Oracle recommends that you implement client certificate authentication (two-way SSL) between the web server and the application server if your organization uses methods that carry user identity in the header for identity propagation.
**HTTP Header**

If you are using Oracle Single Sign-on (OSSO), SiteMinder, or Oracle Access Manager as the web identity management solution, EPM System security automatically selects Custom HTTP header to pass the login name of authenticated users to EPM System components.

The login name of an EPM System product user is determined by the Login Attribute that is specified while configuring user directories in Shared Services. See “Configuring OID, Active Directory, and Other LDAP-Based User Directories” in the Oracle Enterprise Performance Management System User Security Administration Guide for a brief description of the Login Attribute.

The HTTP header must contain the value of the attribute that is set as the Login Attribute. For example, if `uid` is the Login Attribute value, the HTTP header must carry the value of the `uid` attribute.

See your web identity management solution documentation for detailed information on defining and issuing custom HTTP headers.

EPM System security parses the HTTP header and validates the login name that it carries against the user directories configured on Shared Services.

**Custom Login Class**

When a user logs in, the web identity management solution authenticates the user against a directory server and encapsulates the credentials of the authenticated user in an SSO mechanism to enable SSO with downstream systems. If the web identity management solution uses a mechanism unsupported by EPM System products, or if the value of the Login Attribute is not available in the SSO mechanism, you can use a custom login class to derive and pass the value of the Login Attribute to EPM System products.

Using a custom login class enables EPM System to integrate with security agents that use X509 certificate-based authentication. Using this authentication mechanism requires the implementation of standard Shared Services APIs to define the SSO interface between EPM System components and the web identity management solution. The custom login class must pass the value of the Login Attribute to EPM System products. See “Configuring OID, Active Directory, and Other LDAP-Based User Directories” in the Oracle Enterprise Performance Management System User Security Administration Guide for a brief description of Login Attribute. For sample code and implementation steps, see Appendix B, “Implementing a Custom Login Class.”

To use a custom login class (default name is `com.hyperion.css.sso.agent.X509CertificateSecurityAgentImpl`), an implementation of `com.hyperion.css.CSSSecurityAgentIF` interface must be available in the classpath. `CSSSecurityAgentIF` defines the getter method for retrieving the user name and password (optional). If the interface returns a null password, security authentication treats the provider as trusted and verifies the existence of the user in configured providers. If the interface returns a non-null value for the password, EPM System attempts to authenticate the request using the user name and password returned by this implementation.

`CSSSecurityAgentIF` comprises two methods: `getUserName` and `getPassword`. 

---

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**getUserName Method**

This method returns the user name for authentication.

```java
java.lang.String getUserName(
    javax.servlet.http.HttpServletRequest req,
    javax.servlet.http.HttpServletResponse res)
throws java.lang.Exception
```

The `req` parameter identifies the HTTP request that carries the information that is used to determine the user name. The `res` parameter is not used (preset for backward compatibility).

**getPassword Method**

This method returns clear-text password for authentication. Password retrieval is optional.

```java
java.lang.String getPassword(
    javax.servlet.http.HttpServletRequest req,
    javax.servlet.http.HttpServletResponse res)
throws java.lang.Exception
```

The `req` parameter identifies the HTTP request that carries the information that is used to determine the password. The `res` parameter is not used (preset for backward compatibility).

**HTTP Authorization Header**

EPM System security supports the use of an HTTP authorization header to pass value the of Login Attribute to EPM System products from web identity management solutions. EPM System products parse the authorization header to retrieve the user's login name.

**Get Remote User from HTTP Request**

EPM System security supports the use of an HTTP request to pass the value of Login Attribute to EPM System products from web identity management solutions. Use this SSO method if the web identity management solution passes an HTTP request containing the value of the Login Attribute, which is set using the `setRemoteUser` function.

**Single Sign-on from Oracle Access Manager**

EPM System integrates with Oracle Access Manager by accepting a custom HTTP header (default name `HYPLOGIN`) that contains the login attribute value. The login attribute is set when you configure an external user directory in Shared Services. See “Configuring OID, Active Directory, and Other LDAP-Based User Directories” in the Oracle Enterprise Performance Management System User Security Administration Guide for a brief description of Login Attribute.

You can use any header name that provides the value of login attribute to EPM System. You use the header name while configuring Shared Services for SSO from Oracle Access Manager.
EPM System uses the value of the login attribute to authenticate the user against a configured user directory (in this case, the user directory against which Oracle Access Manager authenticates users) and then generates an EPM SSO token that enables SSO across EPM System. Provisioning information of the user is checked in Native Directory to authorize the user to EPM System resources.

**Note:** Administration Services console, which is a thick client, does not support SSO from Oracle Access Manager.

Information about configuring Oracle Access Manager and performing tasks such as setting up the HTTP header and policy domains is available in the Oracle Access Manager documentation. This guide assumes a working Oracle Access Manager deployment where you have completed the following tasks:

- Set up the required policy domains foEPM System components
- Configured an HTTP header to pass login attribute value to EPM System
- Protected the EPM System resources listed in “Resources to Protect” on page 59. Requests to access protected resources are challenged by Oracle Access Manager.
- Unprotected the EPM System resources listed in “Resources to Unprotect” on page 60. Requests to access unprotected resources are not challenged by Oracle Access Manager.

To configure EPM System for SSO from Oracle Access Manager:

1. **Add the user directory that Oracle Access Manager uses to authenticate users as an external user directory in EPM System.** See “Configuring OID, Active Directory, and Other LDAP-Based User Directories” in the Oracle Enterprise Performance Management System User Security Administration Guide.

   **Note:** Ensure that the Trusted check box in the Connection Information screen is selected to indicate that the user directory is a trusted SSO source.

2. **Configure EPM System for SSO.** See “Configuring the EPM System for SSO” on page 80.

   Select Oracle Access Manager from the SSO Provider or Agent list. If the HTTP header from Oracle Access Manager uses a name other than HYPLOGIN, enter the name of the custom header in the text box next to the SSO Mechanism list.

3. **Oracle Data Relationship Management only:**
   a. Configure Data Relationship Management for Shared Services authentication.
   b. Enable SSO in Data Relationship Management Console.

      See the Data Relationship Management documentation for detailed information.
OracleAS Single Sign-on

The OracleAS Single Sign-on (OSSO) solution provides SSO access to web applications using Oracle Internet Directory (OID) as the user directory. Users use a user name and password defined in an OID to log in to EPM System products.

Process Flow

1. Using an EPM System URL, for example, http://OSSO_OHS_Server_NAME:OSSO_OHS_Server_PORT/interop/index.jsp, users access an EPM System component that is defined as an OSSO protected application.

2. Because the URL is under OSSO protection, mod_osso, deployed on Oracle HTTP Server, intercepts the request. Using mod_osso, Oracle HTTP Server checks for a valid cookie. If a valid cookie is not available in the request, Oracle HTTP Server redirects users to the OSSO Server, which challenges users for credentials, which it authenticates against OID.

3. OSSO Server creates the obSSOCookie and returns control to the mod_osso module on the Oracle HTTP Server, which sets the obSSOCookie in the browser. It also redirects the request to the EPM System resource through mod_wl_ohs (WebLogic Server) or mod_proxy (IIS Server). Before forwarding the request to an EPM System resource, Oracle HTTP Server sets the Proxy-Remote-User header, which EPM System security uses to enable SSO.
4. The EPM System component verifies that the user whose identity is retrieved from Proxy-Remote-User is present in OID. For this process to work, the OID that is configured with the OSSO Server should be configured as an external user directory in Shared Services.

**Prerequisites**

1. A fully functional Oracle Application Server Infrastructure.

   To establish an Oracle Application Server Infrastructure, install and configure Oracle Identity Management Infrastructure 10.1.4. Ensure that OSSO is enabled. Oracle Identity Management Infrastructure 10.1.4 installation includes the following components to support OSSO.

   - Oracle 10g OSSO Server.
   - An OID, which the OSSO Server uses to validate credentials. See the following guides:
     - Oracle Fusion Middleware Installation Guide for Oracle Identity Management
     - Oracle Fusion Middleware Administrator’s Guide for Oracle Internet Directory
   - Oracle HTTP Server as a frontend to the OSSO Server. This installation includes mod_osso, which allows you to define partner applications for OSSO.

   **Note:** This Oracle HTTP Server instance is a part of the OSSO infrastructure; it is not directly used for configuring OSSO for EPM System components.

   During the installation process, ensure that mod_osso is registered with the OSSO Server as a partner application.


   When you configure the web server for EPM System components, EPM System Configurator configures the following on the Oracle HTTP Server to proxy requests to the application server:

   - mod_wl_ohs.conf to proxy requests to WebLogic Server
   - mod_proxy to proxy requests to IIS Server
Enabling OSSO for EPM System

Subtopics

- Registering EPM System Web Server as a Partner Application
- Optional: Defining the Virtual Host
- Creating mod_osso.conf
- Relocating osso.conf
- Optional: Adding Cache Management Configuration for Reporting and Analysis
- Configuring EPM System for OSSO
- Optional: Enabling Debugging Messages on the OSSO Server
- Optional: Enabling Debugging Messages for Protected Resources

This section assumes that you have a fully configured OSSO infrastructure. See the Oracle Application Server Administrator's Guide.

Registering EPM System Web Server as a Partner Application

You use the Oracle Identity Manager SSO registration tool (ssoreg.sh or ssoreg.bat) to register EPM System web server as a partner application on the Oracle HTTP Server that front-ends the OSSO Server.

Perform this procedure on the server that hosts the Oracle HTTP Server that front-ends the OSSO Server. This process generates and stores an obfuscated osso.conf in the location of your choice.

To register EPM System web server as a partner application:

1. Open a console on the server that hosts the Oracle HTTP Server that front-ends the OSSO Server and navigate to `ORACLE_HOME/sso/bin` directory of Oracle HTTP Server, for example to `C:/OraHome_1/sso/bin` (Windows).
2. Execute a command similar to the following with `-remote_midtier` option:

   ```bash
   ssoreg.bat -site_name epm.myCompany.com
               -mod_osso_url http://epm.myCompany.com:19400
               -config_mod_osso TRUE
               -update_mode CREATE
               -remote_midtier
               -config_file C:\OraHome_1\myFiles\osso.conf
   ```

The following explains the parameters used in this command. In this description, partner application refers to the Oracle HTTP Server that is used as the EPM System web server.

- `-site_name` identifies the web site of the partner application; for example, epm.myCompany.com.
- `-mod_osso_url` indicates the partner application URL, in `PROTOCOL://HOST_NAME:PORT` format. This is the URL at which the EPM System web server accepts incoming client requests; for example, http://epm.myCompany.com:19000.
- `-config_mod_osso` identifies that the partner application uses mod_osso. You must include the `config_mod_osso` parameter to generate osso.conf.
- `update_mode` indicates the update mode. Use **CREATE**, the default, to generate a new record.

- `remote_midtier` specifies that the `mod_osso` partner application is at a remote mid-tier. Use this option when the partner application is at a different `ORACLE_HOME` than that of the OSSO Server.

- `virtualhost` indicates that the partner application URL is a virtual host. Do not use this parameter if you are not using a virtual host.

  If you are registering a partner application URL tied to a virtual host, you must define the virtual host in `httpd.conf`. See “Optional: Defining the Virtual Host” on page 56.

- `config_file` indicates the path where `osso.conf` file is to be generated.

### Optional: Defining the Virtual Host

If you used a virtual host URL while registering the partner application, you must define the virtual host by updating `httpd.conf` on the Oracle HTTP Server that is used as the EPM System web server.

- **To define a virtual host:**

  1. **Using a text editor, open** `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/httpd.conf`.

  2. **Add a definition similar to the following.** This definition assumes that the web server is running on the virtual server `epm.myCompany.com` at port `epm.myCompany.com:19400`. Modify the settings to suit your requirements.

     ```
     NameVirtualHost epm.myCompany.com:19400
     Listen 19400
     <VirtualHost epm.myCompany.com:19400>
     DocumentRoot "C:/Oracle/Middleware/user_projects/epmsystem1/httpConfig/ohs/config/OHS/ohs_component/private-docs"
     include "${ORACLE_INSTANCE}/config/${COMPONENT_TYPE}/${COMPONENT_NAME}/mod_osso.conf"
     </VirtualHost>
     ```

### Creating `mod_osso.conf`

Create `mod_osso.conf` on the Oracle HTTP Server that front-ends the EPM System web server.

- **To create `mod_osso.conf`:**

  1. **Using a text editor, create a file.**

  2. **Copy the following content into the file and modify it for your environment.**

     ```
     LoadModule osso_module C:/Oracle/Middleware/ohs/ohs/modules/mod_osso.so
     <IfModule mod_osso.c>
     OssoIpCheck off
     OssoIdleTimeout off
     OssoSecureCookies off
     ```
3 Within the `<IfModule mod_osso.c` definition, include location definitions similar to the following to identify each resource that you plan to protect using OSSO.

```plaintext
<Location /interop/>
require valid user
AuthType Osso
</Location>
</IfModule>
```

4 Save the file as `mod_osso.conf`.

### Relocating `osso.conf`

The process of registering EPM System web server as a partner application (see “Registering EPM System Web Server as a Partner Application” on page 55) creates an obfuscated `osso.conf` file in the location identified by the `-config_file` directive.

To relocate `osso.conf`:

1. Locate the `osso.conf` that was created when you registered EPM System web server as a partner application (see “Registering EPM System Web Server as a Partner Application” on page 55).

2. Copy `osso.conf` into the directory (on Oracle HTTP Server that front-ends the OSSO Server) identified by the `OssoConfigFile` property defined in `mod_osso.conf` (see “Creating `mod_osso.conf`” on page 56).

### Adding Cache Management Configuration for Reporting and Analysis

Edit `httpd.conf` of Oracle HTTP Server and add cache management configuration settings for Reporting and Analysis.

To add cache management configuration settings:

1. Using a text editor, open `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/httpd.conf`.

2. Append the following directives for Reporting and Analysis cache management:

```plaintext
<Location /WebAnalysis/>
 OssoSendCacheHeaders off
</Location>
<Location /workspace/>
 OssoSendCacheHeaders off
</Location>
<Location /hr/>
 OssoSendCacheHeaders off
</Location>
<Location /HReports/>
 OssoSendCacheHeaders off
</Location>
```

3 Save and close `httpd.conf`.  

---

OracleAS Single Sign-on   57
Configuring EPM System for OSSO

Configure the OID that is integrated with the OSSO solution as an external user directory in EPM System, and then enable SSO.

➢ To configure EPM System for OSSO:

1. Configure the OID that the OSSO solution uses as an external user directory. See "Configuring OID, Active Directory, and Other LDAP-Based User Directories" in the Oracle Enterprise Performance Management System User Security Administration Guide.

2. Enable SSO in the EPM System. "Configuring the EPM System for SSO" on page 80

Note: To configure OSSO as the identity management solution, you must choose Other in SSO Provider or Agent, Custom HTTP Header in SSO Mechanism, and enter Proxy-Remote-User as the name of the custom HTTP header.

3. Provision at least one OID user as Shared Services administrator.

4. Restart EPM System products and custom applications that use the Shared Services security APIs.

Note: Ensure that the OID configured with Shared Services is running before starting EPM System products.

Optional: Enabling Debugging Messages on the OSSO Server

To record debugging messages on OSSO server, modify policy.properties. Debugging messages are written to ORACLE_HOME/sso/log/ssoServer.log.

➢ To record debug messages:

1. Using a text editor, open ORACLE_HOME/sso/conf/policy.properties; for example, C:\OraHome_1\sso\conf\policy.properties, on the OSSO server.

2. Set the value of debugLevel property to DEBUG.

   debugLevel = DEBUG

3. Save and close policy.properties.

Optional: Enabling Debugging Messages for Protected Resources

To record OSSO debugging messages for resources protected using mod_osso.conf, modify httpd.conf on the EPM System web server. Debugging messages are written to EPM_ORACLE_INSTANCE/httpConfig/ohs/diagnostics/logs/OHS/ohs_component/ohs_component.log.

➢ To record debugging messages for protected resources:

1. Using a text editor, open EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/httpd.conf.
Set the value of `OraLogSeverity` property to `TRACE`.

```
OraLogSeverity TRACE:32
```

Save and close `httpd.conf`.

Protecting EPM System Products for SSO

Subtopics

- Resources to Protect
- Resources to Unprotect

You must protect EPM System resources so that SSO requests from users are redirected to the security agent (OAM, OSSO, or SiteMinder).

Oracle HTTP Server uses `mod_osso` to redirect users to the OSSO server. Users are redirected only if the URLs that they request are configured in `mod_osso` to be protected. See Managing Security in the Oracle HTTP Server Administrator's Guide.

For information on protecting resources for SiteMinder SSO, see SiteMinder documentation.

Resources to Protect

Table 4 lists the contexts that must be protected. The syntax for protecting a resource (using `interop` as an example) for OSSO:

```
<Location /interop>
Require valid-user
AuthType Basic
order deny,allow
deny from all
allow from myServer.myCompany.com
satisfy any
</Location>
```

The `allow from` parameter specifies servers from which the protection of the context can be bypassed.

For EPM Workspace, Financial Reporting, and Web Analysis, you need to set only the parameters indicated in the following example:

```
<Location /workspace>
Require valid-user
AuthType Basic
</Location>
```

<table>
<thead>
<tr>
<th>EPM System Product</th>
<th>Context to Protect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Services</td>
<td>/interop</td>
</tr>
<tr>
<td>EPM System Product</td>
<td>Context to Protect</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Oracle Hyperion Reporting and Analysis Framework</td>
<td>● /raf{}ramework</td>
</tr>
<tr>
<td>● /biplus_web{}services</td>
<td></td>
</tr>
<tr>
<td>EPM Workspace</td>
<td>/workspace</td>
</tr>
<tr>
<td>Financial Reporting</td>
<td>/hr</td>
</tr>
<tr>
<td>Web Analysis</td>
<td>/WebAnalysis</td>
</tr>
<tr>
<td>Oracle Hyperion EPM Architect</td>
<td>/awb</td>
</tr>
<tr>
<td>Planning</td>
<td>/HyperionPlanning</td>
</tr>
<tr>
<td>Oracle Hyperion Performance Scorecard</td>
<td>● /HPSWeb{}Reports</td>
</tr>
<tr>
<td>● /HPSAlerter</td>
<td></td>
</tr>
<tr>
<td>Oracle Hyperion Strategic Finance</td>
<td>/HSFWeb{}Services</td>
</tr>
<tr>
<td>Oracle Integrated Operational Planning</td>
<td>/interface</td>
</tr>
<tr>
<td>Financial Management</td>
<td>● /hfmadf</td>
</tr>
<tr>
<td>● /hfmoffic{}provider</td>
<td></td>
</tr>
<tr>
<td>● /hfmsma{{rtview}provider}</td>
<td></td>
</tr>
<tr>
<td>Data Relationship Management</td>
<td>/{}drm-web{}client</td>
</tr>
<tr>
<td>Administration Services</td>
<td>/{}hbr-launcher</td>
</tr>
<tr>
<td>Oracle Hyperion Financial Data Quality Management</td>
<td>/{}HyperionFDM</td>
</tr>
<tr>
<td>Oracle Hyperion Calculation Manager</td>
<td>/calc{}mgr</td>
</tr>
<tr>
<td>Oracle Hyperion Provider Services</td>
<td>/{}aps</td>
</tr>
<tr>
<td>Oracle Hyperion Profitability and Cost Management</td>
<td>/{}profitability</td>
</tr>
<tr>
<td>Account Reconciliation Manager</td>
<td>/{}arm</td>
</tr>
<tr>
<td>Oracle Hyperion Financial Close Management</td>
<td>/{}fcc</td>
</tr>
<tr>
<td>Oracle Hyperion Disclosure Management¹</td>
<td>/mapping{}tool</td>
</tr>
<tr>
<td>Oracle Hyperion Financial Data Quality Management, Enterprise Edition</td>
<td>/{}ai{}f</td>
</tr>
</tbody>
</table>

¹Full certificates chain (starting from root certificate) is required on the client machine to support the use of Disclosure Management client with SSL protected web services.

### Resources to Unprotect

Table 5 lists the contexts that must be unprotected. The syntax for unprotecting a resource (using `/interop/framework(.*,:)` as an example) for OSSO:

```xml
<LocationMatch /interop/framework(.*,:)>
    Require valid-user
</LocationMatch>
```

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Table 5  EPM System Resources to Unprotect

<table>
<thead>
<tr>
<th>EPM System Product</th>
<th>Contexts to Unprotect</th>
</tr>
</thead>
</table>
| Shared Services                     | ● /interop/framework(.*))¹  
● /interop/Audit(.*))  
● /interop/taskflow²  
● /interop/WorkflowEngine/*³  
● /interop/TaskReceiver⁴  
● /framework/lcm/HSSMigration       |
| Performance Management Architect⁵  | ● /awb/ces.executeAction.do  
● /awb/lcm.executeAction.do  
● /awb/appmanager.deployStatusUpdate.do  
● /awb/jobtask.updateJobStatus.do  
● /hyperion-bpma-server  
● /awb/integration.updateApplicationDeployStatus.do/**  |
| EPM Workspace                       | ● /workspace/browse/listXML*  
● /epmstatic* ⁶                       |
| Planning                            | ● /HyperionPlanning/Smartview  
● /HyperionPlanning/faces/PlanningCentral  
● /HyperionPlanning/servlet/HspLCMServlet  
● /HyperionPlanning/servlet/HspAppManagerServlet (for Performance Management Architect)  
● /HyperionPlanning/servlet/PlanningDMEAdapter |
| Oracle Hyperion Reporting and       | ● /raframework/wsrp4j(.*))  
● /raframework/ResourceProxy(.*))  
● /InsightInstaller* ⁷                  |
| Analysis Framework                  |                                                                                     |
| Oracle Hyperion Web Analysis²      | ● /WebAnalysis/wsrp4j(.*))  
● /WebAnalysis/ResourceProxy(.*))      |
| Oracle Hyperion Financial Reporting³| ● /hr/common/HRLogon.jsp  
● /hr/hrsp4j(.*))  
● /hr/ResourceProxy(.*))  
● /hr/services/*  
● /hr/modules/com/hyperion/reporting/web/reportViewer/HRStaticReport.jsp |
<p>| Oracle Data Relationship Management | /drm-migration-client                                                             |
| Oracle Hyperion Calculation Manager | /calcmgr/common.performAction.do (for Performance Management Architect)              |</p>
<table>
<thead>
<tr>
<th>EPM System Product</th>
<th>Contexts to Unprotect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration Services</td>
<td>- /eas&lt;br&gt;- /easconsole&lt;br&gt;- /easdocs</td>
</tr>
<tr>
<td>Financial Management</td>
<td>- /hfm/EIE/EIEListener.asp&lt;br&gt;- /hfmaplicationservice&lt;br&gt;- /oracle-epm-fm-webservices&lt;br&gt;- /hfmICmservice</td>
</tr>
<tr>
<td>Performance Management Architect Data Synchronization</td>
<td>/DataSync/services*</td>
</tr>
<tr>
<td>Oracle Hyperion Strategic Finance</td>
<td>- /HSFWebServices/HSFWebService.asmx&lt;br&gt;- /HSFWebServices/HSFEntityWebService.asmx</td>
</tr>
</tbody>
</table>
| Oracle Integrated Operational Planning                 | - /interlace/services/(.*<br>- /interlace/anteros/(.*<br>- /interlace/interlace/(.*<br>- /interlace/WebHelp/(.*<br>- /interlace/html/(.*<br>- /interlace/email-book/(.*<br>
| Profitability and Cost Management                      | - /profitability/cesagent<br>- /profitability/lcm<br>- /profitability/control<br>- /profitability/HPMApplicationListener |
| Oracle Hyperion Disclosure Management                  | - /discmanwebservices<br>- /mappingtool/MappingToolWS                                |

1 (.* is a SiteMinder format that means everything including subdirectories.
2 Text appended with * (example, taskflow*) means anything that begins with the text (example, taskflow) within the current directory.
3 /* means anything that is within this directory, including subdirectories.
4 If no wildcard is used, only the specified context is unprotected.
5 /awb/integration.updateApplicationDeployStatus.do/** should be unprotected for Oracle Access Manager integration only.
6 Unprotect this resource if you are using Oracle Access Manager.
7 Unprotect this resource if you are using Oracle Access Manager.
SiteMinder SSO

Subtopics

- Process Flow
- Special Considerations
- Prerequisites
- Enabling SiteMinder Web Agent
- Configuring the SiteMinder Policy Server
- Configuring SiteMinder Web Server to Forward Requests to the EPM System Web Server
- Enabling SiteMinder in EPM System

SiteMinder is a web-only solution. Desktop applications and their add-ins (for example, Microsoft Excel and Report Designer) cannot use authentication through SiteMinder. However, Oracle Smart View for Office can use SiteMinder authentication.

Process Flow

Illustrated overview of SiteMinder-enabled SSO:

The SiteMinder SSO process:

1. Users try to access a SiteMinder-protected EPM System resource. They use a URL that connects them to the web server that front-ends the SiteMinder policy server; for example,

2. The web server redirects users to the policy server, which challenges users for credentials. After verifying credentials against configured user directories, the policy server passes the credentials to the web server that hosts the SiteMinder Web Agent.

3. The web server that hosts the SiteMinder Web Agent redirects the request to the Oracle HTTP Server that front-ends EPM System. Oracle HTTP Server redirects users to the requested application deployed on WebLogic Server or IIS Server.

4. The EPM System component checks provisioning information and serves up content. For this process to work, the user directories that SiteMinder uses to authenticate users must be configured as external user directories in the EPM System. These directories must be configured as trusted.

Special Considerations

SiteMinder is a web-only solution. Desktop applications and their add-ins (for example, Microsoft Excel and Report Designer) cannot use authentication through SiteMinder. However, Smart View can use SiteMinder authentication.

Prerequisites

1. A fully functional SiteMinder installation comprising the following components:
   - SiteMinder Policy Server on which policies and agent objects are defined
   - SiteMinder Web Agent installed on the web server that front-ends the SiteMinder Policy Server


   When you configure the web server for EPM System components, EPM System Configurator configures the following on the Oracle HTTP Server to proxy requests to the application server:
   - mod_wl_ohs.conf to proxy requests to WebLogic Server
   - mod_proxy to proxy requests to IIS

Enabling SiteMinder Web Agent

The web agent is installed on a web server that intercepts requests for EPM System resources. Attempts by unauthenticated users to access a protected EPM System resources forces the web agent to challenge users for SSO credentials. When a user is authenticated, the policy server adds the login name of the authenticated user, which is carried by the header. Thereafter, the HTTP request is passed to the EPM System web server, which redirects the requests. EPM System components extracts the authenticated user credentials from headers.
SiteMinder supports SSO across EPM System products running on heterogeneous web server platforms. If EPM System products use different web servers, you must ensure that the SiteMinder cookie can be passed among web servers within the same domain. You do so by specifying the appropriate EPM System application domain as the value of the \texttt{Cookiedomain} property in the \texttt{WebAgent.conf} file of each web server.

See the “Configuring Web Agents” in the Netegrity SiteMinder Agent Guide.

\textbf{Note:} Because Shared Services uses basic authentication to protect its content, the web server that intercepts requests to Shared Services should enable basic authentication to support SSO with SiteMinder.

You configure the web agent by running the SiteMinder Web Agent Configuration wizard (by executing \texttt{WEBAGENT\_HOME/install\_config\_info/nete-wa-config}; for example, \texttt{C:\netegrity\webagent\install\_config\_info\nete-wa-config.exe} on Windows). The configuration process creates a \texttt{WebAgent.conf} for the SiteMinder web server.

\begin{itemize}
  \item To enable SiteMinder Web Agent:

  \begin{enumerate}
      \item Using a text editor, open \texttt{WebAgent.conf}. The location of this file depends on the web server that you are using. If you are configuring the an IIS Server as the SiteMinder web server, the location of \texttt{WebAgent.conf} is \texttt{WEB\_AGENT\_HOME/bin/IIS}; for example, \texttt{C:\SiteMinder\webagent\bin\iis\WebAgent.conf}.
      \item Set the value of \texttt{enableWebAgent} property to \texttt{Yes}.
      \begin{verbatim}
      enableWebAgent="YES"
      \end{verbatim}
      \item Save and close the web agent configuration file.
  \end{enumerate}
\end{itemize}

\textbf{Configuring the SiteMinder Policy Server}

A SiteMinder administrator must configure the policy server to enable SSO to EPM System products.

The configuration process involves:

\begin{itemize}
  \item Creating a SiteMinder Web Agent and adding configuration objects appropriate for the SiteMinder web server
  \item Creating a realm for each EPM System resource that should be protected and adding the web agent to the realm. See “Resources to Protect” on page 59
  \item Within the realm that was created for protected EPM System resources, create realms for unprotected resources. See “Resources to Unprotect” on page 60
  \item Creating HTTP header reference. The header should provide the value of \texttt{Login Attribute} to EPM System applications. See “Configuring OID, Active Directory, and Other LDAP-Based User Directories” in the Oracle Enterprise Performance Management System User Security Administration Guide for a brief description of \texttt{Login Attribute}.
  \item Creating rules within the realms with Get, Post, and Put as web agent actions
\end{itemize}
Creating a response attribute with `hyplogin=<%userattr="SM_USERLOGINNAME"%>` as the value

Creating a policy, assigning user directory access, and adding rules that you created for EPM System to Current Members list

Setting responses for the rules you created for EPM System components

Configuring SiteMinder Web Server to Forward Requests to the EPM System Web Server

Configure the web server that hosts the SiteMinder web agent to forward requests from authenticated users (containing the header identifying the user) to the EPM System web server.

For Apache-based web servers, use directives similar to the following to forward authenticated requests:

```
ProxyPass / http://EPM_WEB_SERVER:EPM_WEB_SERVER_PORT/
ProxyPassReverse / http://EPM_WEB_SERVER:EPM_WEB_SERVER_PORT/
ProxyPreserveHost On
#If SiteMinder Web Server is using HTTPS but EPM Web Server is using HTTP
RequestHeader set WL-Proxy-SSL true
```

In this directive, replace `EPM_WEB_SERVER` and `EPM_WEB_SERVER_PORT` with the actual values for your environment.

Enabling SiteMinder in EPM System

Integration with SiteMinder requires that you enable SiteMinder authentication for EPM System products. See “Configuring the EPM System for SSO” on page 80.

Kerberos Single Sign-on

Subtopics

- Overview
- Support Limitations
- Assumptions
- Kerberos SSO with WebLogic Server
- WebLogic Server Procedures to Support Kerberos Authentication

Overview

EPM System products support Kerberos SSO if the application server that hosts EPM System products is set up for Kerberos authentication.

Kerberos is a trusted authentication service in which each Kerberos client trusts the identities of other Kerberos clients (users, network services, and so on) to be valid.
The following happens when a user accesses an EPM System product:

1. From a Windows computer, the user logs in to a Windows domain, which is also a Kerberos realm.
2. Using a browser that is configured to use Integrated Windows Authentication, the user tries to log into EPM System products running on the application server.
3. The application server (Negotiate Identity Asserter) intercepts the request and gets the Simple and Protected Generic Security Services API (GSSAPI) Negotiation Mechanism (SPNEGO) token with the Kerberos ticket from the browser's authorization header.
4. The asserter validates the user's identity included in the token against its identity store to pass information about the user to EPM System product. The EPM System product validates the user name against an Active Directory. The EPM System product issues an SSO token that supports SSO across all EPM System products.

**Support Limitations**

Kerberos SSO is supported for all EPM System products, with the following exceptions:

- Kerberos SSO is not supported for thick clients other than Smart View.
- Smart View supports Kerberos integration for Oracle Essbase, Planning, and Financial Management providers only
- Kerberos SSO support for IIS-embedded EPM System products (for example, Financial Management) is available only through EPM Workspace. SSO access to Oracle Hyperion Financial Data Quality Management is provided through Financial Management.

**Assumptions**

This document, which contains application-level Kerberos configuration steps, assumes knowledge of Kerberos configuration at the system level. Before you start these procedures, confirm that the prerequisites for these tasks are completed.

This document assumes that you are working in a fully functional Kerberos-enabled network environment in which Windows client machines are configured for Kerberos authentication.

- The corporate Active Directory is configured for Kerberos authentication. See Microsoft Windows Server documentation.
- Browsers used to access EPM System products are configured to negotiate using Kerberos tickets.
  - Internet Explorer: [http://docs.oracle.com/cd/E12839_01/web.1111/e13707/sso.htm#i1102444](http://docs.oracle.com/cd/E12839_01/web.1111/e13707/sso.htm#i1102444)
Integrated Windows Authentication is enabled in Internet Information System (IIS) if Financial Management is deployed.

If IIS is used only as the web server for EPM System products, Integrated Windows Authentication should be disabled in IIS.

**Kerberos SSO with WebLogic Server**

WebLogic Server Kerberos SSO uses the Negotiate Identity Asserter to negotiate and decode SPNEGO tokens to enable SSO with Microsoft clients. WebLogic Server decodes SPNEGO tokens to obtain Kerberos ticket and validates and maps the ticket to a WebLogic Server user. You can use the Active Directory Authenticator of WebLogic Server with the Negotiate Identity Asserter to configure Active Directory as the user directory for WebLogic Server users.

When the browser requests access to an EPM System product, KDC issues a Kerberos ticket to the browser, which creates a SPNEGO token containing the supported GSS token types. The Negotiate Identity Asserter decodes the SPNEGO token and uses GSSAPIs to accept the security context. The identity of the user who initiated the request is mapped to a user name and passed back to WebLogic Server. Additionally, the WebLogic Server determines the groups to which the user belongs. At this stage, the requested EPM System product is made available to the user.

**Note:** Users must use a browser that supports the SPNEGO (for example, Internet Explorer or Firefox) to access the EPM System products running on WebLogic Server. WebLogic Server can run on a UNIX or Windows platform.

Using the user ID derived from the authentication process, the EPM System product authorization process checks for provisioning data. Access to EPM System product is restricted based on provisioning data.


**WebLogic Server Procedures to Support Kerberos Authentication**

An administrator should complete these tasks to support Kerberos authentication:

- Create the WebLogic domain for EPM System. See “Creating the WebLogic Domain for EPM System” on page 69.
- Create an authentication provider. See “Creating an LDAP Authentication Provider in WebLogic Server” on page 69.
- Create a Negotiate Identity Asserter. See “Creating a Negotiate Identity Asserter” on page 69.
- Create a Kerberos identification. See “Creating Kerberos Identification for WebLogic Server” on page 70.
Creating the EPM System WebLogic Domain

Generally, EPM System components are deployed into an EPM System WebLogic domain (the default location is `MIDDLEWARE_HOME/user_projects/domains/EPMSystem`).

To configure the EPM System WebLogic domain for Kerberos authentication:

1. Install EPM System components.
2. Deploy Foundation Services only.
   - Foundation Services deployment creates the default EPM System WebLogic domain.
3. Log in to the Shared Services Console to verify that Foundation Services deployment was successful. See “Launching Shared Services Console” on page 20.

Creating an LDAP Authentication Provider in WebLogic Server

A WebLogic Server administrator creates the LDAP Authentication provider, which stores user and group information in an external LDAP server. LDAP v2- or v3-compliant LDAP servers work with WebLogic Server. See these references:

- Configuring LDAP Authentication Providers in Oracle Fusion Middleware Securing Oracle WebLogic Server guide.
- Configure Authentication and Identity Assertion Providers in the Oracle Fusion Middleware Oracle WebLogic Server Administration Console Online Help.

Creating a Negotiate Identity Asserter

The Negotiate Identity Asserter provider enables SSO with Microsoft clients. It decodes SPNEGO tokens to obtain Kerberos tokens, validates the Kerberos tokens, and maps the tokens to WebLogic users. The Negotiate Identity Asserter provider, an implementation of the Security Service Provider Interface (SSPI) as defined by the WebLogic Security Framework, provides the necessary logic to authenticate a client based on the client’s SPNEGO token.

- Configuring a Negotiate Identity Asserter Provider in Oracle Fusion Middleware Securing Oracle WebLogic Server guide.
- Configure Authentication and Identity Assertion Providers in the Oracle Fusion Middleware Oracle WebLogic Server Administration Console Online Help.
While creating the Negotiate Identity Assertion provider, set the JAAS Control Flag option to **OPTIONAL** for all authenticators. See “Set the JAAS control flag” in *Oracle Fusion Middleware Oracle WebLogic Server Administration Console Online Help.*

### Creating Kerberos Identification for WebLogic Server

On the Active Directory domain controller machine, create user objects that represent WebLogic Server and EPM System web server, and map them to service principal names (SPN) that represent your WebLogic Server and web server in the Kerberos realm. Clients cannot locate a service that does not have an SPN. You store SPNs in keytab files that are copied to the WebLogic Server domain to be used in the login process.

See *Creating Kerberos identification for WebLogic Server* in the *Oracle Fusion Middleware Securing Oracle WebLogic Server* guide for detailed procedures.

To create Kerberos identification for WebLogic Server:

1. **On the Active Directory domain controller machine, create a user account; for example, *epmHost*, for the computer that hosts the WebLogic Server domain and IIS used by EPM System components.**

   **Note:** Create the identification as a user object, not as a machine.

   Use the simple name of the computer; for example, use *epmHost* if the host is named *epmHost.example.com*.

   Record the password you use while creating the user object. You will need it to create SPNs.

   Do not select any password options, especially the **User must change password at next logon** option.

2. **Modify the user object to comply with the Kerberos protocol. The account must require Kerberos pre-authentication.**

   - On the **Account** tab, select an encryption to use.
   - Ensure that no other account option (especially **Do not require Kerberos pre-authentication**) is selected.
   - Because setting the encryption type may have corrupted the object’s password, reset the password to the password that you set while creating the object.

3. **On the computer that hosts the Active Directory domain Controller, open a command prompt window and navigate to the directory where Active Directory support tools are installed.**

4. **Create and configure the required SPNs.**

   a. Use a command similar to the following to verify that the SPNs are associated with the user object (*epmHost*) that you created in step 1.

   ```bash
   setspn -L epmHost
   ```

   b. Using a command such as the following, configure the SPN for WebLogic Server in Active Directory Domain Services (AD DS) and generate a keytab file that contains the shared secret key.
Create a keytab file on the computer that hosts the WebLogic Server.

a. Open a command prompt.
b. Navigate to MIDDLEWARE_HOME/jdk160_29/bin.
c. Execute a command such as the following:

```bash
ktab -k keytab_filename -a epmHost@example.com
```
d. When prompted for a password, enter the password that you set while creating the user in step 1.

Copy the keytab file into the startup directory within the WebLogic domain; for example, into C:\Oracle\Middleware\user_projects\domains\EPMSystem.

Verify that Kerberos authentication is working correctly.

```bash
kinit -k -t keytab-file account-name
```

In this command, account-name indicates the Kerberos principal; for example, HTTP/epmHost.example.com@EXAMPLE.COM. The output from this command should be similar to the following:

```
New ticket is stored in cache file C:\Documents and Settings\Username\krb5cc_MachineB
```

### Updating JVM Options for Kerberos

See Using Startup Arguments for Kerberos Authentication with WebLogic Server and Creating a JAAS Login File in Oracle Fusion Middleware Securing Oracle WebLogic Server 11g Release 1 (10.3.1).

If EPM System managed servers are run as Windows services, update the Windows registry to set the JVM startup options.

To update JVM Startup options in Windows registry:

1. Open Windows Registry Editor.
2. Select My Computer, then HKEY_LOCAL_MACHINE, then Software, then Hyperion Solutions, then EPMServer0, and then HyS9EPMServer_epmsystem1.
3. Create the following string values:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>JVMOption44</td>
<td>REG_SZ</td>
<td>-Djava.security.krb5.realm=Active Directory Realm Name</td>
</tr>
<tr>
<td>JVMOption45</td>
<td>REG_SZ</td>
<td>-Djava.security.krb5.kdc=Active Directory host name or IP address</td>
</tr>
</tbody>
</table>

Note: The names listed in Table 6 are examples.
4 Update the value of JVMOptionCount DWord to reflect the added JVMOptions (add 4 to the current decimal value).

### Configuring Authorization Policies

See Options for Securing Web Application and EJB Resources in the Oracle Fusion Middleware Securing Resources Using Roles and Policies for Oracle WebLogic Server guide for information on configuring authorization policies for Active Directory users who access the EPM System.

For sample policy configuration steps, see “Creating Policies for SSODiag” on page 75.

### Using SSODiag to Test the Kerberos Environment

#### Subtopics

- Deploying SSODiag
- Configuring Oracle HTTP Server for SSODiag
- Creating Policies for SSODiag
- Using SSODiag to Test WebLogic Server Configuration for Kerberos Authentication

SSODiag is a diagnostic web application that tests whether the WebLogic Server in your Kerberos environment is ready to support EPM System.

#### Deploying SSODiag

Use the WebLogic Server administrator credentials (default user name is epm_admin) that you specified while deploying Foundation Services to deploy SSODiag.

To deploy and configure SSODiag:

1. Log on to the WebLogic Server Administration Console for EPM System domain.
2. In Change Center, select Lock & Edit
3. From EPMSystem in Domain Structure, click Deployments.
4. In Summary of Deployments, click Install.
6. Click Next.
7. In Choose targeting style, ensure that Install this deployment as an application is selected, and then click Next.
8 In Select Deployment Targets, select the following, and then click Next.

- EPMServer
- All servers in the cluster

9 In Optional Settings, select Custom Roles and Policies: Use only roles and Policies that are defined in the Administration Console as the security model.
10 Click Next.

11 On the review screen, select No, I will review the configuration later.

12 Click Finish.

13 In Change Center, select Activate Changes.

**Configuring Oracle HTTP Server for SSODiag**

Update `mod_wl_ohs.conf` to configure Oracle HTTP Server to forward SSODiag URL requests to the WebLogic Server.

To configure URL forwarding in Oracle HTTP Server:

1 **Using a text editor**, open `EPM_ORACLE_INSTANCE/httpConfig/ohs/config/OHS/ohs_component/mod_wl_ohs.conf`.

2 **Add a LocationMatch definition for SSODiag:**

   ```
   <LocationMatch /SSODiag/>
   SetHandler weblogic-handler
   WeblogicCluster myServer:28080
   </LocationMatch>
   ```

   In the preceding sample, `myServer` denotes the Foundation Services host machine, and 28080 represents the port at which Shared Services listens for requests.

3 **Save and close** `mod_wl_ohs.conf`.

4 **Restart Oracle HTTP Server.**
Creating Policies for SSODiag

Create a policy in the WebLogic Server Administrative Console to protect the following SSODiag URL.

http://OHS_HOST_NAME:PORT/SSODiag/krbssodiag

In this sample, OHS_HOST_NAME indicates the name of the server that hosts Oracle HTTP Server and PORT indicates the port where Oracle HTTP Server listens for requests.

To create policies to protect SSODiag:

1. In the Change Center in WebLogic Server Administration Console for EPM System domain, select Lock & Edit.
2. Select Deployments, then SSODiag, then Roles, and then Policies.
3. Create the following URL patterns:
   - /
   - /index.jsp
4. Modify each URL pattern that you created:
   a. From the list of URL patterns in Stand-Alone Web Application URL Patterns, open the pattern (/) that you created by clicking it.
   b. Select Add Conditions.
   d. Select Next.
   e. In User Argument Name, enter the Active Directory user whose account is used to access a client desktop configured for Kerberos authentication; for example, krbuser1, and select Add. krbuser1 is an Active Directory or Windows desktop user.
   f. Select Finish.
5. Select Save.

Using SSODiag to Test WebLogic Server Configuration for Kerberos Authentication

If WebLogic Server configuration for Kerberos authentication works correctly, the Oracle Hyperion Kerberos SSO diagnostic Utility V 1.0 page displays the following message:

Retrieving Kerberos User principal name... Success.
Kerberos principal name retrieved... SOME_USER_NAME

Caution! Do not configure EPM System components for Kerberos authentication if SSODiag cannot retrieve the Kerberos principal name.

To test WebLogic Server configuration for Kerberos authentication:

1. Start Foundation Services and Oracle HTTP Server.
Using WebLogic Server Administration Console, start the SSODiag web application to service all requests.

Log on to a client machine configured for Kerberos authentication using valid Active Directory credentials.

Using a browser, connect to the following SSODiag URL:
http://OHS_HOST_NAME:PORT/SSODiag/krbssodiag

In this sample, OHS_HOST_NAME indicates the name of the server that hosts Oracle HTTP Server, and PORT indicates the port where Oracle HTTP Server listens for requests.

If Kerberos authentication works properly, SSODiag displays the following information:
Retrieving Kerberos User principal name... Success.
Kerberos principal name retrieved... SOME_USER_NAME

If Kerberos authentication does not work properly, SSODiag displays the following information:
Retrieving Kerberos User principal name... failed.

Configuring EPM System Components
Using EPM System Configurator, configure and deploy other EPM System components into the WebLogic domain where Foundation Services is deployed.

Configuring EPM System Managed Servers for Kerberos Authentication
In Microsoft Windows environments, EPM System managed servers are run as Windows services. You must modify the startup JVM options for each WebLogic managed server. A comprehensive list of managed servers in noncompact deployment mode:

- AnalyticProviderServices0
- CalcMgr0
- DisclosureManagement0
- EpmaDataSync0
- EpmaWebReports0
- ErpIntegrator0
- EssbaseAdminServer0
- FinancialReporting0
- FMWebServices0
- FoundationServices0
- HpsAlerter0
- HpsWebReports0
- hsfweb0
- Planning0
If EPM System web applications are deployed in the compact deployment mode, you need to update the startup JVM options of EPMSystem managed server only. If you have multiple compact managed servers, you must update the startup JVM options for all managed servers.


**Note:** The following procedure describes how to set the startup JVM options for the FoundationServices managed server. You must perform this task for each WebLogic managed server in the deployment.

For detailed procedures to configure JVM options in WebLogic Server startup scripts, see “Updating JVM Options for Kerberos” on page 71.

### Configuring Authorization Policies

Configure authorization policies for Active Directory users who will access EPM System components other than Foundation Services. See “Configuring Authorization Policies” on page 72 for information on configuring security policies from WebLogic Administration Console.

### Changing Default Security Model of EPM System Components

You edit the EPM System configuration file to change the default security model. For non-compact EPM System deployments, you must change the default security model of each EPM System web application recorded in config.xml. A list of EPM System web applications:

- AIF
- APS
- CALC
- DISCLOSUREMANAGEMENT
- EAS
- EPMADATASYNCHRONIZER
- EPMAWEBTIER
- FINANCIALREPORTING
- HPSAlerter
- HPSWebReports
- HSFWEB
- PLANNING
To change the security model:

1. Using a text editor, open `MIDDLEWARE_HOME/user_projects/domains/EPMSystem/config/config.xml`

2. In the app-deployment definition of each EPM System component, set the value of `<security-dd-model>` to `CustomRolesAndPolicies` as shown in the following example:

   ```xml
   <app-deployment>
     <name>SHAREDSERVICES#11.1.2.0</name>
     <target>EPMServer</target>
     <module-type>ear</module-type>
     <source-path>C:\Oracle\Middleware\EPMSystem11R1/products/Foundation/AppServer/InstallableApps/common/interop.ear</source-path>
     <security-dd-model>CustomRolesAndPolicies</security-dd-model>
     <staging-mode>nostage</staging-mode>
  </app-deployment>

3. Save and close `config.xml`.

4. Restart the WebLogic Server.

Creating URL Protection Policies for EPM System Components

Create a URL protection policy in the WebLogic Server Administrative Console to protect each EPM System component URL. See Options for Securing Web Applications and EJB Resources in the Oracle Fusion Middleware Securing Resources Using Roles and Policies for Oracle WebLogic Server guide for details.

To create URL protection policies:

1. In the Change Center in WebLogic Server Administration Console for EPM System domain, click Lock & Edit.

2. Click Deployments.

3. Expand an EPM System enterprise application (for example PLANNING) in your deployment and then click its web application (for example HyperionPlanning). See “Changing Default Security Model of EPM System Components” on page 77 for a list of EPM System components.

   **Note:** Some enterprise applications; for example Oracle Essbase Administration Services, comprise multiple web applications for which URL patterns must be defined.

4. Create a URL Pattern scoped policy for the web application.
   a. Click Security, then Policies, and then New.
b. In URL Pattern, enter /*.

c. Click OK.

d. Click the URL pattern (/*) that you created.

e. Click Add Conditions.

f. In Predicate List, select a policy condition, and then click Next.

   Oracle recommends that you use the Group condition, which grants this security policy
to all members of a specified group.

g. Specify the arguments that pertain to the predicate you chose. For example, if you chose
   Group in the preceding step, you should complete the following steps:
   i. In Group Argument Name, enter the name of the group that contains the users who
      should be allowed to access the web application. The name that you enter must
      exactly match an Active Directory group name.

   ii. Click Add.

   iii. Repeat the preceding steps to add more groups.

h. Click Finish.

   WebLogic Server displays an error message if it cannot locate the group in Active
   Directory. You must resolve this error before before proceeding.

i. Select Save.

5 Repeat step 3 and step 4 for the other EPM System components in your deployment.

6 In the Change Center, click Release Configuration.

7 Restart WebLogic Server.

Updating EPM System Security Configuration

Configure EPM System security to honor SSO. See “Configuring the EPM System for SSO” on
page 80.

Configuring IIS Servers for Kerberos

Complete this section if you are using EPM System components; for example, Financial
Management, that use IIS as the application server.

➤ To configuring EPM System IIS Servers for Kerberos:

1 Launch IIS Manager.

2 Expand Web Sites, and then Default Web Site.

3 Right click an EPM System component's website; for example, hfm for Financial Management, and then
   select Properties.

4 On Directory Security tab, click Edit in Authentication and access control.

5 In Authentication Methods, select Integrated Windows authentication.
6 Expand **Application Pools**.

7 Right click the application pool of the EPM System component for which you changed authentication and access control methods in the preceding steps, and then click **Properties**. For example, if you modified the authentication and access control method of hfm website, right-click hfmAppPool, and then select **Properties**.

8 On the Identity tab in **Application pool identity**, do the following:
   a. In **User name**, enter the service principal you created (see “Creating Kerberos Identification for WebLogic Server” on page 70).
   b. In **Password**, enter the password of the service principal.
   c. Click **OK**.

9 Repeat step 3 through step 8 to configure Kerberos authentication for remaining websites and application pools.

10 Restart IIS.

---

**Configuring the EPM System for SSO**

EPM System products must be configured to support security agent for SSO. The configuration specified in Shared Services determines the following for all EPM System products:

- Whether to accept SSO from a security agent
- The authentication mechanism to accept for SSO

In an SSO-enabled environment, the EPM System product that is first accessed by the user parses the SSO mechanism to retrieve the authenticated user ID contained in it. The EPM System product checks the user ID against the user directories configured in Shared Services to determine that the user is a valid EPM System user. It also issues a token that enables SSO across EPM System products.

The configuration specified in Shared Services enables SSO and determines the authentication mechanism to accept for SSO for all EPM System products.

To enable SSO from a web identity management solution:

1 Launch the Shared Services Console as a Shared Services Administrator. See “Launching Shared Services Console” on page 20.

2 Select **Administration**, and then **Configure User Directories**.

3 Verify that the user directories used by the web identity management solution are configured as external user directories in Shared Services.
   For example, to enable Kerberos SSO, you must configure the Active Directory that is configured for Kerberos authentication as an external user directory.
   See Chapter 4, “Configuring User Directories.”

4 Select **Security Options**.
Select Show Advanced Options.

In Single Sign-on Configuration in the Defined User Directories screen, perform the following steps:

a. Select Enable SSO.

b. From SSO Provider or Agent, select a web identity management solution. Choose Other if you are configuring SSO with Kerberos.

The recommended SSO mechanism is automatically selected. See Table 7. See “Supported SSO Methods” on page 49.

Note: If you are not using the recommended SSO mechanism, you must choose Other in SSO Provider or Agent. For example, to use a mechanism other than HTTP Header for SiteMinder, choose Other in SSO Provider or Agent, and then select the SSO Mechanism that you want to use in SSO Mechanism.

Table 7 Preferred SSO Mechanisms for Web Identity Management Solutions

<table>
<thead>
<tr>
<th>Web Identity Management Solution</th>
<th>Recommended SSO Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Access Manager</td>
<td>Custom HTTP Header¹</td>
</tr>
<tr>
<td>OSSO</td>
<td>Custom HTTP Header</td>
</tr>
<tr>
<td>SiteMinder</td>
<td>Custom HTTP Header</td>
</tr>
<tr>
<td>Kerberos</td>
<td>Get Remote User from HTTP Request</td>
</tr>
</tbody>
</table>

¹The default HTTP Header name is HYPLOGIN. If you are using a custom HTTP Header, replace the name.

Click OK.

Single Sign-on Options for Smart View

Although Smart View is a thick client and not a browser, it connects to server components using HTTP and behaves much like a browser from a system perspective. Smart View supports all standard web-based integration methods that browser interfaces support. However, some limitations exist:

- SSO mechanisms are supported for shared connections only. SSO mechanisms are not supported with private connections, which are used primarily for backward compatibility.

- If Smart View is launched from an existing browser session that is connected to an EPM System component, users must sign into Smart View again, because it does not share the cookie from the existing session.

- If you are using a custom html based login form instead of the default Oracle Access Manager login form, ensure that the source of the custom form includes the string loginform. This is required to allow Smart View integration with Oracle Access Manager to work.
User Directories in EPM System Security

EPM System products are supported on a number of user and identity management systems, which are collectively referred to as user directories. These include Lightweight Directory Access Protocol (LDAP) enabled user directories such as Sun Java System Directory Server (formerly SunONE Directory Server) and Active Directory. EPM System also supports relational databases as external user directories.

Generally, EPM System products use Native Directory and external user directories in provisioning. See Oracle Enterprise Performance Management System Certification Matrix for a list of supported user directories.

EPM System products require a user directory account for each user who accesses the products. These users may be assigned to groups to facilitate provisioning. Users and groups can be provisioned with EPM System roles and object ACLs. Because of the administrative overhead, Oracle does not recommend the provisioning of individual users. Users and groups from all configured user directories are visible from Shared Services Console.

By default, EPM System Configurator configures the Shared Services repository as the Native Directory to support EPM System products. Directory Managers access and manage Native Directory using the Shared Services Console.
Operations Related to User Directory Configuration

To support SSO and authorization, System Administrators must configure external user directories. From Shared Services Console, System Administrators can perform several tasks related to configuring and managing user directories. These topics provide instructions:

- Configuring user directories:
  - “Configuring OID, Active Directory, and Other LDAP-based User Directories” on page 85
  - “Configuring Relational Databases as User Directories” on page 96
- “Testing User Directory Connections” on page 99
- “Editing User Directory Settings” on page 99
- “Deleting User Directory Configurations” on page 100
- “Managing the User Directory Search Order” on page 100
- “Setting Security Options” on page 102

Oracle Identity Manager and EPM System

Oracle Identity Manager is a role and user administration solution that automates the process of adding, updating, and deleting both user accounts and attribute-level entitlements across enterprise resources. Oracle Identity Manager is available as a stand-alone product or as part of Oracle Identity and Access Management Suite Plus.

EPM System integrates with Oracle Identity Manager by using enterprise roles which are LDAP groups. Roles of EPM System components can be assigned to enterprise roles. Users or groups added to Oracle Identity Manager enterprise roles automatically inherit assigned EPM System roles.

For example, assume that you have a Planning application named Budget Planning. To support this application, you can create three enterprise roles—Budget Planning Interactive User, Budget Planning End User, and Budget Planning Admin—in Oracle Identity Manager. While provisioning EPM System roles, ensure that Provisioning Managers provision the enterprise roles from Oracle Identity Manager with the required roles from Budget Planning and other EPM System components including Shared Services. All users and groups assigned to the enterprise roles in Oracle Identity Manager inherits the EPM System roles. See Oracle Identity Manager documentation for information on deploying and managing Oracle Identity Manager.

To integrate Oracle Identity Manager with EPM System, Administrators must perform these steps:

- Ensure that members (users and groups) of Oracle Identity Manager enterprise roles that are to be used for EPM System provisioning are defined in an LDAP-enabled user directory; for example OID or Active Directory.
- Configure the LDAP-enabled user directory where members of the enterprise roles are defined as an external user directory in EPM System. See “Configuring OID, Active Directory, and Other LDAP-based User Directories” on page 85.
Active Directory Information

This section explains Microsoft Active Directory concepts used in this document.

DNS Lookup and Host Name Lookup

System Administrators can configure Active Directory so Shared Services can perform a static host name lookup or a DNS lookup to identify Active Directory. Static host name lookup does not support Active Directory failover.

Using the DNS lookup ensures high availability of Active Directory in scenarios in which Active Directory is configured on multiple domain controllers to ensure high availability. When configured to perform a DNS lookup, Shared Services queries the DNS server to identify registered domain controllers and connects to the domain controller with the greatest weight. If the domain controller to which Shared Services is connected fails, Shared Services dynamically switches to the next available domain controller with the greatest weight.

Note: DNS lookup can be configured only if a redundant Active Directory setup that supports failover is available. See Microsoft documentation for information.

Global Catalog

A global catalog is a domain controller that stores a copy of all Active Directory objects in a forest. It stores a complete copy of all objects in the directory for its host domain and a partial copy of all objects for all other domains in the forest, which are used in typical user search operations. See Microsoft documentation for information on setting up a global catalog.

If your organization is using a global catalog, use one of these methods to configure Active Directory:

- Configure the global catalog server as the external user directory (recommended).
- Configure each Active Directory domain as a separate external user directory.

Configuring the global catalog instead of individual Active Directory domains allows EPM System products to access local and universal groups within the forest.

Configuring OID, Active Directory, and Other LDAP-based User Directories

System Administrators use the procedures in this section to configure LDAP-based corporate user directories, such as OID, Sun Java System Directory Server, Oracle Virtual Directory, Active Directory, IBM Tivoli Directory Server, or an LDAP-based user directory that is not listed on the configuration screen.
To configure OID, Active Directory, and other LDAP-based user directories:


2. Select Administration, and then Configure User Directories.
   The Provider Configuration tab opens. This screen lists all configured user directories, including Native Directory.

3. Click New.

4. Under Directory Type, select an option:
   - Lightweight Directory Access Protocol (LDAP) to configure an LDAP-based user directory other than Active Directory. Select this option to configure Oracle Virtual Directory.
   - Microsoft Active Directory (MSAD) to configure Active Directory.

   Active Directory and Active Directory Application Mode (ADAM) only: If you want to use a custom ID attribute (an attribute other than ObjectGUID; for example sAMAccountName with Active Directory or ADAM, select Lightweight Directory Access Protocol (LDAP), and configure it as Directory Type Other.

5. Click Next.
6. Enter the required parameters.
<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
</table>
| Directory Server      | Select a user directory. The **ID Attribute** value changes to the recommended constant unique identity attribute for the selected product. This property is automatically selected if you chose Active Directory in **step 4**. Select **Other** in the following scenarios:  
  - You are configuring an unlisted user directory type; for example, Oracle Virtual Directory  
  - You are configuring a listed LDAP-enabled user directory (for example, OID), but want to use a custom ID Attribute.  
  - You are configuring Active Directory or ADAM to use a custom ID Attribute.  
  **Note:** Because Oracle Virtual Directory provides a virtualized abstraction of LDAP directories and RDBMS data repositories in one directory view, EPM System considers it a single external user directory regardless of the number and type of user directories Oracle Virtual Directory supports.  
  **Example:** Oracle Internet Directory |
| Name                  | A descriptive name for the user directory. Used to identify a specific user directory if multiple user directories are configured.  
  **Example:** Corporate_OID |
| DNS Lookup            | **Active Directory only:** Select this option to enable DNS lookup. See “DNS Lookup and Host Name Lookup” on page 85. Oracle recommends that you configure DNS lookup as the method to connect to Active Directory in production environments to avoid connection failures.  
  **Note:** Do not select this option if you are configuring a global catalog.  
  When you select this option, the following fields are displayed:  
  - **Domain:** The domain name of an Active Directory forest.  
    **Examples:** example.com or us.example.com  
  - **AD Site:** Active Directory site name, generally the relative distinguished name of the site object that is stored in Active Directory configuration container. Typically, AD Site identifies a geographic location such as a city, state, region, or country.  
    **Examples:** Santa Clara or US_West_region  
  - **DNS Server:** DNS name of the server that supports DNS server lookup for domain controllers. |
| Host Name             | **Active Directory only:** Select this option to enable static host name lookup. See “DNS Lookup and Host Name Lookup” on page 85.  
  **Note:** Select this option if you are configuring an Active Directory global catalog. |
| Host Name             | DNS name of the user directory server. Use the fully qualified domain name if the user directory is to be used to support SSO from SiteMinder. Oracle recommends using the host name to establish an Active Directory connection for testing purposes only.  
  **Note:** If you are configuring an Active Directory global catalog, specify the global catalog server host name. See “Global Catalog” on page 85.  
  **Example:** MyServer |
| Port                  | The port number where the user directory is running.  
  **Note:** If you are configuring an Active Directory global catalog, specify the port used by the global catalog server (default is 3268). See “Global Catalog” on page 85.  
  **Example:** 389 |
<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSL Enabled</td>
<td>The check box that enables secure communication with this user directory. The user directory must be configured for secure communication.</td>
</tr>
<tr>
<td>Base DN</td>
<td>The distinguished name (DN) of the node where the search for users and groups should begin. You can also use the Fetch DNs button to list available base DNs and then select the appropriate base DN from the list. Note: If you are configuring a global catalog, specify the base DN of the forest. See “Using Special Characters” on page 106 for restrictions on the use of special characters. Oracle recommends that you select the lowest DN that contains all EPM System product users and groups. Example: dc=example, dc=com</td>
</tr>
</tbody>
</table>
| ID Attribute        | This attribute value can be modified only if Other is selected in Directory Type. This attribute must be a common attribute that exists in user and group objects on the directory server. The recommended value of this attribute is automatically set for OID orclguid, SunONE (nsuniqueid), IBM Directory Server (Ibm-entryUuid), Novell eDirectory (GUID), and Active Directory (ObjectGUID). Example: orclguid The ID attribute value, if you set it manually after choosing Other in Directory Server, for example to configure an Oracle Virtual Directory, should:  
  - Point to a unique attribute  
  - Not be location specific  
  - Not change over time |
<p>| Maximum Size        | The maximum number of results that a search can return. If this value is greater than that supported by the user directory settings, the user directory value overrides this value. For user directories other than Active Directory, leave this field blank to retrieve all users and groups that meet the search criteria. For Active Directory, set this value to 0 to retrieve all users and groups that meet the search criteria. If you are configuring Shared Services in Delegated Administration mode, set this value to 0. |
| Trusted             | The check box to indicate that this provider is a trusted SSO source. SSO tokens from trusted sources do not contain the user's password.                                                                     |
| Anonymous Bind      | The check box to indicate that Shared Services can bind anonymously to the user directory to search for users and groups. Can be used only if the user directory allows anonymous binds. If this option is not selected, you must specify in the User DN an account with sufficient access permissions to search the directory where user information is stored. Oracle recommends that you not use anonymous bind. Note: Anonymous bind is not supported for OID. |
| User DN             | This option is disabled if Anonymous Bind is selected. The distinguished name of the user that Shared Services should use to bind with the user directory. This user must have search privileges on the RDN attribute within the DN. For example, in the dn: cn=John Doe, ou=people, dc=myCompany, dc=com, the bind user should have search access to the cn attribute. Special characters in User DN must be specified using escape characters. See “Using Special Characters” on page 106 for restrictions. Example: cn=admin, dc=myCompany, dc=com |</p>
<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Append Base DN</td>
<td>The check box for appending the base DN to the User DN. If you are using Directory Manager account as the User DN, do not append Base DN. This check box is disabled if the Anonymous Bind option is selected.</td>
</tr>
<tr>
<td>Password</td>
<td>User DN password This box is disabled if the Anonymous Bind option is selected.</td>
</tr>
<tr>
<td>Example: UserDNpassword</td>
<td></td>
</tr>
<tr>
<td>Show Advanced Options</td>
<td>The check box to display advanced options.</td>
</tr>
<tr>
<td>Referrals</td>
<td><strong>Active Directory only:</strong> If Active Directory is configured to follow referrals, select follow to automatically follow LDAP referrals. Select ignore to not use referrals.</td>
</tr>
</tbody>
</table>
| Dereference Aliases          | Select the method that Shared Services searches should use to dereference aliases in the user directory so searches retrieve the object to which the DN of the alias points. Select:  
  - **Always**: Always dereference aliases.  
  - **Never**: Never dereference aliases.  
  - **Finding**: Dereference aliases only during name resolution.  
  - **Searching**: Dereference aliases only after name resolution. |
| Connection Read Timeout      | Interval (seconds) after which the LDAP provider aborts the LDAP read attempt if it does not get a response. Default: 60 seconds                                                                                     |
| Max Connections              | Maximum connections in the connection pool. Default is 100 for LDAP-based directories, including Active Directory. Default: 100  |
| Timeout                      | Timeout to get a connection from the pool. An exception is thrown after this period. Default: 300000 milliseconds (5 minutes)                                                                                   |
| Evict Interval               | **Optional**: The interval for running the eviction process to clean the pool. The eviction process removes idle connections that have exceeded the Allowed Idle Connection Time. Default: 120 minutes |
| Allowed Idle Connection Time | **Optional**: The time after which the eviction process removes the idle connections in the pool. Default: 120 minutes                                                                                           |
| Grow Connections             | This option indicates whether the connection pool can grow beyond Max Connections. Selected by default. If you do not allow the connection pool to grow, the system returns an error if a connection is not available within the time set for Time Out. |
| Enable Custom Authentication Module | The check box to enable the use of a custom authentication module to authenticate users defined in this user directory. You must also enter the fully qualified Java class name of the authentication module in the Security Options screen. See “Setting Security Options” on page 102.  
  The custom authentication module authentication is transparent to thin and thick clients and does not require client deployment changes. See “Using a Custom Authentication Module” in the Oracle Enterprise Performance Management System Security Configuration Guide. |

7 Click Next.
Shared Services uses the properties set on the User Configuration screen to create a user URL that is used to determine the node where search for users begins. Using this URL speeds the search.

**Caution!** The user URL should not point to an alias. EPM System security requires that the user URL point to an actual user.

Oracle recommends that you use the Auto Configure area of the screen to retrieve the required information.

Note: See “Using Special Characters” on page 106 for a list of special characters that can be used in the user configuration.

8 In Auto Configure, enter a unique user identifier using the format `attribute=identifier`; for example, `uid=jdoe`.

Attributes of the user are displayed in the User Configuration area.

If you are configuring OID, you cannot automatically configure the user filter, because the root DSE of OID does not contain entries in the Naming Contexts attribute. See Managing Naming Contexts in the Oracle Fusion Middleware Administrator’s Guide for Oracle Internet Directory.
Note: You can manually enter required user attributes into text boxes in the User Configuration area.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User RDN</td>
<td>The Relative DN of the user. Each component of a DN is called an RDN and represents a branch in the directory tree. The RDN of a user is generally the equivalent of the uid or cn. See “Using Special Characters” on page 106 for restrictions. Example: ou=People</td>
</tr>
<tr>
<td>Login Attribute</td>
<td>A unique attribute (can be a custom attribute) that stores the login name of the user. Users use the value of this attribute as the user name while logging into EPM System products. User IDs (value of Login Attribute) must be unique across all user directories. For example, you may use uid and sAMAccountName respectively as the Login Attribute for your SunONE and Active Directory configurations. The values of these attributes must be unique across all user directories, including Native Directory. Note: User IDs are not case sensitive. Note: If you are configuring OID as an external user directory for EPM System products deployed on Oracle Application Server in a Kerberos environment, you must set this property to userPrincipalName. Default</td>
</tr>
<tr>
<td></td>
<td>● Active Directory: cn</td>
</tr>
<tr>
<td></td>
<td>● LDAP directories other than Active Directory: uid</td>
</tr>
<tr>
<td>First Name Attribute</td>
<td>The attribute that stores the user's first name</td>
</tr>
<tr>
<td>Default</td>
<td>givenName</td>
</tr>
<tr>
<td>Last Name Attribute</td>
<td>The attribute that stores the user's last name</td>
</tr>
<tr>
<td>Default</td>
<td>sn</td>
</tr>
<tr>
<td>Email Attribute</td>
<td>Optional: The attribute that stores the user's email address</td>
</tr>
<tr>
<td>Default</td>
<td>mail</td>
</tr>
<tr>
<td>Object Class</td>
<td>Object classes of the user (the mandatory and optional attributes that can be associated with the user). Shared Services uses the object classes listed in this screen in the search filter. Using these object classes, Shared Services should find all users who should be provisioned. Note: If you are configuring Active Directory or ADAM as user directory type Other to use a custom ID attribute, you must set this value to user. You can manually add object classes if needed. To add an object class, enter the object class name into the Object Class box, and then click Add. To delete object classes, select the object class and click Remove. Default</td>
</tr>
<tr>
<td></td>
<td>● Active Directory: user</td>
</tr>
<tr>
<td></td>
<td>● LDAP directories other than Active Directory: person, organizationalPerson, inetorgperson</td>
</tr>
<tr>
<td>Label</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Filter to Limit Users</td>
<td>An LDAP query that retrieves only the users that are to be provisioned with EPM System product roles. For example, the LDAP query <code>(uid=Hyp*)</code> retrieves only users whose names start with Hyp. The User Configuration screen validates the User RDN and recommends the use of a user filter, if required. The user filter limits the number of users returned during a query. It is especially important if the node identified by the user RDN contains many users that need not be provisioned. User filters can be designed to exclude the users that are not to be provisioned, thereby improving performance.</td>
</tr>
<tr>
<td>User Search Attribute for Multi-Attribute RDN</td>
<td><strong>LDAP-enabled user directories other than Active Directory only:</strong> Set this value only if your directory server is configured to use a multi-attribute RDN. The value you set must be one of the RDN attributes. The value of the attribute you specify should be unique and the attribute should be searchable. For example, assume that a SunONE directory server is configured to combine the <code>cn</code> (cn=John Doe) and <code>uid</code> (uid=jDoe12345) attributes to create a multi-attribute RDN similar to the following: <code>cn=John Doe+uid=jDoe12345, ou=people, dc=myCompany, dc=com</code> In this case, you can use either <code>cn</code> or <code>uid</code> if these attributes meet the following conditions: 1. The attribute is searchable by the user identified in User DN filed on Connection Information tab 2. The attribute requires you to set a unique value across the user directory</td>
</tr>
<tr>
<td>Resolve Custom Primary Groups</td>
<td><strong>Active Directory only:</strong> The check box that indicates whether to identify primary groups of users to determine effective roles. This check box is selected by default. Oracle recommends that you not change this setting.</td>
</tr>
<tr>
<td>Show warning if user password expires in:</td>
<td><strong>Active Directory only:</strong> The check box that indicates whether to display a warning message if the Active Directory user password expires within the specified number of days.</td>
</tr>
</tbody>
</table>

1EPM System security may use default values for some fields for which configuration value is optional. If you do not enter values in such fields, default values are used during runtime.

9 Click Next.

The Group Configuration screen opens. Shared Services uses the properties set in this screen to create the group URL that determines the node where the search for groups starts. Using this URL speeds the search.

**Caution!** The Group URL should not point to an alias. EPM System security requires that the group URL point to an actual group. If you are configuring a Novell eDirectory that uses group aliases, the group aliases and group accounts must be available within the group URL.

**Note:** Data entry in the Group Configuration screen is optional. If you do not enter the group URL settings, Shared Services searches within the Base DN to locate groups, which can negatively affect performance, especially if the user directory contains many groups.
10 Clear **Support Groups** if your organization does not plan to provision groups, or if users are not categorized into groups on the user directory. Clearing this option disables the fields on this screen.

If you are supporting groups, Oracle recommends that you use the autoconfigure feature to retrieve the required information.

If you are configuring OID as a user directory, you cannot use the autoconfigure feature, because the root DSE of OID does not contain entries in the Naming Contexts attribute. See Managing Naming Contexts in the *Oracle Fusion Middleware Administrator’s Guide for Oracle Internet Directory*.

11 In the **Auto Configure** text box, enter a unique group identifier, and then click **Go**.

The group identifier must be expressed in `attribute=identifier` format; for example, `cn=western_region`.

Attributes of the group are displayed in the Group Configuration area.

**Note:** You can enter required group attributes in the Group Configuration text boxes.

**Caution!** If the group URL is not set for user directories that contain `/` (slash) or `\` (backslash) in its node names, the search for users and groups fails. For example, any operation to list the user or group fails if the group URL is not specified for a user directory in which users and groups exist in a node, such as `OU=child \ou,OU=parent/ou` or `OU=child/ou,OU=parent \ ou`. 
**Table 10**  
Group Configuration Screen

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group RDN</td>
<td>The Relative DN of the group. This value, which is path relative to the Base DN, is used as the group URL. Specify a Group RDN that identifies the lowest user directory node in which all the groups that you plan to provision are available. If you use an Active Directory primary group for provisioning, ensure that the primary group falls under the Group RDN. Shared Services does not retrieve the primary group if it is outside the scope of the group URL. The Group RDN has a significant impact on login and search performance. Because it is the starting point for all group searches, you must identify the lowest possible node in which all groups for EPM System products are available. To ensure optimum performance, the number of groups present within the Group RDN should not exceed 10,000. If more groups are present, use a group filter to retrieve only the groups that you want to provision. <strong>Note:</strong> Shared Services displays a warning if the number of available groups within the Group URL exceeds 10,000. See &quot;Using Special Characters&quot; on page 106 for restrictions. <strong>Example:</strong> ou=Groups</td>
</tr>
<tr>
<td>Name Attribute</td>
<td>The attribute that stores the name of the group</td>
</tr>
<tr>
<td>Default</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- LDAP directories including Active Directory: cn</td>
</tr>
<tr>
<td></td>
<td>- Native Directory: cssDisplayNameDefault</td>
</tr>
<tr>
<td>Object class</td>
<td>Object classes of the group. Shared Services uses the object classes listed in this screen in the search filter. Using these object classes, Shared Services should find all groups associated with the user. <strong>Note:</strong> If you are configuring Active Directory or ADAM as user directory type Other to use a custom ID attribute, you must set this value to group?member. You can manually add object classes if needed. To add an object class, enter the object class name into the Object class text box, and then click Add. To delete object classes, select the object class, and then click Remove. <strong>Default</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Active Directory: group?member</td>
</tr>
<tr>
<td></td>
<td>- LDAP directories other than Active Directory: groupofuniquenames?uniqueMember, groupOfNames? member</td>
</tr>
<tr>
<td></td>
<td>- Native Directory: groupofuniquenames?uniqueMember, cssGroupExtend?cssIsActive</td>
</tr>
<tr>
<td>Filter to Limit Groups</td>
<td>An LDAP query that retrieves the groups that are to be provisioned with EPM System product roles only. For example, the LDAP query ([</td>
</tr>
</tbody>
</table>

1EPM System security may use default values for some fields for which configuration value is optional. If you do not enter values in such fields, default values are used during runtime.

12 Click Finish.

Shared Services saves the configuration and returns to the Defined User Directories screen, which now lists the user directory that you configured.

14 If needed, change the search order assignment. See “Managing the User Directory Search Order” on page 100 for details.

15 If needed, specify security options. See “Setting Security Options” on page 102 for details.

16 Restart Foundation Services and other EPM System components.

### Configuring Relational Databases as User Directories

User and group information from the system tables of Oracle, SQL Server, and IBM DB2 relational databases can be used to support provisioning. If group information cannot be derived from the database’s system schema, Shared Services does not support the provisioning of groups from that database provider. For example, Shared Services cannot extract group information from older versions of IBM DB2, because the database uses groups defined on the operating system. Provisioning Managers can, however, add these users to groups in Native Directory and provision those groups. See Oracle Enterprise Performance Management Products—Supported Platforms Matrices for supported platform information.

**Note:** If you are using a DB2 database, the user name must contain at least eight characters. User names should not exceed 256 characters (Oracle and SQL Server databases), and 1000 characters (DB2).

Configure Shared Services to connect to the database as the database administrator; for example, Oracle SYSTEM user, to retrieve the list of users and groups.

**Note:** Shared Services retrieves only active database users for provisioning. Inactive and locked database user accounts are ignored.

- **To configure database providers:**
  2. Select Administration, and then Configure User Directories.
  3. Click Add.
  4. In the Directory Type screen, select Relational Database (Oracle, DB2, SQL Server).
  5. Click Next.
6 On the Database Configuration tab, enter configuration parameters.

Table 11 Database Configuration Tab

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Type</td>
<td>The relational database provider. Shared Services supports only Oracle, IBM DB2, and SQL Server databases as database providers.</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> Oracle</td>
</tr>
<tr>
<td>Name</td>
<td>A unique configuration name for the database provider.</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> Oracle_DB_FINANCE</td>
</tr>
<tr>
<td>Server</td>
<td>The DNS name of the computer on which the database server is running.</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> myserver</td>
</tr>
<tr>
<td>Port</td>
<td>The database server port number</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> 1521</td>
</tr>
<tr>
<td>Service/SID</td>
<td>The system identifier (default is orcl)</td>
</tr>
<tr>
<td>(Oracle only)</td>
<td><strong>Example:</strong> orcl</td>
</tr>
<tr>
<td>Database (SQL Server and DB2 only)</td>
<td>The database to which Shared Services should connect</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> master</td>
</tr>
<tr>
<td>User Name</td>
<td>The user name that Shared Services should use to access the database. This database user must have access privileges to database system tables. Oracle recommends that you use the system account for Oracle databases and the database administrator's user name for SQL Server and IBM DB2 databases.</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> SYSTEM</td>
</tr>
<tr>
<td>Password</td>
<td>The password of the user identified in the User Name.</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> system_password</td>
</tr>
<tr>
<td>Trusted</td>
<td>The check box that specifies that this provider is a trusted SSO source. SSO tokens from trusted sources do not contain the user's password.</td>
</tr>
</tbody>
</table>

7 **Optional:** Click **Next** to configure the connection pool.
The Advanced Database Configuration tab opens.

8 On Advanced Database Configuration, enter connection pool parameters.

**Table 12 Advanced Database Configuration Tab**

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Connections</td>
<td>Maximum connections in the pool. Default is 50.</td>
</tr>
<tr>
<td>Initial Size</td>
<td>Available connections when the pool is initialized. Default is 20.</td>
</tr>
<tr>
<td>Allowed Idle Connection Time</td>
<td><strong>Optional</strong>: The time after which the eviction process removes the idle connections in the pool. Default is 10 minutes.</td>
</tr>
<tr>
<td>Evict Interval</td>
<td><strong>Optional</strong>: The interval for running the eviction process to clean up the pool. Eviction removes idle connections that have exceeded the Allowed Idle Connection Time. Default is five minutes.</td>
</tr>
<tr>
<td>Grow Connections</td>
<td>Indicates whether the connection pool can grow beyond Max Connections. By default, this option is cleared, indicating that the pool cannot grow. If you do not allow the connection pool to grow, the system returns an error if a connection is not available within the time set for Time Out.</td>
</tr>
<tr>
<td>Enable Custom Authentication Module</td>
<td>The check box to enable the use of a custom authentication module to authenticate users defined in this user directory. You must also enter the fully qualified Java class name of the authentication module in the Security Options screen. See “Setting Security Options” on page 102. The custom authentication module authentication is transparent to thin and thick clients. See “Using a Custom Authentication Module” in the Oracle Enterprise Performance Management System Security Configuration Guide.</td>
</tr>
</tbody>
</table>

9 Click **Finish**.

10 Click **OK** to return to the Defined User Directories screen.


12 Change the search order assignment, if needed. See “Managing the User Directory Search Order” on page 100 for details.

13 Specify security settings, if needed. See “Setting Security Options” on page 102.

14 Restart Foundation Services and other EPM System components.
Testing User Directory Connections

After configuring a user directory, test the connection to ensure that Shared Services can connect to the user directory using the current settings.

➢ To test a user directory connection:

2. Select Administration, and then Configure User Directories.
3. From the list of user directories, select an external user directory configuration to test.
4. Click Test, and then OK.

Editing User Directory Settings

Administrators can modify any parameter, other than the name, of a user directory configuration. Oracle recommends that you not edit the configuration data of user directories that were used for provisioning.

Caution! Editing some settings, for example, the ID Attribute, in the user directory configuration invalidates provisioning data. Exercise extreme care when modifying the settings of a user directory that has been provisioned.

➢ To edit a user directory configuration:

2. Select Administration, and then Configure User Directories.
3. Select a user directory to edit.
4. Click Edit.
5. Modify the configuration settings.

Note: You cannot modify the configuration name. If you are modifying an LDAP user directory configuration, you can choose a different directory server or Other (for custom LDAP directories) from the Directory Server list. You cannot edit Native Directory parameters.

For an explanation of the parameters that you can edit, see the following tables:

- Active Directory and other LDAP-based user directories:
  - Table 8, “Connection Information Screen,” on page 88
  - Table 9, “User Configuration Screen,” on page 92
Deleting User Directory Configurations

System Administrators can delete an external user directory configuration anytime. Deleting a configuration invalidates all the provisioning information for the users and groups derived from the user directory and removes the directory from the search order.

**Tip:** If you do not want to use a configured user directory that was used for provisioning, remove it from the search order so that it is not searched for users and groups. This action maintains the integrity of provisioning information and enables you to use the user directory later.

To delete a user directory configuration:

2. Select **Administration**, and then **Configure User Directories**.
3. Select a directory.
4. Click **Delete**.
5. Click **OK**.
6. Click **OK** again.
7. Restart Foundation Services and other EPM System components.

Managing the User Directory Search Order

When a System Administrator configures an external user directory, Shared Services automatically adds the user directory to the search order and assigns it the next available search sequence preceding that of Native Directory. The search order is used to cycle through configured user directories when EPM System searches for users and groups.

System Administrators can remove a user directory from the search order, in which case Shared Services automatically reassigns the search order of the remaining directories. User directories not included in the search order are not used to support authentication and provisioning.

**Note:** Shared Services terminates the search for the user or group when it encounters the specified account. Oracle recommends that the corporate directory that contains most of the EPM System users be placed at the top of the search order.
By default, Native Directory is set as the last directory in the search order. Administrators can perform these tasks to manage the search order:

- “Adding a User Directory to the Search Order” on page 101
- “Changing the Search Order” on page 102
- “Removing a Search Order Assignment” on page 101

### Adding a User Directory to the Search Order

A newly configured user directory is automatically added to the search order. If you removed a directory from the search order, you can add it to the end of the search order.

To add a user directory to the search order:

2. Select Administration, and then Configure User Directories.
3. Select a deactivated user directory to add to the search order.
4. Click Include.
   - This button is available only if you have selected a user directory that is not in the search order.
5. Click OK to return to the Defined User Directories screen.
6. Restart Foundation Services and other EPM System components.

### Removing a Search Order Assignment

Removing a user directory from the search order does not invalidate the directory configuration; it removes the user directory from the list of directories that are searched for authenticating users. A directory that is not included in the search order is set to **Deactivated** status. When an Administrator removes a user directory from the search order, the search sequence assigned to the other user directories is automatically updated.

**Note:** Native Directory cannot be removed from the search order.

To remove a user directory from the search order:

2. Select Administration, and then Configure User Directories.
3. Select a directory to remove from the search order.
4. Click Exclude.
5. Click OK.
Click OK on the Directory Configuration Result screen.

Restart Foundation Services and other EPM System components.

Changing the Search Order

The default search order assigned to each user directory is based on the sequence in which the directory was configured. By default, Native Directory is set as the last directory in the search order.

To change the search order:

2. Select Administration, and then Configure User Directories.
3. Select a directory whose search order you want to change.
4. Click Move Up or Move Down.
5. Click OK.
6. Restart Foundation Services, other EPM System components, and custom applications that use the Shared Services security APIs.

Setting Security Options

Security options comprise the global parameters applicable to all user directories included in the search order.

To set security options:

2. Select Administration, and then Configure User Directories.
Table 13  Security Options for User Directories

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Token Timeout</td>
<td>Time (in minutes) after which the SSO token issued by EPM System products or the web identity management solution expires. Users must log in again after this period. Token timeout is set based on the server's system clock. Default is 480 minutes. <strong>Note:</strong> Token timeout is not the same as session timeout.</td>
</tr>
<tr>
<td>Cache Refresh Interval</td>
<td>Interval (in minutes) for refreshing the Shared Services cache of groups to users relationship data. Default is 60 minutes. Shared Services caches information about new external user directory groups and new users added to existing groups only after the next cache refresh. Users provisioned through a newly created external user directory group do not get their provisioned roles until the cache is refreshed.</td>
</tr>
<tr>
<td>Refresh Now</td>
<td>Click this button to manually initiate the refreshing of Shared Services cache that contains groups to users relationship data. You may want to initiate a cache refresh after creating new groups in external user directories and provisioning them or after adding new users to existing groups. The cache is refreshed only after Shared Services makes a call that uses the data in the cache.</td>
</tr>
<tr>
<td>Enable SSO Compatibility</td>
<td>Select this option if your deployment is integrated with Oracle Business Intelligence Enterprise Edition Release 11.1.1.5 or earlier.</td>
</tr>
<tr>
<td>Enable Delegated User Management Mode</td>
<td>Option enabling delegated user management of EPM System products to support the distributed management of provisioning activities. See “Delegated User Management” in the Oracle Enterprise Performance Management System User Security Administration Guide.</td>
</tr>
<tr>
<td>Enable SSO</td>
<td>Option enabling support for SSO from security agents such as Oracle Access Manager</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SSO Provider or Agent</td>
<td>Select the web identity management solution from which EPM System products should accept SSO. Select Other if your web identity management solution; for example, Kerberos, is not listed. The preferred SSO mechanism and name are automatically selected when you select the SSO provider. You can change the name of the SSO mechanism (HTTP header or custom login class), if required. If you select Other as the SSO provider or agent, you must ensure that it supports an EPM System supported SSO mechanism. See “Supported SSO Methods” in the Oracle Enterprise Performance Management System Security Configuration Guide.</td>
</tr>
</tbody>
</table>
| SSO Mechanism             | The method that the selected web identity management solution uses to provide user's login name to EPM System products. For a description of acceptable SSO methods, see “Supported SSO Methods” in the Oracle Enterprise Performance Management System Security Configuration Guide.  
  - Custom HTTP Header: Set the name of the header that the security agent passes to EPM System.  
  - Custom Login Class: Specify the custom Java class that handles HTTP requests for authentication. See “Custom Login Class” in the Oracle Enterprise Performance Management System Security Configuration Guide.  
  **Note:** Custom Login Class is not the same as custom authentication.  
  - HTTP Authorization Header: The standard HTTP mechanism.  
  - Get Remote User from HTTP Request: Select this option if the security agent populates the remote user in the HTTP request. |
| Custom Authentication Module | The fully qualified Java class name of the custom authentication module (for example, com.mycompany.epm.CustomAuthenticationImpl) that should be used to authenticate users on all user directories for which the custom authentication module is selected.  
  The authentication module is used for a user directory only if the directory configuration has enabled (default) its use.  
  Foundation Services requires that the custom authentication JAR file be named CustomAuth.jar. CustomAuth.jar must be available in EPM_ORACLE_HOME/user_projects/domains/WEBLOGIC_DOMAIN/lib, typically, Oracle/Middleware/user_projects/domains/EPMSYSTEM/lib. You can use any package structure and class name within the JAR file.  
  For more information, see “Using a Custom Authentication Module” in the Oracle Enterprise Performance Management System Security Configuration Guide. |

5 Click OK.  
6 Restart Foundation Services and other EPM System components.

### Regenerating Encryption Keys

EPM System uses the following keys to ensure security:  
- Single Sign On Token encryption key, used to encrypt and decrypt EPM System SSO tokens. This key is stored in Shared Services Registry  
- Trusted Services key, used by EPM System components to verify the authenticity of the service that is requesting an SSO token  
- Provider Configuration encryption key, used to encrypt the password (user DN password for LDAP-enabled user directories) that EPM System security uses to bind with a configured external user directory. This password is set while configuring an external user directory.
Change these keys periodically to strengthen EPM System security.

**Caution!** Taskflows used by Financial Management, Performance Management Architect, and Profitability and Cost Management are invalidated when you regenerate the Single Sign On Encryption key. After regenerating the key, open and save the taskflows to revalidate them.

To regenerate the Single Sign On Encryption key, Provider Configuration key, or Trusted Services key:

2. Select Administration, and then Configure User Directories.
3. Select Encryption Options.
4. In Encryption Options, select the key that you want to regenerate.

**Table 14** EPM System Encryption Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| Single Sign On Token           | Select to regenerate the encryption key that is used to encrypt and decrypt EPM System SSO tokens. Select one of the following buttons if Enable SSO Compatibility is selected on Security Options:  
★ Generate new key to create a new SSO token encryption key  
★ Reset to default to restore the default SSO token encryption key  
**Note:** If you revert to the default encryption key, you must delete the existing keystore file (EPM_ORACLE_HOME/common/CSS/ssHandlerTK) from all EPM System host machines. |
| Trusted Services Key           | Select this option to regenerate the trusted authentication key, used by EPM System components to verify the authenticity of the service that is requesting an SSO token. |
| Provider Configuration Key     | Select this option to regenerate the key that is used to encrypt the password (user DN password for LDAP-enabled user directories) that EPM System security uses to bind with a configured external user directory. This password is set while configuring an external user directory. |

5. Click OK.

6. If you chose to generate a new SSO encryption key, complete this step.
   a. Click Download.
   b. Click OK to save sshHandlerTK, the keystore file that supports the new SSO encryption key, into a folder on the server that hosts Foundation Services.
   c. Copy sshHandlerTK into EPM_ORACLE_HOME/common/CSS on all EPM System host machines.

7. Restart Foundation Services and other EPM System components.
Using Special Characters

Active Directory and other LDAP-based user directories allow special characters in entities such as DNs, user names, roles, and group names. Special handling may be required for Shared Services to understand such characters.

Generally, you must use escape characters while specifying special characters in user directory settings; for example, Base DN and user and group URLs. Table 15 lists the special characters that can be used in user names, group names, user URLs, group URLs, and in the value of OU in user DN.

Table 15  Supported special characters

<table>
<thead>
<tr>
<th>Character</th>
<th>Name or Meaning</th>
<th>Character</th>
<th>Name or Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>(</td>
<td>open parenthesis</td>
<td>$</td>
<td>dollar</td>
</tr>
<tr>
<td>)</td>
<td>close parenthesis</td>
<td>+</td>
<td>plus</td>
</tr>
<tr>
<td>&quot;</td>
<td>quotation mark</td>
<td>&amp;</td>
<td>ampersand</td>
</tr>
<tr>
<td>'</td>
<td>single quotation mark</td>
<td>\</td>
<td>backslash</td>
</tr>
<tr>
<td>,</td>
<td>comma</td>
<td>^</td>
<td>caret</td>
</tr>
<tr>
<td>=</td>
<td>equal to</td>
<td>;</td>
<td>semicolon</td>
</tr>
<tr>
<td>&lt;</td>
<td>less than</td>
<td>#</td>
<td>pound</td>
</tr>
<tr>
<td>&gt;</td>
<td>greater than</td>
<td>@</td>
<td>at</td>
</tr>
</tbody>
</table>

1Do not use / (slash) in organization unit names that come within the Base DN

● Special characters are not permitted in the value of the Login User attribute.
● The asterisk (*) is not supported in user names, group names, user and group URLs, or in the name of the OU in User DN.
● Attribute values containing a combination of special characters are not supported.
● The ampersand (&) can be used without an escape character. For Active Directory settings, & must be specified as &amp;.
● User and group names cannot contain both a backslash (\) and slash (/). For example, names such as test/\user and new\test/user are not supported.

Table 16  Characters that need not be escaped

<table>
<thead>
<tr>
<th>Character</th>
<th>Name or Meaning</th>
<th>Character</th>
<th>Name or Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>(</td>
<td>open parenthesis</td>
<td>'</td>
<td>single quote</td>
</tr>
<tr>
<td>)</td>
<td>close parenthesis</td>
<td>^</td>
<td>caret</td>
</tr>
<tr>
<td>$</td>
<td>dollar</td>
<td>@</td>
<td>at</td>
</tr>
<tr>
<td>&amp;</td>
<td>Ampersand</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1Must be stated as &amp;.
These characters must be escaped if you use them in user directory settings (user names, group names, user URLs, group URLs and User DN).

**Table 17  Escape for Special Characters in User Directory Configuration Settings**

<table>
<thead>
<tr>
<th>Special Character</th>
<th>Escape</th>
<th>Sample Setting</th>
<th>Escaped Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>comma (,)</td>
<td>backslash ()</td>
<td>ou=test,ou</td>
<td>ou=test,ou</td>
</tr>
<tr>
<td>plus sign (+)</td>
<td>backslash ()</td>
<td>ou=test+ou</td>
<td>ou=test+ou</td>
</tr>
<tr>
<td>equal to (=)</td>
<td>backslash ()</td>
<td>ou=test=ou</td>
<td>ou=test=ou</td>
</tr>
<tr>
<td>pound (#)</td>
<td>backslash ()</td>
<td>ou=test#ou</td>
<td>ou=test#ou</td>
</tr>
<tr>
<td>semicolon (;)</td>
<td>backslash ()</td>
<td>ou=test;ou</td>
<td>ou=test;ou</td>
</tr>
<tr>
<td>less than (&lt;)</td>
<td>&amp;lt;</td>
<td>ou=test&lt;ou</td>
<td>ou=test&amp;lt;ou</td>
</tr>
<tr>
<td>greater than (&gt;)</td>
<td>&amp;gt;</td>
<td>ou=test&gt;ou</td>
<td>ou=test&amp;gt;ou</td>
</tr>
<tr>
<td>&quot; (quotation mark)</td>
<td>\ (two backslashes)</td>
<td>ou=test&quot;ou</td>
<td>ou=test&quot;ou</td>
</tr>
<tr>
<td>\ (backslash)</td>
<td>\\ (three backslashes)</td>
<td>ou=test\ou</td>
<td>ou=test\\ou</td>
</tr>
</tbody>
</table>

1 In User DNs, quotation mark (") must be escaped with one backslash. For example, ou=test"ou must be specified as ou=test\"ou in User DN.

2 In User DNs, a backslash (\) must be escaped with one backslash. For example, ou=test\ou must be specified as ou=test\ou in User DN.

**Caution!** If the user URL is unspecified, users created within the RDN root must not contain / (slash) or \ (backslash). Similarly, these characters should not be used in the names of groups created within the RDN root if a group URL is not specified. For example, group names such as OU=child\ou, OU=parent/ou or OU=child/ou, OU=parent\ou are not supported. This issue does not apply if you are using a unique attribute as the ID Attribute in the user directory configuration.
Overview

A custom authentication module is a Java module that customers develop and implement to authenticate EPM System users. Generally, EPM System products use a logon screen to capture the user name and password, which are used to authenticate users. Instead of using EPM System authentication, you can use a custom authentication module to authenticate users and pass authenticated user credentials to EPM System for further processing. Implementing a custom authentication module does not involve modifying EPM System products.

You can use a custom authentication module with both the thick clients (for example, Oracle Smart View for Office, and Oracle Essbase Studio) and thin clients (for example, EPM Workspace).

The custom authentication module uses the information a user enters when logging in to an EPM System product. If enabled for a user directory, it authenticates users through the custom authentication module. On successfully authenticating the user, the custom authentication module returns the user name to EPM System.

The following illustration presents a sample custom authentication scenario:
For example, you can use RSA SecurID infrastructure as the custom provider to ensure transparent strong authentication to the EPM System. An overview:

1. The user enters credentials (generally, user name and password) to access an EPM System product. These credentials should uniquely identify the user to the provider used by the custom authentication module. For example, if you are using an RSA SecurID infrastructure to authenticate users, the user enters an RSA user ID and PIN (not an EPM System user ID and password).

2. Using the search order (see “Search Order” on page 112), EPM System cycles through configured user directories to locate the user.
   - If the current user directory is not configured for custom authentication, EPM System tries to locate and authenticate the user through EPM System authentication.
   - If the user directory is configured for custom authentication, EPM System delegates the authentication process to the custom module.

3. If EPM System delegates authentication to the custom module, the custom authentication module accepts the credentials and uses its own logic to direct user authentication against a custom provider; for example, RSA SecurID infrastructure.

4. If the custom authentication module authenticates the user against its provider, it returns the user name to the EPM System, or it returns a Java exception.

   The user name returned by the custom authentication module must be identical to a user name in a user directory that is enabled for custom authentication.

   - If the custom authentication module returns a user name, EPM System locates the user in a user directory that is enabled for custom authentication. At this stage, EPM System does not search the user directories that are not configured for custom authentication.
If the custom authentication module throws an exception or returns a null user, EPM System continues to search for the user in the remaining user directories in the search order that are not enabled for custom authentication. If a user who matches the credentials is not found, EPM System displays an error.

Use-Case Examples and Limitations

Custom authentication implementation scenarios include the following:

- Adding onetime password Support
- Performing authentication against a Resource Access Control Facility (RACF)
- Adding a Simple Authentication and Security Layer (SASL) bind to LDAP-enabled user directories instead of simple LDAP binds

Authentication with challenge/response mechanism may not work well if you implement a custom authentication module. Custom messages thrown by the custom authentication module are not propagated to the clients. Because clients, for example, EPM Workspace, override the error message to display a generic message, the following scenarios are not valid:

- Two consecutive RSA SecurID PINs
- Password variant with challenges, such as enter first, last, and third characters of password

Prerequisites

- Access to Shared Services as Shared Services administrator
Design and Coding Considerations

Subtopics
- Search Order
- User Directories and Custom Authentication Module
- CSSCustomAuthenticationIF Java Interface

Search Order

In addition to Native Directory, multiple user directories can be configured in Shared Services. A default search order position is assigned to all configured user directories. You can modify the search order from Shared Services Console. Excepting Native Directory, you can remove configured user directories from the search order. EPM System does not use the user directories that are not included in the search order. See the Oracle Enterprise Performance Management System User Security Administration Guide.

The search order determines the order in which EPM System cycles through the user directories to authenticate users. If the user is authenticated in a user directory, EPM System stops the search and returns the user. EPM System denies authentication and returns an error if the user cannot be authenticated against user directories in the search order.

Impact of Custom Authentication on Search Order

Custom authentication affects how EPM System security interprets the search order.

If the custom authentication module returns a user name, EPM System locates the user only in a user directory that is enabled for custom authentication. At this stage, EPM System ignores user directories that are not configured for custom authentication.

Understanding the Custom Authentication Flow

The following use case scenarios are used to explore custom authentication flow:

- “Use-Case Scenario 1” on page 112
- “Use-Case Scenario 2” on page 114
- “Use-Case Scenario 3” on page 114

Use-Case Scenario 1

Table 18 details the EPM System user directory configuration and search order used in this scenario. This scenario assumes that the custom authentication module uses an RSA infrastructure to authenticate users.
Table 18  Setup for Scenario 1

<table>
<thead>
<tr>
<th>User Directory Type and Name</th>
<th>Search Order</th>
<th>Custom Authentication</th>
<th>Sample User Names</th>
<th>Password¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native Directory</td>
<td>1</td>
<td>Disabled</td>
<td>test_user_1</td>
<td>password</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
<tr>
<td>LDAP-Enabled</td>
<td>2</td>
<td>Disabled</td>
<td>test_ldap_1</td>
<td>ldappassword</td>
</tr>
<tr>
<td>SunONE_West</td>
<td></td>
<td></td>
<td>test_ldap_2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_ldap_4</td>
<td></td>
</tr>
<tr>
<td>LDAP-Enabled</td>
<td>3</td>
<td>Enabled</td>
<td>test_ldap_1</td>
<td>ldappassword on SunONE and RSA PIN in custom module</td>
</tr>
<tr>
<td>SunONE_East</td>
<td></td>
<td></td>
<td>test_ldap_2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
</tbody>
</table>

¹For simplicity, it is assumed that all users use the same user directory password.

To initiate the authentication process, a user enters a user name and password in the logon screen of an EPM System product.

In this scenario, the custom authentication module performs the following actions:

- Accepts a user name and RSA PIN as the user credentials
- Returns a user name in username@providername format; for example, test_ldap_2@SunONE_East, to EPM System security

Table 19  User interaction and results

<table>
<thead>
<tr>
<th>User Name and Password</th>
<th>Authentication Result</th>
<th>Login User Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>test_user_1/password</td>
<td>Success</td>
<td>Native Directory</td>
</tr>
<tr>
<td>test_user_3/password</td>
<td>Success</td>
<td>Native Directory</td>
</tr>
<tr>
<td>test_user_3/ldappassword</td>
<td>Success</td>
<td>SunONE_West (search order 2)¹</td>
</tr>
<tr>
<td>test_user_3/RSA PIN</td>
<td>Success</td>
<td>SunONE_East (search order 3)²</td>
</tr>
<tr>
<td>test_ldap_2/ldappassword</td>
<td>Success</td>
<td>SunONE_West (search order 2)</td>
</tr>
<tr>
<td>test_ldap_4/RSA PIN</td>
<td>Failure</td>
<td>EPM System displays an authentication error.³</td>
</tr>
</tbody>
</table>

¹The custom authentication cannot authenticate this user because the user entered EPM System credentials. EPM System can identify this user only in a user directory that is not enabled for custom authentication. The user is not in Native Directory (search order number 1) but is identified in SunONE West (search order number 2).

²EPM System does not find this user in Native Directory (search order number 1) or SunONE West (search order number 2). The custom authentication module validates the user against RSA Server and returns test_user_3@SunONE_EAST to EPM System. EPM System locates the user in SunONE East (search order number 3), which is a custom authentication-enabled user directory.

³Oracle recommends that all users authenticated by the custom module be present in a custom authentication-enabled user directory included in the search order. Login fails if the user name that is returned by the custom authentication module is not present in a custom authentication-enabled user directory included in the search order.
Use-Case Scenario 2

Table 20 details the EPM System user directory configuration and search order used in this scenario. This scenario assumes that the custom authentication module uses an RSA infrastructure to authenticate users.

In this scenario, the custom authentication module performs the following actions:

- Accepts a user name and RSA PIN as the user credentials
- Returns a user name, for example, test_ldap_2, to EPM System security

<table>
<thead>
<tr>
<th>User Directory</th>
<th>Search Order</th>
<th>Custom Authentication</th>
<th>Sample User Names</th>
<th>Password¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native Directory</td>
<td>1</td>
<td>Disabled</td>
<td>test_user_1</td>
<td>password</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
<tr>
<td>LDAP-Enabled, for example, SunONE</td>
<td>2</td>
<td>Enabled</td>
<td>test_ldap1</td>
<td>1dapassword on SunONE and RSA PIN in custom module</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_ldap2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
</tbody>
</table>

¹For simplicity, it is assumed that all users use the same user directory password.

To initiate the authentication process, a user enters a user name and password on the login screen of an EPM System product.

<table>
<thead>
<tr>
<th>User Name and Password</th>
<th>Login Result</th>
<th>Login User Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>test_user_1/password</td>
<td>Success</td>
<td>Native Directory</td>
</tr>
<tr>
<td>test_user_3/password</td>
<td>Success</td>
<td>Native Directory</td>
</tr>
<tr>
<td>test_user_3/1dapassword</td>
<td>Failure</td>
<td>SunONE¹</td>
</tr>
<tr>
<td>test_user_3/RSA PIN</td>
<td>Success</td>
<td>SunONE²</td>
</tr>
</tbody>
</table>

¹Authentication of user against Native Directory fails because of password mismatch. Authentication of user using the custom authentication module fails because the password used is not a valid RSA PIN. EPM System does not try to authenticate this user in SunONE (search order 2), because custom authentication settings override EPM System authentication in this directory.

²Authentication of user against Native Directory fails because of password mismatch. The custom authentication module authenticates the user and returns the user name test_user_3 to EPM System.

Use-Case Scenario 3

Table 22 details the EPM System user directory configuration and search order used in this scenario. This scenario assumes that the custom authentication module uses an RSA infrastructure to authenticate users.

For clarity in such scenarios, Oracle recommends that your custom authentication module return the user name in username@providername format; for example, test_ldap_4@SunONE.
Table 22  A sample search order

<table>
<thead>
<tr>
<th>User Directory</th>
<th>Search Order</th>
<th>Custom Authentication</th>
<th>Sample User Names</th>
<th>Password¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native Directory</td>
<td>1</td>
<td>Enabled</td>
<td>test_user_1</td>
<td>RSA_PIN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
<tr>
<td>LDAP-Enabled, for example, MSAD</td>
<td>2</td>
<td>Disabled</td>
<td>test_ldap1</td>
<td>ldappassword</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_ldap4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
<tr>
<td>LDAP-Enabled, for example, SunONE</td>
<td>3</td>
<td>Enabled</td>
<td>test_ldap1</td>
<td>ldappassword on SunONE and RSA PIN in custom module</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_ldap4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>test_user_3</td>
<td></td>
</tr>
</tbody>
</table>

¹For simplicity, it is assumed that all users use the same user directory password.

To initiate the authentication process, a user enters a user name and password in the logon screen of an EPM System product.

Table 23  User interaction and results

<table>
<thead>
<tr>
<th>User Name and Password</th>
<th>Authentication Result</th>
<th>Login User Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>test_user_1/password</td>
<td>Success</td>
<td>Native Directory</td>
</tr>
<tr>
<td>test_user_3/RSA_PIN</td>
<td>Success</td>
<td>Native Directory</td>
</tr>
<tr>
<td>test_user_3/ldappassword</td>
<td>Success</td>
<td>MSAD (search order 2)</td>
</tr>
<tr>
<td>test_ldap_4/ldappassword</td>
<td>Success</td>
<td>MSAD (search order 2)</td>
</tr>
<tr>
<td>test_ldap_4/RSA_PIN</td>
<td>Success</td>
<td>SunONE (search order 3)</td>
</tr>
</tbody>
</table>

User Directories and Custom Authentication Module

To use the custom authentication module, user directories that contain EPM System user and group information can be individually configured to delegate authentication to the custom module.

EPM System users who are authenticated using a custom module must be present in one of the user directories included in the search order (see “Search Order” on page 112). Also, the user directory must be configured to delegate authentication to the custom module.

The identity of the user in the custom provider (for example, 1357642 in RSA SecurID infrastructure) may be different from the user name in the user directory (for example, jDoe in an Oracle Internet Directory) configured in Shared Services. After authenticating the user, the custom authentication module must return the user name jDoe to EPM System.
Note: As a best practice, Oracle recommends that the user name in the user directories configured in EPM System be identical to those available on the user directory used by the custom authentication module.

**CSSCustomAuthenticationIF Java Interface**

The custom authentication module must use the `CSSCustomAuthenticationIF` Java interface to integrate with EPM System security framework. It must return a user name string if custom authentication is successful or an error message if authentication is unsuccessful. For the authentication process to be completed, the user name returned by the custom authentication module must be present in one of the user directories included in Shared Services search order. EPM System security framework supports the `username@providerName` format.

**Note:** Ensure that the user name that the custom authentication module returns does not contain an `*` (asterisk), because EPM System security framework interprets it as a wildcard character while searching for users.

See “Sample Code 1” on page 127 for `CSSCustomAuthenticationIF` interface signature.

Your custom authentication module can be a class file must be included in `CustomAuth.jar`. The package structure is unimportant.

For detailed information about the `CSSCustomAuthenticationIF` interface, see Security API documentation.

The `authenticate` method of `CSSCustomAuthenticationIF` supports custom authentication. The `authenticate` method accepts credentials (user name and password) that the user entered while trying to access the EPM System as input parameters. This method returns a string (user name) if custom authentication is successful. It throws a `java.lang.Exception` if authentication is unsuccessful. The user name returned by the method should uniquely identify a user in one of the user directories included in Shared Services search order. EPM System security framework supports the `username@providerName` format.

**Note:** To initialize resources, for example, a JDBC connection pool uses the class constructor. Doing so improves performance by not loading resources for every authentication.

### Deploying the Custom Authentication Module

**Subtopics**

- Overview of Steps
- Updating Settings in Shared Services
- Testing Your Deployment

Only one custom module is supported for an EPM System deployment. You can enable custom authentication for one or more user directories in the search order.
The custom authentication module must implement the public interface CSSCustomAuthenticationIF, defined in the com.hyperion.css package. This document assumes that you have a fully functional custom module that defines the logic for authenticating users against the user provider of your choice. After you develop and test a custom authentication module, you must implement it in EPM System environment.

**Overview of Steps**

Your custom authentication code should not use log4j for error logging. If the code that you used in a previous release uses log4j, you must remove it from the code before using it with this release.

To implement the custom authentication module, complete the following steps:

- Stop EPM System products including Shared Services and any systems that use Shared Services APIs.
- Copy the custom authentication module Java archive CustomAuth.jar into $EPM_ORACLE_HOME/user_projects/common/jlib/11.1.2.0.
  
  If you are upgrading from Release 11.1.2.0 or 11.1.2.1 that had an implementation of custom authentication module, move CustomAuth.jar from $EPM_ORACLE_HOME/common/jlib/11.1.2.0 into $EPM_ORACLE_HOME/user_projects/domains/WEBLOGIC_DOMAIN/lib.
- Update user directory settings in Shared Services. See “Updating Settings in Shared Services” on page 117.
- Start Shared Services, followed by other EPM System products.
- Test your implementation. See “Testing Your Deployment” on page 118.

**Updating Settings in Shared Services**

**Subtopics**

- Updating User Directory Configurations
- Updating Security Options

By default, custom authentication is disabled for all user directories. You can override the default behavior to enable custom authentication for specific external user directories or for Native Directory.

**Updating User Directory Configurations**

You must update the configuration of the user directory for which custom authentication must be enabled.
To update user directory configuration:

1. Start Foundation Services.
2. Access Shared Services Console as System Administrator.
3. Select Administration, and then Configure User Directories.
4. On the Defined User Directories screen, select the user directory for which you want to change the custom authentication setting.

**Note:** EPM System uses only the user directories included in the search order.
5. Click Edit.
6. Select Show Advanced Options.
7. In Custom Module, select Authentication Module to enable custom module for the current user directory.
8. Click Finish.
9. Repeat this procedure to update the configuration of other user directories in the search order.

### Updating Security Options

Ensure that CustomAuth.jar is available in EPM_ORACLE_HOME/user_projects/domains/WEBLOGIC_DOMAIN/lib before starting the following procedure.

To update security options:

1. Access Shared Services Console as System Administrator.
2. Select Administration, and then Configure User Directories.
4. Select Show Advanced Options.
5. In Authentication Module, enter the fully qualified class name of the custom authentication module that should be used to authenticate users on all user directories for which the custom authentication module is selected. For example, com.mycompany.epm.CustomAuthenticationImpl.
6. Click OK.

### Testing Your Deployment

If Native Directory is not configured for custom authentication, do not use Native Directory users to test custom authentication.

**Note:** It is your responsibility to identify and correct any issues with the custom authentication module. Oracle assumes that your custom module works flawlessly to map a user from the user directory used by the custom module to a user on a custom authentication-enabled user directory available in EPM System search order.
To test your deployment, log in to EPM System using user credentials from the user directory; for example, an RSA SecurID infrastructure, used by the custom module. These credentials may be different from the EPM System credentials.

Your implementation is considered successful if EPM System products allow you to access their resources. An error indicating that the user was not found is not always an indicator of an unsuccessful implementation. In such cases, verify that the credentials that you entered are present in the custom user store and that a matching user is present in one of the custom authentication-enabled user directories in the EPM System search order.

To test custom authentication:

1. Ensure that EPM System products are running.
2. Access an EPM System component; for example, EPM Workspace.
3. Log in as a user defined on a user directory for which custom authentication is enabled.
   a. In Username, enter your user identifier; for example, an RSA User ID.
   b. In Password, enter a password; for example; an RSA PIN.
   c. Click Login.
4. Verify that you can access EPM System product resources.
Implementing SSL

SSL uses a cryptographic system that encrypts data. SSL creates a secure connection between a client and a server, over which data can be sent securely.

To secure your EPM System environment, secure all communication channels used by your web applications and user directory connections using SSL. See Chapter 2, “SSL-Enabling EPM System Components.”

Changing the Admin Password

The default Native Directory admin user account provides access to all Shared Services functions. This password is set when you deploy Foundation Services. You must periodically change the password of this account.

Edit the admin user account to change the password. See “Modifying User Accounts” in the Oracle Enterprise Performance Management System User Security Administration Guide.
Regenerating Encryption Keys

Use the Shared Services Console to periodically regenerate the following:

- Single sign-on token

  **Caution!** Taskflows used by Financial Management, Oracle Hyperion EPM Architect, and Oracle Hyperion Profitability and Cost Management are invalidated when you generate a new keystore. After regenerating the keystore, open and save the taskflows to revalidate them.

- Trusted Services key
- Provider Configuration key


Changing Database Passwords

Periodically change the password for all EPM System product databases. The procedure for changing the database password in Oracle Hyperion Shared Services Registry is detailed in this section.

For detailed procedures to change an EPM System product database password, see the Oracle Enterprise Performance Management System Installation and Configuration Guide.

To change EPM System product database passwords in Shared Services Registry:

1. Using the database administration console, change the password of the user whose account was used to configure EPM System product database.
2. Stop EPM System products (web applications, services, and processes).
3. Using the EPM System Configurator, reconfigure the database using one of the following procedures.

   **Shared Services Only:**

   a. From the Foundation tasks in EPM System Configurator, select **Configure Database.**
   b. On the Shared Services and Registry Database Configuration page, select **Connect to a previously configured Shared Services database.**
   c. Specify the new password of the user whose account was used to configure the Shared Services database. Do not change any other settings.
   d. Continue the configuration and click **Finish** when you are done.

   **EPM System Products Other Than Shared Services:**

   a. From the Foundation tasks in EPM System Configurator, select **Configure Database.**
   b. On the Shared Services and Registry Database Configuration page, select **Connect to a previously configured Shared Services database.**
   c. Specify the new password of the user whose account was used to configure the Shared Services database. Do not change any other settings.
   d. Continue the configuration and click **Finish** when you are done.
Note: Follow these steps for the EPM System products deployed on the current server only.

a. From the configuration task list of the product in EPM System Configurator, select Configure Database.

b. On the Database Configuration page, select Perform 1st-time configuration of database.

c. Specify the new password of the user whose account was used to configure EPM System product database. Do not change any other settings.

d. Click Next.

e. Select Reuse the existing database.

f. Continue the configuration, and click Finish when you are done.

See the Oracle Enterprise Performance Management System Installation and Configuration Guide for detailed instructions.

4 Start EPM System products and services.

Securing Cookies

EPM System web application set a cookie to track the session. While setting a cookie, especially a session cookie, the server can set the secure flag, which forces the browser to send the cookie over a secure channel. This behavior reduces the risk of session hijacking.

Note: Secure cookies only if EPM System products are deployed in an SSL-enabled environment.

Modify the WebLogic Server session descriptor to secure WebLogic Server cookies. Set the value of cookieSecure attribute in the session-param element to true. See Securing Web Applications in Oracle Fusion Middleware Programming Security for Oracle WebLogic Server 11g.

Reducing SSO Token Timeout

Default SSO token timeout is 480 minutes. You should reduce the SSO token timeout, for example, to 60 minutes, to minimize token reuse if it is exposed. See “Setting Security Options” in the Oracle Enterprise Performance Management System User Security Administration Guide.

Reviewing Security Reports

The Security Report contains audit information related to the security tasks for which auditing is configured. Generate and review this report from Shared Services Console on a regular basis, especially to identify failed login attempts across EPM System products and provisioning changes. Select Detailed View as a report generation option to group the report data based on
attributes that were modified and the new attribute values. See “Generating Reports” in the Oracle Enterprise Performance Management System User Security Administration Guide.

Customizing Authentication System for Strong Authentication

You can use a custom authentication module to add strong authentication to EPM System. For example, you can use RSA SecurID two-factor authentication in nonchallenge response mode. The custom authentication module is transparent for thin and thick clients and does not require client-side deployment changes. See Chapter 5, “Using a Custom Authentication Module.”

Turning off Detailed Financial Management Error Messages

You can hide detailed Financial Management error messages containing technical information from users by updating Windows registry entries.

To hide error messages containing detailed technical information:
1. On Windows server that hosts Financial Management, launch the Windows Registry Editor.
2. Navigate to HKEY_LOCAL_MACHINE\SOFTWARE\Hyperion Solutions\Hyperion Financial Management.
3. Create a new DWORD value using these settings:
   Value name: DisableTechnicalError
   Value data: 1 (set this to 0 to display detailed messages)
4. On the Windows server that hosts the IIS Server that hosts Financial Management, launch the Windows Registry Editor.
5. Navigate to HKEY_LOCAL_MACHINE\SOFTWARE\Hyperion Solutions\Hyperion Financial Management\web.
6. Create a new DWORD value using these settings:
   Value name: DisableAspTechnicalError
   Value data: 1 (Set this value to 0 to display detailed messages.)

Encrypting UDL File (Financial Management)

While configuring Financial Management, EPM System Configurator creates an unencrypted UDL file by default. You can encrypt this file by selecting an option in the Advanced Database Options page of the Oracle Hyperion Enterprise Performance Management System Configurator or by running the EncryptHFMUDL utility after configuration is complete.
See “Encrypting UDL Files” in Oracle Enterprise Performance Management System Installation and Configuration Guide.

Disabling EPM Workspace Debugging Utilities

- For troubleshooting purposes, EPM Workspace ships with uncrunched JavaScript files. For security purposes, you should remove these uncrunched JavaScript files from your production environment:
  - Create a backup copy of \texttt{EPM\_ORACLE\_HOME/common/epmstatic/wspace/js/} directory.
  - Except for the file \texttt{DIRECTORY\_NAME.js}, delete the \texttt{.js} files from each subdirectory of \texttt{EPM\_ORACLE\_HOME/common/epmstatic/wspace/js/}.

    Each subdirectory contains a \texttt{.js} file that bears the name of the directory. For example, \texttt{EPM\_ORACLE\_HOME/common/epmstatic/wspace/js/com/hyperion/bpm/web/common} contains \texttt{Common.js}. Remove all \texttt{.js} files except the one that bears the name of the directory, in this case; \texttt{Common.js}.

- EPM Workspace provides some debug utilities and test applications, which become accessible if EPM Workspace is deployed in debug mode. For security purposes, administrators should turn off client side debugging in EPM Workspace.

To turn off debugging mode:

1. Log in to Oracle Hyperion Enterprise Performance Management Workspace as administrator.
2. Select \texttt{Navigate}, then \texttt{Administer}, and then \texttt{Workspace Server Settings}.
3. In \texttt{ClientDebugEnabled} in Workspace Server Settings, select \texttt{No}.
4. Click \texttt{OK}.

Changing Default Web Server Error Pages

When application servers are not available to accept requests, the web server plug-in for the back-end application server (for example, Oracle HTTP Server plug-in for Oracle WebLogic Server) returns a default error page that displays plug-in build information. Web servers display their default error page on other occasions as well. Attackers can use this information to find known vulnerabilities from public web sites.

Customize the error pages (of web application server plug-in and web server) so that they do not contain information about production system components; for example, server version, server type, plug-in build date, and plug-in type. Consult your application server and web server vendor documentation for more information.
Support for Third-Party Software

Oracle acknowledges and supports the backward-compatibility assertions made by third-party vendors. Therefore, where vendors assert backward-compatibility, subsequent maintenance releases and service packs may be used. If an incompatibility is identified, Oracle will specify a patch release on which the product should be deployed (and remove the incompatible version from the supported matrix) or provide a maintenance release or service fix to the Oracle product.

Server-side Updates: Support for upgrades to third-party server-side components is governed by the Subsequent Maintenance Release Policy. Typically, Oracle supports upgrading third-party server-side components to the next maintenance release of service pack of the currently supported release. Upgrades for the next major release are not supported.

Client-side updates: Oracle supports automatic updates to client components, including updates to the next major release of third-party client components. For example, you can update the browser JRE version from 1.5 to 1.6.
Custom Authentication Sample Code

Sample Code 1

Note: Your custom authentication code should not use log4j for error logging. If the custom authentication code that you used in a previous release used log4j, you must remove it from the code before using it with this release.

The following code snippet is an empty implementation of the custom module:

```java
package com.hyperion.css.custom;

import java.util.Map;
import com.hyperion.css.CSSCustomAuthenticationIF;

public class CustomAuthenticationImpl implements CSSCustomAuthenticationIF {
    public String authenticate(Map context, String userName, String password) throws Exception {
        try {
            // Custom code to find and authenticate the user goes here.
            // The code should do the following:
            // if authentication succeeds:
            // set authenticationSuccessFlag = true
            // return authenticatedUserName
            // if authentication fails:
            // log an authentication failure
            // throw authentication exception
        } catch (Exception e) {
            // Custom code to handle authentication exception goes here
            // Create a new exception, set the root cause
            // Set any custom error message
            // Return the exception to the caller
        }
        return authenticatedUserName;
    }
}
```
Sample Code 2

The following sample code demonstrates the custom authentication of users using user name and password contained in a flat file. You must initialize user and password lists in the class constructor to make custom authentication work.

```java
package com.hyperion.css.security;

import java.util.Map;
import java.util.HashMap;
import com.hyperion.css.CSSCustomAuthenticationIF;
import java.io.*;

public class CSSCustomAuthenticationImpl implements CSSCustomAuthenticationIF{
    static final String DATA_FILE = "datafile.txt";

    /**
     * authenticate method includes the core implementation of the
     * Custom Authentication Mechanism. If custom authentication is
     * enabled for the provider, authentication operations
     * are delegated to this method. Upon successful authentication,
     * this method returns a valid user name, using which EPM System
     * retrieves the user from a custom authentication enabled provider.
     * User name can be returned in the format username@providerName,
     * where providerName indicates the name of the underlying provider
     * where the user is available. authenticate method can use other
     * private methods to access various core components of the
     * custom authentication module.
     *
     * @param context
     * @param userName
     * @param password
     * @return
     * @throws Exception
     */

    Map users = null;

    public CSSCustomAuthenticationImpl(){
        users = new HashMap();
    }
}
```
InputStream is = null;
BufferedReader br = null;
String line;
String[] userDetails = null;
String userKey = null;
try{
    is = CSSCustomAuthenticationImpl.class.getResourceAsStream(DATA_FILE);
    br = new BufferedReader(new InputStreamReader(is));
    while(null != (line = br.readLine())){
        userDetails = line.split(":");
        if(userDetails != null && userDetails.length==3){
            userKey = userDetails[0] + " : " + userDetails[1];
            users.put(userKey, userDetails[2]);
        }
    }
}

/* Use this authenticate method snippet to return username from a flat file */

public String authenticate(Map context, String userName, String password) throws Exception{
    //userName : user input for the userName
    //password : user input for password
    //context  : Map, can be used to additional information required by
              // the custom authentication module.

    String authenticatedUserKey = userName + " : " + password;
    if(users.get(authenticatedUserKey)!=null)
        return(String)users.get(authenticatedUserKey);
    else throw new Exception("Invalid User Credentials");
}

/* Refer to this authenticate method snippet to return username in
username@providername format */

public String authenticate(Map context, String userName, String password) throws Exception{
    //userName : user input for userName
    //password : user input for password
    //context  : Map can be used to additional information required by
              // the custom authentication module.
Your code should uniquely identify the user in a custom provider and in a configured user directory in Shared Services. EPM Security expects you to append the provider name to the user name. Provider name must be identical to the name of a custom authentication-enabled user directory specified in Shared Services.

// If invalid arguments, return null or throw exception with appropriate message
// set authenticationSuccessFlag = false

String authenticatedUserKey = userName + "::" + password;
if (users.get(authenticatedUserKey) != null)
    String userNameStr = (new StringBuffer()
        .append((String)users.get(authenticatedUserKey))
        .append("@").append(PROVIDER_NAME).toString();
    return userNameStr;
else throw new Exception("Invalid User Credentials");

Data File for Sample Code 2

Ensure that the data file is named datafile.txt, which is the name used in the sample code, and that it is included in the Java archive that you create.

Use the following as the contents of the flat file that is used as the custom user directory to support the custom authentication module implemented by Sample Code 2 (See “Sample Code 2” on page 128.)

xyz:password:admin
test1:password:test1@LDAP1
test1@LDAP1:password:test1
user1:Password2:user1@SunONE1
user1_1:Password2:user1
user3:Password3:user3
DS_User1:Password123:DS_User1@MSAD1
DS_User1:Password123:DS_User1
DS_User1@1:Password123:DS_User1

Use the following as the contents of the flat file that is used as the custom user directory if you plan to return user name in username@providername format:

xyz:password:admin
test1:password:test1
test1@1:password:test1
user1_1:Password2:user1
user3:Password3:user3
DS1_G100U_User61_1:Password123:DS1_G100U_User61
DS1_G100U_User61_1@1:Password123:DS1_G100U_User61
TUser:password:TUser
Custom Login Class Sample Code

This sample code illustrates the implementation of the default
should customize the parseCertificate(String _sCertificate) method of this
implementation to derive the user name from a certificate attribute other than DN:

```java
package com.hyperion.css.sso.agent;

import java.io.ByteArrayInputStream;
import java.io.UnsupportedEncodingException;
import java.security.Principal;
import java.security.cert.CertificateException;
import java.security.cert.CertificateFactory;
import java.security.cert.X509Certificate;
import com.hyperion.css.CSSSecurityAgentIF;
import com.hyperion.css.common.configuration.*;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

/**
 * X509CertificateAuthImpl implements the CSSSecurityAgentIF interface. It accepts
 * the X509 certificate of the authenticated user from the Web Server via a
 * header, parses the certificate, extracts the DN of the User and
 * authenticates the user.
 */
```
public class X509CertificateSecurityAgentImpl implements CSSSecurityAgentIF {
    static final String IDENTITY_ATTR = "CN";
    String g_userDN = null;
    String g_userName = null;
    String hostAdrress= null;
    /**
     * Returns the User name (login name) of the authenticated user,
     * for example demouser. See CSS API documentation for more information
     */
    public String getUserName(HttpServletRequest req, HttpServletResponse res)
        throws Exception {
        hostAdrress = req.getServerName();
        String certStr = getCertificate(req); 
        String sCert = prepareCertificate(certStr);
        /* Authenticate with a CN */
        parseCertificate(sCert);
        /* Authenticate if the Login Attribute is a DN */
        if (g_userName == null) {
            throw new Exception("User name not found");
        }
        return g_userName;
    }
    /**
     * Passing null since this is a trusted Security agent authentication
     * See Security API documentation for more information on CSSSecurityAgentIF
     */
    public String getPassword(HttpServletRequest req, HttpServletResponse res)
        throws Exception {
        return null;
    }
    /**
     * Get the Certificate sent by the Web Server in the HYPLOGIN header.
     * If you pass a different header name from the Web server, change the
     * name in the method.
     */
    private String getCertificate(HttpServletRequest request) {
        String cStr = (String)request
                .getHeader(CSSConfigurationDefaults.HTTP_HEADER_HYPLOGIN);
        return cStr;
    }
    /**
     * The certificate sent by the Web server is a String.
     * Put a "\n" in place of whitespace so that the X509Certificate
     * java API can parse the certificate.
     */
    private String prepareCertificate(String gString)
}
String str1 = null;
String str2 = null;
str1 = gString.replace("-----BEGIN CERTIFICATE------", "");
str2 = str1.replace("-----END CERTIFICATE------", "");
String certStrWithNL = "-----BEGIN CERTIFICATE------" + str2.replace(" ", "\n") + "-----END CERTIFICATE------";
return certStrWithNL;

/**
 * Parse the certificate
 * 1. Create X509Certificate using the certificateFactory
 * 2. Get the Principal object from the certificate
 * 3. Set the g_userDN to a certificate attribute value (DN in this sample)
 * 4. Parse the attribute (DN in this sample) to get a unique username
 */
private void parseCertificate(String sCertificate) throws Exception
{
    X509Certificate cert = null;
    String userID = null;
    try
    {
        X509Certificate clientCert = (X509Certificate)CertificateFactory.newInstance("X.509")
            .generateCertificate(new ByteArrayInputStream(sCertificate.getBytes("UTF-8")));
        if (clientCert != null)
        {
            Principal princDN = clientCert.getSubjectDN();
            String dnStr = princDN.getName();
            g_userDN = dnStr;
            int idx = dnStr.indexOf(", ");
            userID = dnStr.substring(3, idx);
            g_userName = userID;
        }
    }
    catch (CertificateException ce)
    {
        throw ce;
    }
    catch (UnsupportedEncodingException uee)
    {
        throw uee;
    }
} //end of parseCertificate

Deploying a Custom Login Class

To implement the custom login class, complete the following steps:
1. Create and test the custom login class. Ensure that you do not have any references to
log4j in your code. See “Custom Login Class Sample Code” on page 131.
   You can use any name for your custom class.

2. Package the custom login class into CustomAuth.jar

3. Copy CustomAuth.jar into $EPM_ORACLE_HOME/user_projects/domains/
   WEBLOGIC_DOMAIN/lib, typically, Oracle/Middleware/user_projects/domains/
   EPMSystem/lib.

   **Note:** If you are upgrading from Release 11.1.2.0 or 11.1.2.1 that had an implementation of
   custom login class, move CustomAuth.jar from $EPM_ORACLE_HOME/common/
   jlib/11.1.2.0 into $EPM_ORACLE_HOME/user_projects/domains/
   WEBLOGIC_DOMAIN/lib.

Oracle recommends that you enable Client Certificate Authentication if you are using a custom
login class.
Overview

Many scenarios may cause the user and group identities of provisioned EPM System users to become stale. EPM System components become inaccessible if the provisioning information available to them is stale. Scenarios that may create stale provisioning data include:

- Retiring a user directory: Organizations may retire a user directory after moving users to another.
- Version upgrade: User directory version upgrade may involve changes in host machine name or operating system environments requiring.
- Vendor change: Organizations may discontinue the use of a user directory in favor of a user directory from another vendor. For example, an organization may replace its Oracle Internet Directory with a SunONE Directory Server.

Note: In this appendix, the user directory that you are phasing out is referred to as the source user directory, and the user directory to which you moved the user accounts is referred to as the target user directory.

Prerequisites

- EPM System users and groups whose provisioning data is being migrated across user directories must be available in the target user directory.
  Group relationships that exist in the source user directory must be maintained in the target user directory.
- User names of EPM System users must be identical across source and target user directories.
Migration Procedure

Subtopics

- Export Native Directory Data
- Prepare EPM System for Migration
- Restart EPM System
- Edit Import Files
- Import Updated Data

Export Native Directory Data

Use Oracle Hyperion Enterprise Performance Management System Lifecycle Management to export the following from Native Directory:

- Native Directory Groups
- Assigned roles
- Delegated lists

Lifecycle Management creates multiple export files, generally in $EPM_ORACLE_INSTANCE/import_export/$USER_NAME/$EXPORT_DIR/resource/Native Directory, where $USER_NAME$ is the identity of the user; for example, admin, who performed the export operation and $EXPORT_DIR$ is the name of the export directory. Typically, these files are created:

- Groups.csv
- Roles.csv
- Delegated Lists.csv
- Assigned Roles/$PROD_NAME$.csv for each deployed application, where $PROD_NAME$ is the name of an EPM System component; for example, Shared Services.

Note: See the Oracle Enterprise Performance Management System Lifecycle Management Guide for detailed instructions on exporting data using Lifecycle Management.

After exporting the artifacts, verify that the Migration Status Report displays the status of the last export operation as Completed.

To export provisioning data from Native Directory:

1. In the View pane of Shared Services Console, in the Foundation application group, select Shared Services application.
2. Select the type of artifacts for which you want to export provisioning information.
3. Click Export.
4. Enter a name for the export archive. Default is admin DATE; for example admin 13-03-18.
5. Click Export.
Prepare EPM System for Migration

Subtopics

- Add the Target User Directory as an External User Directory
- Change the Search Order of the Target User Directory

Add the Target User Directory as an External User Directory

Add the target user directory as an external user directory in EPM System if you moved the user accounts from the source user directory to a different user directory. For example, if you moved the user accounts from Oracle Internet Directory to SunONE Directory Server, add SunONE Directory Server as an external user directory. See “Chapter 3, Configuring User Directories” in the Oracle Enterprise Performance Management System User Security Administration Guide.

Note: Ensure that the target user directory contains user accounts and groups for all EPM System users whose data is being migrated from the source user directory.

If you moved the users to a user directory that is already defined as an external user directory, verify that the user accounts are visible to Shared Services. You can do this by searching for users from Shared Services Console. See “Searching for Users, Groups, Roles, and Delegated Lists” in the Oracle Enterprise Performance Management System User Security Administration Guide.

While configuring the target user directory as an external user directory, verify that the Login Attribute property points to the attribute whose value was originally used as the user name in the source user directory. See “Prerequisites” on page 135.

Change the Search Order of the Target User Directory

Note: If the target user directory name is identical to the source directory name, you must delete the source user directory from EPM System configuration.

Shared Services assigns a lower search order priority to a newly added user directory as compared to the search order assigned to existing directories. Change the search order so that the target user directory has a higher search order priority than the source user directory. This order enables Oracle Hyperion Shared Services to discover users in the target user directory before searching the source. See “Managing the User Directory Search Order” in the Oracle Enterprise Performance Management System User Security Administration Guide.

Restart EPM System

Restart Oracle Hyperion Foundation Services and other EPM System components to enforce the changes that you made.
**Edit Import Files**

**Note:** This step is not required if the target user directory name in EPM System configuration is identical to the source user directory name.

You use the export files that Lifecycle Management created as the source for recreating the data in Native Directory. The export files are generated in the directory that you specified while exporting data from Native Directory. See “Export Native Directory Data” on page 136.

In each export file, replace all references to the source user directory with references to the target user directory. Generally, you edit the assigned roles export files and, optionally, the following files.

- Groups.csv if users from the source user directory are members of Native Directory groups.
- Delegated Lists.csv if users from the source user directory are assigned to delegated lists.

The import files are in EPM_ORACLE_INSTANCE/import_export/USER_NAME/EXPORT_DIR/resource/Native Directory, where USER_NAME is the identity of the user who initiated the operation; for example, admin.

To edit an import file:

1. Extract the contents of the exported zip archive into a folder.
2. Using a text editor, open an import file.
3. Replace the name of the source user directory with the name of the target user directory as displayed in the Directory Name column in the Defined User Directories screen.
4. Save and close the import file.
5. Create an archive of the updated import files.

**Import Updated Data**

Run Lifecycle Management with create/update option to import the data that you exported earlier from Native Directory. See “Export Native Directory Data” on page 136.

**Note:** See the Oracle Enterprise Performance Management System Lifecycle Management Guide for detailed instructions on importing data using Oracle Hyperion Enterprise Performance Management System Lifecycle Management.

After importing data, verify that the Migration Status Report displays the status of the last import operation as Completed.
To import updated provisioning data into Native Directory:

1. In the View pane of Oracle Hyperion Shared Services Console, expand **File System**.
2. Select the file system location of the import files.
3. Select the type of artifacts for which you want to import provisioning information.
4. Click **Import**.
5. Click **OK**.

### Product-Specific Updates

**Caution!** Oracle recommends that you back up the user and group data in the repository used by the Oracle Enterprise Performance Management System component before starting product-specific updates. After updating information in the local product repository, you can revert to the old user and group data in the local product repository from backups only.

### Planning

Planning stores information about provisioned users and groups in the Planning repository. If a user identity was changed in Native Directory as a result of migrating users and groups across user directories, you must synchronize the information in the Planning repository with that in Native Directory by selecting Migrate Users/Groups. This button is available in Oracle Hyperion Planning when assigning access to data forms, members, and task lists.

### Financial Management

Financial Management records information about users and groups provisioned to access objects in a local Financial Management repository. If user and group information in Native Directory has changed as a result of migrating users and groups across user directories, you must synchronize the information in the Oracle Hyperion Financial Management repository with that in Native Directory.

### Reporting and Analysis

Reporting and Analysis uses the syncCSSId utility to synchronize user and group identities stored in its relational database to reflect the identities available in Native Directory. You must run this utility before users are allowed to access Oracle Hyperion Reporting and Analysis after migrating provisioning data in Native Directory. The syncCSSId utility is installed in `EPM_ORACLE_INSTANCE/bin/ReportingAnalysis/syncCSSId` directory; for example, `C:/Oracle/Middleware/user_projects/epmsystem1/bin/ReportingAnalysis/syncCSSId`.
See `EPM_ORACLE_INSTANCE/bin/ReportingAnalysis/syncCSSId/ReadmeSyncCSSId_BI.txt` for detailed instructions on running the `syncCSSId` utility.
access permissions  A set of operations that a user can perform on a resource.

aggregated role  A custom role that aggregates multiple predefined roles within a Hyperion product.

application  1) A software program designed to run a specific task or group of tasks such as a spreadsheet program or database management system; 2) A related set of dimensions and dimension members that are used to meet a specific set of analytical requirements, reporting requirements, or both.

Application Migration Utility  A command-line utility for migrating applications and artifacts.

artifact  An individual application or repository item; for example, scripts, forms, rules files, Interactive Reporting documents, and financial reports. Also known as an object.

authentication  Verification of identity as a security measure. Authentication is typically based on a user name and password. Passwords and digital signatures are forms of authentication.

automated stage  A stage that does not require human intervention; for example, a data load.

backup  A duplicate copy of an application instance.

business process  A set of activities that collectively accomplish a business objective.

context variable  A variable that is defined for a particular task flow to identify the context of the taskflow instance.

external authentication  Logging on to Oracle EPM System products with user information stored outside the application. The user account is maintained by the EPM System, but password administration and user authentication are performed by an external service, using a corporate directory such as Oracle Internet Directory (OID) or Microsoft Active Directory (MSAD).

filter  A constraint on data sets that restricts values to specific criteria; for example, to exclude certain tables, metadata, or values, or to control access.

group  A container for assigning similar access permissions to multiple users.

identity  A unique identification for a user or group in external authentication.

integration  A process that is run to move data between Oracle’s Hyperion applications using Shared Services. Data integration definitions specify the data moving between a source application and a destination application, and they enable the data movements to be grouped, ordered, and scheduled.

lifecycle management  The process of migrating an application, a repository, or individual artifacts across product environments.

link  1) A reference to a repository object. Links can reference folders, files, shortcuts, and other links; 2) In a taskflow, the point where the activity in one stage ends and another begins.

link condition  A logical expression evaluated by the taskflow engine to determine the sequence of launching taskflow stages.

load balancing  Distribution of requests across a group of servers, which helps to ensure optimal end user performance.

managed server  An application server process running in its own Java Virtual Machine (JVM).

manual stage  A stage that requires human intervention.

migration  The process of copying applications, artifacts, or users from one environment or computer to another; for example, from a testing environment to a production environment.
migration audit report  A report generated from the migration log that provides tracking information for an application migration.

migration definition file (.mdf)  A file that contains migration parameters for an application migration, enabling batch script processing.

migration log  A log file that captures all application migration actions and messages.

migration snapshot  A snapshot of an application migration that is captured in the migration log.

model  1) A file or content string containing an application-specific representation of data. Models are the basic data managed by Shared Services, of two major types: dimensional and nondimensional application objects; 2) In Business Modeling, a network of boxes connected to represent and calculate the operational and financial flow through the area being examined.

product  In Shared Services, an application type, such as Planning or Performance Scorecard.

project  An instance of Oracle's Hyperion products grouped together in an implementation. For example, a Planning project may consist of a Planning application, an Essbase cube, and a Financial Reporting Server instance.

provisioning  The process of granting users and groups specific access permissions to resources.

repository  Storage location for metadata, formatting, and annotation information for views and queries.

role  The means by which access permissions are granted to users and groups for resources.

security agent  A web access management provider (for example, Oracle Access Manager, Oracle Single Sign-On, or CA SiteMinder) that protects corporate web resources.

security platform  A framework enabling Oracle EPM System products to use external authentication and single sign-on.

Shared Services Registry  The part of the Shared Services repository that manages EPM System deployment information for most EPM System products, including installation directories, database settings, computer names, ports, servers, URLs, and dependent service data.

single sign-on (SSO)  The ability to log on once and then access multiple applications without being prompted again for authentication.

stage  1) A task description that forms one logical step within a taskflow, usually performed by an individual. A stage can be manual or automated; 2) For Profitability, logical divisions within the model that represent the steps in the allocation process within your organization.

stage action  For automated stages, the invoked action that executes the stage.

sync  Synchronization of Shared Services and application models.

synchronized  The condition that exists when the latest version of a model resides in both the application and in Shared Services. See also model.

task list  A detailed status list of tasks for a particular user.

taskflow  The automation of a business process in which tasks are passed from one taskflow participant to another according to procedural rules.

taskflow definition  Business processes in the taskflow management system that consist of a network of stages and their relationships; criteria indicating the start and end of the taskflow; and information about individual stages, such as participants, associated applications, associated activities, and so on.

taskflow instance  A single instance of a taskflow including its state and associated data.

taskflow management system  A system that defines, creates, and manages the execution of a taskflow, including definitions, user or application interactions, and application executables.

taskflow participant  The resource that performs the task associated with the taskflow stage instance for both manual and automated stages.

token  An encrypted identification of one valid user or group on an external authentication system.

transformation  A process that transforms artifacts so that they function properly in the destination environment after application migration.
**upgrade**  The process of deploying a new software release and moving applications, data, and provisioning information from an earlier deployment to the new deployment.

**user directory**  A centralized location for user and group information, also known as a repository or provider. Popular user directories include Oracle Internet Directory (OID), Microsoft Active Directory (MSAD), and Sun Java System Directory Server.