

Oracle® Application Express

Installation Guide

Release 4.2 for Oracle Database 12c

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Oracle Application Express Installation Guide, Release 4.2 for Oracle Database 12c

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Contents

Preface	vii
Audience	vii
Documentation Accessibility	vii
Related Documents	viii
Conventions	ix
Third-Party License Information	ix
Changes in This Release	xi
Changes in Oracle Application Express Release 4.2 for Oracle Database 12c	xi
1 Oracle Application Express Installation Overview	
Overview of the Installation Process	1-1
Upgrading from a Previous Release of Oracle Application Express	1-2
Upgrading to Application Express Release 4.2.1 or Later	1-2
About the Oracle Application Express Runtime Environment	1-2
About Choosing a Web Listener	1-2
About Oracle REST Data Services and Oracle HTTP Server with mod_plsql	1-2
Where Images Are Stored When Using Oracle HTTP Server	1-3
About the Embedded PL/SQL Gateway	1-3
Security Considerations When Using the Embedded PL/SQL Gateway	1-4
Where Images Are Stored When Using the Embedded PL/SQL Gateway	1-4
Selecting a Web Listener in an Oracle RAC Environment	1-4
Available Installation Scenarios	1-5
Installing from the Database and Configuring Oracle REST Data Services	1-5
Installing from the Database and Configuring the Embedded PL/SQL Gateway	1-5
Installing from the Database and Configuring the Oracle HTTP Server	1-5
2 Oracle Application Express Installation Requirements	
Oracle Database Requirements	2-1
Checking the shared_pool_size of the Target Database	2-1
Browser Requirements	2-2
Web Listener Requirements	2-2
Disk Space Requirement	2-3
Oracle XML DB Requirement	2-3
PL/SQL Web Toolkit	2-3

3 Utilizing the Multitenant Architecture

Understanding Installation Choices in Oracle Database 12c	3-1
Uninstalling Application Express from a CDB	3-2
Installing Application Express Locally in a PDB	3-3
Reinstalling Application Express into a CDB	3-5
Plugging in a PDB When Application Express is Installed in the Root Container	3-7
Scenario 1: Plug-in Non-CDB with Oracle Application Express	3-7
Scenario 2: Plug-in PDB with a Common Application Express from Another CDB	3-7
Scenario 3: Plug-in PDB with a Local Application Express from Another CDB	3-8
Scenario 4: Plug-in Non-CDB or PDB with No Application Express	3-8
About Incompatible Application Express Versions	3-9
Patching Application Express in the CDB	3-9
Patching Application Express in a PDB	3-9
Plugging in a PDB When Application Express Is Not in the Root Container of the Target CDB	3-10
Scenario 1: Plug-in a Non-CDB with Application Express	3-11
Scenario 2: Plug-in PDB with Common Application Express from Another CDB	3-11
Scenario 3: Plug-in PDB with a Local Application Express from Another CDB	3-11
Scenario 4: Plug-in a Non-CDB or PDB with No Application Express	3-11

4 Configuration Tasks When Installing from the Database

About Patching Oracle Application Express	4-1
Recommended Pre-installation Tasks	4-2
Choosing a Web Listener	4-2
Installing from the Database and Configuring Oracle REST Data Services	4-3
Install the Oracle Database and Complete Preinstallation Tasks	4-3
Download and Install Oracle REST Data Services	4-3
Configure RESTful Services	4-3
Enable Network Services in Oracle Database 12c	4-4
Granting Connect Privileges	4-5
Troubleshooting an Invalid ACL Error	4-6
Security Considerations	4-7
About Running Oracle Application Express in Other Languages	4-7
Installing a Translated Version of Oracle Application Express	4-8
About Managing JOB_QUEUE_PROCESSES	4-9
Viewing the Number of JOB_QUEUE_PROCESSES	4-9
Changing the Number of JOB_QUEUE_PROCESSES	4-9
Create a Workspace and Add Oracle Application Express Users	4-10
Creating a Workspace Manually	4-10
Creating Oracle Application Express Users	4-11
Logging in to Your Oracle Application Express Workspace	4-12
Installing from the Database and Configuring the Embedded PL/SQL Gateway	4-13
Install the Oracle Database and Complete Pre-installation Tasks	4-13
Load Resources in the XDB Repository	4-13
Configure the Embedded PL/SQL Gateway	4-14
Running the apxconf.sql Configuration Script	4-14
Verifying the Oracle XML DB Protocol Server Port	4-15

Enabling Oracle XML DB Protocol Server	4-15
Disabling Oracle XML DB Protocol Server	4-16
Enable Network Services in Oracle Database 12c	4-17
Granting Connect Privileges	4-17
Troubleshooting an Invalid ACL Error	4-18
Security Considerations	4-19
About Running Oracle Application Express in Other Languages.....	4-19
Installing a Translated Version of Oracle Application Express	4-20
About Managing JOB_QUEUE_PROCESSES.....	4-21
Viewing the Number of JOB_QUEUE_PROCESSES.....	4-21
Changing the Number of JOB_QUEUE_PROCESSES.....	4-22
Configuring the SHARED_SERVERS Parameter	4-22
Create a Workspace and Add Oracle Application Express Users	4-23
Creating a Workspace Manually	4-23
Creating Oracle Application Express Users.....	4-24
Logging in to Your Oracle Application Express Workspace.....	4-25
Installing from the Database and Configuring the Oracle HTTP Server	4-26
Install the Oracle Database and Complete Pre-installation Tasks	4-26
Configure Oracle HTTP Server Distributed with Oracle Database 12c	4-26
Change the Password for the ADMIN Account.....	4-27
Unlock the APEX_PUBLIC_USER Database User	4-27
Change the Password for the APEX_PUBLIC_USER Database User	4-28
Copy the Images Directory	4-29
Configure Oracle HTTP Server 12c	4-30
Enable Network Services in Oracle Database 12c	4-31
Granting Connect Privileges	4-32
Troubleshooting an Invalid ACL Error	4-33
Security Considerations	4-34
About Running Oracle Application Express in Other Languages.....	4-34
Installing a Translated Version of Oracle Application Express	4-35
About Managing JOB_QUEUE_PROCESSES.....	4-36
Viewing the Number of JOB_QUEUE_PROCESSES.....	4-36
Changing the Number of JOB_QUEUE_PROCESSES.....	4-36
About Obfuscating PlsqlDatabasePassword Parameter	4-37
Obfuscating Passwords.....	4-37
Create a Workspace and Add Oracle Application Express Users	4-37
Creating a Workspace Manually	4-38
Creating Oracle Application Express Users.....	4-38
Logging in to Your Oracle Application Express Workspace.....	4-39
Post Installation Tasks for Upgrade Installations.....	4-40
Remove Prior Oracle Application Express Installations	4-40
Verify if Prior Installation Exist	4-40
Remove Schemas from Prior Installations	4-41
Fix Invalid ACL in Oracle Database 11g Release 1 (11.1) and Later	4-42
About the Oracle Application Express Runtime Environment.....	4-42
Convert a Runtime Environment to a Full Development Environment - Oracle Database 12c Non-CDB	4-43

- Convert a Runtime Environment to a Full Development Environment - Oracle Database 12c Multitenant Architecture 4-43
- Convert a Full Development Environment to a Runtime Environment - Oracle Database 12c Non-CDB 4-44
- Convert a Full Development Environment to a Runtime Environment - Oracle Database 12c Multitenant Architecture 4-44

A Oracle Application Express Troubleshooting

Reviewing a Log of an Installation Session.....	A-1
Verifying the Validity of an Oracle Application Express Installation	A-1
Cleaning Up After a Failed Installation.....	A-1
Removing Oracle Application Express from the Database.....	A-2
Images Displaying Incorrectly in Oracle Application Express	A-3
Page Protection Violation	A-3

Index

Preface

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

- [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

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<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

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.

Accessibility of Links to External Web Sites in Documentation

This documentation may contain links to Web sites of other companies or organizations that Oracle does not own or control. Oracle neither evaluates nor makes any representations regarding the accessibility of these Web sites.

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 End User's Guide*
- *Oracle Database Concepts*
- *Oracle HTTP 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*
- *Oracle REST Data Services Installation and Developer Guide*

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. Search for free online training content, including Oracle by Example (OBE), demos, and tutorials. To access the Oracle Learning Library, go to:

<http://www.oracle.com/technetwork/tutorials/index.html>

Printed documentation is available for sale in the Oracle Store at

<http://shop.oracle.com/>

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

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.
<i>italic</i>	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.

Changes in This Release

This preface contains:

- [Changes in Oracle Application Express Release 4.2 for Oracle Database 12c](#)

Changes in Oracle Application Express Release 4.2 for Oracle Database 12c

The following are changes in *Oracle Application Express Installation Guide* for Oracle Application Express release 4.2 for Oracle Database 12c.

New Features

The following features are new in this release:

- Oracle Database 12c introduces the multitenant architecture
See "[Utilizing the Multitenant Architecture](#)" on page 3-1.
- Increased Size Limit for VARCHAR2, NVARCHAR2, and RAW Data Types
The maximum size of the VARCHAR2, NVARCHAR2, and RAW data types has been increased from 4,000 to 32K characters. Increasing the allotted size for these data types allows users to store more information in character data types before switching to large objects (LOBs). This is especially useful for brief textual data types and the capabilities to build indexes on these types of columns.
In order for Application Express collections to be able to utilize the increased size limit you must run `/core/collection_member_resize.sql` to change collection VARCHAR2 columns from 4000 characters to 32767 characters.
- RESTful Web Services
In SQL Workshop you can now define RESTful Web Service calls from the database. These definitions combined with Oracle REST Data Services 2.0 enables the database to emit RESTful Web Services rather than just being able to consume Web Services. See "Using RESTful Services" in *Oracle Application Express SQL Workshop and Utilities Guide*
RESTful Services require the installation of Oracle REST Data Services release 2.0. See "[Configure RESTful Services](#)" on page 4-3.
The instance administrator enables RESTful Services for this Application Express instance. See "Configuring SQL Workshop" in *Oracle Application Express Administration Guide*.

Other Changes

The following are additional changes in the release:

- All content has been updated to reflect new functionality.
- Screen captures and graphics have been added and updated to reflect Oracle Application Express release 4.2 user interface enhancements.

Oracle Application Express Installation Overview

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

- [Overview of the Installation Process](#)
- [Upgrading from a Previous Release of Oracle Application Express](#)
- [About the Oracle Application Express Runtime Environment](#)
- [About Choosing a Web Listener](#)
- [Available Installation Scenarios](#)

Overview of the Installation Process

The installation process involves the following:

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 Web listener you decide to use. Available options include the Oracle REST Data Services, the embedded PL/SQL gateway, or Oracle HTTP Server and `mod_plsql`.
 - **How you install Oracle Application Express.** Available options include using the release of Oracle Application Express that installs with Oracle Database 12c and later.
 - **Which Web Listener you decide to use.** Available options include the Oracle REST Data Services, the embedded PL/SQL gateway, or Oracle HTTP Server and `mod_plsql`.

Upgrading from a Previous Release of Oracle Application Express

If you have release 1.5.x, 1.6.x, 2.0.x, 2.2.x, 3.0.x, 3.1.x, 3.2.x, 4.0x or 4.1x of Oracle Application Express, following any of the installation scenarios in this guide upgrades your Oracle Application Express instance to release 4.2 and creates Oracle Application Express release 4.2 database objects in a new schema and migrates the application metadata to the new release.

Upgrading to Application Express Release 4.2.1 or Later

Oracle Database 12c Release 1 (12.1) includes Oracle Application Express Release 4.2.0.00.08. However, the latest version available for download from the Oracle Technology Network is Oracle Application Express Release 4.2.2.00.11. If deploying a non-container database, it is recommended that you upgrade to the latest available release. A future patch or major release of Application Express will contain the appropriate scripts to upgrade or patch a container database.

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. To learn more, see "Configuration Tasks When Installing from the Database" on page 4-1.

About Choosing a Web Listener

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

For further information on selecting the best Web listener, please review the Oracle Application Express Deployment page on Oracle Technology Network (OTN):

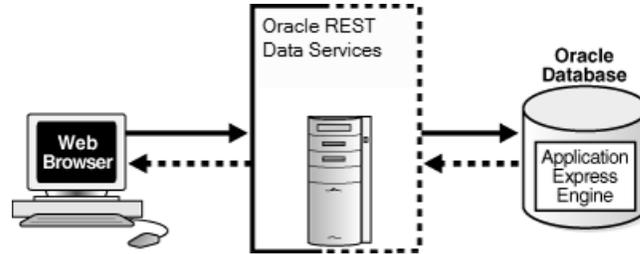
<http://www.oracle.com/technetwork/developer-tools/apex/application-express/apex-deploy-installation-1878444.html#listener>

- [About Oracle REST Data Services and Oracle HTTP Server with mod_plsql](#)
- [About the Embedded PL/SQL Gateway](#)
- [Selecting a Web Listener in an Oracle RAC Environment](#)

About Oracle REST Data Services and Oracle HTTP Server with mod_plsql

Oracle REST Data Services communicates directly with the Oracle Application Express engine. Oracle HTTP Server uses the `mod_plsql` plug-in to communicate with the

Oracle Application Express engine within the Oracle database. Oracle REST Data Services and the Oracle HTTP Server 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 the Oracle REST Data Services.



See Also: ["Web Listener Requirements"](#) on page 2-2

Note this three tier architecture consists of the following components:

- Web browser
- Oracle REST Data Services or Oracle HTTP Server with `mod_plsql`
- Oracle database containing Oracle Application Express

The major advantage of Oracle REST Data Services or Oracle HTTP Server (Apache) with `mod_plsql` is the separation of the mid-tier and the database tier. Note that this architecture is appropriate for Oracle Real Application Clusters (Oracle RAC) environments.

Where Images Are Stored When Using Oracle HTTP Server

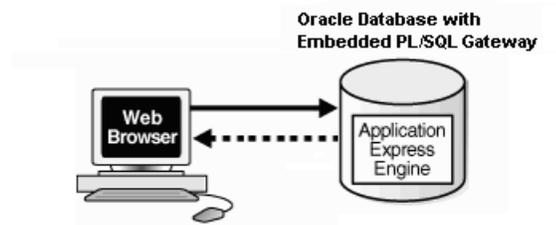
In an Oracle HTTP Server or Oracle Application Server configuration, images are stored on the file system in the location referenced by the alias `/i/`. If you are upgrading Oracle Application Express from a prior release, you can locate the images directory on the file system, by reviewing the following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

- Oracle HTTP Server distributed with Oracle Database 11g Release 1 (11.1) and later — see the `dads.conf` file.
- Oracle Application Server 10g—see the `marvel.conf` file.

Specific examples for locating the text alias `/i/` can be found in ["Configuration Tasks When Installing from the Database"](#) on page 4-1.

About the Embedded PL/SQL Gateway

Oracle XML DB Protocol Server with the embedded PL/SQL gateway installs with Oracle Database. 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 Protocol 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 consists of a simple two tier architecture: a Web browser and an Oracle database containing the embedded PL/SQL gateway and Oracle Application Express.

Advantages of the embedded PL/SQL gateway include:

- 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. 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, Oracle does not recommend the use of the embedded PL/SQL gateway for applications that run on the Internet.

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 "Accessing the Repository Using Protocols" in *Oracle XML DB Developer's Guide*.

Selecting a Web Listener 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 REST Data Services or Oracle HTTP Server with `mod_plsql`. Oracle REST Data Services or Oracle HTTP Server with `mod_plsql` 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 Web listener you decide to use. This section provides an overview of each installation scenario.

See Also: ["About Choosing a Web Listener"](#) on page 1-2 and ["About the Oracle Application Express Runtime Environment"](#) on page 1-2

- [Installing from the Database and Configuring Oracle REST Data Services](#)
- [Installing from the Database and Configuring the Embedded PL/SQL Gateway](#)
- [Installing from the Database and Configuring the Oracle HTTP Server](#)

Installing from the Database and Configuring Oracle REST Data Services

Follow the steps in this scenario if you are using a release of Oracle Application Express that installs with Oracle Database 12c and later and configuring the Oracle REST Data Services. Required steps in this scenario include:

- **Step 1: Install the Oracle Database and Complete Preinstallation Tasks**
- **Step 2: Download and Install Oracle REST Data Services**
- **Step 3: Enable Network Services in Oracle Database 12c**
- **Step 4: Security Considerations**
- **Step 5: About Running Oracle Application Express in Other Languages**
- **Step 6: About Managing JOB_QUEUE_PROCESSES**
- **Step 7: Create a Workspace and Add Oracle Application Express Users**

Installing from the Database and Configuring the Embedded PL/SQL Gateway

Follow the steps in this scenario if you are using a release of Oracle Application Express that installs with Oracle Database 12c or later and configuring the embedded PL/SQL gateway. Required steps in this scenario include:

- **Step 1: Install the Oracle Database and Complete Pre-installation Tasks**
- **Step 2: Configure the Embedded PL/SQL Gateway**
- **Step 3: Enable Network Services in Oracle Database 12c**
- **Step 4: Security Considerations**
- **Step 5: About Running Oracle Application Express in Other Languages**
- **Step 6: About Managing JOB_QUEUE_PROCESSES**
- **Step 7: Configuring the SHARED_SERVERS Parameter**
- **Step 8: Create a Workspace and Add Oracle Application Express Users**

Installing from the Database and Configuring the Oracle HTTP Server

Follow the steps in this scenario if you are using a release of Oracle Application Express that installs with Oracle Database 12c or later and configuring Oracle HTTP Server with `mod_plsql` distributed with Oracle Database 12c and later. Required steps in this scenario include:

- **Step 1: Install the Oracle Database and Complete Pre-installation Tasks**
- **Step 2: Configure Oracle HTTP Server Distributed with Oracle Database 12c**
- **Step 3: Enable Network Services in Oracle Database 12c**
- **Step 4: Security Considerations**
- **Step 5: About Running Oracle Application Express in Other Languages**
- **Step 6: About Managing JOB_QUEUE_PROCESSES**

- **Step 7:** [About Obfuscating PlsqlDatabasePassword Parameter](#)
- **Step 8:** [Create a Workspace and Add Oracle Application Express Users](#)

Oracle Application Express Installation Requirements

This chapter describes the requirements for installing Oracle Application Express.

- [Oracle Database Requirements](#)
- [Browser Requirements](#)
- [Web Listener Requirements](#)
- [Disk Space Requirement](#)
- [Oracle XML DB Requirement](#)
- [PL/SQL Web Toolkit](#)

Oracle Database Requirements

Oracle Application Express release 4.2 requires an Oracle database (Enterprise Edition, Standard Edition or Standard Edition One) that is Release 10.2.0.4 and later. Oracle Application Express release 4.2 can also be used with Oracle Database Express Edition 10g Release 2 (10.2) and later. The Oracle HTTP Server is not included with the distribution of Oracle Database Express Edition.

Note: You can upgrade the version of Oracle Application Express in Oracle Database Express Edition 10g Release 2 (10.2) and later, by installing Oracle Application Express release 4.2. For more information, see the Oracle Application Express Learn More page on the Oracle Technology Network (OTN).

Checking the `shared_pool_size` of the Target Database

Note: Ignore this requirement if your configuration defines specific memory target values for the database initialization parameters `SGA_TARGET` (in Oracle Database 10g and 11g or later) `MEMORY_TARGET` (in Oracle Database 11g or later).

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 (`init sid .ora`) or a server parameter file (`spfile $dbname$.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 value 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 run or develop Oracle Application Express applications, Web browsers must have JavaScript enabled. The following browsers are required to develop applications in Oracle Application Express:

- Microsoft Internet Explorer 7.0 or later
- Mozilla Firefox 14 or later
- Google Chrome 21 or later
- Apple Safari 5.0 or later

Oracle Application Express applications can be developed that support earlier Web browser releases, including Microsoft Explorer 6.0. Application Express has a number of advanced widgets, such as date pickers, which may not work correctly on earlier browsers.

Web Listener Requirements

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

- Oracle REST Data Services

Oracle REST Data Services is a Java-based Web server. It features file system caching, offers improved file upload capability, and is certified with Oracle WebLogic Server, and Oracle Glassfish Server.

- Embedded PL/SQL gateway

Oracle XML DB Protocol Server with the embedded PL/SQL gateway installs with Oracle Database 11g Release 1 (11.1). It provides the database with a Web server and the necessary infrastructure to create dynamic applications.

- 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.

The following products include appropriate versions of HTTP Server and `mod_plsql`:

- Oracle Database 10g Companion CD Release 2
- Oracle Database 11g Release 1 (11.1) and Oracle Database 11g Release 1 (11.2)
- Oracle Database 12c Release 1 (12.1)

See Also: ["About Choosing a Web Listener"](#) 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: 278 MB if using English only download (`apex_4.2_en.zip`) and 935 MB if using full download (`apex_4.2.zip`).
- Free space in Oracle Application Express tablespace: 275 MB
- Free space in `SYSTEM` tablespace: 100 MB
- Free space in Oracle Application Express tablespace for each additional language (other than English) installed: 60 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.

PL/SQL Web Toolkit

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

Utilizing the Multitenant Architecture

This chapter outlines the installation choices and different scenarios associated with copying and moving pluggable databases introduced by the Oracle Database 12c multitenant architecture with respect to Oracle Application Express (Application Express).

- [Understanding Installation Choices in Oracle Database 12c](#)
- [Plugging in a PDB When Application Express is Installed in the Root Container](#)
- [Plugging in a PDB When Application Express Is Not in the Root Container of the Target CDB](#)

Understanding Installation Choices in Oracle Database 12c

Oracle Database 12c Release 1 (12.1) introduces the multitenant architecture. This database architecture has a multitenant container database (CDB) that includes a root container, `CDB$ROOT`, a seed database, `PDB$SEED`, and multiple pluggable databases (PDBs). Each pluggable database is equivalent to a separate database instance in Oracle Database release 11g. The root container, `CDB$ROOT`, holds common objects that are accessible to every PDB utilizing metadata links or object links. The seed database, `PDB$SEED`, is used when creating a new PDB to seed the new database. The key benefit of the Oracle Database 12c multitenant architecture is that the database resources, such as CPU and memory, can be shared across all of the PDBs. This architecture also enables many databases to be treated as one for tasks such as upgrades or patches, and backups.

Oracle Application Express Release 4.2 is the earliest release that can be configured with Oracle Database 12c. When choosing to install Oracle Database 12c using the Oracle Database 12c multitenant architecture, Oracle Application Express 4.2.4 is installed as a common database option by default. You may also choose to uninstall Application Express from the root container and then install a local Application Express Release 4.2.4 or later individually into one or more PDBs. Oracle does not support uninstalling Application Express from the root container, or reinstalling Application Express into the root container, once any PDBs have been configured. This may invalidate or completely remove the meta data associated with the existing Application Express installation.

When configuring multitenant architecture, Oracle Application Express is installed in the root container database by default. In such an installation the root container, `CDB$ROOT`, includes the `APEX_040200` schema to store the common database objects for the Application Express engine such as packages, functions, procedures and views. The seed database, `PDB$SEED`, also includes the `APEX_040200` schema to store the tables that are part of the Application Express engine.

You can create a new PDB by copying `PDB$SEED`, which includes the `APEX_040200` schema with the Application Express tables, and creating metadata links back to the common database objects held in the `APEX_040200` schema within the `CDB$ROOT`. As such there are multiple copies of the Application Express engine tables and only single copies of the Application Express engine packages, functions, procedures and views. Each PDB will have the `APEX_040200` schema and have its own copy of the Application Express engine's tables so that it can hold the metadata for the Application Express applications defined within that PDB.

As a best practice, Oracle recommends having a common Oracle Application Express installation in the root container, which ensures every PDB is running the same version of Oracle Application Express. This offers ease of administration by enabling centralized management of Oracle Application Express infrastructure tasks, such as upgrading and patching. The other alternative is to uninstall Application Express from `CDB$ROOT`, `PDB$SEED`, and all other PDBs, and then install Application Express locally into each PDB. The advantage of a local Oracle Application Express is that you can run different versions of Application Express in each PDB. However, the disadvantage of choosing this option is that each local Oracle Application Express installation must be managed separately in respect of upgrades and patches for Application Express, which is a greater maintenance effort.

Uninstalling Application Express from a CDB

To have the flexibility of installing different versions of Oracle Application Express into different PDBs, you need to uninstall Oracle Application Express release 4.2.4 which was installed into the container database. Once you have removed Oracle Application Express from the container database, then you can install a local Application Express within each PDB as required. When Oracle Application Express is installed locally there are no Application Express metadata linked objects and all packages, views, and tables are created within the `APEX_0402000` schema, within each PDB where Application Express is installed.

To uninstall Oracle Application Express from the CDB:

1. Change your working directory to `$ORACLE_HOME/apex`.
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 `apxremov_con.sql`.

For example:

```
@apxremov_con.sql
```

Note: If you run `apexremov_con.sql` after PDBs have been added to the CDB then Application Express uninstalls from all of the PDBs. Therefore, any applications defined in any of the PDBs will be removed. If you run `apxremov.sql` then Application Express is only removed from the root container. However, every PDB is left in an invalid state and will cause errors when trying to open the PDB.

Installing Application Express Locally in a PDB

Once you have removed Oracle Application Express from the container database by following the instructions in "[Uninstalling Application Express from a CDB](#)" on page 3-2, you can install Application Express locally in a PDB.

To install Oracle Application Express locally in a PDB:

1. Change your working directory to `$ORACLE_HOME/apex`.
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. Set the container to the PDB you wish to install Application Express locally:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

4. 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 4-42.

Available installation options include:

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

```
@apexins.sql 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 or tablespace group.

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

For example:

```
@apexins.sql SYSaux SYSaux TEMP /i/
```

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

```
o@apxrtins.sql 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 or tablespace group.
- *images* is the virtual directory for Oracle Application Express images. To support future Oracle Application Express upgrades, define the virtual image directory as */i/*.

For example:

```
@apxrtins.sql SYSaux SYSaux TEMP /i/
```

Note: If you did not apply the database patch prior to executing `apxremov_con.sql` in the previous step, then attempting to install Oracle Application Express into a PDB will fail as the installation script will exit immediately without installing Oracle Application Express. In this scenario please contact Oracle Support for further assistance.

5. If you are using Oracle REST Data Services, complete the appropriate steps in ["Download and Install Oracle REST Data Services"](#) on page 4-3 through ["Create a Workspace and Add Oracle Application Express Users"](#) on page 4-10.
6. If you are using Oracle HTTP Server, complete the appropriate steps in ["Configure Oracle HTTP Server Distributed with Oracle Database 12c"](#) on page 4-26 through ["Create a Workspace and Add Oracle Application Express Users"](#) on page 4-37.
7. If you are using embedded PL/SQL gateway, run `apex_epg_config.sql` passing the path to the Oracle Home and then complete the appropriate steps in ["Configure the Embedded PL/SQL Gateway"](#) on page 4-14.

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

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

- `APEX_040200` - 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 is used for Oracle Application Express configuration with Oracle REST Data Services or Oracle HTTP Server and `mod_plsql`.

If you configured RESTful Web services, then these additional accounts are created:

- `APEX_REST_PUBLIC_USER` - The account used when invoking RESTful Services definitions stored in Oracle Application Express.
- `APEX_LISTENER` - The account used to query RESTful Services definitions stored in Oracle Application Express.

Reinstalling Application Express into a CDB

If you previously uninstalled Oracle Application Express 4.2.4 and want to reinstall Application Express into a CDB you need to install Oracle Application Express 4.2.4 using the Oracle Database 12c distribution. Following the reinstallation you can apply Application Express patches if required as outlined in "[Patching Application Express in the CDB](#)" on page 3-9.

To reinstall Application Express into a CDB:

1. Change your working directory to `$ORACLE_HOME/apex`.
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. 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 4-42.

Available installation options include:

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

```
@apexins_con.sql 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 or tablespace group.
- `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_con.sql SYSaux SYSaux TEMP /i/
```

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

```
@apxrtins_con.sql 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 or tablespace group.
- `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_con.sql SYSaux SYSaux TEMP /i/
```

4. If using Oracle REST Data Services, complete appropriate steps in sections ["Download and Install Oracle REST Data Services"](#) on page 4-3 through ["Create a Workspace and Add Oracle Application Express Users"](#) on page 4-10.
5. If using the Oracle HTTP Server, complete appropriate steps in sections ["Configure Oracle HTTP Server Distributed with Oracle Database 12c"](#) on page 4-26 through ["Create a Workspace and Add Oracle Application Express Users"](#) on page 4-37.
6. If using the embedded PL/SQL gateway, run `apex_epg_config_con.sql` passing the path to the Oracle Home and then complete appropriate steps in ["Configure the Embedded PL/SQL Gateway"](#) on page 4-14.

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

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

- `APEX_040200` - 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 is used for Oracle Application Express configuration with Oracle REST Data Services or Oracle HTTP Server and `mod_plsql`.

If you configured RESTful Web services, then these additional accounts are created:

- `APEX_REST_PUBLIC_USER` - The account used when invoking RESTful Services definitions stored in Oracle Application Express.
- `APEX_LISTENER` - The account used to query RESTful Services definitions stored in Oracle Application Express.

Plugging in a PDB When Application Express is Installed in the Root Container

This section describes scenarios in which the target database has Application Express installed into the root container, `CDB$ROOT` - the default installation option. Note there are multiple scenarios related to where the database being plugged in originated from and how Application Express was configured in the originating database.

- [Scenario 1: Plug-in Non-CDB with Oracle Application Express](#)
- [Scenario 2: Plug-in PDB with a Common Application Express from Another CDB](#)
- [Scenario 3: Plug-in PDB with a Local Application Express from Another CDB](#)
- [Scenario 4: Plug-in Non-CDB or PDB with No Application Express](#)
- [About Incompatible Application Express Versions](#)

Scenario 1: Plug-in Non-CDB with Oracle Application Express

If you are upgrading from a previous Oracle Database release, then you first need to upgrade to a Oracle Database 12c non-CDB (or standalone database) and then plug the database into your CDB. Alternatively, if you have configured a non-CDB Oracle Database 12c, you may now want to plug this database into a CDB. In both cases, the originating database has Application Express installed and was not formerly a PDB.

As described in the *Oracle Database Installation Guide* for your operating system, when plugging in a standalone database you need to run the `$ORACLE_HOME/rdbms/admin/noncdb_to_pdb.sql` script. This script creates the necessary metadata linked objects, instead of local objects and recompiles the database objects for all common database options, including Oracle Application Express. After installing Oracle Application Express, you need to configure the Web listener for the PDB as described in "[Configuration Tasks When Installing from the Database](#)" on page 4-1.

If the version of Application Express installed in the originating database (which is now a PDB) is not the same as that installed into the root container of the target, an error will be raised when trying to open the PDB. For information on how to make the versions of Application Express compatible, see "[About Incompatible Application Express Versions](#)" on page 3-9.

Scenario 2: Plug-in PDB with a Common Application Express from Another CDB

If you are copying or moving a PDB from an existing Oracle Database 12c where the originating CDB had Application Express installed in the root container, you will not need to perform any additional steps, other than configuring the Web listener for the PDB as described in "[Configuration Tasks When Installing from the Database](#)" on page 4-1.

Assuming Oracle Application Express release 4.2 is installed, the `APEX_040200` schema within the PDB being plugged in already has the metadata linked objects defined and will compile without error against the metadata linked objects within the target CDB.

If the version of Application Express installed in the originating database is not the same as that installed in the root container of the target an error is raised when trying to open the PDB. For information on how to make the versions of Application Express compatible, see "[About Incompatible Application Express Versions](#)" on page 3-9.

Scenario 3: Plug-in PDB with a Local Application Express from Another CDB

If you are copying or moving a PDB from an existing Oracle Database 12c where Application Express was not installed in the root container but is installed locally, then you need to perform additional steps before the PDB can be opened without errors. Assuming Oracle Application Express release 4.2 is installed, the APEX_040200 schema within the PDB being plugged in contains all of the Application Express database objects and has no metadata linked objects. Therefore, you need to run \$ORACLE_HOME/rdbms/admin/apex_to_common.sql to remove the common objects and create the metadata links for the packages, views and so forth.

To replace local objects with metadata links in the PDB:

1. Change your working directory to \$ORACLE_HOME/rdbms/admin.
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. Set the container to the PDB to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

4. Run apex_to_common.sql. For example:

```
@apex_to_common.sql
```

If the version of Application Express installed in the originating database is not the same as that installed in the root container of the target an error is raised when trying to open the PDB. For information on how to make the versions of Application Express compatible, see "[About Incompatible Application Express Versions](#)" on page 3-9.

Scenario 4: Plug-in Non-CDB or PDB with No Application Express

If you are plugging in a non-CDB, or copying or moving a PDB from another CDB, and Application Express is not installed in the originating database or PDB then a warning is raised in the alert log when opening the PDB in the target database.

In this scenario, the Application Express schema, such as APEX_040200 for Oracle Application Express release 4.2, will not be present in the originating database or PDB being plugged in. In order to open the PDB without issue and be able to run Application Express within the new PDB, you must install Application Express into the originating database or PDB before attempting to plug in to the target database.

You should install the same version of Application Express into the originating database or PDB as the version installed into the target database.

About Incompatible Application Express Versions

If the version of Oracle Application Express in the root container, `CDB$ROOT`, is not the same as the Oracle Application Express version in the PDB then an error is raised every time the PDB is opened preventing normal database operations within the PDB. The PDB can only be opened in restricted mode by users with `RESTRICTED SESSION` privilege, until the versions are compatible.

- [Patching Application Express in the CDB](#)
- [Patching Application Express in a PDB](#)

Patching Application Express in the CDB

If the version of Application Express in the PDB is higher than the version of Application Express in the root container, then you must patch the version of Application Express in the root container to be able to open the PDB without error.

To patch Application Express in the root container:

1. Download the appropriate patch from My Oracle Support.
2. Unzip and extract the installation files.
3. Change your working directory to where the installation files were extracted
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. Run `apxpatch_con.sql` for example:


```
@apxpatch_con.sql
```
6. Follow the instructions outlined in the Patch Set Notes for updating the images directory based on the Web Server you are using. If you are using the embedded PL/SQL gateway, run `apxldimg_con.sql` for example:


```
@apxldimg_con.sql
```

Patching Application Express in a PDB

If the version of Application Express in the PDB is lower than the version of Application Express in the root container, `CDB$ROOT`, then it will be necessary to patch the version of Application Express in the PDB.

To patch Application Express in the PDB:

1. Download the appropriate patch from My Oracle Support.
2. Unzip and extract the installation files.

3. Change your working directory to where the installation files were extracted
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. Run apxpatch.sql using catcon.pl like the following example:

```
host &OH_HOME/perl/bin/perl -I

&OH_HOME/rdbms/admin &OH_HOME/rdbms/admin/catcon.pl -b apxpatch
-c '<PDB_name>' apxpatch.sql
```

Where:

- *&OH_HOME* represents the full path to the Oracle home
 - *<PDB_name>* is the name of the PDB you are patching
6. Follow the instructions outlined in the patch set notes for updating the images directory based on the Web Server you are using. If you are using the embedded PL/SQL gateway, run apxldimg.sql for example:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
@apxldimg.sql
```

Plugging in a PDB When Application Express Is Not in the Root Container of the Target CDB

The scenarios in this section describe when Oracle Application Express is not installed in the root container, CDB\$ROOT, by explicitly removing it as described in "[Uninstalling Application Express from a CDB](#)" on page 3-2. In such cases, you can optionally install a local Application Express into each PDB independently. If Oracle Application Express is installed into a PDB it is considered to be installed locally and has no metadata linked objects. There are multiple scenarios related to where the database being plugged in originated from and how Application Express was configured in the originating database.

- [Scenario 1: Plug-in a Non-CDB with Application Express](#)
- [Scenario 2: Plug-in PDB with Common Application Express from Another CDB](#)
- [Scenario 3: Plug-in PDB with a Local Application Express from Another CDB](#)
- [Scenario 4: Plug-in a Non-CDB or PDB with No Application Express](#)

Scenario 1: Plug-in a Non-CDB with Application Express

If you are upgrading from a previous Oracle Database release then you need to upgrade to Oracle Database 12c non-CDB (or standalone database) and then plug the database into your CDB. Alternatively you may have configured a non-CDB Oracle Database 12c that you now wish to plug into a CDB. In both cases, the originating database had Application Express installed and was not formerly a PDB.

As described in the *Oracle Database Installation Guide* for your operating system, when plugging in a standalone database you need to run the `$ORACLE_HOME/rdbms/admin/noncdb_to_pdb.sql` script. This script creates the necessary metadata linked objects (instead of local objects) and recompiles the database objects for all common database options. However, because Oracle Application Express has been removed from the root container, the script will not create any metadata links for any of the Application Express objects. The script does not change the Application Express installation from the originating database and no additional steps are needed other than configuring the Web Server as outlined in "[Configuration Tasks When Installing from the Database](#)" on page 4-1.

Scenario 2: Plug-in PDB with Common Application Express from Another CDB

If you are copying or moving a PDB from an existing Oracle Database 12c where the originating CDB had Application Express installed in the root container, then an error is raised whenever you try and open the PDB. The error is due to the fact that the originating PDB included metadata links to objects in the originating root container which cannot be recompiled because the target root container does not include Application Express. You will not be able to open the PDB unless you remove Application Express from the PDB or if Application Express is already installed in the target root container. Oracle does not support installing Application Express in the root container unless no PDBs are installed. For further assistance, contact Oracle Support.

Scenario 3: Plug-in PDB with a Local Application Express from Another CDB

If you are copying or moving a PDB from an existing Oracle Database 12c where the originating PDB had a local Application Express installed (not in the CDB) then you do not need to perform any additional steps, other than configuring the Web Server in the PDB as described in "[Configuration Tasks When Installing from the Database](#)" on page 4-1. Assuming Oracle Application Express release 4.2 is installed, the `APEX_040200` schema within the PDB being plugged in already has all of the Application Express objects defined locally and no metadata links.

Scenario 4: Plug-in a Non-CDB or PDB with No Application Express

If you are plugging in a non-CDB, or copying or moving a PDB from another CDB, where Application Express was not installed in the originating database or PDB then you do not need to perform any additional steps. There will be no Application Express engine schema, such as `APEX_040200`, within the PDB, and the PDB can be started without error.

Configuration Tasks When Installing from the Database

Oracle Application Express is installed by default with Oracle Database 11g Release 1 (11.1) and later. This chapter describes required postinstallation configuration tasks for Oracle Application Express when installed with Oracle Database 12c or later in the standalone and multitenant architecture.

The instructions in this chapter apply to both new and upgrade installations. To learn more, see ["Upgrading from a Previous Release of Oracle Application Express"](#) on page 1-2.

Note: This chapter applies to installations in Oracle Database 12c in the multitenant architecture and non-CDB (or standalone) architecture. For more information on multitenant architecture, see "Part VI" in *Oracle Database Concepts 12c Release 1 (12.1)*. For more information on different installation scenarios relating to Application Express in an Oracle Database 12c Release 1 (12.1) multitenant architecture, see [Chapter 3, "Utilizing the Multitenant Architecture"](#).

- [About Patching Oracle Application Express](#)
- [Recommended Pre-installation Tasks](#)
- [Choosing a Web Listener](#)
- [Installing from the Database and Configuring Oracle REST Data Services](#)
- [Installing from the Database and Configuring the Embedded PL/SQL Gateway](#)
- [Installing from the Database and Configuring the Oracle HTTP Server](#)
- [Post Installation Tasks for Upgrade Installations](#)
- [About the Oracle Application Express Runtime Environment](#)

About Patching Oracle Application Express

If you are already running Oracle Application Express, then check the Oracle Application Express page on the Oracle Technology Network (OTN) at the following URL for information about patch set releases or later releases of Oracle Application Express:

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

Upgrading to Oracle Database 12c Release 1 (12.1) will not patch Oracle Application Express. To learn more about downloading and installing Oracle Application Express from Oracle Technology Network (OTN) see "Downloading from Oracle Technology Network" in *Oracle Application Express Installation Guide* for Oracle Application Express release 4.2.

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 any existing Oracle Database instances as well as Oracle-related processes.

Shut down any existing Oracle Database instances with normal or immediate priority, except for the database where you plan to install the Oracle Application Express schemas. On Oracle Real Application Clusters (Oracle RAC) systems, shut down all instances on each node.

If Oracle Automatic Storage Management (ASM) is running, shut down all databases that use ASM except for the database where you will install Oracle Application Express, and then shut down the ASM instance.

You can use the Windows **Services** utility, located either in the Windows Control Panel or from the **Administrative Tools** menu (under **Start** and then **Programs**), to shut down Oracle Database and ASM instances. Names of Oracle Databases are preceded with `OracleService`. The Oracle ASM service is named `OracleASMService+ASM`. In addition, shut down the `OracleCSService` service, which ASM uses. Right-click the name of the service and from the menu, choose **Stop**.

3. Back up the Oracle Database installation.

Oracle recommends that you create a backup of the current installation of 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 a Web listener. However, if you are performing a remote installation, make sure the Web listener for the remote database has started.

Note: If you are connecting to a remote database, then start the Web listener.

Choosing a Web Listener

In order to run, Oracle Application Express must have access to Oracle REST Data Services, Oracle HTTP Server and `mod_plsql`, or the embedded PL/SQL gateway. To learn more, see "[About Choosing a Web Listener](#)" on page 1-2.

Installing from the Database and Configuring Oracle REST Data Services

This section describes required postinstallation configuration tasks when running Oracle Application Express with Oracle REST Data Services.

- [Install the Oracle Database and Complete Preinstallation Tasks](#)
- [Download and Install Oracle REST Data Services](#)
- [Configure RESTful Services](#)
- [Enable Network Services in Oracle Database 12c](#)
- [Security Considerations](#)
- [About Running Oracle Application Express in Other Languages](#)
- [About Managing JOB_QUEUE_PROCESSES](#)
- [Create a Workspace and Add Oracle Application Express Users](#)

Install the Oracle Database and Complete Preinstallation Tasks

Oracle Application Express automatically installs with Oracle Database 11g and later. To learn more about installing the Oracle Database, see the *Oracle Database Installation Guide* for your platform and "[Recommended Pre-installation Tasks](#)" on page 4-2.

Download and Install Oracle REST Data Services

To download Oracle REST Data Services:

1. Download the latest release of Oracle REST Data Services from the following site:

<http://www.oracle.com/technetwork/developer-tools/rest-data-services/downloads/index.html>

Note that the *version.number* in the file name reflects the current release number.

2. Unzip the downloaded zip file into a directory (or folder) of your choice:
 - UNIX and Linux: unzip `ords.version.number.zip`
 - Windows: Double-click the file `ords.version.number.zip` in Windows Explorer
3. Copy the images directory, `apex/images`, from the Application Express software ZIP to a location on the file system where Oracle REST Data Services is installed.
4. Locate the installation guide for Oracle REST Data Services and follow instructions to complete installation and configuration steps.
5. For Oracle Database 12c multitenant architecture, ensure that you configure the connection using the service name of the specific pluggable database (PDB) you want to access. Do not use the service name of the `CDB$ROOT` unless you are configuring Oracle REST Data Services to address PDBs through the URL. See *Oracle REST Data Services Installation and Developer Guide* for more information.

Configure RESTful Services

In a new installation of Oracle Application Express, you configure RESTful Services by running the configuration script `apex_rest_config.sql`. This step is optional and only needs to be completed if you wish to use RESTful Services with Oracle REST Data Services on the instance. Once configured, the instance administrator can control the

availability of the feature. If the instance administrator has disabled RESTful Services for this Application Express instance, RESTful Services are not available for this instance and the RESTful Services icon does not display. See "Configuring SQL Workshop" in *Oracle Application Express Administration Guide*.

Note: RESTful Services requires Oracle REST Data Services release 2.0 or later.

To configure RESTful Services in Oracle Application Express:

1. Change your working directory to `$ORACLE_HOME/apex`.
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. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

4. Run `apex_rest_config.sql`. For example:

```
@apex_rest_config.sql
```

When Prompted, enter a password for the `APEX_LISTENER` and `APEX_REST_PUBLIC_USER` accounts. When configuring RESTful Services in Oracle Application Express, it creates two new database accounts.

- `APEX_LISTENER` - The account used to query RESTful Services definitions stored in Oracle Application Express.
- `APEX_REST_PUBLIC_USER` - The account used when calling RESTful Services definitions stored in Oracle Application Express.

Enable Network Services in Oracle Database 12c

By default, the ability to interact with network services is disabled in Oracle Database 12c. Therefore, if you are running Oracle Application Express with Oracle Database 12c, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_040200` 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.
- [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 Oracle Database 12c already has the parameter set properly, but a database upgraded to Oracle Database 12c 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.

The examples below should be modified according to your environment and in a Oracle Database 12c multitenant architecture, should be run on each pluggable database (PDB).

Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the APEX_040200 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);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040200
  -- the "connect" privilege if APEX_040200 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;

  IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
  'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_040200', 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_040200', 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 is used to enable access to servers on the local host only, such as email and report servers.

```

DECLARE
  ACL_PATH VARCHAR2(4000);
BEGIN
  -- Look for the ACL currently assigned to 'localhost' and give APEX_040200
  -- the "connect" privilege if APEX_040200 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;

IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
'APEX_040200', 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 users to connect to localhost',
'APEX_040200', 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 =
                DELETXML(OBJECT_VALUE,
                    '/ACL/ACE[PRINCIPAL="' || R.PRINCIPAL || '"]')
            WHERE OBJECT_ID = ACL_ID;
        END LOOP;
    END IF;

```

```

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_040200 user. See "[Granting Connect Privileges](#)" on page 4-5.

Security Considerations

Oracle highly recommends you configure and use a 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.

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

```

In a multitenant architecture, the scripts below should be run in each pluggable database (PDB).

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 `$ORACLE_HOME/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 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. 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. If running in the Oracle Database 12c multitenant architecture, set the container to the PDB to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```
4. Execute the following statement:

```
ALTER SESSION SET CURRENT_SCHEMA = APEX_040200;
```
5. 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 4.2, transactional support and SQL scripts require jobs. If JOB_QUEUE_PROCESSES is not enabled and working properly, you cannot successfully execute a script.

- [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 4.2, 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 Oracle Application Express Workspace](#)" on page 4-12.
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 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 Change 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

- [Creating a Workspace Manually](#)
- [Creating Oracle Application Express Users](#)
- [Logging in to Your Oracle Application Express 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.

If your setup uses the Oracle REST Data Services, go to:

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

Where:

hostname is the name of the system where Oracle REST Data Services is installed.

port is the port number assigned when configuring Oracle REST Data Services. In a default installation, this number is 8080. To learn more, see *Oracle REST Data Services Installation and Developer Guide*.

apex is the service name defined when configuring Oracle REST Data Services.

- b. On the Login page:

- In Username, enter `admin`.
- In Password, enter the Oracle Application Express administrator account password you specified when you installed Oracle Application Express.
- 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 **Manage Workspaces**.
3. Under Manage Workspaces, click **Manage Developers and Users**.
The Manage Developers and Users page appears.
4. Click **Create**.
The Create/Edit User page appears.
5. Under User Attributes, enter the appropriate information. Fields marked with an asterisk are required.

Tip: To learn more about a specific attribute, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark.
6. Under Password, type a case-sensitive password for this account.
If your organization has set up a password policy, be sure the password meets the requirements.
7. Under Developer Privileges, select the appropriate privileges:

- **User is a developer** - To add this user as a developer or Workspace administrator, select **Yes**. For end users, select **No**.

Developers can create and modify applications and database objects as well as view developer activity, session state, workspace activity, application, and schema reports.

- **User is a workspace administrator** - To add this user as a Workspace administrator, select **Yes**. For developers or end users, select **No**.

In addition to having developer privileges, workspace administrators can create and edit user accounts, manage groups, alter passwords of users within the same workspace, and manage development services.

8. Under Account Control, specify the following:

- **Account Availability** - Select **Unlocked** to enable a user to log in to this account.
- **Require Change of Password on First Use** - Select **Yes** to require the user to change the password immediately after logging in with the current, temporary password. Otherwise, select **No**.

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

Logging in to Your Oracle Application Express 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 and Change Requests" in *Oracle Application Express Administration Guide*

To log in to a workspace:

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

If your setup uses Oracle REST Data Services, go to:

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

Where:

- *hostname* is the name of the system where Oracle REST Data Services is installed.
- *port* is the port number assigned when configuring the Oracle REST Data Services. In a default installation, this number is 8080. To learn more, see *Oracle REST Data Services Installation and Developer Guide*.
- *apex* is the service name defined when configuring Oracle REST Data Services.

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.

Installing from the Database and Configuring the Embedded PL/SQL Gateway

This section describes required post installation configuration tasks when running Oracle Application Express with the embedded PL/SQL gateway.

- [Install the Oracle Database and Complete Pre-installation Tasks](#)
- [Load Resources in the XDB Repository](#)
- [Configure the Embedded PL/SQL Gateway](#)
- [Enable Network Services in Oracle Database 12c](#)
- [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 4-42

Install the Oracle Database and Complete Pre-installation Tasks

Oracle Application Express automatically installs with Oracle Database 11g and later. To learn more about installing the Oracle Database, see the *Oracle Database Installation Guide* for your operating environment and ["Recommended Pre-installation Tasks"](#) on page 4-2.

Load Resources in the XDB Repository

In a new or upgrade installation, you load image and static resources into the XDB repository and make them available by running the configuration script `apex_epg_config.sql`.

To run `apex_epg_config.sql` configuration script:

1. Change your working directory to `ORACLE_BASE\ORACLE_HOME\apex` or whatever convention used to indicate the Oracle home.
2. 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
```

3. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be configured as shown in the following example:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

4. Run `apex_epg_config.sql` passing the file system path to the Oracle home as shown in the following example:

```
@apex_epg_config /u01/app/product/12.1.0/dbhome_1
```

Configure the Embedded PL/SQL Gateway

Although the embedded PL/SQL gateway installs with the Oracle Database 12c, you must configure it before you can use it with Oracle Application Express. To accomplish this, you run a configuration script and unlock the `ANONYMOUS` account.

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

- [Running the `apxconf.sql` Configuration Script](#)
- [Verifying the Oracle XML DB Protocol Server Port](#)
- [Enabling Oracle XML DB Protocol Server](#)
- [Disabling Oracle XML DB Protocol Server](#)

Running the `apxconf.sql` Configuration Script

In a new installation, you configure the embedded PL/SQL gateway by running the configuration script `apxconf.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 "[Enable Network Services in Oracle Database 12c](#)" on page 4-17.

To run the `apxconf.sql` configuration script:

1. Change your working directory to `ORACLE_BASE\ORACLE_HOME\apex` or whatever convention used to indicate the Oracle home.
2. 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
```
3. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be configured as shown in the following example:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```
4. Run `apxconf.sql` as shown in the following example:

```
@apxconf
```

5. If running in the Oracle Database 12c multitenant architecture, set the container to CDB\$ROOT:

```
ALTER SESSION SET CONTAINER = CDB$ROOT;
```

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

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

Tip: If running in the Oracle Database 12c multitenant architecture, you only need to execute steps 5 and 6 once when configuring the first PDB, as you only need to unlock the ANONYMOUS account once in the root container.

7. Complete appropriate steps in sections ["Enable Network Services in Oracle Database 12c"](#) on page 4-17 through ["Create a Workspace and Add Oracle Application Express Users"](#) on page 4-23.

Verifying the Oracle XML DB Protocol Server Port

The embedded PL/SQL gateway runs in the Oracle XML DB Protocol Server in the Oracle Database. You can determine if the Oracle XML DB Protocol Server has HTTP enabled by verifying the associated port number.

To verify the HTTP port number where the Oracle XML DB Protocol 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. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be verified:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

3. 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 Protocol Server is disabled.

4. To enable it, follow the instructions in ["Enabling Oracle XML DB Protocol Server"](#) on page 4-15.

Enabling Oracle XML DB Protocol Server

The embedded PL/SQL gateway runs in the Oracle XML DB Protocol Server in the Oracle Database.

To enable Oracle XML DB Protocol Server:

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

- Windows:

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

- UNIX and Linux:

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

2. If running in the Oracle Database 12c multitenant architecture, set the container to the PDB to enable:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

3. Run the following statements:

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

For example:

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

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

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

Disabling Oracle XML DB Protocol Server

The embedded PL/SQL gateway runs in the Oracle XML DB Protocol Server in the Oracle Database.

To disable Oracle XML DB Protocol Server:

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

- Windows:

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

- UNIX and Linux:

```

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

```

2. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to disable:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

3. Run the following statements:

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

Enable Network Services in Oracle Database 12c

By default, the ability to interact with network services is disabled in Oracle Database 12c. Therefore, if you are running Oracle Application Express with Oracle Database 12c, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_040200` 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.
- [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 Oracle Database 12c already has the parameter set properly, but a database upgraded to Oracle Database 12c 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.

The examples below should be modified according to your environment and in a 12c multitenant architecture, should be run on each pluggable database (PDB).

Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the `APEX_040200` 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);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040200
  -- the "connect" privilege if APEX_040200 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;

```

```

IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
'APEX_040200', 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_040200', 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 is used to enable access to servers on the local host only, such as email and report servers.

```

DECLARE
    ACL_PATH VARCHAR2(4000);
BEGIN
-- Look for the ACL currently assigned to 'localhost' and give APEX_040200
-- the "connect" privilege if APEX_040200 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;

IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
'APEX_040200', 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 users to connect to localhost',
'APEX_040200', 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 NAACL, XDS_ACE ACE
WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL AND
NAACL.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_040200 user. See ["Granting Connect Privileges"](#) on page 4-17.

Security Considerations

Oracle highly recommends you configure and use a 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.

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. 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. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

4. Execute the following statement:

```
ALTER SESSION SET CURRENT_SCHEMA = APEX_040200;
```

5. 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 4.2, transactional support and SQL scripts require jobs. If JOB_QUEUE_PROCESSES is not enabled and working properly, you cannot successfully execute a script.

- [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 4.2, 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 Oracle Application Express Workspace](#)" on page 4-25.
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

- [Creating a Workspace Manually](#)
- [Creating Oracle Application Express Users](#)
- [Logging in to Your Oracle Application Express 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/apex/apex_admin
```

Where:

hostname is the name of the system where Oracle XML DB Protocol Server is installed.

port is the port number assigned to HTTP on the Oracle XML DB Protocol Server. In a default installation, this number is 8080. If you are using the Oracle Database 12c multitenant architecture, then each pluggable database (PDB) will have a distinct port number.

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 when you installed Oracle Application Express.
 - 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 **Manage Workspaces**.
3. Under Manage Workspaces, click **Manage Developers and Users**.
The Manage Developers and Users page appears.
4. Click **Create**.
The Create/Edit User page appears.
5. Under User Attributes, enter the appropriate information. Fields marked with an asterisk are required.

Tip: To learn more about a specific attribute, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark.
6. Under Password, type a case-sensitive password for this account.
If your organization has set up a password policy, be sure the password meets the requirements.
7. Under Developer Privileges, select the appropriate privileges:
 - **User is a developer** - To add this user as a developer or Workspace administrator, select **Yes**. For end users, select **No**.

Developers can create and modify applications and database objects as well as view developer activity, session state, workspace activity, application, and schema reports.

- **User is a workspace administrator** - To add this user as a Workspace administrator, select **Yes**. For developers or end users, select **No**.

In addition to having developer privileges, workspace administrators can create and edit user accounts, manage groups, alter passwords of users within the same workspace, and manage development services.

8. Under Account Control, specify the following:

- **Account Availability** - Select **Unlocked** to enable a user to log in to this account.
- **Require Change of Password on First Use** - Select **Yes** to require the user to change the password immediately after logging in with the current, temporary password. Otherwise, select **No**.

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

Logging in to Your Oracle Application Express 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 a workspace:

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

If 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 Protocol Server is installed.
- *port* is the port number assigned to HTTP on the Oracle XML DB Protocol Server. In a default installation, this number is 8080. If you are using the Oracle Database 12c multitenant architecture then each PDB will have a distinct port number.
- *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.

Installing from the Database and Configuring the Oracle HTTP Server

This section describes how to configure Oracle HTTP Server with `mod_plsql` distributed with Oracle Database 12c.

- [Install the Oracle Database and Complete Pre-installation Tasks](#)
- [Configure Oracle HTTP Server Distributed with Oracle Database 12c](#)
- [Enable Network Services in Oracle Database 12c](#)
- [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](#)

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

Install the Oracle Database and Complete Pre-installation Tasks

Oracle Application Express automatically installs with Oracle Database 11g and later. To learn more about installing the Oracle Database, see the *Oracle Database Installation Guide* for your operating environment and "[Recommended Pre-installation Tasks](#)" on page 4-2.

Configure Oracle HTTP Server Distributed with Oracle Database 12c

Perform these post installation steps if all of the following statements are true:

- You are using a version of Oracle Application Express that installs with Oracle Database 12c or later.
- You are not upgrading from a previous release. This is a new installation of Oracle Application Express.
- You are running Oracle HTTP Server distributed with Oracle Database 12c.

This section contains the following topics:

- [Change the Password for the ADMIN Account](#)
- [Unlock the APEX_PUBLIC_USER Database User](#)
- [Change the Password for the APEX_PUBLIC_USER Database User](#)
- [Copy the Images Directory](#)
- [Configure Oracle HTTP Server 12c](#)

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

Change the Password for the ADMIN Account

First, change the password for the Oracle Application Express ADMIN account. In the multitenant architecture, this should only be done in the pluggable database (PDB) to be configured and never in the CDB\$ROOT container.

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

To change the password for the ADMIN account:

1. Change your working directory to `ORACLE_BASE\ORACLE_HOME\apex` or whatever convention used to indicate the Oracle home.
2. 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
```

3. If running in the Oracle Database 12c multitenant architecture, set the container to the PDB to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

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

```
@apxchpwd.sql
```

When prompted enter a password for the ADMIN account.

Unlock the APEX_PUBLIC_USER Database User

When configuring Oracle HTTP Server for Oracle Application Express in a new installation, the database user `APEX_PUBLIC_USER` must be an unlocked account. To unlock the account for database user `APEX_PUBLIC_USER`, execute the following steps:

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 statement:

```
ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK
```

Change the Password for the APEX_PUBLIC_USER Database User

In order to specify the password in the DAD file, you have to change the password for the database user APEX_PUBLIC_USER. Please use the following steps to change the password for the APEX_PUBLIC_USER database user:

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 statement:

```
SQL> PASSWORD APEX_PUBLIC_USER
Changing password for APEX_PUBLIC_USER
New password: password
Retype new password: password
```

About Password Expiration in Oracle Database 12c In the default profile in Oracle Database 12c, the parameter PASSWORD_LIFE_TIME is set to 180. If you are using Oracle Database 12c 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.

To create a profile where the password does not expire in a non-CDB, follow these steps:

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 statement:

```
SQL> create profile c##apex_pub_profile LIMIT PASSWORD_LIFE_TIME UNLIMITED;
alter user APEX_PUBLIC_USER profile c##apex_pub_profile;
```

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

To create a profile where the password does not expire in a CDB, follow these steps:

1. Start SQL*Plus and connect to CDB\$ROOT of 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 statement:

```
SQL> create profile c##apex_pub_profile LIMIT
PASSWORD_LIFE_TIME UNLIMITED;
alter user APEX_PUBLIC_USER profile c##apex_pub_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.

During an upgrade, to ensure that you can revert to the previous version, rename your existing `images` directory for Oracle Application Express, indicating the release number of the images.

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

- Oracle HTTP Server distributed Oracle9i Release 2—see the `httpd.conf` file.
- Oracle Application Server 10g—see the `marvel.conf` or `dads.conf` files.
- Oracle HTTP Server distributed with Oracle Database 11g or 12c—see the `marvel.conf` or `dads.conf` files.

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

Use the following command syntax to copy the `apex\images` directory from the Oracle Database home to a path in the Oracle HTTP Server home:

- Oracle HTTP Server distributed with Oracle Database 12c:

- On Windows:

```
xcopy /E /I ORACLE_HOME\apex\images ORACLE_HTTPSERVER_HOME\user_projects\
domains\base_domain\images
```

- On UNIX and Linux:

```
cp -rf $ORACLE_HOME/apex/images ORACLE_HTTPSERVER_HOME/user_
projects/domains/base_domain
```

In the preceding syntax examples:

- `ORACLE_HOME` is the Oracle Database 12c Oracle home
- `ORACLE_HTTPSERVER_HOME` is the existing Oracle Application Server or Oracle HTTP Server Oracle home

Configure Oracle HTTP Server 12c

Perform the following post installation steps if:

- You are running Oracle HTTP Server 12c.
- Oracle HTTP Server is installed in an Oracle home.

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

- [Editing the `dads.conf` File](#)
- [Stopping and Restarting Oracle HTTP Server 12c](#)

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 HTTP Server distributed with Oracle Database 12c:

– On Windows see:

```
ORACLE_HTTPSERVER_HOME\user_projects\domains\base_domain\config\
fmwconfig\components\OHS\instances\ohs1\mod_plsql\dads.conf
```

– On UNIX and Linux see:

```
ORACLE_HTTPSERVER_HOME/user_projects/domains/base_
domain/config/fmwconfig/components/OHS/instances/ohs1/mod_
plsql/dads.conf
```

Note: In the examples above, `ohs1` refers to the name of the Oracle HTTP Server instance. When running the Oracle HTTP Server Configuration Wizard, the default name is `ohs1`. It may have been changed to a name other than `ohs1`.

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 "[Change the Password for the APEX_PUBLIC_USER Database User](#)" on page 4-28. Also note that the `service_name` should be the service name of the PDB if configuring a multitenant architecture. It should never be the `service_name` of the `CDB$ROOT` container.

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 4-29. Also, if you are configuring an Oracle Application Express instance in a multitenant architecture, be sure to use the service name of the pluggable database (PDB) to be enabled. Never use the service name of the CDB\$ROOT container.

```
Alias /i/ "ORACLE_HTTPSERVER_HOME/user_projects/domains/base_domain/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 12c To stop and restart the Oracle HTTP Server, enter commands using the following syntax, where `DOMAIN_HOME` is the path to the Oracle HTTP Server domain:

Linux:

```
$DOMAIN_HOME/bin/stopComponent.sh componentName
```

Windows:

```
%DOMAIN_HOME%\bin\stopComponent.cmd componentName
```

In a default installation, `componentName` is `ohs1` but may have been changed when running the Oracle HTTP Server Configuration Wizard.

Enable Network Services in Oracle Database 12c

By default, the ability to interact with network services is disabled in Oracle Database 12c Release 1 (12.1). Therefore, if you are running Oracle Application Express with Oracle Database 12c Release 1 (12.1), you must use the new `DBMS_NETWORK_ACL_`

ADMIN package to grant connect privileges to any host for the APEX_040200 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.
- [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, Oracle Database 12c already has the parameter set properly, but a database upgraded to Oracle Database 12c 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.

The examples below should be modified according to your environment and in an Oracle Database 12c multitenant architecture, should be run on each PDB.

Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the APEX_040200 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);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040200
  -- the "connect" privilege if APEX_040200 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;

  IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
  'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_040200', 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_040200', 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 is used to enable access to servers on the local host only, such as email and report servers.

```

DECLARE
  ACL_PATH VARCHAR2(4000);
BEGIN
  -- Look for the ACL currently assigned to 'localhost' and give APEX_040200
  -- the "connect" privilege if APEX_040200 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;

  IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
    'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_040200', 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 users to localhost',
    'APEX_040200', 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 =
            DELETETEXTML(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_040200 user. See ["Granting Connect Privileges"](#) on page 4-32.

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.

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. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be configured:


```
ALTER SESSION SET CONTAINER = <PDB_name>;
```
3. 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
```

4. Execute the following statement:

```
ALTER SESSION SET CURRENT_SCHEMA = APEX_040200;
```

5. 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 4.2, transactional support and SQL scripts require jobs. If JOB_QUEUE_PROCESSES is not enabled and working properly, you cannot successfully execute a script.

- [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 4.2, 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 Oracle Application Express Workspace](#)" on page 4-39.
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 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

- [Creating a Workspace Manually](#)
- [Creating Oracle Application Express Users](#)
- [Logging in to Your Oracle Application Express 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.

If 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 HTTP on the 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.

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 **Manage Workspaces**.

3. Under Manage Workspaces, click **Manage Developers and Users**.
The Manage Developers and Users page appears.
4. Click **Create**.
The Create/Edit User page appears.
5. Under User Attributes, enter the appropriate information. Fields marked with an asterisk are required.

Tip: To learn more about a specific attribute, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark.
6. Under Password, type a case-sensitive password for this account.
If your organization has set up a password policy, be sure the password meets the requirements.
7. Under Developer Privileges, select the appropriate privileges:
 - **User is a developer** - To add this user as a developer or Workspace administrator, select **Yes**. For end users, select **No**.
Developers can create and modify applications and database objects as well as view developer activity, session state, workspace activity, application, and schema reports.
 - **User is a workspace administrator** - To add this user as a Workspace administrator, select **Yes**. For developers or end users, select **No**.
In addition to having developer privileges, workspace administrators can create and edit user accounts, manage groups, alter passwords of users within the same workspace, and manage development services.
8. Under Account Control, specify the following:
 - **Account Availability** - Select **Unlocked** to enable a user to log in to this account.
 - **Require Change of Password on First Use** - Select **Yes** to require the user to change the password immediately after logging in with the current, temporary password. Otherwise, select **No**.
9. Click **Create User** or **Create and Create Another**.

Logging in to Your Oracle Application Express 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 a workspace:

1. In a Web browser, navigate to the Oracle Application Express Login page. By default, Oracle Application Express installs to the following location:

If your setup uses Oracle HTTP Server (Apache) and mod_plsql, go to:

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

Where:

- *hostname* is the name of the system where Oracle HTTP Server is installed.
- *port* is the port number assigned to HTTP on the Oracle HTTP Server. In a default installation, this number is 7777. You can find information about your Oracle HTTP Server installation's port number from either of the following files:

```
ORACLE_BASE\ORACLE_HOME\install\portlist.ini
ORACLE_BASE\ORACLE_HTTPSERVER_HOME\Apache\Apache\conf\httpd.conf
```

Be aware that if you change a port number, it is not updated in the `portlist.ini` file. You can only rely on this file immediately after installation.

- *pls* is the indicator to use the `mod_plsql` cartridge.
- *apex* is the database access descriptor (DAD) defined in the `mod_plsql` 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.

- [Remove Prior Oracle Application Express Installations](#)
- [Fix Invalid ACL in Oracle Database 11g Release 1 \(11.1\) and Later](#)

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 Prior Installation Exist

To verify if prior installations exist:

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. If running in the Oracle Database 12c multitenant architecture, set the container to the PDB to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

3. 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. If running in the Oracle Database 12c multitenant architecture, set the container to the PDB to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

3. Execute a statement connected similar to the following example:

```
DROP USER FLOWS_030000 CASCADE;
```

Fix Invalid ACL in Oracle Database 11g Release 1 (11.1) and Later

After following the instructions in "[Remove Prior Oracle Application Express Installations](#)" on page 4-40, you may need to fix an invalid ACL if you are running Oracle Database 12c and you enabled network services for the prior Oracle Application Express schema.

To fix an invalid ACL:

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. If running in the Oracle Database 12c multitenant architecture, set the container to the pluggable database (PDB) to be configured:

```
ALTER SESSION SET CONTAINER = <PDB_name>;
```

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 you to run production applications. 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*.

- [Convert a Runtime Environment to a Full Development Environment - Oracle Database 12c Non-CDB](#)
- [Convert a Runtime Environment to a Full Development Environment - Oracle Database 12c Multitenant Architecture](#)
- [Convert a Full Development Environment to a Runtime Environment - Oracle Database 12c Non-CDB](#)
- [Convert a Full Development Environment to a Runtime Environment - Oracle Database 12c Multitenant Architecture](#)

Convert a Runtime Environment to a Full Development Environment - Oracle Database 12c Non-CDB

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

1. Change your working directory to `$ORACLE_HOME/apex`.
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
```

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

Convert a Runtime Environment to a Full Development Environment - Oracle Database 12c Multitenant Architecture

To convert an Oracle Application Express runtime environment to a full development environment in an Oracle Databases 12c multitenant architecture where Oracle Application Express is installed in the `CDB$ROOT`:

1. Change your working directory to `$ORACLE_HOME/apex`.
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_con.sql`. For example:

```
@apxdvins_con.sql
```

Convert a Full Development Environment to a Runtime Environment - Oracle Database 12c Non-CDB

To convert an Oracle Application Express full development environment to a runtime environment in an Oracle Database 12c non-CDB (standalone):

1. Change your working directory to `$ORACLE_HOME/apex`.
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
```

4. Follow the instructions in ["Change the Password for the ADMIN Account"](#) on page 4-27.

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

Convert a Full Development Environment to a Runtime Environment - Oracle Database 12c Multitenant Architecture

To convert an Oracle Application Express full development environment to a runtime environment in Oracle Database 12c multitenant architecture with Oracle Application Express installed in `CDB$ROOT`:

1. Change your working directory to `$ORACLE_HOME/apex`.
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_con.sql`. For example:

```
@apxdevrm_con.sql
```

4. Follow the instructions in ["Change the Password for the ADMIN Account"](#) on page 4-27.

Oracle Application Express Troubleshooting

This appendix contains information on troubleshooting.

- [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](#)
- [Page Protection Violation](#)

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_040200 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_040200 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.

- [Removing Oracle Application Express from the Database](#)

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.

To remove Oracle Application Express from the Oracle Database 12c non-CDB where Oracle Application Express is not installed in the CDB\$ROOT:

1. Change your working directory to `$ORACLE_HOME/apex`.
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
```

4. After successfully removing Application Express using `apxremov.sql`, you must exit your current SQL*Plus session and reconnect prior to attempting another install using `apexins.sql`.

To remove Oracle Application Express from the database in 12c multitenant architecture where Oracle Application Express is installed in the CDB\$ROOT:

1. Change your working directory to `$ORACLE_HOME/apex`.
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_con.sql
```

4. After successfully removing Application Express using `apxremov_con.sql`, you must exit your current SQL*Plus session and reconnect prior to attempting another install using `apexins_con.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.

Page Protection Violation

This may be caused by manual alteration of protected page items. If this error occurs after installation when trying to log into Application Express, then stop and start Oracle REST Data Services. If you are unsure of what caused this error, please contact the application administrator for assistance.

To learn more about stopping and starting Oracle REST Data Services, see *Oracle REST Data Services Installation and Developer Guide*.

Index

A

- ACL
 - fixing invalid, 4-42
- Application Express
 - browser requirement, 2-2
 - database requirement, 2-1
 - disk space requirements, 2-3
 - getting started, 4-23, 4-37
 - logging in to, 4-10, 4-23, 4-37
 - patching, 4-1
 - PL/SQL Web Toolkit requirement, 2-3
 - pre-installation tasks, 4-2
 - Web Listener requirement, 2-2
 - XML DB requirement, 2-3
- Application Express Administration Services, 4-10, 4-23, 4-38
- Application Express users
 - controlling account availability, 4-12, 4-25, 4-39
 - requiring password change, 4-12, 4-25, 4-39
- apxconf.sql, 4-14
- apxdevm_con.sql, 4-44
- apxdevm.sql, 4-44
- apxdvins_con.sql, 4-43
- apxdvins.sql, 4-43
- Automatic Storage Management (ASM)
 - shutting down, 4-2

B

- browser
 - requirement, 2-2

C

- CDBs
 - patching Application Express, 3-9
 - reinstalling Application Express, 3-5
 - uninstalling Application Express, 3-2
- configuring
 - Oracle Application Server 11g, 4-30
 - Oracle Application Server 11g (new), 4-26
 - Oracle HTTP Server 11g, 4-30
 - Oracle HTTP Server 11g (new), 4-26

D

- dadTool.pl utility, 4-37
- database installation
 - backing up Oracle database, 4-2
 - configuring embedded PL/SQL gateway, 4-14
 - configuring Oracle Application Server 11g, 4-30
 - copying images (when upgrading), 4-29
 - downloading from and configuring embedded PL/SQL gateway, 4-1, 4-13
 - fixing invalid ACL, 4-42
 - installing in other languages, 4-34
 - installing other languages, 4-19
 - logging in to Application Express, 4-23, 4-37
 - managing JOB_QUEUE_PROCESSES, 4-21, 4-36
 - obfuscating passwords, 4-37
 - post installation tasks, 4-40
 - pre-installation tasks, 4-13
 - removing prior installation, 4-40
 - running apxconf.sql, 4-14
 - SHARED_SERVERS parameter, 4-22
 - stopping processes, 4-2
- database requirement
 - Application Express, 2-1
- development environment
 - changing to runtime for Oracle Database 12c Multitenant Architecture, 4-44
 - changing to runtime for Oracle Database 12c Non-CDB, 4-44
- disk space
 - requirements, 2-3

E

- embedded PL/SQL gateway
 - about, 1-3
 - location of images, 1-4
 - security, 1-4
 - SHARED_SERVERS parameter, 4-22

G

- getting started
 - Application Express, 4-23, 4-37
- granting connect privileges, 4-5

I

- images
 - copying when upgrading, 4-29
- incompatible Application Express version
 - about, 3-9
- installation
 - overview, 1-1
 - planning, 1-1
 - process, 1-5
 - requirements, 1-1, 2-1
 - scenarios, 1-5
 - understanding installation choices in Oracle Database 12c, 3-1
 - verifying validity, A-1
- installing
 - failures, A-1
 - other languages, 4-19, 4-34

J

- JOB_QUEUE_PROCESSES, 4-21, 4-36
 - about managing, 4-9
 - changing number of, 4-9, 4-22, 4-36
 - viewing number of, 4-9, 4-21, 4-36

L

- listener
 - stopping, 4-2
- log file, A-1

N

- new installation
 - configuring Oracle Application Server 10g, 4-26
 - modifying `marvel.conf`, 4-26

O

- obfuscate
 - password, 4-37
- Oracle Application Express
 - creating and adding users, 4-10
 - creating users, 4-11, 4-24, 4-38
 - creating workspace manually, 4-10, 4-23, 4-38
 - installing a translated version, 4-8
 - logging in to a workspace, 4-12, 4-25, 4-39
- Oracle Application Express Listener
 - about, 1-2
 - configuring, 4-3
 - enabling network services, 4-4
 - installing, 4-3
- Oracle Database 12c
 - enabling network services, 4-4
- Oracle HTTP Server
 - about, 1-2
 - location of images, 1-3
 - with Oracle Real Application Clusters (Oracle RAC), 1-4
- Oracle HTTP Server 11g

- configuring, 4-26, 4-30
- Oracle Real Application Clusters (Oracle RAC)
 - selecting a Web Listener, 1-4
 - shutting down instances, 4-2
- Oracle XML DB HTTP server
 - about, 1-3
 - verifying HTTP server port, 4-15
- overview, 1-1

P

- password
 - obfuscating, 4-37
 - patching Application Express
 - CDBs, 3-9
 - PDBs, 3-9
 - PDBs
 - patching Application Express, 3-9
 - PL/SQL Web Toolkit
 - requirement, 2-3
 - plugging in PDBs
 - Application Express is contained in the root container
 - non-CDB or PDB with no Application Express, 3-8
 - with a local Application Express from another CDB, 3-8
 - Application Express is installed in the root container, 3-7
 - Application Express is not contained in the root container
 - common Application Express from another CDB, 3-11
 - local Application Express from another CDB, 3-11
 - Application Express is not in the root container of the target CDB, 3-10
 - non-CDB or PDB with no Application Express, 3-11
 - non-CDB with Application Express, 3-11
 - non-CDB with Application Express, 3-7
 - with a common Application Express from another CDB, 3-7
 - post-installation tasks
 - configuring Oracle Application Server 11g, 4-26
 - pre-installation tasks
 - shutting down database, 4-2
 - prior installations
 - removing, 4-40
-
- reinstalling Application Express
 - CDBs, 3-5
 - requirements, 2-1
 - browser, 2-2
 - database, 2-1
 - disk space, 2-3
 - Oracle XML DB, 2-3
 - PL/SQL Web Toolkit, 2-3
 - `shared_pool_size`, 2-1

- Web Listener, 2-2
- RESTful Services
 - configuring, 4-3
- running
 - apxdevrm.sql, 4-44
 - apxdvins_con.sql, 4-43
 - apxdvins.sql, 4-43
- running Oracle Application Express
 - in other languages, 4-7
- runtime environment
 - about, 1-2
 - changing to development environment for Oracle Database 12c Multitenant Architecture, 4-43
 - changing to development environment for Oracle Database 12c non-CDB, 4-43

S

- security considerations, 4-7
- shared_pool_size
 - changing, 2-1

T

- translated version
 - installing, 4-19, 4-34
- troubleshooting, A-1
 - cleaning up after failed installation, A-1
 - images, A-3
 - reviewing log file, A-1
- troubleshooting an invalid ACL error, 4-6

U

- uninstalling Application Express
 - CDBs, 3-2
- upgrade installation
 - post installation tasks, 4-40
- upgrading
 - about, 1-2
 - copying images, 4-29
 - obfuscating password, 4-37
- user accounts
 - controlling account availability, 4-12, 4-25, 4-39
 - creating, 4-11, 4-24, 4-38
 - requiring password change, 4-12, 4-25, 4-39

W

- Web browser
 - requirements, 2-2
- Web Listener
 - choosing, 1-2, 4-2
 - pre-installation tasks, 4-2
 - requirement, 2-2
 - selecting with Oracle Real Application Clusters (Oracle RAC), 1-4
- workspace
 - creating, 4-10, 4-23, 4-38
 - logging in to, 4-12, 4-25, 4-39

X

- XML DB
 - requirement, 2-3

