Oracle® Application Express

Installation Guide

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Preface

This guide explains how to install and configure Oracle Application Express.

This Preface contains these topics:

- Audience
- Documentation Accessibility
- Related Documents
- Conventions
- Third-Party License Information

Audience

Oracle Application Express Installation Guide is intended for anyone responsible for installing Oracle Application Express.

To use this manual, you must have administrative privileges on the computer where you installed your Oracle database and familiarity with object-relational database management concepts.

Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible to all users, including users that are disabled. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Accessibility standards will continue to evolve over time, and Oracle is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For more information, visit the Oracle Accessibility Program Web site at `http://www.oracle.com/accessibility/`.

Accessibility of Code Examples in Documentation

Screen readers may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, some screen readers may not always read a line of text that consists solely of a bracket or brace.

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Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/support/contact.html or visit http://www.oracle.com/accessibility/support.html if you are hearing impaired.

Related Documents

For more information, see these Oracle resources:

- *Oracle Application Express Release Notes*
- *Oracle Database 2 Day + Oracle Application Express Developer's Guide*
- *Oracle Application Express Application Builder User's Guide*
- *Oracle Application Express Administration Guide*
- *Oracle Application Express SQL Workshop and Utilities Guide*
- *Oracle Application Express API Reference*
- *Oracle Application Migration Guide*
- *Oracle Application Express Advanced Tutorials*
- *Oracle Database Concepts*
- *Oracle HTTP Server Administrator's Guide*
- *Oracle9i Application Server Administrator's Guide*
- *Oracle Database Advanced Application Developer's Guide*
- *Oracle Database Administrator's Guide*
- *Oracle Database SQL Language Reference*
- *SQL*Plus User's Guide and Reference*
- *Oracle Database Licensing Information*

For information about Oracle error messages, see *Oracle Database Error Messages*. Oracle error message documentation is available only in HTML. If you have access to the Oracle Database Documentation Library, you can browse the error messages by range. Once you find the specific range, use your browser's "find in page" feature to locate the specific message. When connected to the Internet, you can search for a specific error message using the error message search feature of the Oracle online documentation.

Many books in the documentation set use the sample schemas of the seed database, which is installed by default when you install Oracle. Refer to *Oracle Database Sample Schemas* for information on how these schemas were created and how you can use them yourself.

For additional application examples, go to the Learning Library at the following location, click the **All Content** tab and enter search criteria for Application Express (APEX) Product OBEs:
http://apex.oracle.com/pls/apex/f?p=9830:1:0::NO

Printed documentation is available for sale in the Oracle Store at

http://shop.oracle.com/

To download free release notes, installation documentation, white papers, or other collateral, please visit the Oracle Technology Network (OTN). You must register online before using OTN; registration is free and can be done at

http://www.oracle.com/technology/membership/

If you already have a user name and password for OTN, then you can go directly to the documentation section of the OTN Web site at

http://www.oracle.com/technology/documentation/

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Third-Party License Information

Oracle Application Express contains third-party code. Please see the *Oracle Database Licensing Information* book for notices Oracle is required to provide.

Note, however, that the Oracle program license that accompanied this product determines your right to use the Oracle program, including the third-party software, and the terms contained in the following notices do not change those rights.

1

Oracle Application Express Installation Overview

This chapter provides an overview of installing Oracle Application Express and describes issues to consider before installing.

This chapter contains these topics:

- Overview of the Installation Process
- Upgrading from a Previous Version of Oracle Application Express
- About the Oracle Application Express Runtime Environment
- About Choosing an HTTP Server
- Available Installation Scenarios

Overview of the Installation Process

The installation process consists of four parts:

1. **Plan your installation:** This chapter offers an overview of the steps required to install Oracle Application Express. During the planning phase, you should also determine whether to install a full development environment or runtime environment.

   A **full development** environment provides complete access to the Application Builder environment to develop applications. A **runtime environment** is an appropriate choice for production implementations in which you want to run applications that cannot be modified. To learn more, see "About the Oracle Application Express Runtime Environment" on page 1-2.

2. **Verify installation requirements:** **"Oracle Application Express Installation Requirements"** describes the minimum requirements that your system must meet before you install the software.

3. **Install the software:** The required installation steps depend upon which HTTP server you decide to use. Available options include the Oracle Application Express Listener, the embedded PL/SQL gateway or Oracle HTTP Server and mod_plsql.

Upgrading from a Previous Version of Oracle Application Express

If you have version 1.5.x, 1.6.x, 2.0.x, 2.2.x, 3.0.x, 3.1.x, or 3.2.x of Oracle Application Express, following any of the installation scenarios in this guide upgrades your Oracle Application Express instance to version 4.0 and creates Oracle Application Express 4.0

database objects in a new schema and migrates the application metadata to the new version.

About the Oracle Application Express Runtime Environment

For testing and production instances, Oracle Application Express supports the ability to install just a runtime version of Oracle Application Express. This runtime environment minimizes the installed footprint and privileges and improves application security since in a runtime instance developers cannot inadvertently update a production application.

An Oracle Application Express runtime environment enables you to run production applications, but it does not provide a Web interface for administration. A runtime environment only includes the packages necessary to run your application, making it a more hardened environment. You administer the Oracle Application Express runtime environment using SQL*Plus or SQL Developer and the `APEX_INSTANCE_ADMIN` API. To learn more see, "Managing a Runtime Environment" in *Oracle Application Express Application Builder User's Guide*.

Scripts are provided to remove or add the developer interface from an existing instance.

About Choosing an HTTP Server

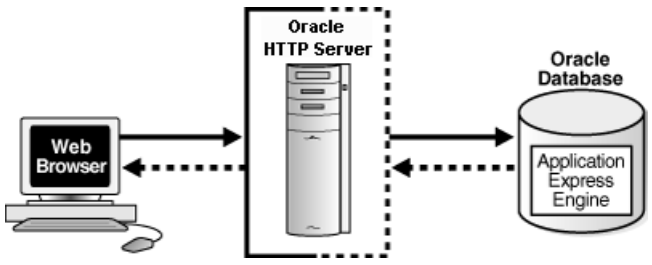
In order to run, Oracle Application Express must have access to Oracle Application Express Listener, Oracle HTTP Server and `mod_plsql` or the embedded PL/SQL gateway.

Topics in this section include:

- About Oracle Application Express Listener, Oracle HTTP Server and mod_plsql
- About the Embedded PL/SQL Gateway
- Selecting an HTTP Server in an Oracle RAC Environment

About Oracle Application Express Listener, Oracle HTTP Server and mod_plsql

Oracle HTTP Server uses the `mod_plsql` plug-in to communicate with the Oracle Application Express engine within the Oracle database. Oracle Application Express Listener communicates directly with the Oracle Application Express engine, thus eliminating the need for the `mod_plsql` plug-in. The Oracle HTTP Server and the Oracle Application Express Listener function as communication brokers between the Web server and the Oracle Application Express objects in the Oracle database. More specifically, they map browser requests into database stored procedure calls over a `SQL*Net` connection. The following graphic illustrates the Oracle Application Express architecture using Oracle HTTP Server and `mod_plsql`.



See Also: "HTTP Server Requirements" on page 2-2

Note that this three tier architecture consists of the following components: a Web browser, Oracle HTTP Server (Apache) with `mod_plsql` or Oracle Application Express Listener and an Oracle database containing Oracle Application Express.

Advantages of Oracle HTTP Server (Apache) with `mod_plsql` or Oracle Application Express Listener:

- Separation from mid-tier for the database tier
- Appropriate for Oracle Real Application Clusters (Oracle RAC) environments

Where Images Are Stored When Using Oracle HTTP Server

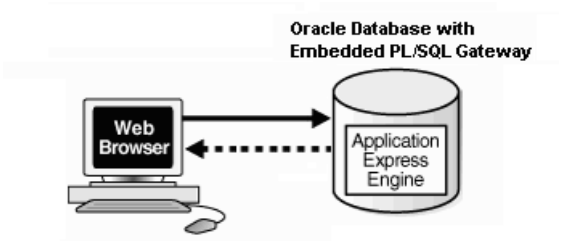
In an Oracle HTTP Server or Oracle Application Server configuration, images are stored on the file system in the location referenced by the alias `/i/`. If you are upgrading Oracle Application Express from a prior release, you can locate the images directory on the file system, by reviewing the following files and searching for the text alias `/i/`:

- Oracle HTTP Server distributed with Oracle Database 11*g*—see the `dads.conf` file.
- Oracle Application Server 10*g*—see the `marvel.conf` file.

.

About the Embedded PL/SQL Gateway

The embedded PL/SQL gateway installs with Oracle Database 11*g*. It provides the Oracle database with a Web server and also the necessary infrastructure to create dynamic applications. The embedded PL/SQL gateway runs in the Oracle XML DB HTTP server in the Oracle database and includes the core features of `mod_plsql`. The following graphic illustrates the Oracle Application Express architecture using the embedded PL/SQL gateway.



As shown in the previous graphic, the embedded PL/SQL gateway is a simple two tier architecture and consists of theses components: a Web browser and an Oracle database, containing the embedded PL/SQL and Oracle Application Express.

Advantages of the embedded PL/SQL gateway:

- Ease of configuration
- Included in the database
- No separate server installation

Security Considerations When Using the Embedded PL/SQL Gateway

The embedded PL/SQL gateway runs in the database as part of the XML DB HTTP Protocol Listener. The XML DB HTTP Protocol Listener and embedded PL/SQL gateway provides the equivalent core features of Oracle HTTP Server and `mod_`

plsql. Because the HTTP Listener runs in the same database where Oracle Application Express is installed, it is not possible to separate the HTTP listener from the database. For this reason, it is not recommended to use the embedded PL/SQL gateway for applications that run on the Internet. Additionally, the embedded PL/SQL gateway does not provide the same flexibility of configuration and detailed logging as Oracle HTTP Server with mod_plsql.

Where Images Are Stored When Using the Embedded PL/SQL Gateway

When running Oracle Application Express with the embedded PL/SQL gateway, images are stored directly in the database within the Oracle XML DB repository. You can access images by using the WebDAV feature of Oracle XML DB or by using FTP. To learn more, see "Using Protocols to Access the Repository" in *Oracle XML DB Developer's Guide.*

Selecting an HTTP Server in an Oracle RAC Environment

When running Oracle Application Express in an Oracle Real Application Clusters (Oracle RAC) environment, Oracle recommends that you use Oracle HTTP Server with mod_plsql or Oracle Application Express Listener. Oracle HTTP Server with mod_plsql or Oracle Application Express Listener permit you to specify a connection in the service name format, so that one HTTP Server can access all nodes.

Oracle recommends that you do not select the embedded PL/SQL gateway option for Oracle RAC installations. The embedded PL/SQL gateway uses an HTTP Server built into the database instance, and because of this, it does not take advantage of the Oracle RAC shared architecture.

Available Installation Scenarios

How you install Oracle Application Express depends upon which HTTP server you decide to use. This section provides an overview of each installation scenario.

> **See Also:** "About Choosing an HTTP Server" on page 1-2 and "About the Oracle Application Express Runtime Environment" on page 1-2

Topics in this section include:

- Scenario 1: Downloading from OTN and Configuring the Oracle Application Express Listener
- Scenario 2: Downloading from OTN and Configuring the Embedded PL/SQL Gateway
- Scenario 3: Downloading from OTN and Configuring Oracle HTTP Server

Scenario 1: Downloading from OTN and Configuring the Oracle Application Express Listener

Follow the steps in this scenario if you are downloading Oracle Application Express from Oracle Technology Network (OTN) and configuring the Oracle Application Express Listener. Required installation steps in this scenario include:

- **Step 1:** Install the Oracle Database and Complete Pre-installation Tasks
- **Step 2:** Download and Install Oracle Application Express
- **Step 3:** Change the Password for the ADMIN Account

- **Step 4:** Restart Processes
- **Step 5:** Configure APEX_PUBLIC_USER Account
- **Step 6:** Download and Install Oracle Application Express Listener
- **Step 7:** Enable Network Services in Oracle Database 11g
- **Step 8:** Enable Indexing of Online Help in Oracle Database 11gR2 and Higher
- **Step 7:** Security Considerations
- **Step 8:** About Running Oracle Application Express in Other Languages
- **Step 9:** About Managing JOB_QUEUE_PROCESSES
- **Step 10:** Create a Workspace and Add Oracle Application Express Users

Scenario 2: Downloading from OTN and Configuring the Embedded PL/SQL Gateway

Follow the steps in this scenario if you are downloading Oracle Application Express from Oracle Technology Network (OTN) and configuring the embedded PL/SQL gateway. Required installation steps in this scenario include:

- **Step 1:** Install the Oracle Database and Complete Pre-installation Tasks
- **Step 2:** Download and Install Oracle Application Express
- **Step 3:** Change the Password for the ADMIN Account
- **Step 4:** Restart Processes
- **Step 5:** Configure the Embedded PL/SQL Gateway
- **Step 6:** Enable Network Services in Oracle Database 11g
- **Step 7:** Enable Indexing of Online Help in Oracle Database 11gR2 and Higher
- **Step 8:** Security Considerations
- **Step 9:** About Running Oracle Application Express in Other Languages
- **Step 10:** About Managing JOB_QUEUE_PROCESSES
- **Step 11:** Configuring the SHARED_SERVERS Parameter
- **Step 12:** Create a Workspace and Add Oracle Application Express Users

Scenario 3: Downloading from OTN and Configuring Oracle HTTP Server

Follow the steps in this scenario if you are downloading Oracle Application Express from Oracle Technology Network (OTN) and configuring Oracle HTTP Server with `mod_plsql` distributed with Oracle Database 11*g* or Oracle Application Server 10*g*. Required steps in this scenario include:

- **Step 1:** Install the Oracle Database and Complete Pre-installation Tasks
- **Step 2:** Download and Install Oracle Application Express
- **Step 3:** Change the Password for the ADMIN Account
- **Step 4:** Restart Processes
- **Step 5:** Configure Oracle HTTP Server Distributed with Oracle Database 11g or Oracle Application Server 10g
- **Step 6:** Enable Network Services in Oracle Database 11g
- **Step 7:** Enable Indexing of Online Help in Oracle Database 11gR2 and Higher

- **Step 8:** Security Considerations
- **Step 9:** About Running Oracle Application Express in Other Languages
- **Step 10:** About Managing JOB_QUEUE_PROCESSES
- **Step 11:** About Obfuscating PlsqlDatabasePassword Parameter
- **Step 12:** Create a Workspace and Add Oracle Application Express Users

2

Oracle Application Express Installation Requirements

This chapter describes the requirements for installing Oracle Application Express.

This chapter contains these topics:

- Oracle Database Requirement
- Browser Requirements
- HTTP Server Requirements
- Disk Space Requirement
- Oracle XML DB Requirement
- Oracle Text Requirement
- PL/SQL Web Toolkit

Oracle Database Requirement

Oracle Application Express version 4.0 requires an Oracle database (Enterprise Edition, Standard Edition or Standard Edition One) that is release 10.2.0.3 or higher. Application Express 4.0 can also be used with Oracle Database 10g Express.

> **Note:** You can upgrade the version of Oracle Application Express in Oracle Database Express Edition 10*g* Release 2 (10.2), by installing Oracle Application Express version 4.0. For more information, see the Oracle Application Express page on Oracle Technology Network (OTN).

Checking the shared_pool_size of the Target Database

> **Note:** Ignore this requirement if your configuration uses non-null values for the database initialization parameters `SGA_TARGET` (in Oracle Database 10*g* and 11*g*) or `MEMORY_TARGET` (in Oracle Database 11*g*).

Oracle Application Express requires the `shared_pool_size` of the target database to be at least 100 MB.

To check the `shared_pool_size` of the target database:

1. Start the database:

```
SQL> STARTUP
```

2. If necessary, enter the following command to determine whether the system uses an initialization parameter file (`initsid.ora`) or a server parameter file (`spfiled`*`bname`*`.ora`):

   ```
   SQL> SHOW PARAMETER PFILE;
   ```

   This command displays the name and location of the server parameter file or the initialization parameter file.

3. Determine the current values of the `shared_pool_size` parameter:

   ```
   SQL> SHOW PARAMETER SHARED_POOL_SIZE
   ```

4. If the system is using a server parameter file, set the value of the `SHARED_POOL_SIZE` initialization parameter to at least 100 MB:

   ```
   SQL> ALTER SYSTEM SET SHARED_POOL_SIZE='100M' SCOPE=spfile;
   ```

5. If the system uses an initialization parameter file, change the values of the `SHARED_POOL_SIZE` parameter to at least 100 MB in the initialization parameter file (`init`*`sid`*`.ora`).

6. Shut down the database:

   ```
   SQL> SHUTDOWN
   ```

7. Restart the database:

   ```
   SQL> STARTUP
   ```

Browser Requirements

To view or develop Oracle Application Express applications, Web browsers must support Java Script and the HTML 4.0 and CSS 1.0 standards. The following browsers are required to develop applications in Oracle Application Express:

- Microsoft Internet Explorer 7.0 or later version
- Mozilla Firefox 3.5 or later version
- Google Chrome 4.0 or later version
- Apple Safari 4.0 or later version

Application Express applications can be developed that support earlier Web browser versions, including Microsoft Explorer 6.0.

HTTP Server Requirements

In order to run, Oracle Application Express you must have access to one of the following:

- Oracle Application Express Listener
- Embedded PL/SQL gateway
- Oracle HTTP Server and `mod_plsql`

Oracle Application Express Listener is a Java-based Web server. It features file system caching, support for FOP transformations to PDF, offers improved file upload

capability, and is certified against Web Logic, Tomcat, and OC4J with Oracle WebLogic Server, OC4J, and Oracle Glassfish Server.

Oracle XML DB HTTP Server with the embedded PL/SQL gateway installs with Oracle Database 11*g*. It provides the database with a Web server and the necessary infrastructure to create dynamic applications.

Oracle HTTP Server uses the `mod_plsql` plug-in to communicate with the Oracle Application Express engine within the Oracle database. The following products include appropriate versions of HTTP Server and `mod_plsql`:

- Oracle Database 10*g* Companion CD release 2
- Oracle Database 11*g* release 1 or 2

See Also: "About Choosing an HTTP Server" on page 1-2

Disk Space Requirement

Oracle Application Express disk space requirements are as follows:

- Free space for Oracle Application Express software files on the file system: 450 MB if using English only download (apex_4_0_en.zip) and 1 GB if using full download (apex_4_0.zip).
- Free space in Oracle Application Express tablespace: 185 MB
- Free space in `SYSTEM` tablespace: 100 MB
- Free space in Oracle Application Express tablespace for each additional language (other than English) installed: 75 MB

Oracle XML DB Requirement

Oracle XML DB must be installed in the Oracle database that you want to use. If you are using a preconfigured database created either during an installation or by Database Configuration Assistant (DBCA), Oracle XML DB is already installed and configured.

See Also: *Oracle XML DB Developer's Guide* for more information about manually adding Oracle XML DB to an existing database

Tip: The installer does a prerequisite check for Oracle XML DB and will exit if it is not installed.

Tip: The installation of Oracle XML DB creates the user ANONYMOUS. In order for Oracle Application Express workspace provisioning to work properly, the ANONYMOUS user must not be dropped from the database.

Oracle Text Requirement

Oracle Text must be installed in order to use the searchable online Help in Oracle Application Express. By default, Oracle Text is installed as part of Oracle Database.

In addition, ensure that the default language preferences for Oracle Text have been installed. To install the Oracle Text default language, log in to the Oracle database where you plan to install Oracle Application Express and run the appropriate `drdef`*`lang`*`.sql` script, which by default is located in *`ORACLE_BASE`*`\`*`ORACLE_`*

HOME\ctx\admin\defaults. For example, to run the language preferences script for US English, drdefus.sql:

```
c:\> sqlplus /nolog
SQL> connect ctxsys
Enter password: password
SQL> @c:\oracle\product\10.2.0\db_1\ctx\admin\defaults\drdefus.sql
```

See Also: *Oracle Text Application Developer's Guide* for more information on Oracle Text and "Enabling Network Services in Oracle Database 11*g*" for your configuration scenario.

Tip: The installer does a prerequisite check for Oracle Text and will exit if it is not installed.

PL/SQL Web Toolkit

Oracle Application Express requires the PL/SQL Web Toolkit version 10.1.2.0.6 or later. For instructions on determining the current version of the PL/SQL Web Toolkit, and for instructions on installing version 10.1.2.0.6, please review the README.txt file contained in the directory apex/owa.

3

Downloading from Oracle Technology Network

This chapter describes how to install Oracle Application Express by downloading a ZIP file from Oracle Technology Network (OTN) and completing the appropriate post installation tasks.

The instructions in this chapter apply to both new and upgrade installations. To learn more, see "Upgrading from a Previous Version of Oracle Application Express" on page 1-1.

This chapter contains these topics:

- Recommended Pre-installation Tasks
- Choosing an HTTP Server
- Downloading from OTN and Configuring Oracle Application Express Listener
- Downloading from OTN and Configuring the Embedded PL/SQL Gateway
- Downloading from OTN and Configuring Oracle HTTP Server
- Post Installation Tasks for Upgrade Installations
- About the Oracle Application Express Runtime Environment

> **Note:** Within the context of this document, the Apache Oracle home directory (`ORACLE_HTTPSERVER_HOME`) is the location where Oracle HTTP Server is installed.

Recommended Pre-installation Tasks

Before installing Oracle Application Express, Oracle recommends that you complete the following steps:

1. Review and satisfy all Oracle Application Express installation requirements. See "Oracle Application Express Installation Requirements" on page 2-1.
2. Shut down with normal or immediate priority the Oracle Database instances where you plan to install Oracle Application Express. On Oracle Real Application Clusters (Oracle RAC) systems, shut down all instances on each node.

   An alternative to shutting down the database is to prevent all users from accessing Oracle Application Express when upgrading your installation from a previous version of Oracle Application Express. Oracle only recommends this option in high availability production environments where planned outages are not available. For all other scenarios, the database should be shut down.

To disable user access to Oracle Application Express when the existing installation is using the Oracle HTTP Server and mod_plsql, you should either shut down the Web server or disable the Application Express Database Access Descriptor of the Web server.

For an existing installation using the embedded PL/SQL gateway, you should disable the Oracle XMLDB HTTP server by setting the HTTP port to 0. This can be accomplished by starting SQL*Plus, connecting as SYS to the database where Oracle Application Express is installed, and running:

```
EXEC DBMS_XDB.SETHTTPPORT(0);
```

Once you have prevented access from Oracle Application Express users, you should log into SQL*Plus as SYS, connecting to the database where Oracle Application Express is installed, and query V$SESSION to ensure there are no long running sessions which would interfere with the upgrade process.

3. Back up the Oracle Database installation.

   Oracle recommends that you create a backup of the current Oracle Database installation before you install Oracle Application Express. You can use Oracle Database Recovery Manager, which is included the Oracle Database installation, to perform the backup.

   See Also: *Oracle Database Backup and Recovery User's Guide*

4. Start the Oracle Database instance that contains the target database.

   After backing up the system, you must start the Oracle instance that contains the target Oracle database. Do not start other processes such as the listener or Oracle HTTP Server. However, if you are performing a remote installation, make sure the database listener for the remote database has started.

Choosing an HTTP Server

In order to run, Oracle Application Express must have access to Oracle Application Express Listener, the embedded PL/SQL gateway or Oracle HTTP Server and `mod_plsql`. To learn more, see "About Choosing an HTTP Server" on page 1-2.

Downloading from OTN and Configuring Oracle Application Express Listener

This section describes how to install Oracle Application Express by downloading a ZIP file from OTN and then configuring the Oracle Application Express Listener.

Topics in this section include:

- Install the Oracle Database and Complete Pre-installation Tasks
- Download and Install Oracle Application Express
- Change the Password for the ADMIN Account
- Restart Processes
- Configure APEX_PUBLIC_USER Account
- Download and Install Oracle Application Express Listener
- Enable Network Services in Oracle Database 11g

- Enable Indexing of Online Help in Oracle Database 11gR2 and Higher
- Security Considerations
- About Running Oracle Application Express in Other Languages
- About Managing JOB_QUEUE_PROCESSES
- Create a Workspace and Add Oracle Application Express Users

See Also: "About the Oracle Application Express Runtime Environment" on page 1-2

Install the Oracle Database and Complete Pre-installation Tasks

Oracle Application Express requires an Oracle database that is release 10.2.0.3 or later or Oracle Database 10g Express Edition. To learn more, see the *Oracle Database Installation Guide* for your operating environment and "Recommended Pre-installation Tasks" on page 3-1.

Download and Install Oracle Application Express

To install Oracle Application Express:

1. For installations where the development will be in English only, download the file `apex_4.0_en.zip` from the Oracle Application Express download page. Where the development will include languages other than English, download `apex_4.0.zip` from the Oracle Application Express download page. See:

   `http://www.oracle.com/technology/products/database/application_express/download.html`

   Note that the actual file name may differ if a more recent release has shipped since this document was published.

2. Unzip downloaded zip file:
   - If English only, unzip `apex_4.0_en.zip` as follows, preserving directory names:
     - UNIX and Linux: Unzip `apex_4.0_en.zip`
     - Windows: Double click the file apex_4.0_en.zip in Windows Explorer
   - If multiple languages, unzip `apex_4.0.zip` as follows, preserving directory names:
     - UNIX and Linux: Unzip `apex_4.0.zip`
     - Windows: Double click the file `apex_4.0.zip` in Windows Explorer

   Note: You should keep the directory tree where you unzip the files short and not under directories that contain spaces. For example, within Windows unzip to C:\.

3. Change your working directory to `apex`.
4. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     ```

```
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

5. Disable any existing password complexity rules for the default profile. See "Configuring Password Protection" in *Oracle Database Security Guide*.
6. Select the appropriate installation option.

   Full development environment provides complete access to the Application Builder environment to develop applications. A **Runtime environment** enables users to run applications that cannot be modified. To learn more, see "About the Oracle Application Express Runtime Environment" on page 1-2.

   Available installation options include:

   - **Full development environment**. Run `apexins.sql` passing the following four arguments in the order shown:

     ```
     @apexins tablespace_apex tablespace_files tablespace_temp images
     ```

     Where:

     - *tablespace_apex* is the name of the tablespace for the Oracle Application Express application user.
     - *tablespace_files* is the name of the tablespace for the Oracle Application Express files user.
     - *tablespace_temp* is the name of the temporary tablespace.
     - *images* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as `/i/`.

     Example:

     ```
     @apexins SYSAUX SYSAUX TEMP /i/
     ```

     Note: If you receive the following error, please exit SQL*Plus and change your working directory to apex:

     ```
     SP2-0310: unable to open file "apexins.sql"
     ```

   - **Runtime environment**. Run `apxrtins.sql` passing the following arguments in the order shown:

     ```
     @apxrtins tablespace_apex tablespace_files tablespace_temp images
     ```

     Where:

     - *tablespace_apex* is the name of the tablespace for the Oracle Application Express application user.
     - *tablespace_files* is the name of the tablespace for the Oracle Application Express files user.
     - *tablespace_temp* is the name of the temporary tablespace.

– *images* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as `/i/`.

Example:

```
@apxrtins SYSAUX SYSAUX TEMP /i/
```

See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

When Oracle Application Express installs it creates three new database accounts:

- `APEX_040000` - The account that owns the Oracle Application Express schema and metadata.
- `FLOWS_FILES` - The account that owns the Oracle Application Express uploaded files.
- `APEX_PUBLIC_USER` - The minimally privileged account used for Oracle Application Express configuration with Oracle HTTP Server and `mod_plsql` or Oracle Application Express Listener.

If you are upgrading from a previous release, `FLOWS_FILES`, already exists and `APEX_PUBLIC_USER` is created if it does not already exist.

Tip: Oracle Application Express must be installed from a writable directory on the file system. See "Reviewing a Log of an Installation Session" on page A-1.

Change the Password for the ADMIN Account

In a new installation of Oracle Application Express, or if you are converting a runtime environment to a development environment, you must change the password of the internal `ADMIN` account. In an upgrade scenario, the password will be preserved and carried over from the prior release.

To change the password for the `ADMIN` account:

1. Change your working directory to the `apex` directory where you unzipped the installation software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Run `apxchpwd.sql`. For example:

   ```
   @apxchpwd
   ```

   When prompted enter a password for the `ADMIN` account.

See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

Restart Processes

After you install Oracle Application Express, you must restart the processes that you stopped before you began the installation, such as listener and other processes. In addition, restart Oracle HTTP Server.

Configure APEX_PUBLIC_USER Account

It is important to correctly configure the APEX_PUBLIC_USER account to enable proper operation of Oracle Application Express.

Unlocking the APEX_PUBLIC_USER Account

The APEX_PUBLIC_USER account is locked at the end of a new installation of Oracle Application Express. You must unlock this account before configuring the database access descriptor (DAD) in a new installation.

Tip: If you are upgrading from a prior release of Oracle Application Express, this step is unnecessary.

To unlock the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. Run the following statement:

   ```
   ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK
   ```

Changing the Password for the APEX_PUBLIC_USER Account

The APEX_PUBLIC_USER account is created with a random password in a new installation of Oracle Application Express. You must change the password for this account before configuring the database access descriptor (DAD) in a new installation.

Tip: If you are upgrading from a prior release of Oracle Application Express, this step is unnecessary.

To change the password for the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:
   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Run the following statement:

```
ALTER USER APEX_PUBLIC_USER IDENTIFIED BY new_password
```

Where `new_password` is the new password you are setting for `APEX_PUBLIC_USER`. You will use this password when creating the DAD in the sections that follow.

About Password Expiration in Oracle Database 11*g* In the default profile in Oracle Database 11*g*, the parameter `PASSWORD_LIFE_TIME` is set to 180. If you are using Oracle Database 11*g* with Oracle Application Express, this causes the password for `APEX_PUBLIC_USER` to expire in 180 days. As a result, your Oracle Application Express instance will become unusable until you change the password.

To prevent this behavior, create another profile in which the `PASSWORD_LIFE_TIME` parameter is set to unlimited and alter the `APEX_PUBLIC_USER` account and assign it the new profile.

> **See Also:** *Oracle Database Security Guide* for information on creating profiles and assigning them to database users.

Download and Install Oracle Application Express Listener

To download the Oracle Application Express Listener:

1. Download the file `apex_listener_1.0.zip` from the Oracle Application Express download page. See:

   http://www.oracle.com/technology/products/database/application_express/html/apex_listener_download.html

   Note that the actual file name may differ if a more recent release has shipped since this document was published.

2. Unzip `apex_listener_1.0.zip` as follows, preserving directory names:
   - UNIX and Linux: Unzip `apex_listener_1.0.zip`
   - Windows: Double click the file `apex_listener_1.0.zip` in Windows Explorer

   > **Note:** You should keep the directory tree where you unzip the files short and not under directories that contain spaces. For example, within Windows unzip to C:\.

3. Locate the Installation Guide and follow instructions to complete installation and configuration steps.

Enable Network Services in Oracle Database 11*g*

By default, the ability to interact with network services is disabled in Oracle Database 11*g* release 1 or 2. Therefore, if you are running Oracle Application Express with Oracle Database 11*g* release 1 or 2, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_040000` database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle Application Express.

  Users can call methods from the `APEX_MAIL` package, but issues arise when sending outbound email.
- Using Web services in Oracle Application Express.
- PDF/report printing.
- Searching for content in online Help (that is, using the Find link).

Topics in this section include:

- Granting Connect Privileges
- Troubleshooting an Invalid ACL Error

> **Tip:** To run the examples described in this section, the compatible initialization parameter of the database must be set to at least 11.1.0.0.0. By default an 11*g* database will already have the parameter set properly, but a database upgraded to 11*g* from a prior version may not. See "Creating and Configuring an Oracle Database" in *Oracle Database Administrator's Guide* for information about changing database initialization parameters.

Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the `APEX_040000` database user. This example assumes you connected to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040000
  -- the "connect" privilege if APEX_040000 does not have the privilege yet.

  SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
   WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- Before checking the privilege, ensure that the ACL is valid
  -- (for example, does not contain stale references to dropped users).
  -- If it does, the following exception will be raised:
  --
  -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040000'
  -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
  --
  SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
    FROM XDB.XDB$ACL A, PATH_VIEW P
   WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
         EQUALS_PATH(P.RES, ACL_PATH) = 1;

  DBMS_XDBZ.ValidateACL(ACL_ID);
```

```
   IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', TRUE, 'connect');
  END IF;

EXCEPTION
  -- When no ACL has been assigned to '*'.
  WHEN NO_DATA_FOUND THEN
  DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('power_users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('power_users.xml','*');
END;
/
COMMIT;
```

The following example demonstrates how to provide less privileged access to local network resources. This example would enable indexing the Oracle Application Express Online Help and could possibly enable email and PDF printing if those servers were also on the local host.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to 'localhost' and give APEX_040000
  -- the "connect" privilege if APEX_040000 does not have the privilege yet.
  SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
   WHERE HOST = 'localhost' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- Before checking the privilege, ensure that the ACL is valid
  -- (for example, does not contain stale references to dropped users).
  -- If it does, the following exception will be raised:
  --
  -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040000'
  -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
  --

  SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
    FROM XDB.XDB$ACL A, PATH_VIEW P
   WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
         EQUALS_PATH(P.RES, ACL_PATH) = 1;

  DBMS_XDBZ.ValidateACL(ACL_ID);
   IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', TRUE, 'connect');
  END IF;

EXCEPTION
  -- When no ACL has been assigned to 'localhost'.
  WHEN NO_DATA_FOUND THEN
  DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('local-access-users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml','localhost');
END;
/
```

```
COMMIT;
```

Troubleshooting an Invalid ACL Error

If you receive an `ORA-44416: Invalid ACL` error after running the previous script, use the following query to identify the invalid ACL:

```
REM Show the dangling references to dropped users in the ACL that is assigned
REM to '*'.

SELECT ACL, PRINCIPAL
  FROM DBA_NETWORK_ACLS NACL, XDS_ACE ACE
 WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL AND
       NACL.ACLID = ACE.ACLID AND
       NOT EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);
```

Next, run the following code to fix the ACL:

```
DECLARE
  ACL_ID   RAW(16);
  CNT      NUMBER;
BEGIN
  -- Look for the object ID of the ACL currently assigned to '*'
  SELECT ACLID INTO ACL_ID FROM DBA_NETWORK_ACLS
   WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- If just some users referenced in the ACL are invalid, remove just those
  -- users in the ACL. Otherwise, drop the ACL completely.
  SELECT COUNT(PRINCIPAL) INTO CNT FROM XDS_ACE
   WHERE ACLID = ACL_ID AND
         EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);

  IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
                WHERE ACLID = ACL_ID AND
                      NOT EXISTS (SELECT NULL FROM ALL_USERS
                                  WHERE USERNAME = PRINCIPAL)) LOOP
      UPDATE XDB.XDB$ACL
         SET OBJECT_VALUE =
               DELETEXML(OBJECT_VALUE,
                         '/ACL/ACE[PRINCIPAL="'||R.PRINCIPAL||'"]')
       WHERE OBJECT_ID = ACL_ID;
    END LOOP;

  ELSE
    DELETE FROM XDB.XDB$ACL WHERE OBJECT_ID = ACL_ID;
  END IF;

END;
/

REM commit the changes.

COMMIT;
```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the `APEX_040000` user. See "Granting Connect Privileges" on page 3-45.

Enable Indexing of Online Help in Oracle Database 11gR2 and Higher

The ability to search Oracle Application Express online Help is accomplished through Oracle Text and a URL datastore. There is a change in the default behavior and permissions to use an Oracle Text URL datastore in database 11gR2 and higher.

If users attempt to search Oracle Application Express online Help in Oracle database 11gR2 and encounter the following error, then the permission to use an Oracle Text URL datastore has not been granted to database user APEX_040000.

```
ORA-29855: error occurred in the execution of ODCIINDEXCREATE routine
ORA-20000: Oracle Text error:
DRG-10758: index owner does not have the privilege to use file or URL datastore
```

To enable the indexing of online Help in Oracle Application Express, the permission to use an Oracle Text URL datastore must be granted to the APEX_040000 database user. This is accomplished by assigning this specific privilege to a database role and then granting this role to the APEX_040000 database user.

To determine if the ability to use an Oracle Text URL datastore is already granted to a database role:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. Run the following command:

   ```
   SELECT par_value FROM ctxsys.ctx_parameters WHERE par_name = 'FILE_ACCESS_
   ROLE';
   ```

   This returns either NULL or the database role which is granted the ability to use an Oracle Text URL datastore.

3. If no value is returned by step 2, then create a new database role as shown in the following example:

   ```
   CREATE ROLE APEX_URL_DATASTORE_ROLE;
   ```

4. Grant this role to the database user APEX_040000 with the following statement:

   ```
   GRANT APEX_URL_DATASTORE_ROLE to APEX_040000;
   ```

   If step 2 returned a value, use this database role name instead of the example *APEX_URL_DATASTORE_ROLE*.

5. Lastly, if step 2 did not return a value, then use the Oracle Text API to grant permission to the newly created database role with the following statement:

   ```
   EXEC ctxsys.ctx_adm.set_parameter('file_access_role', 'APEX_URL_DATASTORE_
   ROLE');
   ```

Security Considerations

Oracle highly recommends you configure and use Secure Sockets Layer (SSL) to ensure that passwords and other sensitive data are not transmitted in clear text in HTTP requests. Without the use of SSL, passwords could potentially be exposed, compromising security.

SSL is an industry standard protocol that uses RSA public key cryptography in conjunction with symmetric key cryptography to provide authentication, encryption, and data integrity.

> **See Also:** "Requiring HTTPS" in *Oracle Application Express Administration Guide*

About Running Oracle Application Express in Other Languages

The Oracle Application Express interface is translated into German, Spanish, French, Italian, Japanese, Korean, Brazilian Portuguese, Simplified Chinese, and Traditional Chinese. A single instance of Oracle Application Express can be installed with one or more of these translated versions. At runtime, each user's Web browser language settings determine the specific language version.

In order to install other languages you must use the `apex_4.0.zip` file which contains the extra files referenced below. If you previously downloaded `apex_4.0_en.zip`, then you don't need to re-install Oracle Application Express. Simply download `apex_4.0.zip` and unzip the file into the same directory where you unzipped `apex_4.0_en.zip`.

The translated version of Oracle Application Express should be loaded into a database that has a character set that supports the specific language. If you attempt to install a translated version of Oracle Application Express into a database that does not support the character encoding of the language, the installation may fail or the translated Oracle Application Express instance may appear corrupt when run. The database character set `AL32UTF8` supports all the translated versions of Oracle Application Express.

You can manually install translated versions of Oracle Application Express using SQL*Plus. The installation files are encoded in `AL32UTF8`.

> **Note:** Regardless of the target database character set, to install a translated version of Oracle Application Express, you must set the character set value of the `NLS_LANG` environment variable to `AL32UTF8` before starting SQL*Plus.

The following examples illustrate valid `NLS_LANG` settings for loading Oracle Application Express translations:

```
American_America.AL32UTF8
Japanese_Japan.AL32UTF8
```

Installing a Translated Version of Oracle Application Express

Whether you are installing for the first time or upgrading from a previous release, you must run the `load_`*`lang`*`.sql` script to run a translated version of Oracle Application Express.

The installation scripts are located in subdirectories identified by a language code in the unzipped distribution `apex/builder`. For example, the German version is located in `apex/builder/de` and the Japanese version is located in `apex/builder/ja`. Within each of directory, there is a language loading script identified by the language code (for example, `load_de.sql` or `load_ja.sql`).

To install a translated version of Oracle Application Express:

1. Set the `NLS_LANG` environment variable, making sure that the character set is `AL32UTF8`. For example:
   - Bourne or Korn shell:

     ```
     NLS_LANG=American_America.AL32UTF8
     export NLS_LANG
     ```

   - C shell:

     ```
     setenv NLS_LANG American_America.AL32UTF8
     ```

   - For Windows based systems:

     ```
     set NLS_LANG=American_America.AL32UTF8
     ```

2. Navigate to the directory under apex/builder based on the language you need to install. For example for German, navigate to apex/builder/de. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Execute the following statement:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = APEX_040000;
   ```

4. Execute the appropriate language specific script. For example:

   ```
   @load_lang.sql
   ```

   Where `lang` is the specific language (for example, `load_de.sql` for German or `load_ja.sql` for Japanese).

About Managing JOB_QUEUE_PROCESSES

`JOB_QUEUE_PROCESSES` determine the maximum number of concurrently running jobs. In Oracle Application Express release 4.0, transactional support and SQL scripts require jobs. If `JOB_QUEUE_PROCESSES` is not enabled and working properly, you cannot successfully execute a script.

Topics in this section include:

- Viewing the Number of JOB_QUEUE_PROCESSES
- Changing the Number of JOB_QUEUE_PROCESSES

Viewing the Number of JOB_QUEUE_PROCESSES

There are currently three ways to view the number of JOB_QUEUE_PROCESSES:

- In the installation log file
- On the About Application Express page in Oracle Application Express
- From SQL*Plus

Viewing JOB_QUEUE_PROCESSES in the Installation Log File After installing or upgrading Oracle Application Express to release 4.0, you can view the number of JOB_QUEUE_PROCESSES in the installation log files. See "Reviewing a Log of an Installation Session" on page A-1.

Viewing JOB_QUEUE_PROCESSES in Oracle Application Express You can also view the number of JOB_QUEUE_PROCESSES on the About Application Express page.

To view the About Application Express page:

1. Log in to Oracle Application Express. See "Logging in to Your Workspace" on page 3-54.
2. On the Administration list, click **About Application Express**.

   The current number JOB_QUEUE_PROCESSES displays at the bottom of the page.

Viewing JOB_QUEUE_PROCESSES from SQL*Plus You can also view the number of JOB_QUEUE_PROCESSES from SQL*Plus by running the following SQL statement:

```
SELECT VALUE FROM v$parameter WHERE NAME = 'job_queue_processes'
```

Changing the Number of JOB_QUEUE_PROCESSES

You can change the number of JOB_QUEUE_PROCESSES by running a SQL statement in SQL*Plus:

To update the number of JOB_QUEUE_PROCESSES:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. In SQL*Plus run the following SQL statement:

   ```
   ALTER SYSTEM SET JOB_QUEUE_PROCESSES = <number>
   ```

   For example, running the statement ALTER SYSTEM SET JOB_QUEUE_PROCESSES = 20 sets JOB_QUEUE_PROCESSES to 20.

Create a Workspace and Add Oracle Application Express Users

You access the Oracle Application Express home page by logging in to workspace using a Web browser. Your Web browser must support JavaScript and the HTML 4.0 and CSS 1.0 standards. See "Browser Requirements" on page 2-2.

A **workspace** is a virtual private database allowing multiple users to work within the same Oracle Application Express installation while keeping their objects, data and applications private. Each workspace has a unique ID and name.

An instance administrator can create a workspace manually within Oracle Application Express Administration Services or have users submit requests. Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*.

> **See Also:** *Oracle Database 2 Day + Oracle Application Express Developer's Guide* if you are new to Oracle Application Express

Topics in this section include:

- Creating a Workspace Manually
- Creating Oracle Application Express Users
- Logging in to Your Workspace

Creating a Workspace Manually

To create an Oracle Application Express workspace manually:

1. **Log in to Oracle Application Express Administration Services.** Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. You log in using the `ADMIN` account and password created or reset during the installation process.

   a. In a Web browser, navigate to the Oracle Application Express Administration Services application.

      Because your setup uses Oracle Application Express Listener, go to:

      `http://hostname:port/apex/apex_admin`

      Where:

      `hostname` is the name of the system where Oracle HTTP Server is installed.

      `port` is the port number assigned to Oracle HTTP Server. In a default installation, for Oracle WebLogic Server this number is 7001, in OC4J this number is 8888, in Oracle Glassfish Server this number is 8080. These defaults are correct at the time this document was written. Please review the related Web server documentation for the latest default port if necessary.

      `apex` is the mount point defined in the Web Server configuration file.

   b. On the Login page:

      – In Username, enter `admin`.

      – In Password, enter the Oracle Application Express administrator account password you specified in "Change the Password for the ADMIN Account" on page 3-5.

      – Click **Login**.

> **See Also:** See "Logging in to Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*.

Next, create a workspace.

2. Click **Manage Workspaces**.
3. Under Manage Workspaces, click **Create Workspace**.

   The Create Workspace Wizard appears.
4. For Identify Workspace, enter a workspace name and description and click **Next**.
5. For Identify Schema, select the Oracle Forms application schema.
   a. For Re-use existing schema, select **Yes**.
   b. Select a schema from the list.
   c. Click **Next**.
6. For Identify Administrator, enter the Workspace administrator information and click **Next**.
7. Confirm your selections and click **Create**.

Creating Oracle Application Express Users

To create an Oracle Application Express user account:

1. Log in to Oracle Application Express Administration Services as described in the previous section. See "Logging in to Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*.
2. Click the **Administration** icon.

   The Administration page appears.
3. Click **Manage Users and Groups**.
4. Click **Create User**.

   The Create User page appears.
5. Under User Identification, enter:
   a. **Username** - Enter the username used to log in to the system. Restrictions include:
      – Maximum length of 100 characters
      – No spaces
      – Only these special characters are permitted: ampersand (@) and period (.)
   b. **Email Address** - Enter the valid email address for this user.
   c. **First Name** - Enter the first or given name to further identify the user (optional).
   d. **Last Name** - Enter the last or family name to further identify the user (optional).
   e. **Description** - Enter comments about this user (optional).
6. Under Account Privileges:

a. **Default Schemas** - Specify the default schema used for data browsing, application creation, and SQL script execution.

   When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.

b. **Accessible Schemas** (null for all) - Leave this blank to enable the end user to access all schemas in the workspace, or enter a colon-delimited list of schemas for which this user has permissions when using the SQL Workshop.

c. **User is a workspace administrator** - Specify if this user should have workspace administrator privileges.

   Administrators are given access to all components. Additionally, they can manage user accounts, groups, and development services. Components may not be available if they are switched off by Instance Administrators.

d. **User is a developer** - Specify if this user should have developer privileges.

   Developers must have access to either Application Builder, SQL Workshop, or both. Components may not be available if they are switched off by Instance Administrators.

e. **Application Builder Access** - Determines whether a developer has access to the Application Builder.

f. **SQL Workshop Access** - Determines whether a developer has access to the SQL Workshop.

g. **Team Development Access** - Determines whether a developer has access to the Team Development.

h. **Set Account Availability** - Select **Locked** to prevent the account from being used. Select **Unlocked** to allow the account to be used.

   If the user has exceeded the maximum login failures allowed, specified in Workspace Preferences, then their account will be locked automatically.

7. Under Password:

   - **Password** - Enter a case sensitive password.
   - **Confirm Password** - Enter the password again.
   - **Require Change of Password On First Use** - Select **No** to allow the user to use the same password until it expires. Select **Yes** to require the user to change the password immediately when logging in the first time.

8. Under User Groups, optionally select one or more user groups by holding down the **CTRL** key and selecting the groups.

9. Click **Create User** or **Create and Create Another**.

Logging in to Your Workspace

Once you create a workspace, you must log in to it using your login credentials (that is, the workspace name, user name, and password).

> **See Also:** See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*

To log in to your workspace:

1. In a Web browser, navigate to the Oracle Application Express Login page.

Because your setup uses the Oracle Application Express Listener, go to:

`http://hostname:port/apex`

Where:

- `hostname` is the name of the system where Oracle XML DB HTTP server is installed.
- `port` is the port number assigned to Oracle HTTP Server. In a default installation, for Oracle WebLogic Server this number is 7001, in OC4J this number is 8888, in Oracle Glassfish Server this number is 8080. These defaults are correct at the time this document was written. Please review the related Web server documentation for the latest default port if necessary.
- `apex` is the mount point defined in the Web Server configuration file.

The Login page appears.

2. Under Login, enter the following:
   - Workspace field - Enter the name of your workspace.
   - Username field - Enter your user name.
   - Password field - Enter your case-sensitive password.
3. Click **Login**.

   Note that, depending on your setup, you might be required to change your password when you log in for the first time.

Downloading from OTN and Configuring the Embedded PL/SQL Gateway

This section describes how to install Oracle Application Express by downloading a ZIP file from OTN and then configuring the embedded PL/SQL gateway.

Topics in this section include:

- Install the Oracle Database and Complete Pre-installation Tasks
- Download and Install Oracle Application Express
- Change the Password for the ADMIN Account
- Restart Processes
- Configure the Embedded PL/SQL Gateway
- Enable Network Services in Oracle Database 11g
- Enable Indexing of Online Help in Oracle Database 11gR2 and Higher
- Security Considerations
- About Running Oracle Application Express in Other Languages
- About Managing JOB_QUEUE_PROCESSES
- Configuring the SHARED_SERVERS Parameter
- Create a Workspace and Add Oracle Application Express Users

See Also: "About the Oracle Application Express Runtime Environment" on page 1-2

Install the Oracle Database and Complete Pre-installation Tasks

Oracle Application Express requires an Oracle database that is release 10.2.0.3 or later or Oracle Database 10g Express Edition. To learn more, see the *Oracle Database Installation Guide* for your operating environment and "Recommended Pre-installation Tasks" on page 3-1.

Download and Install Oracle Application Express

To install Oracle Application Express:

1. For installations where the development will be in English only, download the file `apex_4.0_en.zip` from the Oracle Application Express download page. Where the development will include languages other than English, download `apex_4.0.zip` from the Oracle Application Express download page. See:

   `http://www.oracle.com/technology/products/database/application_express/download.html`

   Note that the actual file name may differ if a more recent release has shipped since this document was published.

2. Unzip downloaded zip file:
   - If English only, unzip `apex_4.0_en.zip` as follows, preserving directory names:
     - UNIX and Linux: Unzip `apex_4.0_en.zip`
     - Windows: Double click the file apex_4.0_en.zip in Windows Explorer
   - If multiple languages, unzip `apex_4.0.zip` as follows, preserving directory names:
     - UNIX and Linux: Unzip `apex_4.0.zip`
     - Windows: Double click the file `apex_4.0.zip` in Windows Explorer

   Note: You should keep the directory tree where you unzip the files short and not under directories that contain spaces. For example, within Windows unzip to C:\.

3. Change your working directory to `apex`.
4. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

5. Disable any existing password complexity rules for the default profile. See "Configuring Password Protection" in *Oracle Database Security Guide*.

6. Select the appropriate installation option.

   Full development environment provides complete access to the Application Builder environment to develop applications. A **Runtime environment** enables users to run applications that cannot be modified. To learn more, see "About the Oracle Application Express Runtime Environment" on page 1-2.

   Available installation options include:

   - **Full development environment**. Run `apexins.sql` passing the following four arguments in the order shown:

     ```
     @apexins tablespace_apex tablespace_files tablespace_temp images
     ```

     Where:

     - *tablespace_apex* is the name of the tablespace for the Oracle Application Express application user.
     - *tablespace_files* is the name of the tablespace for the Oracle Application Express files user.
     - *tablespace_temp* is the name of the temporary tablespace.
     - *images* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as `/i/`.

     Example:

     ```
     @apexins SYSAUX SYSAUX TEMP /i/
     ```

     Note: If you receive the following error, please exit SQL*Plus and change your working directory to apex:

     ```
     SP2-0310: unable to open file "apexins.sql"
     ```

   - **Runtime environment**. Run `apxrtins.sql` passing the following arguments in the order shown:

     ```
     @apxrtins tablespace_apex tablespace_files tablespace_temp images
     ```

     Where:

     - *tablespace_apex* is the name of the tablespace for the Oracle Application Express application user.
     - *tablespace_files* is the name of the tablespace for the Oracle Application Express files user.
     - *tablespace_temp* is the name of the temporary tablespace.
     - *images* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as `/i/`.

     Example:

     ```
     @apxrtins SYSAUX SYSAUX TEMP /i/
     ```

     See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

When Oracle Application Express installs it creates three new database accounts:

- APEX_040000 - The account that owns the Oracle Application Express schema and metadata.
- FLOWS_FILES - The account that owns the Oracle Application Express uploaded files.
- APEX_PUBLIC_USER - The minimally privileged account used for Oracle Application Express configuration with Oracle HTTP Server and mod_plsql or Oracle Application Express Listener.

If you are upgrading from a previous release, FLOWS_FILES, already exists and APEX_PUBLIC_USER is created if it does not already exist.

> **Tip:** Oracle Application Express must be installed from a writable directory on the file system. See "Reviewing a Log of an Installation Session" on page A-1.

Change the Password for the ADMIN Account

In a new installation of Oracle Application Express, or if you are converting a runtime environment to a development environment, you must change the password of the internal ADMIN account. In an upgrade scenario, the password will be preserved and carried over from the prior release.

To change the password for the ADMIN account:

1. Change your working directory to the apex directory where you unzipped the installation software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Run apxchpwd.sql. For example:

   ```
   @apxchpwd
   ```

   When prompted enter a password for the ADMIN account.

   > **See Also:** *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

Restart Processes

After you install Oracle Application Express, you must restart the processes that you stopped before you began the installation, such as listener and other processes.

Configure the Embedded PL/SQL Gateway

The embedded PL/SQL gateway installs with the Oracle Database 11*g*. However, you must configure it before you can use it with Oracle Application Express. To accomplish this, you run a configuration file and unlock the ANONYMOUS account.

> **Note:** The Oracle XML DB HTTP Server with the embedded PL/SQL gateway is not supported before Oracle Database 11*g*.

Topics in this section include:

- Running the apex_epg_config.sql Configuration Script
- Updating the Images Directory When Upgrading from a Previous Release
- Verifying the Oracle XML DB HTTP Server Port
- Enabling Oracle XML DB HTTP Server

> **See Also:** "About Choosing an HTTP Server" on page 1-2 and "About the Embedded PL/SQL Gateway" on page 1-3

Running the apex_epg_config.sql Configuration Script

In a new installation, you configure the embedded PL/SQL gateway by running the configuration script `apex_epg_config.sql`. Then, you unlock the ANONYMOUS account.

> **Note:** If you are upgrading and have previously configured the embedded PL/SQL gateway, skip this section and go to "Updating the Images Directory When Upgrading from a Previous Release" on page 3-23.

To run the `apex_epg_config.sql` configuration script:

1. Change your working directory to the `apex` directory where you unzipped the Oracle Application Express software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Run `apex_epg_config.sql` passing the file system path to the base directory where the Oracle Application Express software was unzipped as shown in the following example:
   - On Windows:

     ```
     @apex_epg_config SYSTEM_DRIVE:\TEMP
     ```

   - On UNIX and Linux:

```
@apex_epg_config /tmp
```

4. Enter the following statement to unlock the ANONYMOUS account:

```
ALTER USER ANONYMOUS ACCOUNT UNLOCK;
```

Updating the Images Directory When Upgrading from a Previous Release

If you are upgrading Oracle Application Express from a previous release, you must run the apxldimg.sql script to update the images directory.

> **Tip:** If you are not upgrading from a prior release of Oracle Application Express, this step is unnecessary. The images will be loaded by running apex_epg_config.sql as described in the prior section.

To run the apxldimg.sql script:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:
   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

   - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Run apxldimg.sql passing the file system path to the base directory where the Oracle Application Express software was unzipped as shown in the following example:
   - On Windows:

```
@apxldimg.sql SYSTEM_DRIVE:\TEMP
```

   - On UNIX and Linux:

```
@apxldimg.sql /tmp
```

> **Tip:** The above examples assume that you unzipped Oracle Application Express in a directory called TEMP on Windows and tmp on UNIX or Linux.

Verifying the Oracle XML DB HTTP Server Port

The embedded PL/SQL gateway runs in the Oracle XML DB HTTP server in the Oracle database. You can determine if the Oracle XML DB HTTP server is enabled by verifying the associated port number.

To verify the port number where the Oracle XML DB HTTP Server is running:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:
   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Enter the following statement to verify the port number:

```
SELECT DBMS_XDB.GETHTTPPORT FROM DUAL;
```

If the port number returns `0`, the Oracle XML DB HTTP Server is disabled.

3. To enable it, follow the instructions in "Enabling Oracle XML DB HTTP Server" on page 3-24.

Enabling Oracle XML DB HTTP Server

The embedded PL/SQL gateway runs in the Oracle XML DB HTTP server in the Oracle database.

To enable Oracle XML DB HTTP server:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

- On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Enter a statement similar to the following:

```
EXEC DBMS_XDB.SETHTTPPORT(port);
```

For example:

```
EXEC DBMS_XDB.SETHTTPPORT(8080);
```

Note: Port numbers less than 1024 are reserved for use by privileged processes on many operating systems. To enable the XML DB HTTP listener on a port less than 1024, such as 80, review the following documentation:

- "Using Protocols to Access the Repository" in *Oracle XML DB Developer's Guide*.
- "Protocol Address Configuration" and "Port Number Limitations" in *Oracle Database Net Services Reference*.

Enable Network Services in Oracle Database 11*g*

By default, the ability to interact with network services is disabled in Oracle Database 11*g* release 1 or 2. Therefore, if you are running Oracle Application Express with Oracle Database 11*g* release 1 or 2, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_040000` database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle Application Express.

  Users can call methods from the `APEX_MAIL` package, but issues arise when sending outbound email.
- Using Web services in Oracle Application Express.
- PDF/report printing.
- Searching for content in online Help (that is, using the Find link).

Topics in this section include:

- Granting Connect Privileges
- Troubleshooting an Invalid ACL Error

> **Tip:** To run the examples described in this section, the compatible initialization parameter of the database must be set to at least 11.1.0.0.0. By default an 11*g* database will already have the parameter set properly, but a database upgraded to 11*g* from a prior version may not. See "Creating and Configuring an Oracle Database" in *Oracle Database Administrator's Guide* for information about changing database initialization parameters.

Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the `APEX_040000` database user. This example assumes you connected to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040000
  -- the "connect" privilege if APEX_040000 does not have the privilege yet.

  SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
   WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- Before checking the privilege, ensure that the ACL is valid
  -- (for example, does not contain stale references to dropped users).
  -- If it does, the following exception will be raised:
  --
  -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040000'
  -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
  --
  SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
    FROM XDB.XDB$ACL A, PATH_VIEW P
   WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
         EQUALS_PATH(P.RES, ACL_PATH) = 1;

  DBMS_XDBZ.ValidateACL(ACL_ID);
```

```
   IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', TRUE, 'connect');
  END IF;

EXCEPTION
  -- When no ACL has been assigned to '*'.
  WHEN NO_DATA_FOUND THEN
  DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('power_users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('power_users.xml','*');
END;
/
COMMIT;
```

The following example demonstrates how to provide less privileged access to local network resources. This example would enable indexing the Oracle Application Express Online Help and could possibly enable email and PDF printing if those servers were also on the local host.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to 'localhost' and give APEX_040000
  -- the "connect" privilege if APEX_040000 does not have the privilege yet.
  SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
   WHERE HOST = 'localhost' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- Before checking the privilege, ensure that the ACL is valid
  -- (for example, does not contain stale references to dropped users).
  -- If it does, the following exception will be raised:
  --
  -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040000'
  -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
  --

  SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
    FROM XDB.XDB$ACL A, PATH_VIEW P
   WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
         EQUALS_PATH(P.RES, ACL_PATH) = 1;

  DBMS_XDBZ.ValidateACL(ACL_ID);
   IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', TRUE, 'connect');
  END IF;

EXCEPTION
  -- When no ACL has been assigned to 'localhost'.
  WHEN NO_DATA_FOUND THEN
  DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('local-access-users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml','localhost');
END;
/
```

```
COMMIT;
```

Troubleshooting an Invalid ACL Error

If you receive an `ORA-44416: Invalid ACL` error after running the previous script, use the following query to identify the invalid ACL:

```
REM Show the dangling references to dropped users in the ACL that is assigned
REM to '*'.

SELECT ACL, PRINCIPAL
  FROM DBA_NETWORK_ACLS NACL, XDS_ACE ACE
 WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL AND
       NACL.ACLID = ACE.ACLID AND
       NOT EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);
```

Next, run the following code to fix the ACL:

```
DECLARE
  ACL_ID   RAW(16);
  CNT      NUMBER;
BEGIN
  -- Look for the object ID of the ACL currently assigned to '*'
  SELECT ACLID INTO ACL_ID FROM DBA_NETWORK_ACLS
   WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- If just some users referenced in the ACL are invalid, remove just those
  -- users in the ACL. Otherwise, drop the ACL completely.
  SELECT COUNT(PRINCIPAL) INTO CNT FROM XDS_ACE
   WHERE ACLID = ACL_ID AND
         EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);

  IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
                WHERE ACLID = ACL_ID AND
                      NOT EXISTS (SELECT NULL FROM ALL_USERS
                                  WHERE USERNAME = PRINCIPAL)) LOOP
      UPDATE XDB.XDB$ACL
         SET OBJECT_VALUE =
               DELETEXML(OBJECT_VALUE,
                         '/ACL/ACE[PRINCIPAL="'||R.PRINCIPAL||'"]')
       WHERE OBJECT_ID = ACL_ID;
    END LOOP;

  ELSE
    DELETE FROM XDB.XDB$ACL WHERE OBJECT_ID = ACL_ID;
  END IF;

END;
/

REM commit the changes.

COMMIT;
```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the `APEX_040000` user. See "Granting Connect Privileges" on page 3-25.

Enable Indexing of Online Help in Oracle Database 11gR2 and Higher

The ability to search Oracle Application Express online Help is accomplished through Oracle Text and a URL datastore. There is a change in the default behavior and permissions to use an Oracle Text URL datastore in database 11gR2 and higher.

If users attempt to search Oracle Application Express online Help in Oracle database 11gR2 and encounter the following error, then the permission to use an Oracle Text URL datastore has not been granted to database user APEX_040000.

```
ORA-29855: error occurred in the execution of ODCIINDEXCREATE routine
ORA-20000: Oracle Text error:
DRG-10758: index owner does not have the privilege to use file or URL datastore
```

To enable the indexing of online Help in Oracle Application Express, the permission to use an Oracle Text URL datastore must be granted to the APEX_040000 database user. This is accomplished by assigning this specific privilege to a database role and then granting this role to the APEX_040000 database user.

To determine if the ability to use an Oracle Text URL datastore is already granted to a database role:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. Run the following command:

   ```
   SELECT par_value FROM ctxsys.ctx_parameters WHERE par_name = 'FILE_ACCESS_
   ROLE';
   ```

   This returns either NULL or the database role which is granted the ability to use an Oracle Text URL datastore.

3. If no value is returned by step 2, then create a new database role as shown in the following example:

   ```
   CREATE ROLE APEX_URL_DATASTORE_ROLE;
   ```

4. Grant this role to the database user APEX_040000 with the following statement:

   ```
   GRANT APEX_URL_DATASTORE_ROLE to APEX_040000;
   ```

   If step 2 returned a value, use this database role name instead of the example *APEX_URL_DATASTORE_ROLE*.

5. Lastly, if step 2 did not return a value, then use the Oracle Text API to grant permission to the newly created database role with the following statement:

   ```
   EXEC ctxsys.ctx_adm.set_parameter('file_access_role', 'APEX_URL_DATASTORE_
   ROLE');
   ```

Security Considerations

Oracle highly recommends you configure and use Secure Sockets Layer (SSL) to ensure that passwords and other sensitive data are not transmitted in clear text in HTTP requests. Without the use of SSL, passwords could potentially be exposed, compromising security.

SSL is an industry standard protocol that uses RSA public key cryptography in conjunction with symmetric key cryptography to provide authentication, encryption, and data integrity.

> **See Also:** "Requiring HTTPS" in *Oracle Application Express Administration Guide*

About Running Oracle Application Express in Other Languages

The Oracle Application Express interface is translated into German, Spanish, French, Italian, Japanese, Korean, Brazilian Portuguese, Simplified Chinese, and Traditional Chinese. A single instance of Oracle Application Express can be installed with one or more of these translated versions. At runtime, each user's Web browser language settings determine the specific language version.

In order to install other languages you must use the `apex_4.0.zip` file which contains the extra files referenced below. If you previously downloaded `apex_4.0_en.zip`, then you don't need to re-install Oracle Application Express. Simply download `apex_4.0.zip` and unzip the file into the same directory where you unzipped `apex_4.0_en.zip`.

The translated version of Oracle Application Express should be loaded into a database that has a character set that supports the specific language. If you attempt to install a translated version of Oracle Application Express into a database that does not support the character encoding of the language, the installation may fail or the translated Oracle Application Express instance may appear corrupt when run. The database character set `AL32UTF8` supports all the translated versions of Oracle Application Express.

You can manually install translated versions of Oracle Application Express using SQL*Plus. The installation files are encoded in `AL32UTF8`.

> **Note:** Regardless of the target database character set, to install a translated version of Oracle Application Express, you must set the character set value of the `NLS_LANG` environment variable to `AL32UTF8` before starting SQL*Plus.

The following examples illustrate valid `NLS_LANG` settings for loading Oracle Application Express translations:

```
American_America.AL32UTF8
Japanese_Japan.AL32UTF8
```

Installing a Translated Version of Oracle Application Express

Whether you are installing for the first time or upgrading from a previous release, you must run the `load_lang.sql` script to run a translated version of Oracle Application Express.

The installation scripts are located in subdirectories identified by a language code in the unzipped distribution `apex/builder`. For example, the German version is located in `apex/builder/de` and the Japanese version is located in `apex/builder/ja`. Within each of directory, there is a language loading script identified by the language code (for example, `load_de.sql` or `load_ja.sql`).

To install a translated version of Oracle Application Express:

1. Set the `NLS_LANG` environment variable, making sure that the character set is `AL32UTF8`. For example:
   - Bourne or Korn shell:

     ```
     NLS_LANG=American_America.AL32UTF8
     export NLS_LANG
     ```

   - C shell:

     ```
     setenv NLS_LANG American_America.AL32UTF8
     ```

   - For Windows based systems:

     ```
     set NLS_LANG=American_America.AL32UTF8
     ```

2. Navigate to the directory under apex/builder based on the language you need to install. For example for German, navigate to apex/builder/de. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Execute the following statement:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = APEX_040000;
   ```

4. Execute the appropriate language specific script. For example:

   ```
   @load_lang.sql
   ```

   Where `lang` is the specific language (for example, `load_de.sql` for German or `load_ja.sql` for Japanese).

About Managing JOB_QUEUE_PROCESSES

`JOB_QUEUE_PROCESSES` determine the maximum number of concurrently running jobs. In Oracle Application Express release 4.0, transactional support and SQL scripts require jobs. If `JOB_QUEUE_PROCESSES` is not enabled and working properly, you cannot successfully execute a script.

Topics in this section include:

- Viewing the Number of JOB_QUEUE_PROCESSES
- Changing the Number of JOB_QUEUE_PROCESSES

Viewing the Number of JOB_QUEUE_PROCESSES

There are currently three ways to view the number of JOB_QUEUE_PROCESSES:

- In the installation log file
- On the About Application Express page in Oracle Application Express
- From SQL*Plus

Viewing JOB_QUEUE_PROCESSES in the Installation Log File After installing or upgrading Oracle Application Express to release 4.0, you can view the number of JOB_QUEUE_PROCESSES in the installation log files. See "Reviewing a Log of an Installation Session" on page A-1.

Viewing JOB_QUEUE_PROCESSES in Oracle Application Express You can also view the number of JOB_QUEUE_PROCESSES on the About Application Express page.

To view the About Application Express page:

1. Log in to Oracle Application Express. See "Logging in to Your Workspace" on page 3-35.
2. On the Administration list, click **About Application Express**.

   The current number JOB_QUEUE_PROCESSES displays at the bottom of the page.

Viewing JOB_QUEUE_PROCESSES from SQL*Plus You can also view the number of JOB_QUEUE_PROCESSES from SQL*Plus by running the following SQL statement:

```
SELECT VALUE FROM v$parameter WHERE NAME = 'job_queue_processes'
```

Changing the Number of JOB_QUEUE_PROCESSES

You can change the number of JOB_QUEUE_PROCESSES by running a SQL statement in SQL*Plus:

To update the number of JOB_QUEUE_PROCESSES:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. In SQL*Plus run the following SQL statement:

   ```
   ALTER SYSTEM SET JOB_QUEUE_PROCESSES = <number>
   ```

   For example, running the statement ALTER SYSTEM SET JOB_QUEUE_PROCESSES = 20 sets JOB_QUEUE_PROCESSES to 20.

Configuring the SHARED_SERVERS Parameter

The embedded PL/SQL gateway uses the shared server architecture of the Oracle Database. To achieve acceptable performance when using the embedded PL/SQL gateway, ensure the SHARED_SERVERS database initialization parameter is set to a reasonable value (that is, not 0 or 1). For a small group of concurrent users, Oracle recommends a value of 5 for SHARED_SERVERS.

Consider the following example:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. Run the following statement:

   ```
   ALTER SYSTEM SET SHARED_SERVERS = 5 SCOPE=BOTH;
   ```

Create a Workspace and Add Oracle Application Express Users

You access the Oracle Application Express home page by logging in to workspace using a Web browser. Your Web browser must support JavaScript and the HTML 4.0 and CSS 1.0 standards. See "Browser Requirements" on page 2-2.

A **workspace** is a virtual private database allowing multiple users to work within the same Oracle Application Express installation while keeping their objects, data and applications private. Each workspace has a unique ID and name.

An Oracle Application Express administrator can create a workspace manually within Oracle Application Express Administration Services or have users submit requests. Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*.

> **See Also:** *Oracle Database 2 Day + Oracle Application Express Developer's Guide* if you are new to Oracle Application Express

Topics in this section include:

- Creating a Workspace Manually
- Creating Oracle Application Express Users
- Logging in to Your Workspace

Creating a Workspace Manually

To create an Oracle Application Express workspace manually:

1. **Log in to Oracle Application Express Administration Services.** Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. You log in using the `ADMIN` account and password created or reset during the installation process.

   a. In a Web browser, navigate to the Oracle Application Express Administration Services application.

      Because your setup uses the embedded PL/SQL gateway, go to:

      `http://hostname:port/pls/apex/apex_admin`

      Where:

      `hostname` is the name of the system where Oracle XML DB HTTP server is installed.

      `port` is the port number assigned to Oracle XML DB HTTP server. In a default installation, this number is 8080.

      `apex` is the database access descriptor (DAD) defined in the configuration file.

   b. On the Login page:

      – In Username, enter `admin`.

      – In Password, enter the Oracle Application Express administrator account password you specified in "Change the Password for the ADMIN Account" on page 3-21.

      – Click **Login**.

      See Also: See "Logging in to Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*.

   Next, create a workspace.

2. Click **Manage Workspaces**.
3. Under Manage Workspaces, click **Create Workspace**.

   The Create Workspace Wizard appears.
4. For Identify Workspace, enter a workspace name and description and click **Next**.
5. For Identify Schema, select the Oracle Forms application schema.

   a. For Re-use existing schema, select **Yes**.

   b. Select a schema from the list.

   c. Click **Next**.
6. For Identify Administrator, enter the Workspace administrator information and click **Next**.
7. Confirm your selections and click **Create**.

Creating Oracle Application Express Users

To create an Oracle Application Express user account:

1. Log in to Oracle Application Express Administration Services as described in the previous section. See "Logging in to Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*.

2. Click the **Administration** icon.

   The Administration page appears.

3. Click **Manage Users and Groups**.

4. Click **Create User**.

   The Create User page appears.

5. Under User Identification, enter:

   a. **Username** - Enter the username used to log in to the system. Restrictions include:

      – Maximum length of 100 characters

      – No spaces

      – Only these special characters are permitted: ampersand (@) and period (.)

   b. **Email Address** - Enter the valid email address for this user.

   c. **First Name** - Enter the first or given name to further identify the user (optional).

   d. **Last Name** - Enter the last or family name to further identify the user (optional).

   e. **Description** - Enter comments about this user (optional).

6. Under Account Privileges:

   a. **Default Schemas** - Specify the default schema used for data browsing, application creation, and SQL script execution.

      When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.

   b. **Accessible Schemas** (null for all) - Leave this blank to enable the end user to access all schemas in the workspace, or enter a colon-delimited list of schemas for which this user has permissions when using the SQL Workshop.

   c. **User is a workspace administrator** - Specify if this user should have workspace administrator privileges.

      Administrators are given access to all components. Additionally, they can manage user accounts, groups, and development services. Components may not be available if they are switched off by Instance Administrators.

   d. **User is a developer** - Specify if this user should have developer privileges.

      Developers must have access to either Application Builder, SQL Workshop, or both. Components may not be available if they are switched off by Instance Administrators.

   e. **Application Builder Access** - Determines whether a developer has access to the Application Builder.

   f. **SQL Workshop Access** - Determines whether a developer has access to the SQL Workshop.

   g. **Team Development Access** - Determines whether a developer has access to the Team Development.

   h. **Set Account Availability** - Select **Locked** to prevent the account from being used. Select **Unlocked** to allow the account to be used.

If the user has exceeded the maximum login failures allowed, specified in Workspace Preferences, then their account will be locked automatically.

7. Under Password:
   - **Password** - Enter a case sensitive password.
   - **Confirm Password** - Enter the password again.
   - **Require Change of Password On First Use** - Select **No** to allow the user to use the same password until it expires. Select **Yes** to require the user to change the password immediately when logging in the first time.
8. Under User Groups, optionally select one or more user groups by holding down the **CTRL** key and selecting the groups.
9. Click **Create User** or **Create and Create Another**.

Logging in to Your Workspace

Once you create a workspace, you must log in to it using your login credentials (that is, the workspace name, user name, and password).

> **See Also:** See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*

To log in to your workspace:

1. In a Web browser, navigate to the Oracle Application Express Login page.

   Because your setup uses the embedded PL/SQL gateway, go to:

   `http://hostname:port/apex`

   Where:

   – `hostname` is the name of the system where Oracle XML DB HTTP server is installed.

   – `port` is the port number assigned to Oracle XML DB HTTP server. In a default installation, this number is 8080.

   – `apex` is the database access descriptor (DAD) defined in the configuration file.

   For users who have upgraded from earlier releases, or who have a custom configuration, this value may be `htmldb` or something else. Verify your DAD with your Oracle Application Express administrator.

   The Login page appears.
2. Under Login, enter the following:
   - Workspace field - Enter the name of your workspace.
   - Username field - Enter your user name.
   - Password field - Enter your case-sensitive password.
3. Click **Login**.

   Note that, depending on your setup, you might be required to change your password when you log in for the first time.

Downloading from OTN and Configuring Oracle HTTP Server

This section describes how to install Oracle Application Express by downloading a ZIP file from OTN and then configuring Oracle HTTP Server with `mod_plsql` distributed with Oracle Database 11*g* or Oracle Application Server 10*g*.

Topics in this section include:

- Install the Oracle Database and Complete Pre-installation Tasks
- Download and Install Oracle Application Express
- Change the Password for the ADMIN Account
- Restart Processes
- Configure Oracle HTTP Server Distributed with Oracle Database 11g or Oracle Application Server 10g
- Enable Network Services in Oracle Database 11g
- Enable Indexing of Online Help in Oracle Database 11gR2 and Higher
- Security Considerations
- About Running Oracle Application Express in Other Languages
- About Managing JOB_QUEUE_PROCESSES
- About Obfuscating PlsqlDatabasePassword Parameter
- Create a Workspace and Add Oracle Application Express Users

> **See Also:** "About the Oracle Application Express Runtime Environment" on page 1-2

Install the Oracle Database and Complete Pre-installation Tasks

Oracle Application Express requires an Oracle database that is release 10.2.0.3 or later or Oracle Database 10g Express Edition. To learn more, see the *Oracle Database Installation Guide* for your operating environment and "Recommended Pre-installation Tasks" on page 3-1.

Download and Install Oracle Application Express

To install Oracle Application Express:

1. For installations where the development will be in English only, download the file `apex_4.0_en.zip` from the Oracle Application Express download page. Where the development will include languages other than English, download `apex_4.0.zip` from the Oracle Application Express download page. See:

   `http://www.oracle.com/technology/products/database/application_express/download.html`

   Note that the actual file name may differ if a more recent release has shipped since this document was published.

2. Unzip downloaded zip file:
   - If English only, unzip `apex_4.0_en.zip` as follows, preserving directory names:
     - UNIX and Linux: Unzip `apex_4.0_en.zip`
     - Windows: Double click the file apex_4.0_en.zip in Windows Explorer

- If multiple languages, unzip `apex_4.0.zip` as follows, preserving directory names:
  - UNIX and Linux: Unzip `apex_4.0.zip`
  - Windows: Double click the file `apex_4.0.zip` in Windows Explorer

Note: You should keep the directory tree where you unzip the files short and not under directories that contain spaces. For example, within Windows unzip to C:\.

---

3. Change your working directory to `apex`.
4. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

5. Disable any existing password complexity rules for the default profile. See "Configuring Password Protection" in *Oracle Database Security Guide*.
6. Select the appropriate installation option.

   Full development environment provides complete access to the Application Builder environment to develop applications. A **Runtime environment** enables users to run applications that cannot be modified. To learn more, see "About the Oracle Application Express Runtime Environment" on page 1-2.

   Available installation options include:

   - **Full development environment**. Run `apexins.sql` passing the following four arguments in the order shown:

     ```
     @apexins tablespace_apex tablespace_files tablespace_temp images
     ```

     Where:
     - *`tablespace_apex`* is the name of the tablespace for the Oracle Application Express application user.
     - *`tablespace_files`* is the name of the tablespace for the Oracle Application Express files user.
     - *`tablespace_temp`* is the name of the temporary tablespace.
     - *`images`* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as `/i/`.

     Example:

     ```
     @apexins SYSAUX SYSAUX TEMP /i/
     ```

Note: If you receive the following error, please exit SQL*Plus and change your working directory to apex:

```
SP2-0310: unable to open file "apexins.sql"
```

- **Runtime environment**. Run `apxrtins.sql` passing the following arguments in the order shown:

  ```
  @apxrtins tablespace_apex tablespace_files tablespace_temp images
  ```

  Where:

  - *`tablespace_apex`* is the name of the tablespace for the Oracle Application Express application user.
  - *`tablespace_files`* is the name of the tablespace for the Oracle Application Express files user.
  - *`tablespace_temp`* is the name of the temporary tablespace.
  - *`images`* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as `/i/`.

  Example:

  ```
  @apxrtins SYSAUX SYSAUX TEMP /i/
  ```

See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

When Oracle Application Express installs it creates three new database accounts:

- `APEX_040000` - The account that owns the Oracle Application Express schema and metadata.
- `FLOWS_FILES` - The account that owns the Oracle Application Express uploaded files.
- `APEX_PUBLIC_USER` - The minimally privileged account used for Oracle Application Express configuration with Oracle HTTP Server and `mod_plsql` or Oracle Application Express Listener.

If you are upgrading from a previous release, `FLOWS_FILES`, already exists and `APEX_PUBLIC_USER` is created if it does not already exist.

Tip: Oracle Application Express must be installed from a writable directory on the file system. See "Reviewing a Log of an Installation Session" on page A-1.

Change the Password for the ADMIN Account

In a new installation of Oracle Application Express, or if you are converting a runtime environment to a development environment, you must change the password of the internal `ADMIN` account. In an upgrade scenario, the password will be preserved and carried over from the prior release.

To change the password for the `ADMIN` account:

1. Change your working directory to the `apex` directory where you unzipped the installation software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Run `apxchpwd.sql`. For example:

   ```
   @apxchpwd
   ```

   When prompted enter a password for the `ADMIN` account.

   See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

Restart Processes

After you install Oracle Application Express, you must restart the processes that you stopped before you began the installation, such as listener and other processes. In addition, restart Oracle HTTP Server.

Configure Oracle HTTP Server Distributed with Oracle Database 11*g* or Oracle Application Server 10*g*

This section describes how to configure Oracle HTTP Server with `mod_plsql` distributed with Oracle Database 11*g* or Oracle Application Server 10*g*.

Topics in this section include:

- Unlocking the APEX_PUBLIC_USER Account
- Changing the Password for the APEX_PUBLIC_USER Account
- Copy the Images Directory
- Configuring Oracle HTTP Server 11g or Oracle Application Server 10g

Unlocking the APEX_PUBLIC_USER Account

The `APEX_PUBLIC_USER` account is locked at the end of a new installation of Oracle Application Express. You must unlock this account before configuring the database access descriptor (DAD) in a new installation.

Tip: If you are upgrading from a prior release of Oracle Application Express, this step is unnecessary.

To unlock the `APEX_PUBLIC_USER` account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

- On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Run the following statement:

```
ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK
```

Changing the Password for the APEX_PUBLIC_USER Account

The APEX_PUBLIC_USER account is created with a random password in a new installation of Oracle Application Express. You must change the password for this account before configuring the database access descriptor (DAD) in a new installation.

> **Tip:** If you are upgrading from a prior release of Oracle Application Express, this step is unnecessary.

To change the password for the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. For example:

   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

   - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Run the following statement:

```
ALTER USER APEX_PUBLIC_USER IDENTIFIED BY new_password
```

   Where new_password is the new password you are setting for APEX_PUBLIC_USER. You will use this password when creating the DAD in the sections that follow.

About Password Expiration in Oracle Database 11*g* In the default profile in Oracle Database 11*g*, the parameter PASSWORD_LIFE_TIME is set to 180. If you are using Oracle Database 11*g* with Oracle Application Express, this causes the password for APEX_PUBLIC_USER to expire in 180 days. As a result, your Oracle Application Express instance will become unusable until you change the password.

To prevent this behavior, create another profile in which the PASSWORD_LIFE_TIME parameter is set to unlimited and alter the APEX_PUBLIC_USER account and assign it the new profile.

See Also: *Oracle Database Security Guide* for information on creating profiles and assigning them to database users.

Copy the Images Directory

Whether you are loading a new installation or upgrading from a previous release, you must copy the `images` directory from the top level of the `apex\images` directory to the location on the file system containing the Oracle home for Oracle HTTP Server.

Topics in this section include:

- Copying the Images Directory After an Upgrade
- Copying the Images Directory in a New Installation

Copying the Images Directory After an Upgrade During an upgrade, you must overwrite your existing images directory. Before you begin the upgrade, to ensure that you can revert to the previous version, Oracle recommends that you create a copy of your existing `images` directory for Oracle Application Express, indicating the release number of the images (for example, `images_3_1`).

To locate the `images` directory on the file system, review the following files for the text alias `/i/`:

- Oracle Application Server 10*g*—see the `marvel.conf` or `dads.conf` files.
- Oracle HTTP Server distributed with Oracle Database 11*g*—see the `marvel.conf` or `dads.conf` files.

When you locate the images directory path, copy the existing images directory to a backup location. Doing so enables you to revert to the previous release, if that becomes necessary.

After you copy the existing images directory, use the following command syntax to copy the `apex\images` directory from the Oracle Database home to the existing images directory path, overwriting the existing images:

- Oracle Application Server 10*g*:
  - On Windows:

    ```
    xcopy /E /I APEX_HOME\apex\images ORACLE_HTTPSERVER_HOME\Apache\images
    ```

  - On UNIX and Linux:

    ```
    cp -rf APEX_HOME/apex/images ORACLE_HTTPSERVER_HOME/Apache
    ```

- Oracle HTTP Server distributed with Oracle Database 11*g*:
  - On Windows:

    ```
    xcopy /E /I APEX_HOME\apex\images ORACLE_HTTPSERVER_HOME\ohs\images
    ```

  - On UNIX and Linux:

    ```
    cp -rf APEX_HOME/apex/images ORACLE_HTTPSERVER_HOME/ohs
    ```

In the preceding syntax examples:

- `APEX_HOME` is the directory where the Oracle Application Express software was unzipped
- `ORACLE_HTTPSERVER_HOME` is the existing Oracle Application Server or Oracle HTTP Server Oracle home

Copying the Images Directory in a New Installation After installation, copy the directory `apex/images`.

- Oracle Application Server 10*g*:
  - On Windows:

    ```
    xcopy /E /I ORACLE_HOME\apex\images ORACLE_HTTPSERVER_HOME\Apache\images
    ```

  - On UNIX and Linux:

    ```
    cp -rf $ORACLE_HOME/apex/images ORACLE_HTTPSERVER_HOME/Apache
    ```

- Oracle HTTP Server distributed with Oracle Database 11*g:*
  - On Windows:

    ```
    xcopy /E /I ORACLE_HOME\apex\images ORACLE_HTTPSERVER_HOME\ohs\images
    ```

  - On UNIX and Linux:

    ```
    cp -rf $ORACLE_HOME/apex/images ORACLE_HTTPSERVER_HOME/ohs
    ```

In the preceding syntax examples:

- `ORACLE_HOME` is the Oracle Database Oracle home
- `ORACLE_HTTPSERVER_HOME` is the existing Oracle Application Server or Oracle HTTP Server Oracle home

Configuring Oracle HTTP Server 11*g* or Oracle Application Server 10*g*

Perform the following post installation steps if:

- This is a new installation of Oracle Application Express (that is, you are not upgrading from a previous release).
- You are running Oracle HTTP Server distributed with Oracle Database 11*g* or Oracle Application Server 10*g*.
- Oracle HTTP Server is installed in an Oracle home.

Topics in this section include:

- Editing the dads.conf File
- Stopping and Restarting Oracle HTTP Server

Note: Within the context of this document, `ORACLE_HTTPSERVER_HOME` is the location where Oracle HTTP Server is installed.

Editing the dads.conf File If this is a new installation of Oracle Application Express, you must edit the `dads.conf` file. The `dads.conf` file contains the information about the DAD to access Oracle Application Express.

To edit the `dads.conf` file:

1. Use a text editor and open the `dads.conf`.
   - Oracle Application Server 10*g*:
     - On Windows see:

       ```
       ORACLE_HTTPSERVER_HOME\Apache\modplsql\conf\dads.conf
       ```

  - On UNIX and Linux see:

    ORACLE_HTTPSERVER_HOME/Apache/modplsql/conf/dads.conf

- Oracle HTTP Server distributed with Oracle Database 11*g*:
  - On Windows see:

    ORACLE_HTTPSERVER_HOME\ohs\modplsql\conf\dads.conf

  - On UNIX and Linux see:

    ORACLE_HTTPSERVER_HOME/ohs/modplsql/conf/dads.conf

2. In the `dads.conf` file, replace `ORACLE_HTTPSERVER_HOME`, `host`, `port`, `service_name`, and `apex_public_user_password` with values appropriate for your environment. Note that the `apex_public_user_password` is the password you changed in "Changing the Password for the APEX_PUBLIC_USER Account" on page 3-40.

   Note that the path listed is only an example. The path in the dads.conf file should reference the file system path described in "Copy the Images Directory" on page 3-41.

```
Alias /i/ "ORACLE_HTTPSERVER_HOME/Apache/images/"

<Location /pls/apex>
 Order deny,allow
 PlsqlDocumentPath docs
 AllowOverride None
 PlsqlDocumentProcedure         wwv_flow_file_mgr.process_download
 PlsqlDatabaseConnectString     host:port:service_name ServiceNameFormat
 PlsqlNLSLanguage               AMERICAN_AMERICA.AL32UTF8
 PlsqlAuthenticationMode        Basic
 SetHandler                     pls_handler
 PlsqlDocumentTablename         wwv_flow_file_objects$
 PlsqlDatabaseUsername          APEX_PUBLIC_USER
 PlsqlDefaultPage               apex
 PlsqlDatabasePassword          apex_public_user_password
 PlsqlRequestValidationFunction wwv_flow_epg_include_modules.authorize
 Allow from all
</Location>
```

3. Locate the line containing `PlsqlNLSLanguage`.

   The `PlsqlNLSLanguage` setting determines the language setting of the DAD. The character set portion of the `PlsqlNLSLanguage` value must be set to `AL32UTF8`, regardless of whether or not the database character set is `AL32UTF8`. For example:

```
...
PlsqlNLSLanguage            AMERICAN_AMERICA.AL32UTF8
...
```

4. Save and exit the `dads.conf` file.

Stopping and Restarting Oracle HTTP Server To stop and restart Oracle HTTP Server:

- UNIX and Linux

  If database is 10g and lower, execute the following:

```
ORACLE_HTTPSERVER_HOME/opmn/bin/opmnctl stopproc ias-component=HTTP_Server
```

```
ORACLE_HTTPSERVER_HOME/opmn/bin/opmnctl startproc ias-component=HTTP_Server
```

- Windows, execute the following:

  If database is 10g and lower, execute the following:

```
ORACLE_HTTPSERVER_HOME\opmn\bin\opmnctl stopproc ias-component=HTTP_Server
ORACLE_HTTPSERVER_HOME\opmn\bin\opmnctl startproc ias-component=HTTP_Server
```

> **Note:** If you are using Oracle HTTP Server that is included with Oracle Fusion Middleware 11.1.1, you may need to replace the ias-component name above if the name given to the component was something other than HTTP_Server when it was installed. The default name is ohs1.

Disabling Oracle XML DB HTTP Server

If you were previously using the embedded PL/SQL Gateway and now wish to use Oracle HTTP server and mod_plsql, you need to disable the Oracle XML DB HTTP server.

To disable Oracle XML DB HTTP server:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

   - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Run the following command:

```
EXEC DBMS_XDB.SETHTTPPORT(0);
```

Enable Network Services in Oracle Database 11*g*

By default, the ability to interact with network services is disabled in Oracle Database 11*g* release 1 or 2. Therefore, if you are running Oracle Application Express with Oracle Database 11*g* release 1 or 2, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_040000` database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle Application Express.

  Users can call methods from the `APEX_MAIL` package, but issues arise when sending outbound email.

- Using Web services in Oracle Application Express.
- PDF/report printing.
- Searching for content in online Help (that is, using the Find link).

Topics in this section include:

- Granting Connect Privileges
- Troubleshooting an Invalid ACL Error

> **Tip:** To run the examples described in this section, the compatible initialization parameter of the database must be set to at least 11.1.0.0.0. By default an 11*g* database will already have the parameter set properly, but a database upgraded to 11*g* from a prior version may not. See "Creating and Configuring an Oracle Database" in *Oracle Database Administrator's Guide* for information about changing database initialization parameters.

Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the `APEX_040000` database user. This example assumes you connected to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040000
  -- the "connect" privilege if APEX_040000 does not have the privilege yet.

  SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
   WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- Before checking the privilege, ensure that the ACL is valid
  -- (for example, does not contain stale references to dropped users).
  -- If it does, the following exception will be raised:
  --
  -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040000'
  -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
  --
  SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
    FROM XDB.XDB$ACL A, PATH_VIEW P
   WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
         EQUALS_PATH(P.RES, ACL_PATH) = 1;

  DBMS_XDBZ.ValidateACL(ACL_ID);
   IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', TRUE, 'connect');
  END IF;

EXCEPTION
  -- When no ACL has been assigned to '*'.
  WHEN NO_DATA_FOUND THEN
  DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('power_users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('power_users.xml','*');
END;
/
COMMIT;
```

The following example demonstrates how to provide less privileged access to local network resources. This example would enable indexing the Oracle Application Express Online Help and could possibly enable email and PDF printing if those servers were also on the local host.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to 'localhost' and give APEX_040000
  -- the "connect" privilege if APEX_040000 does not have the privilege yet.
  SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
   WHERE HOST = 'localhost' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- Before checking the privilege, ensure that the ACL is valid
  -- (for example, does not contain stale references to dropped users).
  -- If it does, the following exception will be raised:
  --
  -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040000'
  -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
  --

  SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
    FROM XDB.XDB$ACL A, PATH_VIEW P
   WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
         EQUALS_PATH(P.RES, ACL_PATH) = 1;

  DBMS_XDBZ.ValidateACL(ACL_ID);
   IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', TRUE, 'connect');
  END IF;

EXCEPTION
  -- When no ACL has been assigned to 'localhost'.
  WHEN NO_DATA_FOUND THEN
  DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('local-access-users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml','localhost');
END;
/
COMMIT;
```

Troubleshooting an Invalid ACL Error

If you receive an `ORA-44416: Invalid ACL` error after running the previous script, use the following query to identify the invalid ACL:

```
REM Show the dangling references to dropped users in the ACL that is assigned
REM to '*'.

SELECT ACL, PRINCIPAL
  FROM DBA_NETWORK_ACLS NACL, XDS_ACE ACE
 WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL AND
       NACL.ACLID = ACE.ACLID AND
       NOT EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);
```

Next, run the following code to fix the ACL:

```
DECLARE
  ACL_ID   RAW(16);
  CNT      NUMBER;
BEGIN
  -- Look for the object ID of the ACL currently assigned to '*'
  SELECT ACLID INTO ACL_ID FROM DBA_NETWORK_ACLS
   WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- If just some users referenced in the ACL are invalid, remove just those
  -- users in the ACL. Otherwise, drop the ACL completely.
  SELECT COUNT(PRINCIPAL) INTO CNT FROM XDS_ACE
   WHERE ACLID = ACL_ID AND
         EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);

  IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
                WHERE ACLID = ACL_ID AND
                      NOT EXISTS (SELECT NULL FROM ALL_USERS
                                  WHERE USERNAME = PRINCIPAL)) LOOP
      UPDATE XDB.XDB$ACL
         SET OBJECT_VALUE =
               DELETEXML(OBJECT_VALUE,
                         '/ACL/ACE[PRINCIPAL="'||R.PRINCIPAL||'"]')
       WHERE OBJECT_ID = ACL_ID;
    END LOOP;

  ELSE
    DELETE FROM XDB.XDB$ACL WHERE OBJECT_ID = ACL_ID;
  END IF;

END;
/

REM commit the changes.

COMMIT;
```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the APEX_040000 user. See "Granting Connect Privileges" on page 3-45.

Enable Indexing of Online Help in Oracle Database 11gR2 and Higher

The ability to search Oracle Application Express online Help is accomplished through Oracle Text and a URL datastore. There is a change in the default behavior and permissions to use an Oracle Text URL datastore in database 11gR2 and higher.

If users attempt to search Oracle Application Express online Help in Oracle database 11gR2 and encounter the following error, then the permission to use an Oracle Text URL datastore has not been granted to database user APEX_040000.

```
ORA-29855: error occurred in the execution of ODCIINDEXCREATE routine
ORA-20000: Oracle Text error:
DRG-10758: index owner does not have the privilege to use file or URL datastore
```

To enable the indexing of online Help in Oracle Application Express, the permission to use an Oracle Text URL datastore must be granted to the APEX_040000 database user. This is accomplished by assigning this specific privilege to a database role and then granting this role to the APEX_040000 database user.

To determine if the ability to use an Oracle Text URL datastore is already granted to a database role:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. Run the following command:

   ```
   SELECT par_value FROM ctxsys.ctx_parameters WHERE par_name = 'FILE_ACCESS_
   ROLE';
   ```

   This returns either `NULL` or the database role which is granted the ability to use an Oracle Text URL datastore.

3. If no value is returned by step 2, then create a new database role as shown in the following example:

   ```
   CREATE ROLE APEX_URL_DATASTORE_ROLE;
   ```

4. Grant this role to the database user `APEX_040000` with the following statement:

   ```
   GRANT APEX_URL_DATASTORE_ROLE to APEX_040000;
   ```

   If step 2 returned a value, use this database role name instead of the example *APEX_URL_DATASTORE_ROLE*.

5. Lastly, if step 2 did not return a value, then use the Oracle Text API to grant permission to the newly created database role with the following statement:

   ```
   EXEC ctxsys.ctx_adm.set_parameter('file_access_role', 'APEX_URL_DATASTORE_
   ROLE');
   ```

Security Considerations

Oracle highly recommends you configure and use Secure Sockets Layer (SSL) to ensure that passwords and other sensitive data are not transmitted in clear text in HTTP requests. Without the use of SSL, passwords could potentially be exposed, compromising security.

SSL is an industry standard protocol that uses RSA public key cryptography in conjunction with symmetric key cryptography to provide authentication, encryption, and data integrity.

About Running Oracle Application Express in Other Languages

The Oracle Application Express interface is translated into German, Spanish, French, Italian, Japanese, Korean, Brazilian Portuguese, Simplified Chinese, and Traditional Chinese. A single instance of Oracle Application Express can be installed with one or

more of these translated versions. At runtime, each user's Web browser language settings determine the specific language version.

In order to install other languages you must use the `apex_4.0.zip` file which contains the extra files referenced below. If you previously downloaded `apex_4.0_en.zip`, then you don't need to re-install Oracle Application Express. Simply download `apex_4.0.zip` and unzip the file into the same directory where you unzipped `apex_4.0_en.zip`.

The translated version of Oracle Application Express should be loaded into a database that has a character set that supports the specific language. If you attempt to install a translated version of Oracle Application Express into a database that does not support the character encoding of the language, the installation may fail or the translated Oracle Application Express instance may appear corrupt when run. The database character set `AL32UTF8` supports all the translated versions of Oracle Application Express.

You can manually install translated versions of Oracle Application Express using SQL*Plus. The installation files are encoded in `AL32UTF8`.

Note: Regardless of the target database character set, to install a translated version of Oracle Application Express, you must set the character set value of the `NLS_LANG` environment variable to `AL32UTF8` before starting SQL*Plus.

The following examples illustrate valid `NLS_LANG` settings for loading Oracle Application Express translations:

```
American_America.AL32UTF8
Japanese_Japan.AL32UTF8
```

Installing a Translated Version of Oracle Application Express

Whether you are installing for the first time or upgrading from a previous release, you must run the `load_`*`lang`*`.sql` script to run a translated version of Oracle Application Express.

The installation scripts are located in subdirectories identified by a language code in the unzipped distribution `apex/builder`. For example, the German version is located in `apex/builder/de` and the Japanese version is located in `apex/builder/ja`. Within each of directory, there is a language loading script identified by the language code (for example, `load_de.sql` or `load_ja.sql`).

To install a translated version of Oracle Application Express:

1. Set the `NLS_LANG` environment variable, making sure that the character set is `AL32UTF8`. For example:

   - Bourne or Korn shell:

     ```
     NLS_LANG=American_America.AL32UTF8
     export NLS_LANG
     ```

   - C shell:

     ```
     setenv NLS_LANG American_America.AL32UTF8
     ```

   - For Windows based systems:

     ```
     set NLS_LANG=American_America.AL32UTF8
     ```

2. Navigate to the directory under apex/builder based on the language you need to install. For example for German, navigate to apex/builder/de. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Execute the following statement:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = APEX_040000;
   ```

4. Execute the appropriate language specific script. For example:

   ```
   @load_lang.sql
   ```

   Where `lang` is the specific language (for example, `load_de.sql` for German or `load_ja.sql` for Japanese).

About Managing JOB_QUEUE_PROCESSES

`JOB_QUEUE_PROCESSES` determine the maximum number of concurrently running jobs. In Oracle Application Express release 4.0, transactional support and SQL scripts require jobs. If `JOB_QUEUE_PROCESSES` is not enabled and working properly, you cannot successfully execute a script.

Topics in this section include:

- Viewing the Number of JOB_QUEUE_PROCESSES
- Changing the Number of JOB_QUEUE_PROCESSES

Viewing the Number of JOB_QUEUE_PROCESSES

There are currently three ways to view the number of `JOB_QUEUE_PROCESSES`:

- In the installation log file
- On the About Application Express page in Oracle Application Express
- From SQL*Plus

Viewing JOB_QUEUE_PROCESSES in the Installation Log File After installing or upgrading Oracle Application Express to release 4.0, you can view the number of `JOB_QUEUE_PROCESSES` in the installation log files. See "Reviewing a Log of an Installation Session" on page A-1.

Viewing JOB_QUEUE_PROCESSES in Oracle Application Express You can also view the number of `JOB_QUEUE_PROCESSES` on the About Application Express page.

To view the About Application Express page:

1. Log in to Oracle Application Express. See "Logging in to Your Workspace" on page 3-54.
2. On the Administration list, click **About Application Express**.

   The current number JOB_QUEUE_PROCESSES displays at the bottom of the page.

Viewing JOB_QUEUE_PROCESSES from SQL*Plus You can also view the number of JOB_QUEUE_PROCESSES from SQL*Plus by running the following SQL statement:

```
SELECT VALUE FROM v$parameter WHERE NAME = 'job_queue_processes'
```

Changing the Number of JOB_QUEUE_PROCESSES

You can change the number of JOB_QUEUE_PROCESSES by running a SQL statement in SQL*Plus:

To update the number of JOB_QUEUE_PROCESSES:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. In SQL*Plus run the following SQL statement:

   ```
   ALTER SYSTEM SET JOB_QUEUE_PROCESSES = <number>
   ```

   For example, running the statement ALTER SYSTEM SET JOB_QUEUE_PROCESSES = 20 sets JOB_QUEUE_PROCESSES to 20.

About Obfuscating PlsqlDatabasePassword Parameter

The PlsqlDatabasePassword parameter specifies the password for logging in to the database. You can use the dadTool.pl utility to obfuscate passwords in the dads.conf file.

You can find the dadTool.pl utility in the following directory:

- For UNIX and Linux based systems:

  ORACLE_BASE/*ORACLE_HTTPSERVER_HOME*/Apache/modplsql/conf

- For Windows based systems:

  *ORACLE_BASE**ORACLE_HTTPSERVER_HOME*\Apache\modplsql\conf

Obfuscating Passwords

To obfuscate passwords, run dadTool.pl by following the instructions in the dadTool.README file.

Create a Workspace and Add Oracle Application Express Users

You access the Oracle Application Express home page by logging in to workspace using a Web browser. Your Web browser must support JavaScript and the HTML 4.0 and CSS 1.0 standards. See "Browser Requirements" on page 2-2.

A **workspace** is a virtual private database allowing multiple users to work within the same Oracle Application Express installation while keeping their objects, data and applications private. Each workspace has a unique ID and name.

An instance administrator can create a workspace manually within Oracle Application Express Administration Services or have users submit requests. Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*.

> **See Also:** *Oracle Database 2 Day + Oracle Application Express Developer's Guide* if you are new to Oracle Application Express

Topics in this section include:

- Creating a Workspace Manually
- Creating Oracle Application Express Users
- Logging in to Your Workspace

Creating a Workspace Manually

To create an Oracle Application Express workspace manually:

1. **Log in to Oracle Application Express Administration Services.** Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. You log in using the `ADMIN` account and password created or reset during the installation process.

   a. In a Web browser, navigate to the Oracle Application Express Administration Services application.

      Because your setup uses Apache and `mod_plsql`, go to:

      `http://hostname:port/pls/apex/apex_admin`

      Where:

      `hostname` is the name of the system where Oracle HTTP Server is installed.

      `port` is the port number assigned to Oracle HTTP Server. In a default installation, this number is 7777.

      `pls` is the indicator to use the `mod_plsql` cartridge.

      `apex` is the database access descriptor (DAD) defined in the `mod_plsql` configuration file.

   b. On the Login page:

      – In Username, enter `admin`.

      – In Password, enter the Oracle Application Express administrator account password you specified in "Change the Password for the ADMIN Account" on page 3-21.

      – Click **Login**.

See Also: See "Logging in to Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*.

Next, create a workspace.

2. Click **Manage Workspaces**.
3. Under Manage Workspaces, click **Create Workspace**.

   The Create Workspace Wizard appears.
4. For Identify Workspace, enter a workspace name and description and click **Next**.
5. For Identify Schema, select the Oracle Forms application schema.
   a. For Re-use existing schema, select **Yes**.
   b. Select a schema from the list.
   c. Click **Next**.
6. For Identify Administrator, enter the Workspace administrator information and click **Next**.
7. Confirm your selections and click **Create**.

Creating Oracle Application Express Users

To create an Oracle Application Express user account:

1. Log in to Oracle Application Express Administration Services as described in the previous section. See "Logging in to Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*.
2. Click the **Administration** icon.

   The Administration page appears.
3. Click **Manage Users and Groups**.
4. Click **Create User**.

   The Create User page appears.
5. Under User Identification, enter:
   a. **Username** - Enter the username used to log in to the system. Restrictions include:
      – Maximum length of 100 characters
      – No spaces
      – Only these special characters are permitted: ampersand (@) and period (.)
   b. **Email Address** - Enter the valid email address for this user.
   c. **First Name** - Enter the first or given name to further identify the user (optional).
   d. **Last Name** - Enter the last or family name to further identify the user (optional).
   e. **Description** - Enter comments about this user (optional).
6. Under Account Privileges:

a. **Default Schemas** - Specify the default schema used for data browsing, application creation, and SQL script execution.

   When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.

b. **Accessible Schemas** (null for all) - Leave this blank to enable the end user to access all schemas in the workspace, or enter a colon-delimited list of schemas for which this user has permissions when using the SQL Workshop.

c. **User is a workspace administrator** - Specify if this user should have workspace administrator privileges.

   Administrators are given access to all components. Additionally, they can manage user accounts, groups, and development services. Components may not be available if they are switched off by Instance Administrators.

d. **User is a developer** - Specify if this user should have developer privileges.

   Developers must have access to either Application Builder, SQL Workshop, or both. Components may not be available if they are switched off by Instance Administrators.

e. **Application Builder Access** - Determines whether a developer has access to the Application Builder.

f. **SQL Workshop Access** - Determines whether a developer has access to the SQL Workshop.

g. **Team Development Access** - Determines whether a developer has access to the Team Development.

h. **Set Account Availability** - Select **Locked** to prevent the account from being used. Select **Unlocked** to allow the account to be used.

   If the user has exceeded the maximum login failures allowed, specified in Workspace Preferences, then their account will be locked automatically.

7. Under Password:
   - **Password** - Enter a case sensitive password.
   - **Confirm Password** - Enter the password again.
   - **Require Change of Password On First Use** - Select **No** to allow the user to use the same password until it expires. Select **Yes** to require the user to change the password immediately when logging in the first time.
8. Under User Groups, optionally select one or more user groups by holding down the **CTRL** key and selecting the groups.
9. Click **Create User** or **Create and Create Another**.

Logging in to Your Workspace

Once you create a workspace, you must log in to it using your login credentials (that is, the workspace name, user name, and password).

> **See Also:** See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*

To log in to your workspace:

1. In a Web browser, navigate to the Oracle Application Express Login page.

Because your setup uses the HTTP server, go to:

```
http://hostname:port/pls/apex
```

Where:

- `hostname` is the name of the system where Oracle XML DB HTTP server is installed.
- `port` is the port number assigned to Oracle XML DB HTTP server. In a default installation, this number is 8080.
- `pls` is the indicator to use the `mod_plsql` cartridge.
- `apex` is the database access descriptor (DAD) defined in the configuration file.

  For users who have upgraded from earlier releases, or who have a custom configuration, this value may be `htmldb` or something else. Verify your DAD with your Oracle Application Express administrator.

The Login page appears.

2. Under Login, enter the following:
   - Workspace field - Enter the name of your workspace.
   - Username field - Enter your user name.
   - Password field - Enter your case-sensitive password.
3. Click **Login**.

   Note that, depending on your setup, you might be required to change your password when you log in for the first time.

Post Installation Tasks for Upgrade Installations

Once you have verified that your upgrade installation was successful and all upgraded applications function properly, you should remove schemas from prior Oracle Application Express installations.

Topics in this section include:

- Remove Prior Oracle Application Express Installations
- Fix Invalid ACL in Oracle Database 11g

Remove Prior Oracle Application Express Installations

The database users associated with schemas from prior installations are privileged users and should be removed when they are no longer necessary. Removing schemas from a prior installation is a two step process. First you verify if a prior installation exists and then you remove the schemas.

Verify if a Prior Installation Exists

To verify if a prior installation exists:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS`. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     ```

```
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Run the following query:

```
SELECT username
   FROM dba_users
 WHERE (username LIKE 'FLOWS_%' OR USERNAME LIKE 'APEX_%')
   AND USERNAME NOT IN (
        SELECT 'FLOWS_FILES'
          FROM DUAL
         UNION
        SELECT 'APEX_PUBLIC_USER' FROM DUAL
         UNION
        SELECT SCHEMA s
           FROM dba_registry
          WHERE comp_id = 'APEX');
```

If the results contain entries in the form `FLOWS_XXXXXX` or `APEX_XXXXXX` where *XXXXXX* represents six numbers, those entries are candidates for removal.

Remove Schemas from Prior Installations

To remove schemas from prior installations:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

   - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Execute a statement similar to the following example:

```
DROP USER FLOWS_030000 CASCADE;
```

Fix Invalid ACL in Oracle Database 11g

After following the instructions in"Remove Prior Oracle Application Express Installations" on page 3-55, you may need to fix an invalid ACL if you are running Oracle Database 11*g* and you enabled network services for the prior Oracle Application Express schema.

To fix an invalid ACL:

1. Change your working directory to the `apex` directory where you unzipped the installation software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

- On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

3. Execute a statement similar to following:

```
EXEC DBMS_NETWORK_ACL_ADMIN.DELETE_PRIVILEGE('power_users.xml', 'FLOWS_
030000');
```

About the Oracle Application Express Runtime Environment

The Oracle Application Express runtime environment enables users to run a production application without supporting the ability to change or edit the application. It includes only the packages necessary to run your applications, making it a more hardened environment. It does not provide a Web interface for administration.

You administer the Oracle Application Express runtime environment using SQL*Plus or SQL Developer and the `APEX_INSTANCE_ADMIN` API. To learn more see, "Managing a Runtime Environment" and in *Oracle Application Express Application Builder User's Guide*.

Topics in this section include:

- Converting a Runtime Environment to a Full Development Environment
- Converting a Full Development Environment to a Runtime Environment

Converting a Runtime Environment to a Full Development Environment

To convert an Oracle Application Express runtime environment to a full development environment:

1. Change your working directory to the `apex` directory where you unzipped the installation software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

   - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

   - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

3. Run `apxdvins.sql`. For example:

```
@apxdvins
```

4. Follow the instructions in "Change the Password for the ADMIN Account" on page 3-38.

   See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

Converting a Full Development Environment to a Runtime Environment

To convert an Oracle Application Express full development environment to a runtime environment:

1. Change your working directory to the `apex` directory where you unzipped the installation software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

3. Run `apxdevrm.sql`. For example:

   ```
   @apxdevrm
   ```

   See Also: *Oracle Database PL/SQL Language Reference* for more information about SQL*Plus

A

Oracle Application Express Troubleshooting

This appendix contains information on troubleshooting.

This chapter contains these topics:

- Reviewing a Log of an Installation Session
- Verifying the Validity of an Oracle Application Express Installation
- Cleaning Up After a Failed Installation
- Images Displaying Incorrectly in Oracle Application Express
- Online Help Not Working

Reviewing a Log of an Installation Session

The `apexins.sql` script creates a log file in the `apex` directory using the naming convention `installYYYY-MM-DD_HH24-MI-SS.log`. In a successful installation, the log file contains the following text:

```
Thank you for installing Oracle Application Express.
Oracle Application Express is installed in the APEX_040000 schema.
```

If the log file contains a few errors, it does not mean that your installation failed. Note that acceptable errors are noted as such in the log file.

Verifying the Validity of an Oracle Application Express Installation

You can verify the validity of an Oracle Application Express installation by running the following query:

```
SELECT STATUS FROM DBA_REGISTRY
WHERE COMP_ID = 'APEX';
```

If the result is `VALID`, you can assume the installation was successful.

Cleaning Up After a Failed Installation

In a successful installation the following banner displays at the end of the installation:

```
Thank you for installing Oracle Application Express.
Oracle Application Express is installed in the APEX_040000 schema.
```

To reinstall, you must either drop the Oracle Application Express database schemas, or run a script to completely remove Application Express from the database, depending upon the installation type.

Topics in this section include:

- Reverting to a Previous Release After a Failed Upgrade Installation
- Removing Oracle Application Express from the Database

Reverting to a Previous Release After a Failed Upgrade Installation

In the case of a failed upgrade installation, you may want to revert Oracle Application Express to a previous release and then remove the schemas associated with the current release.

Topics in this section include:

- Verifying If You Have a Previous Version of Oracle Application Express
- Reverting to a Previous Release
- Removing the Oracle Application Express Release 4.0 Schema

Verifying If You Have a Previous Version of Oracle Application Express

To verify whether you have a previous version of Application Express:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:

   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

2. Execute the following command in SQL*Plus:

   ```
   SELECT username FROM dba_users WHERE username LIKE 'FLOWS_%' or username =
   'APEX_030200';
   ```

   If the query above returns any rows, the database contains a previous version of Oracle Application Express.

Reverting to a Previous Release

To revert to a previous Oracle Application Express release:

1. If you altered your images directory, you must point the text alias `/i/` back to images directory for the release you wish to revert to. See "Copying the Images Directory After an Upgrade" on page 3-41.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role:

   – On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     SQL> SQL> CONNECT SYS as SYSDBA
     Enter password: SYS_password
     ```

   – On UNIX and Linux:

```
$ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

3. Depending upon the release you are reverting to, execute the appropriate command in SQL*Plus:

   a. To revert to Oracle Application Express release 1.5, execute the following:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = FLOWS_010500;
   exec flows_010500.wwv_flow_upgrade.switch_schemas
   ('APEX_040000','FLOWS_010500');
   ```

   b. To revert to Oracle Application Express release 1.6, execute the following:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = FLOWS_010600;
   exec flows_010600.wwv_flow_upgrade.switch_schemas
   ('APEX_040000','FLOWS_010600');
   ```

   c. To revert to Oracle Application Express release 2.0, execute the following:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = FLOWS_020000;
   exec flows_020000.wwv_flow_upgrade.switch_schemas
   ('APEX_040000','FLOWS_020000');
   ```

   d. To revert to Oracle Application Express release 2.2, execute the following:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = FLOWS_020200;
   exec flows_020200.wwv_flow_upgrade.switch_schemas
   ('APEX_040000','FLOWS_020200');
   ```

   e. To revert to Oracle Application Express release 3.0, execute the following:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = FLOWS_030000;
   exec flows_030000.wwv_flow_upgrade.switch_schemas
   ('APEX_040000','FLOWS_030000');
   ```

   f. To revert to Oracle Application Express release 3.1:

   – Change your working directory to `apex/core` in the 3.1 source.

   – Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:

   On Windows:

   ```
   SYSTEM_DRIVE:\ sqlplus /nolog
   SQL> SQL> CONNECT SYS as SYSDBA
   Enter password: SYS_password
   ```

   On UNIX and Linux:

   ```
   $ sqlplus /nolog
   SQL> SQL> CONNECT SYS as SYSDBA
   Enter password: SYS_password
   ```

   – Execute the following commands:

   ```
   @wwv_flow_val.plb
   @wwv_dbms_sql.sql
   ```

   If you are running Oracle Database Express Edition (Oracle Database XE) or release 10.2.0.3 or higher, execute the following:

   ```
   @wwv_dbms_sql.plb
   ```

If you are not running Oracle Database XE or release 10.2.0.3 or higher, execute the following:

```
@wwv_dbms_sql_noroles.plb
```

– Execute the following:

```
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_030100;
exec flows_030100.wwv_flow_upgrade.switch_schemas
('APEX_030200','FLOWS_030100');
```

– Change your working directory to `apex` in the 3.1 source.

– Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:

On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

On UNIX and Linux:

```
$ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

– Execute the following:

```
@apexvalidate x x FLOWS_030100
```

g. To revert to Oracle Application Express release 3.2:

– Change your working directory to `apex/core` in the 3.2 source.

– Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role:

On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

On UNIX and Linux:

```
$ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

– Execute the following commands:

```
@wwv_flow_val.plb
@wwv_dbms_sql.sql
@wwv_dbms_sql.plb
```

– Execute the following:

```
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_030200;
flows_030200.wwv_flow_upgrade.switch_schemas
('APEX_040000','APEX_030200');
```

– Change your working directory to `apex` in the 3.2 source.

– Execute the following:

```
@apexvalidate x x APEX_030200
```

4. See the next section, "Removing the Oracle Application Express Release 4.0 Schema" on page A-5.

Removing the Oracle Application Express Release 4.0 Schema

After you have reverted back to the prior release you can remove the Oracle Application Express 4.0 schema.

To remove the release 4.0 schema:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role:

   – On Windows:

   ```
   SYSTEM_DRIVE:\ sqlplus /nolog
   SQL> SQL> CONNECT SYS as SYSDBA
   Enter password: SYS_password
   ```

   – On UNIX and Linux:

   ```
   $ sqlplus /nolog
   SQL> SQL> CONNECT SYS as SYSDBA
   Enter password: SYS_password
   ```

2. Execute the following command:

   ```
   DROP USER APEX_040000 CASCADE;
   ```

   Once you have removed the Oracle Application Express 4.0 schema, you can now attempt the upgrade again.

Removing Oracle Application Express from the Database

This section describes how to remove the Oracle Application Express schema, synonyms, and users from the database without deleting the database. If you are going to delete the database, then you must complete these steps.

> **Note:** Do not follow these steps if you have upgraded your database from a prior release, and still want to use the prior release of Oracle Application Express. For information about reverting to a prior release, see "Reverting to a Previous Release" on page A-2. If you are not sure whether you have completed a new installation or an upgrade installation, follow the steps in "Cleaning Up After a Failed Installation" on page A-1 to verify if a previous version of Application Express exists in the database

To remove Oracle Application Express from the database:

1. Change your working directory to the `apex` directory where you unzipped the Oracle Application Express software.
2. Start SQL*Plus and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role:

   ■ On Windows:

   ```
   SYSTEM_DRIVE:\ sqlplus /nolog
   ```

```
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

- On UNIX and Linux:

```
$ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

3. Execute the following command:

```
SQL> @apxremov.sql
```

Images Displaying Incorrectly in Oracle Application Express

If images in Oracle Application Express do not display correctly, you may have more than one definition of the `/i/` alias. To address this issue:

- If possible, rename the first instance of `/i/` to a different alias name.
- Alternatively, copy the images from the *ORACLE_HOME*`\apex\images` directory to the directory defined by the first `/i/` alias.

Online Help Not Working

This section describes issues with Oracle Application Express online Help.

Topics in this section include:

- Online Help Not Working When Using a Virtual Host
- Problems Searching Online Help

> **See Also:** "Enable Network Services in Oracle Database 11*g*" for your installation scenario.

Online Help Not Working When Using a Virtual Host

If users are accessing Oracle Application Express through a Virtual Host, online Help will not work. Consider the following example:

- The hostname of the Oracle HTTP Server where the Oracle Application Express database access descriptor (DAD) resides is `internal.server.com` and the port is `7777`.
- Users access Oracle Application Express through a Virtual Host. In their Web browsers, users see `external.server.com` and port `80`.

In this example, Oracle Application Express online Help will not work if the users cannot access `internal.server.com`. To resolve this issue, add the following lines to the Oracle Application Express database access descriptor (DAD) to override the CGI environment variables `SERVER_NAME` and `SERVER_PORT`:

```
PlsqlCGIEnvironmentList SERVER_NAME=external.server.com
PlsqlCGIEnvironmentList SERVER_PORT=80
```

> **See Also:** *Oracle HTTP Server mod_plsql User's Guide* for information on overriding the CGI environment variables and "Oracle Text Requirement" on page 2-3

Problems Searching Online Help

The underlying index that enables search capability in Oracle Application Express online Help is created upon first use. Note that this index must be created over a non-SSL link. If your connection is an SSL link, `https` displays in the URL. To index online help, access Oracle Application Express over a non-SSL link. Once the online Help index is created, you can revert to normal `https` access.

> **See Also:** "Enable Indexing of Online Help in Oracle Database 11gR2 and Higher" for your installation scenario

B

Accessibility in Oracle Application Express

This section attempts to provide information for users who are accessing Oracle Application Express utilizing only a keyboard or Freedom Scientific's screen reader JAWS.

Topics in this section include:

- Screen Reader Mode
- Accessing Form Pages Using JAWS
- Accessing Components Using a Keyboard

For additional information about the accessibility of Oracle products, see:

`http://www.oracle.com/accessibility`

> **Note:** JAWS release 11.0.1430 with all default settings was used in writing this section.

Screen Reader Mode

In Oracle Application Express release 4.0 sessions can now be defined as optimized for use with screen readers. This includes both when using the Application Express development environment and also for use in your own applications. To learn more, see "Advanced Programming Techniques" in *Oracle Application Express Application Builder User's Guide*.

You can enable screen reader mode in the development environment by selecting the **Set Screen Reader Mode On** link, located on:

- Workspace home page
- Oracle Application Express Administration Services page

You can also enable reader mode in the Application Express Websheet runtime by clicking the **Set Screen Reader Mode On** link located on any websheet application home page, which you are taken to after logging in to a websheet application.

If you intend on using the Oracle Application Express development environment with a screen reader, please ensure that you have this option enabled.

Accessing Form Pages Using JAWS

Many of the pages in Oracle Application Express are form pages designed for maintaining application metadata. This section describes how you can gain an understanding of the structure of these pages and interact with them using a screen reader such as JAWS.

Topics in this section include:

- Understanding the Structure of a Page
- Using the Tasks Links on a Page
- Accessing Help Text
- Dealing with Raised Validations

Understanding the Structure of a Page

Many form pages are logically broken up into different regions. For example, the Edit Page Item page has the following regions containing form fields for maintaining information about the page item:

- Name
- Displayed
- Label
- Settings
- List of Values (depending on item type)
- Element
- Source
- Default
- Quick Picks (depending on item type)
- Conditions
- Read Only
- Security
- Configuration
- Help Text
- Comments

Oracle Application Express uses Heading (`Hn`) tags throughout its development interface to help define the structure of a page. For example, the Edit Page Item page has the following Headings defined:

- Level 1 (H1)*
  - Application Express
- Level 2 (H2)*
  - Name
  - Displayed
  - Label
  - Settings
  - Element
  - Source
  - Default
  - Conditions

  - Read Only
  - Security
  - Configuration
  - Help Text
  - Comments
- Level 3 (H3)*
  - Page Items
  - Tasks

The previous list represents of how headings are used in the Oracle Application Express development environment. Note the following:

- Level 1 headings (`H1`) provides a link to the relevant root page depending on the context of where you are in the development environment (for example when editing an application this takes you to the home page for the application in the Application Builder).
- Level 2 headings (`H2`) contain sections integral to the primary function of the current page.
- Level 3 headings (`H3`) that contain sections that are related to the function of the current page.

To gain an overview of all the headings on the current page, press **INSERT+F6** to list the current page's headings.

You can also utilize other JAWS keystrokes to navigate through the page headings. For example, to navigate around level 2 headings:

1. Press **INSERT+ALT+CTRL+2** to go to the first heading on the page at level 2.

   On the Edit Page Item page, JAWS announces, "Name heading level 2."

2. Press **2** to go to the next heading at level 2.

   On the Edit Page Item page, JAWS announces, "Displayed heading level 2."

3. Press **SHIFT+2** to go to the previous heading at level 2.

   On the Edit Page Item page, JAWS announces, "Name heading level 2."

Using the Tasks Links on a Page

Many pages in Oracle Application Express contain a Tasks region on the right-hand side of the page. For example, the Edit Page Item page has a Tasks region on the right side containing a list of links relevant to the current item type. This region has a level 3 Heading (H3) defined on the section title Tasks (as this is a section that is related to the primary function of the current page).

To navigate to the Tasks region using JAWS:

1. Press **INSERT+ALT+CTRL+3** to go to the first heading on the page at level 3.

   JAWS announces, "Page Items heading level 3" on the Edit Page Item page. This contains general help information about page items.

2. Press **3** to go to the next heading at level 3.

   On the Edit Page Item page, JAWS announces, "Tasks heading level 3." This contains a list of links to related tasks.

3. Press **L** once to navigate to the list.

   JAWS announces, "List of *x* items" (where *x* depends on the type of page item currently being edited).

4. Press **I** to navigate through the list items and press **ENTER** to activate a link.

Accessing Help Text

This section describes how to use JAWS to access Page Help and Item-level help in Oracle Application Express.

Topics in this section include:

- Accessing Item Help

Accessing Item Help

Most items within the user interface have field-level Help available by activating or clicking on the field label. If Help text is available, the adjacent label will be implemented as a link, where the link text will match that of the current form item's label text. Activating this link will load a separate window containing the help text.

To access this field-level Help for an item using JAWS:

1. Press **CTRL+HOME** to go to the top of the page.

   JAWS announces the page name.

2. Press **INSERT+F7** to load the Links List dialog box.

3. Press the first letter of the link text you wish to locate, repeatedly.

   If there is no link text matching the label of the form item you wish to get help for, then there is no help available for that item

4. If the appropriate link is found, press **ENTER** to activate the link.

   A separate window containing the Help text appears

5. Press the JAWS navigation quick key **N** to go to the help text.

6. Once you are finished reading the help text, press **ALT+F4** to close the Help window and return to page.

Dealing with Raised Validations

If a validation fails when submitting a form, you are redirected back to the same page and an error message displays in a list at the top of the page. Additionally, error text displays inline next to the page item associated with the validation.

The following procedure explains how to identify when a validation fails, review error messages, and rectify the necessary values in order to pass the validation, all within the context of the Edit Page Item form page.

Topics in this section include:

- Identifying when a Validation Fails
- Reviewing Error Messages
- Fixing a Validation Error

Identifying when a Validation Fails

When a validation fails, the same page loads with details of the failure. In this situation JAWS does not read the page as it would normally when loading a new page. You can quickly check if a validation error has occurred by searching for any images with an `alt` text of `Error`.

To check for images having an `alt` text of `Error`:

1. Press **CTRL+HOME** to go to the top of the page.

   JAWS announces the page name.

2. Press **CTRL+INSERT+G** to launch the Select a Graphic dialog box.

3. Press **E** repeatedly to try and locate the error image. If there is an error image, then this means a validation has failed.

Reviewing Error Messages

If a validation error occurs, a list appears at the top of the page and contains list items with the error text for the failed validations.

To navigate to the list containing error text:

1. Press **CTRL+HOME** to go to the top of the page.

   JAWS announces the page name.

2. Press the JAWS navigation quick key **L** to go to the first list on the page.

   JAWS announces, "list of *x* items" where *x* is the number of errors that has occurred.

3. Press the JAWS navigation quick key **I** to read through each error message.

Fixing a Validation Error

There is no simple way to navigate from the summary list of error messages to the page item associated with the failed validation. One approach is to navigate to the error image that displays next to the associated page item and then use JAWS reading commands to understand which error you are dealing with.

To navigate to the error image:

1. Press **CTRL+HOME** to go to the top of the page.

   JAWS announces the page name.

2. Press **CTRL+INSERT+G** to load the Select a Graphic dialog box.

3. Press **E** repeatedly to locate the error image.

4. Press **ENTER** to navigate to the error image.

5. Press **DOWN ARROW** once to go to the Help text link for the associated field.

   This tells you which field has a validation error since the link text is the same as the form field label.

6. Press the **DOWN ARROW** again to go to the error message.

7. Press the JAWS navigation quick key **F** to go to the page item.

8. Press **ENTER** to enable Forms Mode and provide a new value.

   Once you provide a new value and fix the error, you need to locate subsequent error images on the page.

9. To locate subsequent error messages on the page:
   a. Press the **PLUS** sign (+) on the numeric keypad to go back into Virtual PC Cursor mode.
   b. Press the JAWS navigation quick key **G** repeatedly until you locate the next error image.

      JAWS announces, "graphic error."
   c. Once you have located the next error image, repeat steps 5 to 8 until all errors have been addressed.
   d. Once all errors have been addressed, you need to click the **Apply Changes** button:
      – Press the JAWS navigation quick key **B** until you hear JAWS announce, "Apply Changes Button."
      – Press **ENTER** to apply your changes.

        If your changes fixed all the validation errors, you are back to the Page Definition page.

Accessing Components Using a Keyboard

This section describes how to access components in Oracle Application Express using a keyboard.

Topics in this section include:

- Using New Date Pickers
- Accessing Interactive Report Regions

Using New Date Pickers

In Oracle Application Express release 4.0 there are many keyboard shortcuts for the new Date Picker.

To open a Date Picker:

1. Tab to the relevant input field.
2. Press **CTRL+HOME** to open the Date Picker.
3. Once the Date Picker is open, you have the following navigation optioins:
   - By month:
     – Press **PAGE UP** to go to the previous month.
     – Press **PAGE DOWN** to go to the next month.
     – Press **CTRL +HOME** to go to the current month.
   - By week:
     – Press **CTRL+UP** to go to the previous week.
     – Press **CTRL+DOWN** to go to the next week.
   - By day:
     – Press **CTRL+LEFT** to go to the previous day.
     – Press **CTRL+RIGHT** to go to the next day.

Once you are finished with the Date Picker:

1. Press **ENTER** to accept the selected date.
2. Press **ESCAPE** to close the date picker without selection.
3. Press **CTRL+END** to close the date picker and erase the date.

Accessing Interactive Report Regions

This section describes how to access common features within Interactive Report regions.

Topics in this section include:

- Searching Data in an Interactive Report
- Using the Actions Menu
- Managing Bulk Updates
- Utilizing Drill Down Links
- Editing Existing Filters
- Loading Saved Reports

Searching Data in an Interactive Report

If a search bar displays above an interactive report then the Include Search Bar attribute has been enabled in Report Attributes. This attribute is enabled by default when a new interactive report is created.

> **See Also:** "Editing Interactive Reports as a Developer" in *Oracle Application Express Application Builder User's Guide*

To execute a search:

1. Press **TAB** until the search field has focus.
2. Type your search keywords into the search field.
3. Press **ENTER** to invoke the search.
4. To refine your search to a specific column:
   a. Press **TAB** to access the magnifying glass icon to the left of the search field.
   b. Press **ENTER** to activate the pull down menu and display a list of all available columns to search.
   c. Press the **DOWN** or **UP** arrow keys on your keyboard to navigate through the list of **columns**.
   d. Press **ENTER** to select the column you wish to search on. This sets the context of the subsequent search as specific to the column selected.
5. Repeat steps 1 and 2 to execute your column specific search.

Using the Actions Menu

By default, new interactive reports include both a search bar and Actions menu. Both of these features are controlled by the developer by enabling the Include Search Bar and Actions menu attributes on the Report Attributes page. To learn more, see "Editing Interactive Reports as a Developer" in *Oracle Application Express Application Builder User's Guide*.

Depending upon how the developer creates the report, the Action menu can contain different options. To learn more about using the Actions menu, see "Customizing an Interactive Reports as a Developer" in *Oracle Application Express Application Builder User's Guide*.

To access the Actions menu using a keyboard:

1. Press **TAB** until the Actions menu has focus.
2. Press **ENTER** to open the menu.
3. Once the menu is open, you have the following navigation options:
   - Press the **DOWN** arrow key to go down the menu.
   - Press the **UP** arrow key to go up the menu.
   - Press the **RIGHT** arrow key to open a sub-menu (indicated by a right arrow) and move focus to the first item in the sub-menu.
   - Press the **LEFT** arrow key to close a sub-menu and move focus back to the appropriate item in the parent menu.
4. To exit the Action menu:
   - Press **ENTER** to load the action specific dialog. Focus is set to the first focusable element within the dialog box.
   - Press **ESC** to close the menu without selection.

Managing Bulk Updates

Some interactive reports in Oracle Application Express contain form items for applying bulk updates to components. All form items within the report and buttons to apply the changes are keyboard accessible. Also some pages feature a check box in the first row to perform bulk processing and corresponding **Select All** and **Deselect All** links below the report. All of these items are keyboard accessible.

Utilizing Drill Down Links

Some interactive reports in Oracle Application Express contain at least one link to edit or view a specific sub-components. These are all standard links and are therefore keyboard accessible.

Editing Existing Filters

When an existing search filter is applied to an interactive report, a search filter displays below the Search bar.

You can access the search filter using the keyboard to:

- Edit the search filter.

  Press **TAB** to navigate to the search filter and then press **ENTER** to open the Filter dialog box. Focus will be automatically set to first focusable element in the dialog box.

- Disable or enable the search filter.

  Press **TAB** to navigate to the check box to the right of the filter and **SPACEBAR** to disable or enable the filter.

- Delete the search filter.

Press **TAB** to navigate to the search filter and then **ENTER** to open the Filter dialog box. Press **TAB** or **SHIFT+TAB** to navigate to the Delete button and then press **ENTER**.

Loading Saved Reports

If an Interactive Report includes a Search bar, Actions menu, and support for saved reports, then these options have been enabled by the developer on the Report Attributes page. To learn more, see "Editing Interactive Reports as a Developer" in *Oracle Application Express Application Builder User's Guide*.

To load a saved report:

1. Press **TAB** until the Reports select list has focus. Note that the Reports select list only displays if there are saved reports.
2. Press the **UP** and **DOWN** keys to select the specific saved report you wish to view.
3. Press **ENTER** to view the saved report.

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