

Oracle® Application Express

Installation Guide

Release 5.0

E39144-05

February 2017

Oracle Application Express Installation Guide, Release 5.0

E39144-05

Copyright © 2003, 2017, Oracle and/or its affiliates. All rights reserved.

Primary Author: Terri Jennings

Contributors: Christina Cho, Joel Kallman, David Peake, Marc Sewtz, Jason Straub, Vlad Uvarov, Patrick Wolf

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

| | |
|---|------|
| Preface | xi |
| Audience | xi |
| Documentation Accessibility | xi |
| Related Documents | xi |
| Conventions | xii |
| Third-Party License Information..... | xii |
| | |
| Changes in This Release | xiii |
| Changes in Oracle Application Express Release 5.0 | xiii |
| | |
| 1 Oracle Application Express Installation Overview | |
| Understanding the Installation Process | 1-1 |
| About Planning Your Installation | 1-1 |
| About Patch Sets and Point Releases | 1-2 |
| About Oracle Application Express Schemas..... | 1-2 |
| About the Installation Process..... | 1-3 |
| About Accessing Oracle Application Express | 1-3 |
| Signing In When Workspace Requests Is Enabled..... | 1-4 |
| Requesting a Workspace from the Sign In Page..... | 1-4 |
| Signing In To a Workspace..... | 1-5 |
| Signing Out of a Workspace..... | 1-5 |
| Recovering Your Workspace Name | 1-5 |
| Resetting Your Password from the Sign In Page..... | 1-6 |
| Upgrading from a Previous Oracle Application Express Release | 1-6 |
| Sample Upgrade Scenarios | 1-6 |
| Determining Your Oracle Application Express Release Version..... | 1-7 |
| About Installing the Application Express Release Included with the Oracle Database..... | 1-7 |
| About Upgrading Existing Applications..... | 1-7 |
| About Specifying an Application Compatibility Mode | 1-8 |
| About Testing Requirements..... | 1-8 |
| About Cleaning Up Your Environment..... | 1-8 |
| About Reverting to a Previous Release..... | 1-9 |
| Choosing a Web Listener | 1-9 |
| About Choosing a Web Listener | 1-9 |
| About Oracle REST Data Services | 1-10 |

| | |
|--|-------------|
| About Oracle HTTP Server with mod_plsql..... | 1-10 |
| About the Embedded PL/SQL Gateway..... | 1-11 |
| Comparing Web Listener Options..... | 1-12 |
| About Security Considerations When Using the Embedded PL/SQL gateway | 1-12 |
| Selecting a Web Listener in an Oracle RAC Environment..... | 1-12 |
| About the Oracle Application Express Runtime Environment..... | 1-13 |

2 Oracle Application Express Installation Requirements

| | |
|--|------------|
| Oracle Database Requirements | 2-1 |
| Checking the MEMORY_TARGET 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 |

3 Utilizing the Multitenant Architecture in Oracle Database 12c

| | |
|--|------------|
| Understanding the Installation Choices | 3-1 |
| Installing Application Express into Different PDBs..... | 3-2 |
| Uninstalling Application Express from a CDB..... | 3-2 |
| Installing Application Express Locally in a PDB..... | 3-3 |
| Reinstalling Application Express into a CDB | 3-4 |
| Plugging in a PDB When Application Express is Installed in the Root Container..... | 3-5 |
| Scenario 1: Plug-in Non-CDB with Application Express | 3-5 |
| Scenario 2: Plug-in PDB with a Common Application Express from Another CDB | 3-5 |
| Scenario 3: Plug-in PDB with a Local Application Express from Another CDB | 3-6 |
| Scenario 4: Plug-in Non-CDB or PDB with No Application Express..... | 3-6 |
| Working with Incompatible Application Express Versions | 3-7 |
| Patching or Upgrading Application Express in the CDB | 3-7 |
| Patching or Upgrading Application Express in a PDB | 3-8 |
| Plugging in a PDB When Application Express Is Not in the Root Container of the Target CDB ... | 3-9 |
| Scenario 1: Plug-in a Non-CDB with Application Express | 3-10 |
| Scenario 2: Plug-in PDB with Common Application Express from Another CDB | 3-10 |
| Scenario 3: Plug-in PDB with a Local Application Express from Another CDB | 3-10 |
| Scenario 4: Plug-in a Non-CDB or PDB with No Application Express..... | 3-10 |

4 Installing Application Express and Configuring Oracle REST Data Services

| | |
|---|------------|
| Oracle Database Requirement..... | 4-2 |
| Oracle REST Data Services Requirement..... | 4-2 |
| About Patching Oracle Application Express..... | 4-2 |
| Performing Pre-installation Tasks for Oracle Application Express | 4-2 |
| Installing Oracle Application Express | 4-3 |
| Accessing the Installation Script | 4-3 |
| Downloading the Script from Oracle Technology Network | 4-3 |
| Accessing the Script Shipping with Oracle Database 12c Release 2 (12.2) | 4-4 |
| Running the Application Express Installation Script..... | 4-4 |

| | |
|---|-------------|
| Creating or Updating Your Instance Administration Account..... | 4-6 |
| What Is an Instance Administrator?..... | 4-6 |
| About apxchpwd.sql | 4-6 |
| Running apxchpwd.sql | 4-7 |
| Restarting Processes..... | 4-7 |
| Configuring the APEX_PUBLIC_USER Account..... | 4-7 |
| About the APEX_PUBLIC_USER Account | 4-8 |
| Unlocking the APEX_PUBLIC_USER Account..... | 4-8 |
| Changing the Password for the APEX_PUBLIC_USER Account..... | 4-8 |
| About Password Expiration in Oracle Database 11g and Later | 4-9 |
| Downloading and Installing Oracle REST Data Services..... | 4-9 |
| Downloading Oracle REST Data Services | 4-9 |
| Configuring Static File Support | 4-10 |
| Configuring Oracle REST Data Services..... | 4-10 |
| Disabling Oracle XML DB Protocol Server | 4-10 |
| About Configuring Oracle REST Data Services Behind a Reverse Proxy or Load Balancer | 4-11 |
| Configuring RESTful Services with Oracle REST Data Services..... | 4-11 |
| About Configuring RESTful Services..... | 4-11 |
| Configuring RESTful Services..... | 4-11 |
| Enabling Network Services in Oracle Database 11g or Later..... | 4-12 |
| When and Why Network Services Must be Enabled..... | 4-12 |
| Granting Connect Privileges Prior to Oracle Database 12c..... | 4-13 |
| Granting Connect Privileges in Oracle Database 12c..... | 4-14 |
| Troubleshooting an Invalid ACL Error..... | 4-14 |
| Performing Security Tasks | 4-15 |
| Controlling the Number of Concurrent Jobs | 4-15 |
| About Managing the Number of Concurrent Jobs..... | 4-15 |
| Viewing the Number of JOB_QUEUE_PROCESSES | 4-16 |
| Viewing JOB_QUEUE_PROCESSES in the Installation Log File..... | 4-16 |
| Viewing JOB_QUEUE_PROCESSES in Oracle Application Express | 4-16 |
| Viewing JOB_QUEUE_PROCESSES from SQL*Plus | 4-16 |
| Changing the Number of JOB_QUEUE_PROCESSES..... | 4-16 |
| About Running Oracle Application Express in Other Languages | 4-17 |
| Installing Translated Versions of Oracle Application Express..... | 4-17 |
| About Installing Translated Versions of Oracle Application Express | 4-17 |
| Installing a Translated Version of Oracle Application Express | 4-18 |
| Creating a Workspace and Adding Oracle Application Express Users | 4-18 |
| About Workspaces and Users | 4-19 |
| Accessing Oracle Application Express Administration Services..... | 4-19 |
| Creating a Workspace Manually | 4-20 |
| Creating Oracle Application Express Users..... | 4-21 |
| Signing In to Your Workspace | 4-22 |
| Performing Post Installation Tasks for Upgrade Installations | 4-22 |
| About Removing Prior Oracle Application Express Installations | 4-23 |
| Verifying if a Prior Installation Exists | 4-23 |
| Removing Schemas from Prior Installations..... | 4-23 |
| Fixing Invalid ACL in Oracle Database 11g or Later | 4-24 |

| | |
|---|------|
| About Performance Optimization Tasks | 4-24 |
| Converting Between Runtime and Full Development Environments | 4-24 |
| About Runtime and Full Development Environments | 4-25 |
| Converting a Runtime Environment to a Full Development Environment | 4-25 |
| Converting a Full Development Environment to a Runtime Environment | 4-26 |

5 Installing Application Express and Configuring Embedded PL/SQL Gateway

| | |
|---|------|
| Oracle Database Requirement | 5-1 |
| About Patching Oracle Application Express | 5-2 |
| Performing Pre-installation Tasks for Oracle Application Express | 5-2 |
| Installing Oracle Application Express | 5-3 |
| Accessing the Installation Script | 5-3 |
| Downloading the Script from Oracle Technology Network | 5-3 |
| Accessing the Script Shipping with Oracle Database 12c Release 2 (12.2) | 5-4 |
| Running the Application Express Installation Script..... | 5-4 |
| Creating or Updating Your Instance Administration Account..... | 5-5 |
| What Is an Instance Administrator?..... | 5-6 |
| About apxchpwd.sql | 5-6 |
| Running apxchpwd.sql | 5-6 |
| Restarting Processes..... | 5-7 |
| Configuring the Embedded PL/SQL Gateway | 5-7 |
| Running the apex_epg_config.sql Configuration Script | 5-7 |
| Updating the Images Directory When Upgrading from a Previous Release | 5-8 |
| Verifying the Oracle XML DB Protocol Server Port..... | 5-9 |
| Enabling Oracle XML DB Protocol Server..... | 5-9 |
| Configuring Static File Support | 5-10 |
| About Configuring Embedded PL/SQL Gateway Behind a Reverse Proxy or Load Balancer | 5-10 |
| Enabling Network Services in Oracle Database 11g or Later | 5-11 |
| When and Why Network Services Must be Enabled..... | 5-11 |
| Granting Connect Privileges Prior to Oracle Database 12c..... | 5-11 |
| Granting Connect Privileges in Oracle Database 12c..... | 5-12 |
| Troubleshooting an Invalid ACL Error..... | 5-13 |
| Performing Security Tasks | 5-14 |
| Controlling the Number of Concurrent Jobs | 5-14 |
| About Managing the Number of Concurrent Jobs..... | 5-14 |
| Viewing the Number of JOB_QUEUE_PROCESSES | 5-14 |
| Viewing JOB_QUEUE_PROCESSES in the Installation Log File..... | 5-14 |
| Viewing JOB_QUEUE_PROCESSES in Oracle Application Express | 5-15 |
| Viewing JOB_QUEUE_PROCESSES from SQL*Plus | 5-15 |
| Changing the Number of JOB_QUEUE_PROCESSES..... | 5-15 |
| About Running Oracle Application Express in Other Languages | 5-15 |
| Installing Translated Versions of Oracle Application Express | 5-16 |
| About Installing Translated Versions of Oracle Application Express | 5-16 |
| Installing a Translated Version of Oracle Application Express | 5-16 |
| About Configuring the SHARED_SERVERS Parameter | 5-17 |
| Creating a Workspace and Adding Oracle Application Express Users | 5-18 |

| | |
|--|-------------|
| About Workspaces and Users | 5-18 |
| Accessing Oracle Application Express Administration Services | 5-18 |
| Creating a Workspace Manually | 5-19 |
| Creating Oracle Application Express Users | 5-20 |
| Signing In to Your Workspace | 5-21 |
| Performing Post Installation Tasks for Upgrade Installations | 5-22 |
| About Removing Prior Oracle Application Express Installations | 5-22 |
| Verifying if a Prior Installation Exists | 5-22 |
| Removing Schemas from Prior Installations | 5-22 |
| Fixing Invalid ACL in Oracle Database 11g or Later | 5-23 |
| About Performance Optimization Tasks | 5-23 |
| Converting Between Runtime and Full Development Environments..... | 5-24 |
| About Runtime and Full Development Environments | 5-24 |
| Converting a Runtime Environment to a Full Development Environment in a non-CDB or Locally in a PDB | 5-24 |
| Converting a Full Development Environment to a Runtime Environment in a non-CDB or Locally in a PDB | 5-25 |
| Converting a Runtime Environment to a Full Development Environment in a CDB | 5-25 |
| Converting a Full Development Environment to a Runtime Environment in a CDB | 5-26 |

6 Installing Application Express and Configuring Oracle HTTP Server

| | |
|--|-------------|
| Oracle Database Requirement | 6-2 |
| About Patching Oracle Application Express..... | 6-2 |
| Performing Pre-installation Tasks for Oracle Application Express | 6-2 |
| Installing Oracle Application Express | 6-3 |
| Accessing the Installation Script | 6-3 |
| Downloading the Script from Oracle Technology Network | 6-3 |
| Accessing the Script Shipping with Oracle Database 12c Release 2 (12.2) | 6-4 |
| Running the Application Express Installation Script..... | 6-4 |
| Running the Application Express Installation Script in a CDB..... | 6-6 |
| Creating or Updating Your Instance Administration Account..... | 6-7 |
| What Is an Instance Administrator?..... | 6-8 |
| About apxchpwd.sql | 6-8 |
| Running apxchpwd.sql | 6-8 |
| Restarting Processes..... | 6-9 |
| Configuring the APEX_PUBLIC_USER Account..... | 6-9 |
| About the APEX_PUBLIC_USER Account | 6-9 |
| Unlocking the APEX_PUBLIC_USER Account | 6-9 |
| Changing the Password for the APEX_PUBLIC_USER Account | 6-10 |
| About Password Expiration in Oracle Database 11g | 6-10 |
| Configuring the Oracle HTTP Server..... | 6-10 |
| About Copying the Images Directory | 6-11 |
| Copying the Images Directory | 6-11 |
| Editing the dads.conf File | 6-11 |
| Configuring Static File Support | 6-13 |
| Stopping and Restarting Oracle HTTP Server | 6-13 |
| Stopping and Restarting Oracle HTTP Server with Oracle Database 10g and Lower .. | 6-13 |

| | |
|--|-------------|
| Stopping and Restarting Oracle HTTP Server 12c | 6-14 |
| Disabling Oracle XML DB Protocol Server | 6-14 |
| About Configuring Oracle HTTP Server Behind a Reverse Proxy or Load Balancer | 6-15 |
| Enabling Network Services in Oracle Database 11g or Later | 6-15 |
| When and Why Network Services Must be Enabled..... | 6-15 |
| Granting Connect Privileges Prior to Oracle Database 12c..... | 6-16 |
| Granting Connect Privileges in Oracle Database 12c..... | 6-17 |
| Troubleshooting an Invalid ACL Error..... | 6-17 |
| Performing Security Tasks | 6-18 |
| Controlling the Number of Concurrent Jobs | 6-18 |
| About Managing the Number of Concurrent Jobs..... | 6-18 |
| Viewing the Number of JOB_QUEUE_PROCESSES | 6-19 |
| Viewing JOB_QUEUE_PROCESSES in the Installation Log File..... | 6-19 |
| Viewing JOB_QUEUE_PROCESSES in Oracle Application Express | 6-19 |
| Viewing JOB_QUEUE_PROCESSES from SQL*Plus | 6-19 |
| Changing the Number of JOB_QUEUE_PROCESSES..... | 6-19 |
| About Running Oracle Application Express in Other Languages | 6-20 |
| Installing Translated Versions of Oracle Application Express..... | 6-20 |
| About Installing Translated Versions of Oracle Application Express | 6-20 |
| Installing a Translated Version of Oracle Application Express | 6-21 |
| Creating a Workspace and Adding Oracle Application Express Users | 6-21 |
| About Workspaces and Users | 6-22 |
| Accessing Oracle Application Express Administration Services..... | 6-22 |
| Creating a Workspace Manually | 6-23 |
| Creating Oracle Application Express Users..... | 6-24 |
| Signing In to Your Workspace | 6-25 |
| Performing Post Installation Tasks for Upgrade Installations | 6-25 |
| About Removing Prior Oracle Application Express Installations | 6-26 |
| Verifying if a Prior Installation Exists | 6-26 |
| Removing Schemas from Prior Installations..... | 6-26 |
| Fixing Invalid ACL in Oracle Database 11g or Later | 6-27 |
| About Performance Optimization Tasks..... | 6-27 |
| Converting Between Runtime and Full Development Environments..... | 6-28 |
| About Runtime and Full Development Environments | 6-28 |
| Converting a Runtime Environment to a Full Development Environment in a non-CDB or Locally in a PDB | 6-28 |
| Converting a Full Development Environment to a Runtime Environment in a non-CDB or Locally in a PDB | 6-29 |
| Converting a Runtime Environment to a Full Development Environment in a CDB | 6-29 |
| Converting a Full Development Environment to a Runtime Environment in a CDB | 6-30 |

A Oracle Application Express Installation Troubleshooting

| | |
|---|------------|
| Reviewing a Log of an Installation Session..... | A-1 |
| Verifying the Validity of an Oracle Application Express Installation | A-1 |
| Downloading and Installing Patches | A-1 |
| Cleaning Up After a Failed Installation..... | A-2 |
| Reverting to a Previous Release After a Failed Upgrade Installation | A-2 |

| | |
|--|-------------|
| Verifying If You Have a Previous Release of Oracle Application Express | A-3 |
| Reverting to a Previous Release..... | A-3 |
| Removing the Oracle Application Express Release 5.0 Schema | A-14 |
| Removing Oracle Application Express from the Database..... | A-16 |
| About Images Displaying Incorrectly in Oracle Application Express | A-16 |
| About Page Protection Violation..... | A-16 |

B Upgrading Oracle Application Express within Oracle Database Express Edition

| | |
|---|-----|
| Upgrading to the Latest Oracle Application Express Release | B-1 |
| Understanding the Differences Between Later Oracle Application Express Releases | B-3 |
| User Interface Differences..... | B-3 |
| Database Management Differences | B-4 |

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

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit <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.

Related Documents

For more information, see these Oracle resources:

- *Oracle Application Express Release Notes*
- *Oracle Application Express Application Builder User's Guide*
- *Oracle Application Express End User's Guide*
- *Oracle Application Express Administration Guide*

- *Oracle Application Express SQL Workshop Guide*
- *Oracle Application Express API Reference*
- *Oracle Application Migration Guide*
- *Oracle Database Concepts*
- *Oracle Database Advanced Application Developer's Guide*
- *Oracle Database Administrator's Guide*
- *Oracle Database SQL Language Reference*
- *SQL*Plus User's Guide and Reference*

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 5.0](#)

Changes in Oracle Application Express Release 5.0

The following are changes in *Oracle Application Express Installation Guide* for Oracle Application Express release 5.0.

New Features

The following features are new in this release:

- Oracle Application Express supports Oracle Database 12c multitenant architecture. See "[Utilizing the Multitenant Architecture in Oracle Database 12c](#)" on page 3-1.
- Same Installation Script for all Architecture Types

Oracle Application Express release 5.0 features a simplified, streamlined installation process. In earlier releases, you ran a different installation script depending upon the target architecture (that is, multitenant or non-multitenant). For example, in Oracle Application Express release 4.2.6 you would run `apexins.sql` for a non-multitenant architecture and `apexins_con.sql` for a multitenant architecture. In Oracle Application Express release 5.0, you run just one installation script, `apexins.sql`, for all target architectures.

Deprecated and Desupported Features

See "Deprecated Features" and "Desupported Features" in *Oracle Application Express Release Notes*.

Other Changes

The following are additional changes in the release:

- All content has been updated to reflect release 5.0 functionality.
- Requirements for the Oracle database, web browser, and web listener have changed. See "[Oracle Application Express Installation Requirements](#)" on page 2-1.
- The procedures in *Oracle Application Express Installation Guide* are now organized by web listener. To learn more see:
 - "[Choosing a Web Listener](#)" on page 1-9.
 - For Oracle REST Data Services, see "[Installing Application Express and Configuring Oracle REST Data Services](#)" on page 4-1.

- For Embedded PL/SQL Gateway, see ["Installing Application Express and Configuring Embedded PL/SQL Gateway"](#) on page 5-1.
- For Oracle HTTP Server, see ["Installing Application Express and Configuring Oracle HTTP Server"](#) on page 6-1.

Oracle Application Express Installation Overview

This document describes how to install Oracle Application Express in a on-premises (or local) installation. How you sign in and access Oracle Application Express depends upon your user role and where Oracle Application Express resides. Oracle Application Express may reside in a local on-premises Oracle Database or in an Oracle Cloud Service.

Note: If you are accessing Oracle Application Express in the Oracle Database Cloud, see the corresponding *Using Guide* for the Cloud Service hosting Oracle Application Express. To learn more, see the Cloud Documentation Platform and Infrastructure page:

<http://docs.oracle.com/cloud/latest/?tab=3>

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

Understanding the Installation Process

This section provides an overview of the Oracle Application Express installation process.

- [About Planning Your Installation](#)
- [About Patch Sets and Point Releases](#)
- [About Oracle Application Express Schemas](#)
- [About the Installation Process](#)
- [About Accessing Oracle Application Express](#)
- [Signing In When Workspace Requests Is Enabled](#)

See Also: "Upgrading from a Previous Oracle Application Express Release" on page 1-6

About Planning Your Installation

The installation process involves the following steps:

1. **Plan your installation:** During the planning phase, you should determine whether to install a full development environment or runtime environment. A **full development** environment provides complete access to the Application Builder development 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.

You should also determine which Web listener to use. Available options include the Oracle REST Data Services, embedded PL/SQL gateway, or Oracle HTTP Server and `mod_plsql`.

2. **Verify installation requirements:** ["Oracle Application Express Installation Requirements"](#) on page 2-1 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.

See also: ["About the Oracle Application Express Runtime Environment"](#) on page 1-13, ["Choosing a Web Listener"](#) on page 1-9, and ["Oracle Application Express Installation Requirements"](#) on page 2-1

About Patch Sets and Point Releases

Patch sets are a mechanism for delivering fully tested and integrated product fixes. Patch sets provide bug fixes only. Patch sets typically do not include new functionality and they do not require certification on the target system. Patch sets include all of the libraries that have been rebuilt to implement the bug fixes in the set. All of the fixes in the patch set have been tested and are certified to work with each other.

In between major product releases, Oracle may offer a point release. A point release (for example Oracle Application Express release 4.2.5) includes bug fixes and incorporates all current patch sets. Typically, point releases do not introduce new functionality.

See Also: ["Upgrading from a Previous Oracle Application Express Release"](#) on page 1-6 and ["Downloading and Installing Patches"](#) on page A-1

About Oracle Application Express Schemas

The Application Express engine consists of a large number of Oracle tables and thousands of lines of PL/SQL programs residing within their own version specific schema. For each release of Oracle Application Express, this schema has a unique name as described in [Table 1-1](#).

Table 1-1 Oracle Application Express Release and Schema

| Oracle Application Express Release | Schema Name |
|--|--------------|
| Oracle Application Express release 5.0.x | APEX_050000 |
| Oracle Application Express release 4.2.x | APEX_040200 |
| Oracle Application Express release 4.1.x | APEX_040100 |
| Oracle Application Express release 3.1.x and earlier | FLows_XXXXXX |

About the Installation Process

Whether you are installing Oracle Application Express for the first time or updating from previous release, you use the same installation procedure and the same installation scripts. The installation script checks for the latest existing Oracle Application Express schema and automatically copies the instance metadata, workspaces, and applications from the previous schema into the current schema. The original schema associated with the previous release is left completely unaltered. Following best practices, Oracle recommends that you create new tablespaces for a new release of Oracle Application Express and follow the appropriate installation instructions as outlined in this document.

About Accessing Oracle Application Express

Note: This information does not apply to Oracle Database Cloud Service (Database Schema).

How you sign in and access Oracle Application Express depends upon your user role.

- **Instance administrators** are superusers that manage an entire hosted instance using a separate application called Oracle Application Express Administration Services. Instance administrators manage workspace provisioning, configure features and instance settings, and manage security.
- **Workspace administrators** can perform administrator tasks specific to a workspace such as configuring workspace preferences, managing user accounts, monitoring workspace activity, and viewing log files.
- **Developers** are users who sign in to a workspace and create and edit applications.
- **End users** can only run existing database or Websheet applications.

If you are a developer, an administrator must grant you access to shared work area called a **workspace**. If you are an Instance administrator, you must sign in to Oracle Application Express Administration Services, determine whether to specify a provisioning mode, create a workspace, and then sign in to that workspace.

About Specifying a Provisioning Mode

An Instance administrator determines how the process of provisioning (or creating) a workspace works for a specific Oracle Application Express instance. To determine how provisioning works, an Instance Administrator selects one of the following options on the Instance Settings page:

- **Manual** - In this mode, an Instance administrator creates new workspaces and notifies the Workspace administrator of the login icon.
- **Request** - Users request workspaces directly in a self-service fashion. Users click a link on the login page to access a request form. After the workspace request has been granted, users are automatically emailed the appropriate login information.
- **Request with Email Verification** - In this mode, users request workspaces directly by clicking a link on the login page to access a request form. Each user receives an initial email containing a verification link. Clicking this link validates the user's email address and then the request is processed. Then another email is sent to the user containing login credentials (that is, the workspace name, username, and password).

About Creating Workspaces and Users

Before you can develop or install applications, an administrator must create a workspace and add Oracle Application Express users. To learn more contact your administrator, or see the “Creating a Workspace and Adding Oracle Application Express Users” section for your Web listener in this document.

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

Signing In When Workspace Requests Is Enabled

Note: This information does not apply to Oracle Database Cloud Service (Database Schema).

If your administrator has enabled workspace requests, signing in to a workspace requires the following steps. First, you request a workspace using a link on the Sign In page. Second, your administrator approves the request and the system send you an email with your sign in credentials. Third, you sign in to your workspace.

Tip: Before users can request a workspace or change their passwords, an Oracle Application Express administrator must configure Oracle Application Express environment preferences.

- [Requesting a Workspace from the Sign In Page](#)
- [Signing In To a Workspace](#)
- [Signing Out of a Workspace](#)
- [Recovering Your Workspace Name](#)
- [Resetting Your Password from the Sign In Page](#)

Requesting a Workspace from the Sign In Page

Note: Before a user can request a workspace from the Sign In page, your Oracle Application Express administrator must configure Oracle Application Express to support workspace requests. To learn more, see "Creating Workspaces" in *Oracle Application Express Administration Guide*

To request a workspace:

1. In a web browser, navigate to the Oracle Application Express Sign In page.
The Sign In page appears.
2. Under Workspace, click **Request a Workspace**.
The Request Service Wizard appears.
3. Select the type of workspace. Options include:
 - Application Development

- Packaged Apps Only
4. Follow the on-screen instructions.

Signing In To a Workspace

After an Oracle Application Express administrator approves a workspace request, an e-mail arrives with your login credentials (the workspace name, user name, and password).

Note that if your administrator selected Email Verification as the automated method for handling new workspace requests, you might first receive an email containing a verification link. This step ensures that your email is a valid one before the workspace request is approved.

To sign in to Oracle Application Express:

1. In a web browser, navigate to the Oracle Application Express Login page provided in your workspace request email.
2. On the Sign In page:
 - In the Workspace field, enter the name of your workspace.
 - In the Username field, enter your user name.
 - In the Password field, enter your case-sensitive password.
3. Click **Sign In**.

The workspace home page appears.

Tip: Depending on your setup, you might be required to change your password when you sign in for the first time.

See Also: "Creating Workspaces" in *Oracle Application Express Administration Guide*

Signing Out of a Workspace

To sign out of an Oracle Application Express workspace:

- Select the **Account Menu** in the upper right corner of the window and click **Sign out**.

Recovering Your Workspace Name

If you cannot remember your workspace name, you can request a list of all workspace names associated with your email address.

To find your workspace name:

1. In a web browser, navigate to the Oracle Application Express Sign In page.
2. On the Sign In page, click **Reset Password**.
3. Click **Find My Workspace**.
4. Enter your email address and click **Find Workspace**.

You will receive an email listing all workspaces associated with the email address you provided.

Resetting Your Password from the Sign In Page

Tip: To reset your password from the Sign In page, you must provide your email address and workspace name.

To reset your password from the Sign In Page:

1. Under Sign in, click **Reset Password**.
2. Enter your email address and workspace name, and click **Reset Password**.
You will receive an email containing new passwords for all accounts associated with the email address and workspace name you provided.
3. On the Sign In page, enter your workspace, username, and the new password and click **Sign In**.

Tip: Passwords are case sensitive. Do not copy and paste the new password.

4. On Change Password, enter:
 - a. Current Password - Enter the current password provided by the email.
 - b. New Password - Enter your new password.
 - c. Confirm Password - Enter your new password again.
 - d. Click **Apply Changes**.

Upgrading from a Previous Oracle Application Express Release

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, 4.1x or 4.2.x of Oracle Application Express, following any of the installation scenarios in this guide upgrades your Oracle Application Express instance to release 5.0 and creates Oracle Application Express 5.0 database objects in a new schema and migrates the application metadata to the new release. This section describes other information relevant to the upgrade process.

- [Sample Upgrade Scenarios](#)
- [Determining Your Oracle Application Express Release Version](#)
- [About Installing the Application Express Release Included with the Oracle Database](#)
- [About Specifying an Application Compatibility Mode](#)
- [About Upgrading Existing Applications](#)
- [About Specifying an Application Compatibility Mode](#)
- [About Testing Requirements](#)
- [About Cleaning Up Your Environment](#)
- [About Reverting to a Previous Release](#)

See Also: ["Understanding the Installation Process"](#) on page 1-1

Sample Upgrade Scenarios

Both Patch sets and point releases are available for download from My Oracle Support. [Table 1–2](#) lists common upgrade scenarios.

Table 1–2 Sample Upgrade Scenarios

| Upgrade Scenarios | Action |
|---|--|
| Upgrade from a prior Oracle Application Express release | Download the latest files from the Downloads page. |
| Upgrade from a major Oracle Application Express to point release. | Download the point release from My Oracle Support. |
| You install Oracle Database 12c which includes Oracle Application Express release 4.2 by default. | Download the latest files from the Downloads page. |

Determining Your Oracle Application Express Release Version

To determine which release of Oracle Application Express you are currently running:

1. Sign in to Oracle Application Express.
 - The Workspace home page appears.
 - The current release version displays in bottom right corner.
2. To view the About Application Express page:
 - Locate the Help menu at the top of the page.
 - From the Help menu, select **About**.

The About Application Express page appears.

About Installing the Application Express Release Included with the Oracle Database

Oracle Application Express is included with the following Oracle Database releases:

- Oracle Database 11g Release 1 (11.1) - Oracle Application Express Release 3.0.
- Oracle Database 11g Release 1 (11.2) - Oracle Application Express Release 3.2.
- Oracle Database 12c Release 1 (12.1) - Oracle Application Express Release 4.2.
- Oracle Database 12c Release 2 (12.2) - Oracle Application Express Release 5.0.

The Oracle Database releases less frequently than Oracle Application Express. Therefore, Oracle recommends updating to the latest Oracle Application Express release available on Oracle Technology Network. To learn more, see the installation instructions for the appropriate Web Listener in your environment.

Note: If upgrading Oracle Application Express from a release that ships from the database do not alter any Oracle Application Express files in the Oracle home directory (for example: `dbhome_1`).

About Upgrading Existing Applications

If you install a new release of Oracle Application Express, the installation process updates existing applications to the latest release. The upgrade process is designed to not alter the application user interface or application components. As a result, application components that may impact the user interface are left untouched by the upgrade process. It is the developer's responsibility to manually review these components and update them, or leave them as is. Examples of components which may impact existing functionality include new features added to interactive reports, charts, certain validations, and so on.

Tip: Charts that use custom XML must be updated manually otherwise the custom XML will be lost.

See Also: "Running Advisor to Check Application Integrity" in *Oracle Application Express Application Builder User's Guide*

About Specifying an Application Compatibility Mode

Within each application, you can also specify the Compatibility Mode in the Application Definition. Changing the application Compatibility Mode changes certain runtime behaviors. Compatibility Mode options include Pre 4.1, 4.1, 4.2, and 5.0.

See Also: "Compatibility Mode" in *Oracle Application Express Release Notes* and "Editing the Application Attributes" and "Properties" in *Oracle Application Express Application Builder User's Guide*

About Testing Requirements

Determining the appropriate amount of regression testing when upgrading Oracle Application Express depends upon the complexity, size, and number of applications you are upgrading. You should include the majority of complex pages, particularly those that incorporate significant JavaScript or extensive PL/SQL computations or processes. Developers should ensure pages which they manually update based on the Upgrade Application or Advisor are also included in regression tests. Not all remaining pages have to be included in regression testing. Oracle recommends you include a good representation of different page types includes reports, charts, and forms. An application should always be included in regression testing if its compatibility mode was modified post-upgrade.

While regression testing of upgraded applications is imperative to minimize risk of disrupting the end users, it is important that testing is not drawn out for an extended period. As a general rule:

- Step 1: Upgrade your development environment first. Allow developers to review the applications and make initial updates as needed.
- Step 2: Upgrade your QA/Test environment.
- Step 3: Upgrade applications from development are built into this environment.
- Step 4: Upgrade your production environment.
- Step 5: Build upgraded applications into this environment.

About Cleaning Up Your Environment

Following the successful upgrade of all of the environments to the latest release of Oracle Application Express, you should clean-up the environments. Once you start developing with the newer release, the Oracle Application Express schema associated with the prior release can be deleted.

If you installed the prior release into a separate tablespace, you can simply drop the specific tablespace. Oracle recommends leaving the older Oracle Application Express schema(s) for a few weeks and then remove them from the development, test, and production environments. This cleanup process releases disk space and ensures that no one accesses an outdated schema using tools such as SQL Developer or SQL*Plus.

About Reverting to a Previous Release

Because Oracle Application Express creates a new schema for each major release, reverting back to a prior release is a relatively simple process. If you revert to a prior release, any modifications made in the current Oracle Application Express instance are lost. The main task is to switch the public synonyms and grants to point at the previous schema instead of the new schema.

See Also: ["Reverting to a Previous Release After a Failed Upgrade Installation"](#) on page A-2

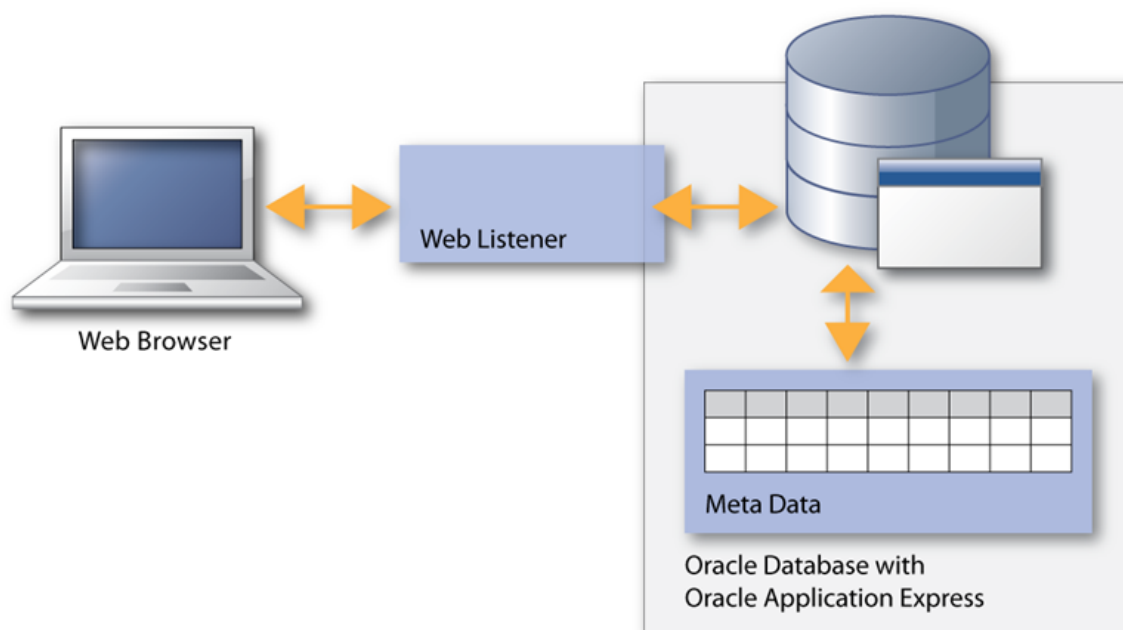
Choosing a Web Listener

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.

- [About Choosing a Web Listener](#)
- [About Oracle REST Data Services](#)
- [About Oracle HTTP Server with `mod_plsql`](#)
- [About the Embedded PL/SQL Gateway](#)
- [Comparing Web Listener Options](#)
- [About Security Considerations When Using the Embedded PL/SQL gateway](#)
- [Selecting a Web Listener in an Oracle RAC Environment](#)

About Choosing a Web Listener

Oracle Application Express uses a simple architecture where pages are dynamically generated using metadata stored within the Oracle Database. There is no code generation or file based compilation. Once fully installed, a Uniform Resource Locator (URL) is defined for both developers and end users to access Oracle Application Express. Users require only a Web browser and the required URL. No additional client software is required.



The Web Listener functions as a communications broker between the Web browser and the Oracle Application Express objects in the Oracle database by mapping browser requests into database stored procedure calls. You have a choice of three Web Listeners.

- Oracle REST Data Services (formerly Oracle Application Express Listener). See ["About Oracle REST Data Services"](#) on page 1-10.
- Oracle HTTP Server. See ["About Oracle HTTP Server with mod_plsql"](#) on page 1-10.
- Embedded PL/SQL gateway. See ["About the Embedded PL/SQL Gateway"](#) on page 1-11.

See Also: ["Choosing a Web Listener"](#) on page 1-9 and ["Web Listener Requirements"](#) on page 2-2

About Oracle REST Data Services

Oracle REST Data Services (formerly Oracle Application Express Listener) is Java-based, can be installed into any supported J2EE compliant Web Server, and is the preferred option for use with Oracle Application Express. It is a free tool that is fully supported against Oracle WebLogic Server, Oracle Glassfish Server, and Apache Tomcat. Oracle REST Data Services is part of the reference architecture used to operate the Oracle Database Cloud Service.

Note: There are licensing costs associated with Oracle WebLogic Server and Oracle Glassfish Enterprise edition. Oracle Glassfish Community edition is a no cost option.

Using Oracle REST Data Services creates an architecture which consists of:

- A web browser
- Oracle REST Data Services
- Oracle Database containing Oracle Application Express

The major advantage of this architecture is the separation of the mid-tier and the database tier.

Tip: This architecture is appropriate for Oracle Real Application Clusters (Oracle RAC) environments. See ["Selecting a Web Listener in an Oracle RAC Environment"](#) on page 1-12.

See Also: ["Web Listener Requirements"](#) on page 2-2, ["About Configuring Oracle REST Data Services with Oracle Application Express"](#) in *Oracle Application Express Application Builder User's Guide*, and ["Installing Application Express and Configuring Oracle REST Data Services"](#) on page 4-1

About Oracle HTTP Server with mod_plsql

Note: mod_plsql is deprecated as of Oracle HTTP Server 12c (12.1.3). For more information, see My Oracle Support Note 1576588.1. Oracle recommends using Oracle REST Data Services instead. See ["About Oracle REST Data Services"](#) on page 1-10.

The Oracle HTTP Server (Apache) with `mod_plsql` can be placed on the same physical machine as the database, or on a separate physical machine. If Oracle HTTP Server is installed on the same physical machine as the database then the Oracle HTTP Server is included as part of the limited-use license included with the Oracle Database license. Otherwise, you must obtain a separate Oracle HTTP Server license.

Using Oracle HTTP Server (Apache) with `mod_plsql` creates an architecture which consists of:

- a Web browser
- Oracle HTTP Server with `mod_plsql`
- Oracle Database containing Oracle Application Express

This architecture separates the mid-tier and the database tier.

Tip: This architecture is appropriate for Oracle Real Application Clusters (Oracle RAC) environments. See ["Selecting a Web Listener in an Oracle RAC Environment"](#) on page 1-12.

See Also: ["Web Listener Requirements"](#) on page 2-2, ["About Configuring Oracle HTTP Server with `mod_plsql` with Oracle Application Express"](#) in *Oracle Application Express Application Builder User's Guide*, and ["Installing Application Express and Configuring Oracle HTTP Server"](#) on page 6-1

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 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.

Specific examples for locating the text alias `/i/` can be found in ["Copying the Images Directory"](#) on page 6-11.

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 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

See Also: ["Web Listener Requirements"](#) on page 2-2 and ["About Security Considerations When Using the Embedded PL/SQL gateway"](#) on page 1-12

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

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

Comparing Web Listener Options

Table 1-3, "Web Listener Comparisons" compares Web Listener options for Oracle Application Express.

Table 1-3 Web Listener Comparisons

| Capabilities | Oracle REST Data Services | Oracle HTTP Server with mod_plsql | Embedded PL/SQL Gateway |
|-----------------------------|--|-----------------------------------|------------------------------------|
| Image location | File system | File system | Within the database |
| Configuration options | GUI interface (Release 2.0.3 or later); Administration pages | Database Access Descriptor (DAD) | Database initialization parameters |
| Connection Pool settings | JDBC parameters | Min/MaxSpareServers; MaxClients | SHARED_SERVERS; MAX_SHARED_SERVERS |
| Emit RESTful Web Services | Yes (Release 2.0.3 or later) | No | No |
| Support multi-databases | Yes, including Oracle RAC | Yes, including Oracle RAC | No |
| Virus scan files | Yes, with integration of ICAP server | No | No |
| PDF printing | Yes, included FOP support | No | No |
| Environment recommendations | All | All | Development only |

About Security Considerations When Using the Embedded PL/SQL gateway

The embedded PL/SQL gateway runs in the database as part of the Oracle XML DB HTTP listener. The Oracle XML DB HTTP listener and embedded PL/SQL gateway provides the equivalent core features of Oracle HTTP Server and mod_plsql. Because the HTTP Listener runs in the same database where Oracle Application Express is installed, it is not possible to separate the HTTP listener from the database. For this reason, Oracle does not recommend the embedded PL/SQL gateway for applications that run on the Internet. Additionally, the embedded PL/SQL gateway does not provide the same flexibility of configuration and detailed logging as Oracle REST Data Services or Oracle HTTP Server.

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. Because the embedded PL/SQL gateway uses an HTTP Server built into the database instance, it does not take advantage of the Oracle RAC shared architecture.

About the Oracle Application Express Runtime Environment

As with any software development life cycle, Oracle strongly recommends that you have different environments for development, testing/QA, and production. 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, "About the Advantages of the Application Express 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 one of the following for the corresponding type of installation:

- For [Installing Application Express and Configuring Oracle REST Data Services](#), see "Converting Between Runtime and Full Development Environments" on page 4-24
- For [Installing Application Express and Configuring Embedded PL/SQL Gateway](#), see "Converting Between Runtime and Full Development Environments" on page 5-24
- For [Installing Application Express and Configuring Oracle HTTP Server](#), see "Converting Between Runtime and Full Development Environments" on page 6-28

Oracle Application Express Installation Requirements

This chapter describes the requirements for installing Oracle Application Express.

- [Oracle Database Requirements](#)
- [Checking the MEMORY_TARGET of the Target Database](#)
- [Browser Requirements](#)
- [Web Listener Requirements](#)
- [Disk Space Requirement](#)
- [Oracle XML DB Requirement](#)

Oracle Database Requirements

Oracle Application Express release 5.0 requires an Oracle Database Release 11.1.0.7 or later, including Enterprise Edition and Express Edition (Oracle Database XE). If you are upgrading an Oracle Database version 12.1 CDB, you must download from My Oracle Support the one off patch for bug 20618595. Search for **20618595** on the Patches tab.

Checking the MEMORY_TARGET of the Target Database

Oracle Application Express requires the system global area (SGA) and program global area (PGA) to be at least 300 MB. Databases typically use automatic memory management, where the memory can be controlled by the server parameter MEMORY_TARGET. If your database does not use automatic memory management, consult the *Oracle Database Administrator's Guide* to find out how to configure manual memory parameters (for example, SGA_TARGET, PGA_AGGREGATE_TARGET, SHARED_POOL_SIZE) instead, for a similar result.

See Also: *Oracle Database Administrator's Guide*

To check the MEMORY_TARGET of the target database:

1. Start the database:

```
SQL> STARTUP
```

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

```
SQL> SHOW PARAMETER MEMORY_TARGET
```

4. If the value is 0, your database is using manual memory management. Consult the *Oracle Database Administrator's Guide* to learn how to configure an equivalent memory size using manual memory management, instead of continuing with the steps that follow.

If the system is using a server parameter file, set the value of the `MEMORY_TARGET` initialization parameter to at least 300 MB:

```
SQL> ALTER SYSTEM SET MEMORY_TARGET='300M' SCOPE=spfile;
```

5. If the system uses an initialization parameter file, change the value of the `MEMORY_TARGET` parameter to at least 300 MB in the initialization parameter file (`init.ora`).

6. Shut down the database:

```
SQL> SHUTDOWN
```

7. Restart the database:

```
SQL> STARTUP
```

Browser Requirements

Oracle Application Express supports the current and prior major release of Google Chrome, Mozilla Firefox, Apple Safari, Microsoft Internet Explorer and Microsoft Edge.

Note: Microsoft Internet Explorer 11 is the prior major release, with Microsoft Edge being the current Microsoft browser.

Web Listener Requirements

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

- Oracle REST Data Services release 2.0.3 or later

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

- 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.

See Also: ["Choosing a Web Listener"](#) on page 1-9

Disk Space Requirement

Oracle Application Express disk space requirements are as follows:

- Free space for Oracle Application Express software files on the file system: 265 MB if using English only download (apex_5.0_en.zip) and 630 MB if using full download (apex_5.0.zip).
- Free space in Oracle Application Express tablespace: 220 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.

Utilizing the Multitenant Architecture in Oracle Database 12c

This section 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 the Installation Choices](#)
- [Installing Application Express into Different PDBs](#)
- [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 the Installation Choices

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.

When configuring multitenant architecture in Oracle Database 12c Release 1 (12.1), Oracle Application Express is installed in the root container database by default. In such an installation the root container, `CDB$ROOT`, includes the `APEX_050000` schema to store the common database objects for the Application Express engine such as packages, functions, procedures and views. The seed database, `PDB$SEED`, also includes the `APEX_050000` schema to store the tables that are part of the Application Express engine.

You can create a new PDB by copying `PDB$SEED`, which includes the `APEX_050000` schema with the Application Express tables, and creating metadata links back to the common database objects held in the `APEX_050000` schema within the `CDB$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_050000` 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.

In Oracle Database 12c Release 2 (12.2) multitenant architecture, Oracle Application Express is not installed in the root container database or any pluggable database by default.

Tip: Oracle recommends removing Oracle Application Express from the root container database for the majority of use cases, except for hosting companies or installations where all pluggable databases (PDBs) utilize Oracle Application Express and they all need to run the exact same release and patch set of Oracle Application Express. To learn more, see ["Installing Application Express into Different PDBs"](#) on page 3-2.

Installing Application Express into Different PDBs

To have the flexibility of installing different versions of Oracle Application Express into different PDBs, you need to uninstall Application Express from the container database. Once you have removed Application Express from the container database, then you can install a local Application Express within each PDB as required. When Application Express is installed locally there are no Application Express metadata linked objects and all packages, views, and tables are created within the APEX_0500000 schema, within each PDB where Application Express is installed.

- [Uninstalling Application Express from a CDB](#)
- [Installing Application Express Locally in a PDB](#)
- [Reinstalling Application Express into a CDB](#)

Uninstalling Application Express from a CDB

To uninstall Application Express from the CDB:

1. Change the apex directory in the location where you unzipped the distribution.
2. Start SQL*Plus and connect to the database where 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.sql`.

For example:

```
@apxremov.sql
```

Note: If you run `apexremov.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.

Installing Application Express Locally in a PDB

Once you have removed 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 Application Express locally in a PDB:

1. Change the `apex` directory in the location where you unzipped the distribution.
2. Start SQL*Plus and connect to the database where 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 want to install Application Express locally:


```
ALTER SESSION SET CONTAINER = <PDB_name>;
```
4. If you are using Oracle REST Data Services, complete the appropriate steps in "[Installing Application Express and Configuring Oracle REST Data Services](#)" on page 4-1.
5. If you are using Oracle HTTP Server, complete the appropriate steps in "[Installing Application Express and Configuring Oracle HTTP Server](#)" on page 6-1.
6. If you are using Embedded PL/SQL Gateway, complete the appropriate steps in "[Installing Application Express and Configuring Embedded PL/SQL Gateway](#)" on page 5-1 and then run `apex_epg_config.sql` passing the path to the Oracle home.

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

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

- `APEX_050000` - The account that owns the Application Express schema and metadata.
- `FLows_FILES` - The account that owns the Application Express uploaded files.
- `APEX_PUBLIC_USER` - The minimally privileged account is used for 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 Application Express.
- APEX_LISTENER - The account used to query RESTful Services definitions stored in Application Express.

Reinstalling Application Express into a CDB

If you previously uninstalled Oracle Application Express and want to reinstall Application Express into a CDB you need to install Oracle Application Express using the Oracle Database 12c distribution. Following the reinstallation, you can apply Application Express patches if required as outlined in ["Patching or Upgrading Application Express in the CDB"](#) on page 3-7.

To reinstall Application Express into a CDB:

1. Change your working directory to the apex directory in the location where you unzipped the distribution.
2. Start SQL*Plus and connect to the database where 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 using Oracle REST Data Services, complete appropriate steps in [Chapter 4, "Installing Application Express and Configuring Oracle REST Data Services"](#).
4. If using the Embedded PL/SQL Gateway, complete appropriate steps in [Chapter 5, "Installing Application Express and Configuring Embedded PL/SQL Gateway"](#).
5. If using the Oracle HTTP Server, complete appropriate steps in [Chapter 6, "Installing Application Express and Configuring Oracle HTTP Server"](#).

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

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

- APEX_050000 - The account that owns the Application Express schema and metadata.
- FLOWS_FILES - The account that owns the Application Express uploaded files.
- APEX_PUBLIC_USER - The minimally privileged account is used for 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 Application Express.

- `APEX_LISTENER` - The account used to query RESTful Services definitions stored in 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 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](#)
- [Working with Incompatible Application Express Versions](#)

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

After installing Application Express, you need to configure the Web listener for the PDB as described in "[Installing Application Express and Configuring Oracle REST Data Services](#)" on page 4-1, "[Installing Application Express and Configuring Embedded PL/SQL Gateway](#)" on page 5-1, or "[Installing Application Express and Configuring Oracle HTTP Server](#)" on page 6-1.

If the version of Application Express installed in the originating database (which is now a PDB) is different from what is 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 "[Working with Incompatible Application Express Versions](#)" on page 3-7.

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 "[Installing Application Express and Configuring Oracle REST Data Services](#)" on page 4-1, "[Installing Application Express and Configuring Embedded PL/SQL Gateway](#)" on page 5-1, or "[Installing Application Express and Configuring Oracle HTTP Server](#)" on page 6-1.

Assuming Application Express release 5.0 is installed, the APEX_050000 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 different from what is 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 "[Working with Incompatible Application Express Versions](#)" on page 3-7.

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 Application Express release 5.0 is installed, the APEX_050000 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 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 different from what is 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 "[Working with Incompatible Application Express Versions](#)" on page 3-7.

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_050000 for Application Express release 5.0, 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.

Working with Incompatible Application Express Versions

If the version of Application Express in the root container, CDB\$ROOT, is not the same as the 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 or Upgrading Application Express in the CDB](#)
- [Patching or Upgrading Application Express in a PDB](#)

Patching or Upgrading Application Express in the CDB

If the version of Application Express in the PDB is a later minor release version than the version of Application Express in the root container (for example, the PDB contains Application Express release 4.2.6 and the CDB contains Application Express release 4.2.5) then you must patch the version of Application Express in the root container to be able to open the PDB without error. If the major version of Application Express in the PDB is higher than the version in the CDB (for example the PDB has Application Express release 5.0 and the CDB has Application Express release 4.2) then you must upgrade the version of Application Express in the CDB 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 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

Tip: To upgrade Application Express in the root container, see ["Reinstalling Application Express into a CDB"](#) on page 3-4

Patching or Upgrading Application Express in a PDB

If the minor version of Application Express in the PDB is lower than the version of Application Express in the root container (for example the PDB has Application Express release 4.2.0 and the CDB has Application Express release 4.2.6) then it will be necessary to patch the version of Application Express in the PDB. If the major version of Application Express in the PDB is lower than the version in the root container (for example, the PDB has Application Express release 4.2 and the CDB has Application Express release 5.0) then the version of Application Express in the PDB will need to be upgraded.

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

Patching Application Express in a 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 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 apex_epg_config.sql for example:

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


Upgrading Application Express in a PDB To upgrade Application Express in the PDB:

1. Unzip and extract the installation files.
2. Change your working directory to where the installation files were extracted
3. Start SQL*Plus and connect to the database where 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. Run apexins_nocdb.sql or apxrtins_nocdb.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 apexins -c '<PDB_name>'
apexins_nocdb.sql SYSAUX SYSAUX TEMP /i/
```

Where:

- &OH_HOME represents the full path to the Oracle home
 - <PDB_name> is the name of the PDB you are patching
5. Follow the instructions outlined in the patch set notes for updating the images directory based on the Web Server you are using.

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

The scenarios in this section describe when 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 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 want 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 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 listener as outlined in ["Installing Application Express and Configuring Oracle REST Data Services"](#), ["Installing Application Express and Configuring Embedded PL/SQL Gateway"](#) on page 5-1, or ["Installing Application Express and Configuring Oracle HTTP Server"](#) on page 6-1 depending on the type of Web listener you are using.

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 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 if it contains PDBs with locally installed Application Express.

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 listener in the PDB as described in ["Installing Application Express and Configuring Oracle REST Data Services"](#) on page 4-1, ["Installing Application Express and Configuring Embedded PL/SQL Gateway"](#) on page 5-1, or ["Installing Application Express and Configuring Oracle HTTP Server"](#) on page 6-1 depending on the type of Web listener you are using.

Assuming Application Express release 5.0 is installed, the `APEX_050000` 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_050000`, within the PDB, and the PDB can be started without error.

Installing Application Express and Configuring Oracle REST Data Services

In order to run, Oracle Application Express must have access to a Web listener. To use Oracle REST Data Services with Oracle Application Express, you must first install Oracle Application Express and then install Oracle REST Data Services. These instructions apply to both new and upgrade installations.

See Also: "Web Listener Requirements" on page 2-2 and "Choosing a Web Listener" on page 1-9

- Oracle Database Requirement
- Oracle REST Data Services Requirement
- About Patching Oracle Application Express
- Performing Pre-installation Tasks for Oracle Application Express
- Installing Oracle Application Express
- Downloading and Installing Oracle REST Data Services
- Configuring RESTful Services with Oracle REST Data Services
- Enabling Network Services in Oracle Database 11g or Later
- Performing Security Tasks
- Controlling the Number of Concurrent Jobs
- About Running Oracle Application Express in Other Languages
- Installing Translated Versions of Oracle Application Express
- Creating a Workspace and Adding Oracle Application Express Users
- Performing Post Installation Tasks for Upgrade Installations
- About Performance Optimization Tasks
- Converting Between Runtime and Full Development Environments

See Also: "Web Listener Requirements" on page 2-2 and "About Configuring Oracle REST Data Services with Oracle Application Express" in *Oracle Application Express Application Builder User's Guide* and "Configuring Report Printing in a Full Development Environment" in *Oracle Application Express Administration Guide*

Oracle Database Requirement

Oracle Application Express release 5.0 requires an Oracle Database Release 11.1.0.7 or later, including Enterprise Edition and Express Edition (Oracle Database XE).

See Also: *Oracle Database Installation Guide* and "[Oracle Application Express Installation Requirements](#)" on page 2-1

Oracle REST Data Services Requirement

Oracle Application Express release 5.0 requires Oracle REST Data Services release 2.0 or later.

Tip: If you are currently running Oracle REST Data Services 3.0 to 3.0.2, you should upgrade to the latest version of Oracle REST Data Services, available for download from OTN.

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 for information about patch set releases or later releases of Oracle Application Express:

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

See Also: "[Upgrading from a Previous Oracle Application Express Release](#)" on page 1-6

Performing Pre-installation Tasks for Oracle Application Express

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. If you are actively using Oracle Application Express and upgrading the current installation then shut down with normal or immediate priority the Oracle Database instances where you plan to install Oracle Application Express. On Oracle Real Application Clusters (Oracle RAC) systems, shut down all instances on each node.

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

To disable access to Oracle Application Express when an existing installation is using Oracle REST Data Services, shut down the appropriate application server where Oracle REST Data Services is deployed.

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

3. Back up the Oracle Database installation.

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

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.

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

Installing Oracle Application Express

How you install Oracle Application Express depends upon how you access the installation script and the type of database you into which you are installing.

- [Accessing the Installation Script](#)
- [Running the Application Express Installation Script](#)
- [Creating or Updating Your Instance Administration Account](#)
- [Restarting Processes](#)
- [Configuring the APEX_PUBLIC_USER Account](#)

See Also: "[Utilizing the Multitenant Architecture in Oracle Database 12c](#)" on page 3-1.

Accessing the Installation Script

How you access the Oracle Application Express installation script depends upon whether you download the Oracle Application Express distribution from Oracle Technology Network (OTN), or install the version that ships with Oracle Database 12c Release 2 (12.2).

Downloading the Script from Oracle Technology Network

To download the script from the Oracle Application Express download page:

1. For installations where the development will be in English only, download the file `apex_5.0_en.zip` from the Oracle Application Express download page. If the development will include languages other than English, download `apex_5.0.zip` from the Oracle Application Express download page. See:

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

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

2. Unzip downloaded zip file:

- If English only, unzip apex_5.0_en.zip as follows, preserving directory names:
 - UNIX and Linux: `$ unzip apex_5.0_en.zip`
 - Windows: Double click the file apex_5.0_en.zip in Windows Explorer
- If multiple languages, unzip apex_5.0.zip as follows, preserving directory names:
 - UNIX and Linux: `$ unzip apex_5.0.zip`
 - Windows: Double click the file apex_5.0.zip in Windows Explorer

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

3. Change your working directory to apex.
4. Run the installation script. Go to the next section, "[Running the Application Express Installation Script](#)" on page 4-4.

Accessing the Script Shipping with Oracle Database 12c Release 2 (12.2)

To access the script shipping with Oracle Database 12c Release 2 (12.2):

1. Change your working directory to `$ORACLE_HOME/apex`.
2. Run the installation script. Go to the next section, "[Running the Application Express Installation Script](#)" on page 4-4.

Running the Application Express Installation Script

To run the Oracle Application Express installation script:

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

- **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/*.

Example:

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

Note: If you receive the following error, exit SQL*Plus and change your working directory to where you unzipped the installation file, for example C:\TEMP in Windows, before starting SQL*Plus:

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

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

```
@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/*.

Example:

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

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

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

- `APEX_050000` - 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`.

When you complete the required step to configure RESTful Web services, these additional accounts will be 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.

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

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

Creating or Updating Your Instance Administration Account

This section describes how to create or update your Instance Administrator account.

Tip: Skip this section if you are upgrading from a previous release of Oracle Application Express. In an upgrade scenario, the Instance Administrator account and password is preserved and carried over from the prior release.

- [What Is an Instance Administrator?](#)
- [About `apxchpwd.sql`](#)
- [Running `apxchpwd.sql`](#)

What Is an Instance Administrator?

Instance administrators are superusers that are responsible for managing an entire Oracle Application Express instance, including managing workspace provisioning, configuring features and instance settings, and managing security. To perform these tasks, an Instance administrator signs in to the Oracle Application Express Administration Services application.

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

About `apxchpwd.sql`

Running the `apxchpwd.sql` script enables you to create or update your Instance Administrator account. You must run the `apxchpwd.sql` script in the following scenarios:

- **New Oracle Application Express installations** - Run `apxchpwd.sql` to create an Instance Administrator account and password.
- **Converting of a runtime environment to a development environment** - Run `apxchpwd.sql` to change the Instance Administrator account password.
- **Changing Your Instance Administrator Password** - Run `apxchpwd.sql` to change the password for an existing Instance Administrator account.

- **Unlocking Your Instance Administrator Account** - Run `apxchpwd.sql` to unlock an existing Instance Administrator account.

Tip: You do not need to run `apxchpwd.sql` when upgrading from a previous release of Oracle Application Express. In an upgrade scenario, the Instance Administrator account password is preserved and carried over from the prior release.

Running `apxchpwd.sql`

To create or update your Instance Administrator account:

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxchpwd.sql
```

Follow the on-screen instructions. You will be prompted provide a username, password, and email address. If the account username does not exist, it will be created for you.

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

Restarting Processes

After you install Oracle Application Express, you must restart the processes that you stopped before you began the installation.

Configuring the APEX_PUBLIC_USER Account

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

- [About the APEX_PUBLIC_USER Account](#)
- [Unlocking the APEX_PUBLIC_USER Account](#)
- [Changing the Password for the APEX_PUBLIC_USER Account](#)
- [About Password Expiration in Oracle Database 11g and Later](#)

About the APEX_PUBLIC_USER Account

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

Unlocking the APEX_PUBLIC_USER Account

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

To unlock the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. If Oracle Application Express is installed in the CDB, ensure you connect to CDB\$ROOT. For example:

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following statement:

```
ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK
```

Changing the Password for the APEX_PUBLIC_USER Account

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

To change the password for the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. If Oracle Application Express is installed in the CDB, ensure you connect to CDB\$ROOT. For example:

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following statement:

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

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

About Password Expiration in Oracle Database 11g and Later

In the default profile in Oracle Database 11g, the parameter `PASSWORD_LIFE_TIME` is set to 180. If you are using Oracle Database 11g 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 to the new profile.

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

Downloading and Installing Oracle REST Data Services

This section describes how to download and install Oracle REST Data Services.

- [Downloading Oracle REST Data Services](#)
- [Configuring Static File Support](#)
- [Configuring Oracle REST Data Services](#)
- [Disabling Oracle XML DB Protocol Server](#)
- [About Configuring Oracle REST Data Services Behind a Reverse Proxy or Load Balancer](#)

See Also: *REST Data Services Installation, Configuration, and Development Guide*

Downloading Oracle REST Data Services

Tip: By default, the context root for accessing Oracle Application Express through Oracle REST Data Services is `/ords`. If you wish to have a context root of `/apex` for accessing Oracle Application Express, rename the `ords.war` file to `apex.war` before installing Oracle REST Data Services. See "Installing Oracle REST Data Services" in *REST Data Services Installation, Configuration, and Development Guide*.

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 Oracle Application Express software ZIP to a location on the file system where Oracle REST Data Services is installed.
- 4. See *REST Data Services Installation, Configuration, and Development Guide* and follow and complete all 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 *REST Data Services Installation, Configuration, and Development Guide* for more information.

Configuring Static File Support

Oracle Application Express enables application developers to include static files with their applications. Static files can be associated with a workspace, an application, a plug-in, or an application theme. When using Oracle REST Data Services as your web listener, static files are served using RESTful service module built into Oracle Application Express. Therefore, you must configure RESTful Services in new installations and in upgrade installations when RESTful Services were not configured in a previous release.

See Also: ["Configuring RESTful Services with Oracle REST Data Services"](#) on page 4-11

Configuring Oracle REST Data Services

When configuring Oracle Application Express, Oracle recommends setting the parameter `security.requestValidationFunction` to `wwv_flow_epg_include_modules.authorize`. This activates the white list of callable procedures which ships with Oracle Application Express and prohibits calls to other procedures.

See Also: "About Configuring Oracle REST Data Services with Oracle Application Express" in *Oracle Application Express Application Builder User's Guide*

Disabling Oracle XML DB Protocol Server

If you were previously using the Embedded PL/SQL Gateway and now want to use Oracle REST Data Services, you need to disable the Oracle XML DB Protocol Server.

To disable Oracle XML DB Protocol Server:

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


```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:


```
$ sqlplus /nolog
```

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

2. Run the following command:

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

About Configuring Oracle REST Data Services Behind a Reverse Proxy or Load Balancer

When Oracle Application Express is running behind a reverse proxy or load balancer, it is important to communicate the original HTTP hostname and protocol as seen by the user's browser to the Application Express engine. The Application Express engine uses this information to generate valid URLs in HTML responses and HTTP redirects that the user's browser can successfully follow. The exact configuration steps depend on your Java EE application server. For example, for Oracle WebLogic Server, this is accomplished using Oracle WebLogic Server Proxy Plug-Ins. To learn more, see your Java EE application server documentation.

Configuring RESTful Services with Oracle REST Data Services

This section describes how to configure RESTful Services in a new installation.

- [About Configuring RESTful Services](#)
- [Configuring RESTful Services](#)

About Configuring RESTful Services

In a new installation of Oracle Application Express, you configure RESTful Services by running the configuration script `apex_rest_config.sql`. 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 "Controlling RESTful Services for an Instance" in *Oracle Application Express Administration Guide*.

Note: RESTful Services requires Oracle REST Data Services 2.0 or later. The configuration of RESTful Services is required when upgrading to Oracle Application Express release 5.0 and RESTful Services were not configured in a previous release.

Configuring RESTful Services

To configure RESTful Services in Oracle Application Express:

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

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

- On UNIX and Linux:

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

3. Run `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.

Enabling Network Services in Oracle Database 11g or Later

- [When and Why Network Services Must be Enabled](#)
- [Granting Connect Privileges Prior to Oracle Database 12c](#)
- [Granting Connect Privileges in Oracle Database 12c](#)
- [Troubleshooting an Invalid ACL Error](#)

When and Why Network Services Must be Enabled

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 1 or 2 or later. Therefore, if you are running Oracle Application Express with Oracle Database 11g Release 1 or 2 or later, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_050000` 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.

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 a 11g or 12c database will already have the parameter set properly, but a database upgraded to 11g or 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.

Granting Connect Privileges Prior to Oracle Database 12c

The following example demonstrates how to grant connect privileges to any host for the APEX_050000 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_050000
  -- the "connect" privilege if APEX_050000 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_050000',
    'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_050000', 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_050000', 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 enables 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_050000
  -- the "connect" privilege if APEX_050000 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_050000',
    'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_050000', 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_050000', TRUE, 'connect');
    DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml', 'localhost');
END;
/
COMMIT;

```

Granting Connect Privileges in Oracle Database 12c

Procedures `CREATE_ACL`, `ASSIGN_ACL`, `ADD_PRIVILEGE` and `CHECK_PRIVILEGE` in `DBMS_NETWORK_ACL_ADMIN` are deprecated in Oracle Database 12c. Oracle recommends using `APPEND_HOST_ACE` instead. The following example demonstrates how to grant connect privileges to any host for the `APEX_050000` database user. This example assumes you connected to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role.

```
BEGIN
  DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
    host => '*',
    ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                      principal_name => 'apex_050000',
                      principal_type => xs_acl.p_type_db));
END;
/
```

The following example demonstrates how to provide less privileged access to local network resources. This example enables access to servers on the local host only, such as email and report servers.

```
BEGIN
  DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
    host => 'localhost',
    ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                      principal_name => 'apex_050000',
                      principal_type => xs_acl.p_type_db));
END;
/
```

Troubleshooting an Invalid ACL Error

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

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

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

Next, run the following code to fix the ACL:

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

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



```

IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
              WHERE ACLID = ACL_ID AND
                    NOT EXISTS (SELECT NULL FROM ALL_USERS
                                WHERE USERNAME = PRINCIPAL)) LOOP

        UPDATE XDB.XDB$ACL
           SET OBJECT_VALUE =
              DELETEXML(OBJECT_VALUE,
                        '/ACL/ACE[PRINCIPAL="' || R.PRINCIPAL || '"]')
           WHERE OBJECT_ID = ACL_ID;
        END LOOP;

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

END;
/

REM commit the changes.

COMMIT;

```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the APEX_050000 user. See ["Granting Connect Privileges Prior to Oracle Database 12c"](#) on page 4-13.

Performing Security Tasks

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: "Configuring HTTP Protocol Attributes" in *Oracle Application Express Administration Guide*

Controlling the Number of Concurrent Jobs

This section explains how to specify the number of concurrently running jobs.

- [About Managing the Number of Concurrent Jobs](#)
- [Viewing the Number of JOB_QUEUE_PROCESSES](#)
- [Changing the Number of JOB_QUEUE_PROCESSES](#)

About Managing the Number of Concurrent Jobs

JOB_QUEUE_PROCESSES determine the maximum number of concurrently running jobs. In Oracle Application Express 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

This section describes three ways to view the number of JOB_QUEUE_PROCESSES:

- [Viewing JOB_QUEUE_PROCESSES in the Installation Log File](#)
- [Viewing JOB_QUEUE_PROCESSES in Oracle Application Express](#)
- [Viewing JOB_QUEUE_PROCESSES from SQL*Plus](#)

Viewing JOB_QUEUE_PROCESSES in the Installation Log File

After installing or upgrading Oracle Application Express, 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 view the number of JOB_QUEUE_PROCESSES on the About Application Express page.

To view the About Application Express page:

1. Sign in to Oracle Application Express. See "[Signing In to Your Workspace](#)" on page 4-22.
2. Locate the Help menu at the top of the page.
3. From the Help menu, select **About**.

The About Application Express page appears. The current number JOB_QUEUE_PROCESSES displays at the bottom of the page.

Viewing JOB_QUEUE_PROCESSES from SQL*Plus

You can 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 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. Developers can choose to run the Application Express development environment in any of the installed languages by simply selecting the language from the Application Builder log in screen or home page.

In order to install other languages you must use the `apex_5.0.zip` file which contains the extra files referenced below. If you previously downloaded `apex_5.0_en.zip`, then you do not need to re-install Oracle Application Express. Simply download `apex_5.0.zip` and unzip the file into the same directory where you unzipped `apex_5.0_en.zip`.

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

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

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

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

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

Installing Translated Versions of Oracle Application Express

This section describes installing translated versions of Oracle Application Express.

- [About Installing Translated Versions of Oracle Application Express](#)
- [Installing a Translated Version of Oracle Application Express](#)

About Installing Translated Versions 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 directory, there is a language loading script identified by the language code (for example, `load_de.sql` or `load_ja.sql`).

Installing a Translated Version of Oracle Application Express

To install a translated version of Oracle Application Express:

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


```
NLS_LANG=American_America.AL32UTF8
export NLS_LANG
```
 - C shell:


```
setenv NLS_LANG American_America.AL32UTF8
```
 - For Windows based systems:


```
set NLS_LANG=American_America.AL32UTF8
```
2. Navigate to the directory under `apex/builder` based on the language you need to install. For example for German, navigate to `apex/builder/de`. Start `SQL*Plus` and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
 - On Windows:


```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:


```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
3. Execute the following statement:


```
ALTER SESSION SET CURRENT_SCHEMA = APEX_050000;
```
4. Execute the appropriate language specific script. For example:


```
@load_lang.sql
```

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

Creating a Workspace and Adding Oracle Application Express Users

Before you can develop or install applications, you must create a workspace, add Oracle Application Express users and sign in to your workspace.

- [About Workspaces and Users](#)
- [Accessing Oracle Application Express Administration Services](#)

- [Creating a Workspace Manually](#)
- [Creating Oracle Application Express Users](#)
- [Signing In to Your Workspace](#)

About Workspaces and Users

You access the Oracle Application Express home page by logging in to a workspace using a JavaScript enabled Web browser. To learn more, see "[Browser Requirements](#)" on page 2-2.

A workspace enables multiple users to work within the same Oracle Application Express installation while keeping their objects, data, and applications private. Each workspace has a unique ID and name. An instance administrator can create a workspace manually within Oracle Application Express Administration Services or have users submit requests. Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance.

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

Accessing Oracle Application Express Administration Services

To manually create a workspace and user accounts, you sign in to a separate application for managing an entire Oracle Application Express instance called Oracle Application Express Administration Services. You sign in to Oracle Application Express Administration Services using the ADMIN account and password created or reset during the installation process.

To access Oracle Application Express Administration Services:

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

Tip: By default, the context root for accessing Oracle Application Express through Oracle REST Data Services is /ords. If you wish to have a context root of /apex for accessing Oracle Application Express, rename the ords.war file to apex.war before installing Oracle REST Data Services. See "Installing Oracle REST Data Services" in *REST Data Services Installation, Configuration, and Development Guide*.

Because 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 Oracle REST Data Services. In a default installation, this number is 8080. To learn more, see *REST Data Services Installation, Configuration, and Development Guide*.

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

2. On the Sign In page:
 - Username - Enter admin.
 - Password - Enter the Oracle Application Express administrator account password you specified in "[Creating or Updating Your Instance](#)"

[Administration Account](#)" on page 4-6.

- Click **Sign In to Administration**.

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

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

Creating a Workspace Manually

To manually create a workspace you sign in to a separate application called Oracle Application Express Administration Services. You sign in to Oracle Application Express Administration Services using the ADMIN account and password created or reset during the installation process.

To create an Oracle Application Express workspace manually:

1. Access Oracle Application Express Administration Services. See "[Accessing Oracle Application Express Administration Services](#)" on page 4-19.

Oracle Application Express Administration Services appears. Next, create a workspace.

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

The Create Workspace Wizard appears.

4. For Identify Workspace, enter the following:
 - a. Workspace Name - Enter a unique workspace name.
 - b. Workspace ID - Leave Workspace ID blank to have the new Workspace ID automatically generated. A Workspace ID must be a positive integer greater than 100000.
 - c. Workspace Description - Enter a workspace description.
 - d. Click **Next**.
5. For Identify Schema, specify whether you are re-using an existing schema or creating a new one.

If you are using an existing schema:

- a. For Re-use existing schema, select **Yes**.
- b. Select a schema from the list.
- c. Click **Next**.

If you are creating a new schema:

- a. For Re-use existing schema, select **No**.
 - b. Enter a schema name and password.
 - c. Specify a space quota.
 - d. Click **Next**.
6. For Identify Administrator, enter the Workspace administrator information and click **Next**.
 7. Confirm your selections and click **Create Workspace**.

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

Creating Oracle Application Express Users

To create an Oracle Application Express user account:

1. Access Oracle Application Express Administration Services. See "[Accessing Oracle Application Express Administration Services](#)" on page 4-19.

Oracle Application Express Administration Services appears.

2. Click the **Manage Workspaces** icon.
3. Click **Manage Developers and Users**.
4. Click **Create User**.
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 Account Privileges:
 - a. **Workspace** - Select a workspace from the list.
 - b. **Default Schemas** - Specify the default schema used for data browsing, application creation, and SQL script execution.

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

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

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

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

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

- e. **Application Builder Access** - Determines whether a developer has access to the Application Builder.
 - f. **SQL Workshop Access** - Determines whether a developer has access to the SQL Workshop.
 - g. **Team Development Access** - Determines whether a developer has access to the Team Development.
 - h. **Set Account Availability** - Select **Locked** to prevent the account from being used. Select **Unlocked** to allow the account to be used.

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

7. Under Password:
 - **Password** - Enter a case sensitive password.
 - **Confirm Password** - Enter the password again.
 - **Require Change of Password On First Use** - Select **No** to allow the user to use the same password until it expires. Select **Yes** to require the user to change the password immediately when logging in the first time.
8. Click **Create User** or **Create and Create Another**.

Signing In to Your Workspace

Use your credentials (that is, your workspace name, user name and password) to sign in to the workspace.

To sign in to your workspace:

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

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

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

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 *REST Data Services Installation, Configuration, and Development Guide*.
- *apex* is the service name defined when configuring Oracle REST Data Services.

The Sign In page appears.

2. On the Sign In page, enter:
 - Workspace - Enter the name of your workspace.
 - Username - Enter your user name.
 - Password - Enter your case-sensitive password.
3. Click **Sign In**.

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

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

Performing 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.

- [About Removing Prior Oracle Application Express Installations](#)
- [Verifying if a Prior Installation Exists](#)
- [Removing Schemas from Prior Installations](#)

- [Fixing Invalid ACL in Oracle Database 11g or Later](#)

See Also: "Upgrading from a Previous Oracle Application Express Release" on page 1-6

About Removing 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.

Verifying if a Prior Installation Exists

To verify if a prior installation exists:

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

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following query:

```
SELECT username
FROM dba_users
WHERE ( username LIKE 'FLOWS\_____' ESCAPE '\\'
OR username LIKE 'APEX\_____' ESCAPE '\\' )
AND username NOT IN ( SELECT schema
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.

Removing Schemas from Prior Installations

To remove schemas from prior installations:

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

- On Windows:

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

- On UNIX and Linux:

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

2. Execute a statement similar to the following example:

```
DROP USER APEX_040200 CASCADE;
```

Fixing Invalid ACL in Oracle Database 11g or Later

After following the instructions in "[About Removing Prior Oracle Application Express Installations](#)" on page 4-23, you may need to fix an invalid ACL if you are running Oracle Database 11g or later and you enabled network services for the prior Oracle Application Express schema.

To fix an invalid ACL:

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

- On Windows:

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

- On UNIX and Linux:

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

3. Execute a statement similar to the following:

```
EXEC DBMS_NETWORK_ACL_ADMIN.DELETE_PRIVILEGE('power_users.xml', 'FLOWS_030000');
```

About Performance Optimization Tasks

Performance of web applications heavily depends on their size and how often a browser has to request static content like images, CSS and JavaScript files. To improve performance, most web servers support on-the-fly HTTP response compression and provide settings that enable you to configure on how long browsers can cache a file before requesting it again. The HTTP response compression is usually implemented using gzip encoding, while browser file caching is enabled by issuing Cache-Control HTTP response header.

Please see your web server documentation to learn how to enable response compression and browser file caching. For optimal performance of the Oracle Application Express development environment and Oracle Application Express applications, Oracle recommends enabling gzip compression of files in the virtual images directory (for example, /i/) and responses from the database access descriptor as well as allowing browsers to cache files from the virtual images directory for at least 12 hours.

Converting Between Runtime and Full Development Environments

This section describes how to convert between runtime and full development environments.

- [About Runtime and Full Development Environments](#)

- [Converting a Runtime Environment to a Full Development Environment](#)
- [Converting a Full Development Environment to a Runtime Environment](#)

About Runtime and Full Development Environments

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

You administer an Oracle Application Express runtime environment using SQL*Plus or SQL Developer and the `APEX_INSTANCE_ADMIN` API.

See Also: ["About the Oracle Application Express Runtime Environment"](#) on page 1-13 and "Installing Exported Applications into a Runtime Environment" in *Oracle Application Express Administration Guide*

Converting a Runtime Environment to a Full Development Environment

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

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


```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:


```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
3. Run `apxdvins.sql`. For example:


```
@apxdvins.sql
```
4. Follow the instructions in ["Creating or Updating Your Instance Administration Account"](#) on page 4-6.

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

Converting a Full Development Environment to a Runtime Environment

Tip: Before converting a full development environment to a runtime environment, export all Websheet applications. When you convert a development environment to runtime, existing Websheet data grids and reports will be deleted from all workspaces. Converting the environment back to a full development environment will not restore these Websheet data grids or reports.

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

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

- On Windows:

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

- On UNIX and Linux:

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

3. Run apxdevrm.sql. For example:

```
@apxdevrm.sql
```

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

Installing Application Express and Configuring Embedded PL/SQL Gateway

In order to run, Oracle Application Express must have access to a Web listener. To use the embedded PL/SQL gateway with Oracle Application Express, you must first install Oracle Application Express and then configure the embedded PL/SQL gateway. These instructions apply to both new and upgrade installations.

See Also: ["Web Listener Requirements"](#) on page 2-2, ["Choosing a Web Listener"](#) on page 1-9, and ["About Security Considerations When Using the Embedded PL/SQL gateway"](#) on page 1-12

- [Oracle Database Requirement](#)
- [About Patching Oracle Application Express](#)
- [Performing Pre-installation Tasks for Oracle Application Express](#)
- [Installing Oracle Application Express](#)
- [Configuring the Embedded PL/SQL Gateway](#)
- [Enabling Network Services in Oracle Database 11g or Later](#)
- [Performing Security Tasks](#)
- [Controlling the Number of Concurrent Jobs](#)
- [About Running Oracle Application Express in Other Languages](#)
- [Installing Translated Versions of Oracle Application Express](#)
- [About Configuring the SHARED_SERVERS Parameter](#)
- [Creating a Workspace and Adding Oracle Application Express Users](#)
- [Performing Post Installation Tasks for Upgrade Installations](#)
- [About Performance Optimization Tasks](#)
- [Converting Between Runtime and Full Development Environments](#)

Oracle Database Requirement

Oracle Application Express release 5.0 requires an Oracle Database Release 11.1.0.7 or later, including Enterprise Edition and Express Edition (Oracle Database XE).

See Also: *Oracle Database Installation Guide* and ["Oracle Application Express Installation Requirements"](#) on page 2-1

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) for information about patch set releases or later releases of Oracle Application Express:

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

See Also: "Upgrading from a Previous Oracle Application Express Release" on page 1-6

Performing Pre-installation Tasks for Oracle Application Express

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. If you are actively using Oracle Application Express and upgrading the current installation then shut down with normal or immediate priority the Oracle Database instances where you plan to install Oracle Application Express. On Oracle Real Application Clusters (Oracle RAC) systems, shut down all instances on each node.

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

To disable access to Oracle Application Express when an existing installation is using the embedded PL/SQL gateway, disable the Oracle XML DB Protocol Server by setting the HTTP port to 0. Start SQL*Plus, connect as SYS to the database where Oracle Application Express is installed, and run:

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

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

3. Back up the Oracle Database installation.

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

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.

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

Installing Oracle Application Express

How you install Oracle Application Express depends upon how you access the installation script and the type of database you into which you are installing.

- [Accessing the Installation Script](#)
- [Running the Application Express Installation Script](#)
- [Creating or Updating Your Instance Administration Account](#)
- [Restarting Processes](#)

See Also: "[Utilizing the Multitenant Architecture in Oracle Database 12c](#)" on page 3-1.

Accessing the Installation Script

How you access the Oracle Application Express installation script depends upon whether you download the Oracle Application Express distribution from Oracle Technology Network (OTN), or install the version that ships with Oracle Database 12c Release 2 (12.2).

Downloading the Script from Oracle Technology Network

To download the script from the Oracle Application Express download page:

1. For installations where the development will be in English only, download the file `apex_5.0_en.zip` from the Oracle Application Express download page. If the development will include languages other than English, download `apex_5.0.zip` from the Oracle Application Express download page. See:

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

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

2. Unzip downloaded zip file:
 - If English only, unzip `apex_5.0_en.zip` as follows, preserving directory names:
 - UNIX and Linux: `$ unzip apex_5.0_en.zip`
 - Windows: Double click the file `apex_5.0_en.zip` in Windows Explorer
 - If multiple languages, unzip `apex_5.0.zip` as follows, preserving directory names:
 - UNIX and Linux: `$ unzip apex_5.0.zip`
 - Windows: Double click the file `apex_5.0.zip` in Windows Explorer

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

3. Change your working directory to `apex`.

4. Run the installation script. Go to the next section, "[Running the Application Express Installation Script](#)" on page 5-4.

Accessing the Script Shipping with Oracle Database 12c Release 2 (12.2)

To access the script shipping with Oracle Database 12c Release 2 (12.2):

1. Change your working directory to `$ORACLE_HOME/apex`.
2. Run the installation script. Go to the next section, "[Running the Application Express Installation Script](#)" on page 5-4.

Running the Application Express Installation Script

To run the Oracle Application Express installation script:

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

- **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/`.

Example:

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

Note: If you receive the following error, exit SQL*Plus and change your working directory to where you unzipped the installation file, for example C:\TEMP in Windows, before starting SQL*Plus:

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

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

```
@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/`.

Example:

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

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

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

- `APEX_050000` - 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 are upgrading from a previous release, then `FLows_FILES` already exists and `APEX_PUBLIC_USER` is created if it does not already exist.

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

Creating or Updating Your Instance Administration Account

This section describes how to create or update your Instance Administrator account.

Tip: Skip this section if you are upgrading from a previous release of Oracle Application Express. In an upgrade scenario, the Instance Administrator account and password is preserved and carried over from the prior release.

- [What Is an Instance Administrator?](#)
- [About apxchpwd.sql](#)
- [Running apxchpwd.sql](#)

What Is an Instance Administrator?

Instance administrators are superusers that are responsible for managing an entire Oracle Application Express instance, including managing workspace provisioning, configuring features and instance settings, and managing security. To perform these tasks, an Instance administrator signs in to the Oracle Application Express Administration Services application.

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

About apxchpwd.sql

Running the `apxchpwd.sql` script enables you to create or update your Instance Administrator account. You must run the `apxchpwd.sql` script in the following scenarios:

- **New Oracle Application Express installations** - Run `apxchpwd.sql` to create an Instance Administrator account and password.
- **Converting of a runtime environment to a development environment** - Run `apxchpwd.sql` to change the Instance Administrator account password.
- **Changing Your Instance Administrator Password** - Run `apxchpwd.sql` to change the password for an existing Instance Administrator account.
- **Unlocking Your Instance Administrator Account** - Run `apxchpwd.sql` to unlock an existing Instance Administrator account.

Tip: You do not need to run `apxchpwd.sql` when upgrading from a previous release of Oracle Application Express. In an upgrade scenario, the Instance Administrator account password is preserved and carried over from the prior release.

Running apxchpwd.sql

To create or update your Instance Administrator account:

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

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
3. Run `apxchpwd.sql`. For example:

```
@apxchpwd.sql
```

Follow the on-screen instructions. You will be prompted provide a username, password, and email address. If the account username does not exist, it will be created for you.

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

Restarting Processes

After you install Oracle Application Express, you must restart the processes that you stopped before you began the installation.

Configuring the Embedded PL/SQL Gateway

The embedded PL/SQL gateway installs with the Oracle Database 11g and later. However, you must configure it before you can use it with Oracle Application Express. To configure the embedded PL/SQL gateway, 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 apex_epg_config.sql Configuration Script](#)
- [Updating the Images Directory When Upgrading from a Previous Release](#)
- [Verifying the Oracle XML DB Protocol Server Port](#)
- [Enabling Oracle XML DB Protocol Server](#)
- [Configuring Static File Support](#)
- [About Configuring Embedded PL/SQL Gateway Behind a Reverse Proxy or Load Balancer](#)

See Also: "Choosing a Web Listener" on page 1-9 and "About the Embedded PL/SQL Gateway" on page 1-11

Running the apex_epg_config.sql Configuration Script

You configure the embedded PL/SQL gateway by running the configuration script apex_epg_config.sql. Then, you unlock the ANONYMOUS account.

To run the apex_epg_config.sql configuration script:

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

- On Windows:

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

- On UNIX and Linux:

```
$ sqlplus /nolog
```

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

3. If you are configuring a PDB, enter the following statement:

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

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

- On Windows:

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

- On UNIX and Linux:

```
@apex_epg_config.sql /tmp
```

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

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

Updating the Images Directory When Upgrading from a Previous Release

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

Tip: If this is a new installation, this step is unnecessary. The images will be loaded by running `apex_epg_config.sql` as described in the prior section.

To run the `apex_epg_config.sql` script:

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

- On Windows:

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

- On UNIX and Linux:

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

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

- On Windows:

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

- On UNIX and Linux:

```
@apex_epg_config.sql /tmp
```

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

Verifying the Oracle XML DB 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 is enabled by verifying the associated port number.

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

```
SELECT DBMS_XDB.GETHTTTPORT FROM DUAL;
```

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

3. To enable it, follow the instructions in the sect section, "[Enabling Oracle XML DB Protocol Server](#)" on page 5-9.

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` specifying the `SYSDBA` role. For example:

- On Windows:

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

- On UNIX and Linux:

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

2. Enter a statement similar to the following:

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

For example:

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

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

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

Configuring Static File Support

Oracle Application Express enables application developers to include static files with their applications. Static files can be associated with a workspace, an application, a plug-in, or an application theme. When using the embedded PL/SQL Gateway as your web listener, the necessary configuration to support static files is performed as part of the embedded PL/SQL Gateway configuration.

See Also: For new installations, see ["Running the apex_epg_config.sql Configuration Script"](#) on page 5-7 and for upgrade installations, see ["Updating the Images Directory When Upgrading from a Previous Release"](#) on page 5-8

About Configuring Embedded PL/SQL Gateway Behind a Reverse Proxy or Load Balancer

If Oracle Application Express will be running behind a reverse proxy or load balancer, you set the CGI environment variables `PROTOCOL` and `HTTP_HOST`. For embedded PL/SQL gateway, you must call the following PL/SQL block:

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

- On Windows:

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

- On UNIX and Linux:

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

3. Execute the following PL/SQL block:

```
BEGIN
  DBMS_EPG.set_dad_attribute (
    dad_name => 'APEX',
    attr_name => 'cgi-environment-list',
    attr_value => 'REQUEST_PROTOCOL=https');
```

```

DBMS_EPG.set_dad_attribute (
dad_name => 'APEX',
attr_name => 'cgi-environment-list',
attr_value => 'HTTP_HOST=external-name:external-port');
commit;
END;
/

```

To learn more, see your Java EE application servers documentation.

Enabling Network Services in Oracle Database 11g or Later

- [When and Why Network Services Must be Enabled](#)
- [Granting Connect Privileges Prior to Oracle Database 12c](#)
- [Troubleshooting an Invalid ACL Error](#)

When and Why Network Services Must be Enabled

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 1 or 2 or later. Therefore, if you are running Oracle Application Express with Oracle Database 11g Release 1 or 2 or later, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_050000` 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.

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 11g database will already have the parameter set properly, but a database upgraded to 11g or 12c database from a prior version may not. See "Creating and Configuring an Oracle Database" in *Oracle Database Administrator's Guide* for information about changing database initialization parameters.

Granting Connect Privileges Prior to Oracle Database 12c

The following example demonstrates how to grant connect privileges to any host for the `APEX_050000` 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_050000
-- the "connect" privilege if APEX_050000 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_050000',
'connect') IS NULL THEN

```

```

        DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
        'APEX_050000', 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_050000', 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 enables 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_050000
    -- the "connect" privilege if APEX_050000 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_050000',
    'connect') IS NULL THEN
        DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
        'APEX_050000', 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_050000', TRUE, 'connect');
        DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml', 'localhost');
    END;
/
COMMIT;

```

Granting Connect Privileges in Oracle Database 12c

Procedures `CREATE_ACL`, `ASSIGN_ACL`, `ADD_PRIVILEGE` and `CHECK_PRIVILEGE` in `DBMS_NETWORK_ACL_ADMIN` are deprecated in Oracle Database 12c. Oracle recommends using `APPEND_HOST_ACE` instead. The following example demonstrates how to grant connect privileges to any host for the `APEX_050000` database user. This example assumes you connected to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role.

```

BEGIN
    DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
        host => '*',
        ace => xs$acl_type(privilege_list => xs$name_list('connect'),
            principal_name => 'apex_050000',
            principal_type => xs_acl.p_type_db));
END;

```


/

The following example demonstrates how to provide less privileged access to local network resources. This example enables access to servers on the local host only, such as email and report servers.

```
BEGIN
  DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
    host => 'localhost',
    ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                      principal_name => 'apex_050000',
                      principal_type => xs_acl.ptype_db));
END;
/
```

Troubleshooting an Invalid ACL Error

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

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

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

Next, run the following code to fix the ACL:

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

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

  IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
              WHERE ACLID = ACL_ID AND
                    NOT EXISTS (SELECT NULL FROM ALL_USERS
                               WHERE USERNAME = PRINCIPAL)) LOOP

      UPDATE XDB.XDB$ACL
        SET OBJECT_VALUE =
            DELETEXML(OBJECT_VALUE,
                      '/ACL/ACE[PRINCIPAL="' || R.PRINCIPAL || '"]')
        WHERE OBJECT_ID = ACL_ID;
    END LOOP;

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

```
END IF;  
  
END;  
/  
  
REM commit the changes.  
  
COMMIT;
```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the APEX_050000 user. See ["Granting Connect Privileges Prior to Oracle Database 12c"](#) on page 5-11.

Performing Security Tasks

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: "Configuring HTTP Protocol Attributes" in *Oracle Application Express Administration Guide*

Controlling the Number of Concurrent Jobs

This section explains how to specify the number of concurrently running jobs.

- [About Managing the Number of Concurrent Jobs](#)
- [Viewing the Number of JOB_QUEUE_PROCESSES](#)
- [Changing the Number of JOB_QUEUE_PROCESSES](#)

About Managing the Number of Concurrent Jobs

JOB_QUEUE_PROCESSES determine the maximum number of concurrently running jobs. In Oracle Application Express 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

This section describes three ways to view the number of JOB_QUEUE_PROCESSES:

- [Viewing JOB_QUEUE_PROCESSES in the Installation Log File](#)
- [Viewing JOB_QUEUE_PROCESSES in Oracle Application Express](#)
- [Viewing JOB_QUEUE_PROCESSES from SQL*Plus](#)

Viewing JOB_QUEUE_PROCESSES in the Installation Log File

After installing or upgrading Oracle Application Express, 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 view the number of JOB_QUEUE_PROCESSES on the About Application Express page.

To view the About Application Express page:

1. Sign in to Oracle Application Express. See ["Signing In to Your Workspace"](#) on page 5-21.
2. Locate the Help menu at the top of the page.
3. From the Help menu, select **About**.

The About Application Express page appears. The current number JOB_QUEUE_PROCESSES displays at the bottom of the page.

Viewing JOB_QUEUE_PROCESSES from SQL*Plus

You can 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 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. Developers can choose to run the Application Express development environment in any of the installed languages by simply selecting the language from the Application Builder log in screen or home page.

In order to install other languages you must use the `apex_5.0.zip` file which contains the extra files referenced below. If you previously downloaded `apex_5.0_en.zip`, then you do not need to re-install Oracle Application Express. Simply download `apex_5.0.zip` and unzip the file into the same directory where you unzipped `apex_5.0_en.zip`.

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

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

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

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

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

Installing Translated Versions of Oracle Application Express

This section describes installing translated versions of Oracle Application Express.

- [About Installing Translated Versions of Oracle Application Express](#)
- [Installing a Translated Version of Oracle Application Express](#)

About Installing Translated Versions 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 directory, there is a language loading script identified by the language code (for example, `load_de.sql` or `load_ja.sql`).

Installing a Translated Version of Oracle Application Express

To install a translated version of Oracle Application Express:

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

- Bourne or Korn shell:

```
NLS_LANG=American_America.AL32UTF8
```

```
export NLS_LANG
```

- C shell:

```
setenv NLS_LANG American_America.AL32UTF8
```

- For Windows based systems:

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

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

- On Windows:

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

- On UNIX and Linux:

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

3. Execute the following statement:

```
ALTER SESSION SET CURRENT_SCHEMA = APEX_050000;
```

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

```
@load_lang.sql
```

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

About 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;
```

Creating a Workspace and Adding Oracle Application Express Users

Before you can develop or install applications, you must create a workspace, add Oracle Application Express users and sign in to your workspace.

- [About Workspaces and Users](#)
- [Accessing Oracle Application Express Administration Services](#)
- [Creating a Workspace Manually](#)
- [Creating Oracle Application Express Users](#)
- [Signing In to Your Workspace](#)

About Workspaces and Users

You access the Oracle Application Express home page by logging in to a workspace using a JavaScript enabled Web browser. To learn more, see "[Browser Requirements](#)" on page 2-2.

A workspace enables multiple users to work within the same Oracle Application Express installation while keeping their objects, data, and applications private. Each workspace has a unique ID and name. An instance administrator can create a workspace manually within Oracle Application Express Administration Services or have users submit requests. Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance.

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

Accessing Oracle Application Express Administration Services

To manually create a workspace and user accounts, you sign in to a separate application for managing an entire Oracle Application Express instance called Oracle Application Express Administration Services. You sign in to Oracle Application Express Administration Services using the ADMIN account and password created or reset during the installation process.

To access Oracle Application Express Administration Services:

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

Because your setup uses 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.

2. On the Sign In page:
 - Username - Enter `admin`.
 - Password - Enter the Oracle Application Express administrator account password you specified in "[Creating or Updating Your Instance Administration Account](#)" on page 5-5.
 - Click **Sign In to Administration**.

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

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

Creating a Workspace Manually

To manually create a workspace you sign in to a separate application called Oracle Application Express Administration Services. You sign in to Oracle Application Express Administration Services using the `ADMIN` account and password created or reset during the installation process.

To create an Oracle Application Express workspace manually:

1. Access Oracle Application Express Administration Services. See "[Accessing Oracle Application Express Administration Services](#)" on page 5-18.

Oracle Application Express Administration Services appears. Next, create a workspace.

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

The Create Workspace Wizard appears.

4. For Identify Workspace, enter the following:
 - a. Workspace Name - Enter a unique workspace name.
 - b. Workspace ID - Leave Workspace ID blank to have the new Workspace ID automatically generated. A Workspace ID must be a positive integer greater than 100000.
 - c. Workspace Description - Enter a workspace description.
 - d. Click **Next**.
5. For Identify Schema, specify whether you are re-using an existing schema or creating a new one.

If you are using an existing schema:

- a. For Re-use existing schema, select **Yes**.
- b. Select a schema from the list.
- c. Click **Next**.

If you are creating a new schema:

- a. For Re-use existing schema, select **No**.
- b. Enter a schema name and password.

- c. Specify a space quota.
- d. Click **Next**.
6. For Identify Administrator, enter the Workspace administrator information and click **Next**.
7. Confirm your selections and click **Create Workspace**.

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

Creating Oracle Application Express Users

To create an Oracle Application Express user account:

1. Access Oracle Application Express Administration Services. See "[Accessing Oracle Application Express Administration Services](#)" on page 5-18.

Oracle Application Express Administration Services appears.

2. Click the **Manage Workspaces** icon.
3. Click **Manage Developers and Users**.
4. Click **Create User**.
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 Account Privileges:
 - a. **Workspace** - Select a workspace from the list.
 - b. **Default Schemas** - Specify the default schema used for data browsing, application creation, and SQL script execution.

When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.
 - c. **User is an administrator** - Specify if this user should have workspace administrator privileges.

Administrators are given access to all components. Additionally, they can manage user accounts, groups, and development services. Components may not be available if they are switched off by Instance Administrators.
 - d. **User is a developer** - Specify if this user should have developer privileges.

Developers must have access to either Application Builder, SQL Workshop, or both. These components may not be available if they are switched off by the Instance Administrator.
 - e. **Application Builder Access** - Determines whether a developer has access to the Application Builder.
 - f. **SQL Workshop Access** - Determines whether a developer has access to the SQL Workshop.

- g. **Team Development Access** - Determines whether a developer has access to the Team Development.
 - h. **Set Account Availability** - Select **Locked** to prevent the account from being used. Select **Unlocked** to allow the account to be used.

If the user has exceeded the maximum log in failures allowed, specified in Workspace Preferences, then their account will be locked automatically.
7. Under Password:
 - **Password** - Enter a case sensitive password.
 - **Confirm Password** - Enter the password again.
 - **Require Change of Password On First Use** - Select **No** to allow the user to use the same password until it expires. Select **Yes** to require the user to change the password immediately when logging in the first time.
 8. Click **Create User** or **Create and Create Another**.

Signing In to Your Workspace

Use your credentials (that is, your workspace name, user name and password) to sign in to the workspace.

To sign in to your workspace:

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

Because your setup uses 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 pluggable database (PDB) will have a distinct port number.
- *apex* is the database access descriptor (DAD) defined in the configuration file.

The Sign In page appears.

2. On the Sign In page, enter:
 - **Workspace** - Enter the name of your workspace.
 - **Username** - Enter your user name.
 - **Password** - Enter your case-sensitive password.
3. Click **Sign In**.

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

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

Performing 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.

- [About Removing Prior Oracle Application Express Installations](#)
- [Verifying if a Prior Installation Exists](#)
- [Removing Schemas from Prior Installations](#)
- [Fixing Invalid ACL in Oracle Database 11g or Later](#)

See Also: ["Upgrading from a Previous Oracle Application Express Release"](#) on page 1-6

About Removing 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.

Verifying if a Prior Installation Exists

To verify if a prior installation exists:

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

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following query:

```
SELECT username
FROM dba_users
WHERE ( username LIKE 'FLOWS\_____' ESCAPE '\\'
      OR username LIKE 'APEX\_____' ESCAPE '\\' )
AND username NOT IN ( SELECT schema
                     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.

Removing Schemas from Prior Installations

To remove schemas from prior installations:

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

- On Windows:

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

- On UNIX and Linux:

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

2. Execute a statement similar to the following example:

```
DROP USER APEX_040200 CASCADE;
```

Fixing Invalid ACL in Oracle Database 11g or Later

After following the instructions in "[About Removing Prior Oracle Application Express Installations](#)" on page 5-22, you may need to fix an invalid ACL if you are running Oracle Database 11g or later and you enabled network services for the prior Oracle Application Express schema.

To fix an invalid ACL:

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

- On Windows:

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

- On UNIX and Linux:

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

3. Execute a statement similar to the following:

```
EXEC DBMS_NETWORK_ACL_ADMIN.DELETE_PRIVILEGE('power_users.xml', 'FLOWS_030000');
```

About Performance Optimization Tasks

Performance of web applications heavily depends on their size and how often a browser has to request static content like images, CSS and JavaScript files. To improve performance, most web servers support on-the-fly HTTP response compression and provide settings that enable you to configure on how long browsers can cache a file before requesting it again. The HTTP response compression is usually implemented using gzip encoding, while browser file caching is enabled by issuing Cache-Control HTTP response header.

Please see your web server documentation to learn how to enable response compression and browser file caching. For optimal performance of the Oracle Application Express development environment and Oracle Application Express applications, Oracle recommends enabling gzip compression of files in the virtual

images directory (for example, /i/) and responses from the database access descriptor as well as allowing browsers to cache files from the virtual images directory for at least 12 hours.

Converting Between Runtime and Full Development Environments

This section describes how to convert between runtime and full development environments.

- [About Runtime and Full Development Environments](#)
- [Converting a Runtime Environment to a Full Development Environment in a non-CDB or Locally in a PDB](#)
- [Converting a Full Development Environment to a Runtime Environment in a non-CDB or Locally in a PDB](#)
- [Converting a Runtime Environment to a Full Development Environment in a CDB](#)
- [Converting a Full Development Environment to a Runtime Environment in a CDB](#)

About Runtime and Full Development Environments

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

You administer an Oracle Application Express runtime environment using SQL*Plus or SQL Developer and the `APEX_INSTANCE_ADMIN` API.

See Also: ["About the Oracle Application Express Runtime Environment"](#) on page 1-13 and "Installing Exported Applications into a Runtime Environment" in *Oracle Application Express Administration Guide*

Converting a Runtime Environment to a Full Development Environment in a non-CDB or Locally in a PDB

To convert an Oracle Application Express runtime environment to a full development environment in a non-CDB or locally in a PDB:

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxdvins.sql
```
4. Follow the instructions in "[Creating or Updating Your Instance Administration Account](#)" on page 5-5.

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

Converting a Full Development Environment to a Runtime Environment in a non-CDB or Locally in a PDB

Tip: Before converting a full development environment to a runtime environment, export all Websheet applications. When you convert a development environment to runtime, existing Websheet data grids and reports will be deleted from all workspaces. Converting the environment back to a full development environment will not restore these Websheet data grids or reports.

To convert an Oracle Application Express full development environment to a runtime environment in a non-CDB or locally in a PDB:

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxdevrm.sql
```

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

Converting a Runtime Environment to a Full Development Environment in a CDB

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

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxdvins_con.sql
```

4. Follow the instructions in "[Creating or Updating Your Instance Administration Account](#)" on page 5-5.

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

Converting a Full Development Environment to a Runtime Environment in a CDB

Tip: Before converting a full development environment to a runtime environment, export all Websheet applications. When you convert a development environment to runtime, existing Websheet data grids and reports will be deleted from all workspaces. Converting the environment back to a full development environment will not restore these Websheet data grids or reports.

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

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxdevrn_con.sql
```

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

Installing Application Express and Configuring Oracle HTTP Server

Note: `mod_plsql` is deprecated as of Oracle HTTP Server 12c (12.1.3). For more information, please see My Oracle Support Note 1576588.1. Oracle recommends using Oracle REST Data Services instead.

In order to run, Oracle Application Express must have access to a Web listener. To use Oracle HTTP Server with `mod_plsql` with Oracle Application Express, you must first install Oracle Application Express and then configure Oracle HTTP Server with `mod_plsql` distributed with Oracle Database 11g or Oracle Application Server 10g and Oracle Database 12c. These instructions apply to both new and upgrade installations.

See Also: "[Web Listener Requirements](#)" on page 2-2 and "[Choosing a Web Listener](#)" on page 1-9

- [Oracle Database Requirement](#)
- [About Patching Oracle Application Express](#)
- [Performing Pre-installation Tasks for Oracle Application Express](#)
- [Installing Oracle Application Express](#)
- [Configuring the Oracle HTTP Server](#)
- [Enabling Network Services in Oracle Database 11g or Later](#)
- [Performing Security Tasks](#)
- [Controlling the Number of Concurrent Jobs](#)
- [About Running Oracle Application Express in Other Languages](#)
- [Installing Translated Versions of Oracle Application Express](#)
- [Creating a Workspace and Adding Oracle Application Express Users](#)
- [Performing Post Installation Tasks for Upgrade Installations](#)
- [About Performance Optimization Tasks](#)
- [Converting Between Runtime and Full Development Environments](#)

See Also: "[Web Listener Requirements](#)" on page 2-2 and "[About Oracle REST Data Services Configuring Oracle HTTP Server with mod_plsql with Oracle Application Express](#)" in *Oracle Application Express Application Builder User's Guide*

Oracle Database Requirement

Oracle Application Express release 5.0 requires an Oracle Database Release 11.1.0.7 or later, including Enterprise Edition and Express Edition (Oracle Database XE).

See Also: *Oracle Database Installation Guide* and "[Oracle Application Express Installation Requirements](#)" on page 2-1

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) for information about patch set releases or later releases of Oracle Application Express:

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

See Also: "[Upgrading from a Previous Oracle Application Express Release](#)" on page 1-6

Performing Pre-installation Tasks for Oracle Application Express

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. If you are actively using Oracle Application Express and upgrading the current installation then shut down with normal or immediate priority the Oracle Database instances where you plan to install Oracle Application Express. On Oracle Real Application Clusters (Oracle RAC) systems, shut down all instances on each node.

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

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

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

3. Back up the Oracle Database installation.

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

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.

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

Installing Oracle Application Express

How you install Oracle Application Express depends upon how you access the installation script and the type of database you into which you are installing.

- [Accessing the Installation Script](#)
- [Running the Application Express Installation Script](#)
- [Running the Application Express Installation Script in a CDB](#)
- [Creating or Updating Your Instance Administration Account](#)
- [Restarting Processes](#)
- [Configuring the APEX_PUBLIC_USER Account](#)

See Also: "[Utilizing the Multitenant Architecture in Oracle Database 12c](#)" on page 3-1.

Accessing the Installation Script

How you access the Oracle Application Express installation script depends upon whether you download the Oracle Application Express distribution from Oracle Technology Network (OTN), or install the version that ships with Oracle Database 12c Release 2 (12.2).

Downloading the Script from Oracle Technology Network

To download the script from the Oracle Application Express download page:

1. For installations where the development will be in English only, download the file `apex_5.0_en.zip` from the Oracle Application Express download page. If the development will include languages other than English, download `apex_5.0.zip` from the Oracle Application Express download page. See:

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

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

2. Unzip downloaded zip file:
 - If English only, unzip `apex_5.0_en.zip` as follows, preserving directory names:
 - UNIX and Linux: `$ unzip apex_5.0_en.zip`
 - Windows: Double click the file `apex_5.0_en.zip` in Windows Explorer

- If multiple languages, unzip apex_5.0.zip as follows, preserving directory names:
 - UNIX and Linux: `$ unzip apex_5.0.zip`
 - Windows: Double click the file apex_5.0.zip in Windows Explorer

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

3. Change your working directory to apex.
4. Run the installation script. Go to the appropriate section:
 - ["Running the Application Express Installation Script"](#) on page 6-4.
 - ["Running the Application Express Installation Script in a CDB"](#) on page 6-6.

Accessing the Script Shipping with Oracle Database 12c Release 2 (12.2)

To access the script shipping with Oracle Database 12c Release 2 (12.2):

1. Change your working directory to `$ORACLE_HOME/apex`.
2. Run the installation script. Go to the appropriate section:
 - ["Running the Application Express Installation Script"](#) on page 6-4.
 - ["Running the Application Express Installation Script in a CDB"](#) on page 6-6.

Running the Application Express Installation Script

To run the Oracle Application Express installation script:

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

- **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/*.

Example:

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

Note: If you receive the following error, exit SQL*Plus and change your working directory to where you unzipped the installation file, for example C:\TEMP in Windows, before starting SQL*Plus:

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

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

```
@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/*.

Example:

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

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

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

- `APEX_050000` - 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 are upgrading from a previous release, then `FLows_FILES` already exists and `APEX_PUBLIC_USER` is created if it does not already exist.

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

Running the Application Express Installation Script in a CDB

Follow this procedure to install Oracle Application Express in a multitenant container database (CDB).

To install Oracle Application Express in a CDB:

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. Disable any existing password complexity rules for the default profile. See "Configuring Password Protection" in *Oracle Database Security Guide*.
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 1-13.

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/`.

Example:

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

Note: If you receive the following error, exit SQL*Plus and change your working directory to where you unzipped the installation file, for example C:\TEMP in Windows, before starting SQL*Plus:

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

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

```
@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/`.

Example:

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

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

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

- `APEX_050000` - 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`.

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

Creating or Updating Your Instance Administration Account

This section describes how to create or update your Instance Administrator account.

Tip: Skip this section if you are upgrading from a previous release of Oracle Application Express. In an upgrade scenario, the Instance Administrator account and password is preserved and carried over from the prior release.

- [What Is an Instance Administrator?](#)
- [About apxchpwd.sql](#)
- [Running apxchpwd.sql](#)

What Is an Instance Administrator?

Instance administrators are superusers that are responsible for managing an entire Oracle Application Express instance, including managing workspace provisioning, configuring features and instance settings, and managing security. To perform these tasks, an Instance administrator signs in to the Oracle Application Express Administration Services application.

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

About apxchpwd.sql

Running the `apxchpwd.sql` script enables you to create or update your Instance Administrator account. You must run the `apxchpwd.sql` script in the following scenarios:

- **New Oracle Application Express installations** - Run `apxchpwd.sql` to create an Instance Administrator account and password.
- **Converting of a runtime environment to a development environment** - Run `apxchpwd.sql` to change the Instance Administrator account password.
- **Changing Your Instance Administrator Password** - Run `apxchpwd.sql` to change the password for an existing Instance Administrator account.
- **Unlocking Your Instance Administrator Account** - Run `apxchpwd.sql` to unlock an existing Instance Administrator account.

Tip: You do not need to run `apxchpwd.sql` when upgrading from a previous release of Oracle Application Express. In an upgrade scenario, the Instance Administrator account password is preserved and carried over from the prior release.

Running apxchpwd.sql

To create or update your Instance Administrator account:

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

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
3. Run `apxchpwd.sql`. For example:

```
@apxchpwd.sql
```

Follow the on-screen instructions. You will be prompted provide a username, password, and email address. If the account username does not exist, it will be created for you.

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

Restarting Processes

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

Configuring the APEX_PUBLIC_USER Account

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

- [About the APEX_PUBLIC_USER Account](#)
- [Unlocking the APEX_PUBLIC_USER Account](#)
- [Changing the Password for the APEX_PUBLIC_USER Account](#)
- [About Password Expiration in Oracle Database 11g](#)

About the APEX_PUBLIC_USER Account

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

Unlocking the APEX_PUBLIC_USER Account

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

To unlock the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. If you are configuring an Oracle Database 12c CDB, make sure you are connected to the root container, CDB\$ROOT when completing this step.

For example:

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following statement:

```
ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK
```

Changing the Password for the APEX_PUBLIC_USER Account

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

To change the password for the APEX_PUBLIC_USER account:

1. Start SQL*Plus and connect to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role. If you are configuring an Oracle Database 12c CDB, make sure you are connected to the root container, CDB\$ROOT when completing this step.

For example:

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following statement:

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

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

About Password Expiration in Oracle Database 11g

In the default profile in Oracle Database 11g, the parameter `PASSWORD_LIFE_TIME` is set to 180. If you are using Oracle Database 11g 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 to the new profile.

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

Configuring the Oracle HTTP Server

This section describes how to configure Oracle HTTP Server with `mod_plsql`.

- [About Copying the Images Directory](#)
- [Copying the Images Directory](#)
- [Editing the dads.conf File](#)

- [Configuring Static File Support](#)
- [Stopping and Restarting Oracle HTTP Server](#)
- [Disabling Oracle XML DB Protocol Server](#)
- [About Configuring Oracle HTTP Server Behind a Reverse Proxy or Load Balancer](#)

About Copying 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, for example `C:\TEMP`, to the location on the file system containing the Oracle home for Oracle HTTP Server.

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

Copying the Images Directory

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:
 - Windows:


```
xcopy /E /I APEX_HOME\apex\images ORACLE_HTTPSERVER_HOME\user_
projects\domains\base_domain\images
```
 - UNIX and Linux:


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

In the preceding syntax examples:

- `APEX_HOME` is the location of where the installation Zip file was unzipped
- `ORACLE_HTTPSERVER_HOME` is the existing Oracle Application Server or Oracle HTTP Server Oracle home

Editing the `dads.conf` File

The `dads.conf` file contains the information about the Database Access Descriptor (DAD) to access Oracle Application Express.

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

To edit the `dads.conf` file:

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


```
ORACLE_HTTPSERVER_HOME\Apache\modplsql\conf\dads.conf
```
 - UNIX and Linux:


```
ORACLE_HTTPSERVER_HOME/Apache/modplsql/conf/dads.conf
```
 - Oracle HTTP Server distributed with Oracle Database 11g:
 - Windows:


```
ORACLE_INSTANCE\config\OHS/ohs<1>\mod_plsql
```
 - UNIX and Linux:


```
ORACLE_INSTANCE/config/OHS/ohs<1>/mod_plsql
```
 - Oracle HTTP Server 12c:
 - Windows:


```
ORACLE_HTTPSERVER_HOME\user_projects\domains\base_
domain\config\fmwconfig\components\OHS\instances\ohs1\mod_
plsql\dads.conf
```
 - UNIX and Linux:


```
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 ["Changing the Password for the APEX_PUBLIC_USER Account"](#) on page 6-10.

Note that the path listed is only an example. The path in the `dads.conf` file should reference the file system path described in ["About Copying the Images Directory"](#) on page 6-11.

```
Alias /i/ "ORACLE_HTTPSERVER_HOME/user_projects/domains/base_domain/images/"

<Location /pls/apex>
    Order deny,allow
    AllowOverride None
```

```

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
PlsqlPathAlias                 r
PlsqlPathAliasProcedure        wwv_flow.resolve_friendly_url
Allow from all
</Location>

```

Note: `PlsqlPathAlias` and `PlsqlPathAliasProcedure` are required new parameters that must be added to an existing DAD. This is important when upgrading to Application Express release 5.0.

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 the database character set is `AL32UTF8`. For example:

```

...
PlsqlNLSLanguage              AMERICAN_AMERICA.AL32UTF8
...

```

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

Configuring Static File Support

Oracle Application Express enables application developers to include static files with their applications. Static files can be associated with a workspace, an application, a plug-in, or an application theme. When using the Oracle HTTP Server as your web listener, static files are served using Path Aliasing functionality of the `mod_plsql` plug-in.

See Also: ["Editing the dads.conf File"](#) on page 6-11 for the required configuration parameters

Stopping and Restarting Oracle HTTP Server

This section describes how to stop and restart Oracle HTTP Server.

- [Stopping and Restarting Oracle HTTP Server with Oracle Database 10g and Lower](#)
- [Stopping and Restarting Oracle HTTP Server 12c](#)

Stopping and Restarting Oracle HTTP Server with Oracle Database 10g and Lower

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

To stop and restart Oracle HTTP Server:

- Windows:

Execute the following:

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

- UNIX and Linux

Execute the following:

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

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

Stopping and Restarting Oracle HTTP Server 12c

To stop and restart the Oracle HTTP Server distributed with Oracle Database 12c, enter commands using the following syntax, where *DOMAIN_HOME* is the path to the Oracle HTTP Server domain:

- Windows:

Execute the following:

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

- UNIX and Linux

Execute the following:

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

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

See Also: "Creating an OHS Instance" in *Administering Oracle HTTP Server*

Disabling Oracle XML DB Protocol Server

If you were previously using the Embedded PL/SQL Gateway and now want to use Oracle HTTP server and `mod_plsql`, you need to disable the Oracle XML DB Protocol Server.

To disable Oracle XML DB Protocol Server:

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

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following command:

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

About Configuring Oracle HTTP Server Behind a Reverse Proxy or Load Balancer

When Oracle Application Express is running behind a reverse proxy or load balancer, it is important to communicate the original HTTP hostname and protocol as seen by user's browser to the Application Express engine. The engine will use this information to generate valid URL in HTML responses and HTTP redirects that user's browser can successfully follow. For Oracle HTTP server and mod_plsql, use `PlsqlCGIEnvironmentList` directive in the `dads.conf` configuration file. For example:

```
PlsqlCGIEnvironmentList REQUEST_PROTOCOL=https
PlsqlCGIEnvironmentList HTTP_HOST=www.example.com:443
```

See Also: ["Editing the dads.conf File"](#) on page 6-11

Enabling Network Services in Oracle Database 11g or Later

- [When and Why Network Services Must be Enabled](#)
- [Granting Connect Privileges Prior to Oracle Database 12c](#)
- [Troubleshooting an Invalid ACL Error](#)

When and Why Network Services Must be Enabled

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 1 or 2 or later. Therefore, if you are running Oracle Application Express with Oracle Database 11g Release 1 or 2 or later, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_050000` 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.

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 a 11g database will already have the parameter set properly, but a database upgraded to 11g from a prior version may not. See "Creating and Configuring an Oracle Database" in *Oracle Database Administrator's Guide* for information about changing database initialization parameters.

Granting Connect Privileges Prior to Oracle Database 12c

The following example demonstrates how to grant connect privileges to any host for the APEX_050000 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_050000
  -- the "connect" privilege if APEX_050000 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_050000',
  'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_050000', 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_050000', 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 enables 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_050000
  -- the "connect" privilege if APEX_050000 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_050000',
  'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_050000', 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_050000', TRUE, 'connect');
    DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml', 'localhost');
END;
/
COMMIT;

```

Granting Connect Privileges in Oracle Database 12c

Procedures `CREATE_ACL`, `ASSIGN_ACL`, `ADD_PRIVILEGE` and `CHECK_PRIVILEGE` in `DBMS_NETWORK_ACL_ADMIN` are deprecated in Oracle Database 12c. Oracle recommends using `APPEND_HOST_ACE` instead. The following example demonstrates how to grant connect privileges to any host for the `APEX_050000` database user. This example assumes you connected to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role.

```
BEGIN
  DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
    host => '*',
    ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                      principal_name => 'apex_050000',
                      principal_type => xs_acl.ptype_db));
END;
/
```

The following example demonstrates how to provide less privileged access to local network resources. This example enables access to servers on the local host only, such as email and report servers.

```
BEGIN
  DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
    host => 'localhost',
    ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                      principal_name => 'apex_050000',
                      principal_type => xs_acl.ptype_db));
END;
/
```

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;

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_050000 user. See ["Granting Connect Privileges Prior to Oracle Database 12c"](#) on page 6-16.

Performing Security Tasks

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: "Configuring HTTP Protocol Attributes" in *Oracle Application Express Administration Guide*

Controlling the Number of Concurrent Jobs

This section explains how to specify the number of concurrently running jobs.

- [About Managing the Number of Concurrent Jobs](#)
- [Viewing the Number of JOB_QUEUE_PROCESSES](#)
- [Changing the Number of JOB_QUEUE_PROCESSES](#)

About Managing the Number of Concurrent Jobs

JOB_QUEUE_PROCESSES determine the maximum number of concurrently running jobs. In Oracle Application Express 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

This section describes three ways to view the number of JOB_QUEUE_PROCESSES:

- [Viewing JOB_QUEUE_PROCESSES in the Installation Log File](#)
- [Viewing JOB_QUEUE_PROCESSES in Oracle Application Express](#)
- [Viewing JOB_QUEUE_PROCESSES from SQL*Plus](#)

Viewing JOB_QUEUE_PROCESSES in the Installation Log File

After installing or upgrading Oracle Application Express, 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 view the number of JOB_QUEUE_PROCESSES on the About Application Express page.

To view the About Application Express page:

1. Sign in to Oracle Application Express. See "[Signing In to Your Workspace](#)" on page 6-25.
2. Locate the Help menu at the top of the page.
3. From the Help menu, select **About**.

The About Application Express page appears. The current number JOB_QUEUE_PROCESSES displays at the bottom of the page.

Viewing JOB_QUEUE_PROCESSES from SQL*Plus

You can 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 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. Developers can choose to run the Application Express development environment in any of the installed languages by simply selecting the language from the Application Builder log in screen or home page.

In order to install other languages you must use the `apex_5.0.zip` file which contains the extra files referenced below. If you previously downloaded `apex_5.0_en.zip`, then you do not need to re-install Oracle Application Express. Simply download `apex_5.0.zip` and unzip the file into the same directory where you unzipped `apex_5.0_en.zip`.

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

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

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

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

```
American_America.AL32UTF8
```

```
Japanese_Japan.AL32UTF8
```

Installing Translated Versions of Oracle Application Express

This section describes installing translated versions of Oracle Application Express.

- [About Installing Translated Versions of Oracle Application Express](#)
- [Installing a Translated Version of Oracle Application Express](#)

About Installing Translated Versions 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 directory, there is a language loading script identified by the language code (for example, `load_de.sql` or `load_ja.sql`).

Installing a Translated Version of Oracle Application Express

To install a translated version of Oracle Application Express:

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


```
NLS_LANG=American_America.AL32UTF8
export NLS_LANG
```
 - C shell:


```
setenv NLS_LANG American_America.AL32UTF8
```
 - For Windows based systems:


```
set NLS_LANG=American_America.AL32UTF8
```
2. Navigate to the directory under `apex/builder` based on the language you need to install. For example for German, navigate to `apex/builder/de`. Start `SQL*Plus` and connect to the database where Oracle Application Express is installed as `SYS` specifying the `SYSDBA` role. For example:
 - On Windows:


```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:


```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
3. Execute the following statement:


```
ALTER SESSION SET CURRENT_SCHEMA = APEX_050000;
```
4. Execute the appropriate language specific script. For example:


```
@load_lang.sql
```

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

Creating a Workspace and Adding Oracle Application Express Users

Before you can develop or install applications, you must create a workspace, add Oracle Application Express users and sign in to your workspace.

- [About Workspaces and Users](#)
- [Accessing Oracle Application Express Administration Services](#)

- [Creating a Workspace Manually](#)
- [Creating Oracle Application Express Users](#)
- [Signing In to Your Workspace](#)

About Workspaces and Users

You access the Oracle Application Express home page by logging in to a workspace using a JavaScript enabled web browser. To learn more, see "[Browser Requirements](#)" on page 2-2.

A workspace enables multiple users to work within the same Oracle Application Express installation while keeping their objects, data, and applications private. Each workspace has a unique ID and name. An instance administrator can create a workspace manually within Oracle Application Express Administration Services or have users submit requests. Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance.

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

Accessing Oracle Application Express Administration Services

To manually create a workspace and user accounts, you sign in to a separate application for managing an entire Oracle Application Express instance called Oracle Application Express Administration Services. You sign in to Oracle Application Express Administration Services using the ADMIN account and password created or reset during the installation process.

To access Oracle Application Express Administration Services:

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

Because your setup uses Oracle HTTP Server with 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.

2. On the Sign In page:
 - Username - Enter admin.
 - Password - Enter the Oracle Application Express administrator account password you specified in "[Creating or Updating Your Instance Administration Account](#)" on page 6-7.
 - Click **Sign In to Administration**.

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

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

Creating a Workspace Manually

To manually create a workspace you sign in to a separate application called Oracle Application Express Administration Services. You sign in to Oracle Application Express Administration Services using the ADMIN account and password created or reset during the installation process.

To create an Oracle Application Express workspace manually:

1. Access Oracle Application Express Administration Services. See "[Accessing Oracle Application Express Administration Services](#)" on page 6-22.

Oracle Application Express Administration Services appears. Next, create a workspace.

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

The Create Workspace Wizard appears.

4. For Identify Workspace, enter the following:
 - a. Workspace Name - Enter a unique workspace name.
 - b. Workspace ID - Leave Workspace ID blank to have the new Workspace ID automatically generated. A Workspace ID must be a positive integer greater than 100000.
 - c. Workspace Description - Enter a workspace description.
 - d. Click **Next**.
5. For Identify Schema, specify whether you are re-using an existing schema or creating a new one.

If you are using an existing schema:

- a. For Re-use existing schema, select **Yes**.
- b. Select a schema from the list.
- c. Click **Next**.

If you are creating a new schema:

- a. For Re-use existing schema, select **No**.
- b. Enter a schema name and password.
- c. Specify a space quota.
- d. Click **Next**.

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

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

Creating Oracle Application Express Users

To create an Oracle Application Express user account:

1. Access Oracle Application Express Administration Services. See "[Accessing Oracle Application Express Administration Services](#)" on page 6-22.

Oracle Application Express Administration Services appears.

2. Click the **Manage Workspaces** icon.
3. Click **Manage Developers and Users**.
4. Click **Create User**.
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 Account Privileges:
 - a. **Workspace** - Select a workspace from the list.
 - b. **Default Schemas** - Specify the default schema used for data browsing, application creation, and SQL script execution.

When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.
 - c. **User is an administrator** - Specify if this user should have workspace administrator privileges.

Administrators are given access to all components. Additionally, they can manage user accounts, groups, and development services. Components may not be available if they are switched off by Instance Administrators.
 - d. **User is a developer** - Specify if this user should have developer privileges.

Developers must have access to either Application Builder, SQL Workshop, or both. These components may not be available if they are switched off by the Instance Administrator.
 - e. **Application Builder Access** - Determines whether a developer has access to the Application Builder.
 - f. **SQL Workshop Access** - Determines whether a developer has access to the SQL Workshop.
 - g. **Team Development Access** - Determines whether a developer has access to the Team Development.
 - h. **Set Account Availability** - Select **Locked** to prevent the account from being used. Select **Unlocked** to allow the account to be used.

If the user has exceeded the maximum log in failures allowed, specified in Workspace Preferences, then their account will be locked automatically.
7. Under Password:
 - a. **Password** - Enter a case sensitive password.

- **Confirm Password** - Enter the password again.
 - **Require Change of Password On First Use** - Select **No** to allow the user to use the same password until it expires. Select **Yes** to require the user to change the password immediately when logging in the first time.
8. Click **Create User** or **Create and Create Another**.

Signing In to Your Workspace

Use your credentials (that is, your workspace name, user name and password) to sign in to the workspace.

To sign in to your workspace:

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

Because 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.

The Sign In page appears.

2. On the Sign In page, enter:
 - **Workspace** - Enter the name of your workspace.
 - **Username** - Enter your user name.
 - **Password** - Enter your case-sensitive password.
3. Click **Sign In**.

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

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

Performing 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.

- [About Removing Prior Oracle Application Express Installations](#)
- [Verifying if a Prior Installation Exists](#)
- [Removing Schemas from Prior Installations](#)
- [Fixing Invalid ACL in Oracle Database 11g or Later](#)

See Also: ["Upgrading from a Previous Oracle Application Express Release"](#) on page 1-6

About Removing 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.

Verifying if a Prior Installation Exists

To verify if a prior installation exists:

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

- On Windows:

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

- On UNIX and Linux:

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

2. Run the following query:

```
SELECT username
FROM dba_users
WHERE ( username LIKE 'FLOWS\_____' ESCAPE '\ '
        OR username LIKE 'APEX\_____' ESCAPE '\ ' )
AND USERNAME NOT IN ( SELECT SCHEMA
                      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.

Removing Schemas from Prior Installations

To remove schemas from prior installations:

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

- On Windows:

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


- On UNIX and Linux:

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

2. Execute a statement similar to the following example:

```
DROP USER APEX_040200 CASCADE;
```

Fixing Invalid ACL in Oracle Database 11g or Later

After following the instructions in "[About Removing Prior Oracle Application Express Installations](#)" on page 6-26, you may need to fix an invalid ACL if you are running Oracle Database 11g or later and you enabled network services for the prior Oracle Application Express schema.

To fix an invalid ACL:

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

- On Windows:

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

- On UNIX and Linux:

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

3. Execute a statement similar to the following:

```
EXEC DBMS_NETWORK_ACL_ADMIN.DELETE_PRIVILEGE('power_users.xml', 'FLOWS_030000');
```

About Performance Optimization Tasks

Performance of web applications heavily depends on their size and how often a browser has to request static content like images, CSS and JavaScript files. To improve performance, most web servers support on-the-fly HTTP response compression and provide settings that enable you to configure how long browsers may cache a file before requesting it again. The HTTP response compression is usually implemented using gzip encoding (for example, `mod_deflate` in Oracle HTTP Server), while browser file caching is enabled by issuing Cache-Control HTTP response header (for example, using `mod_headers` in Oracle HTTP Server).

See your web server documentation to learn how to enable response compression and browser file caching. For optimal performance of the Oracle Application Express development environment and Oracle Application Express applications, Oracle recommends enabling gzip compression of files in the virtual images directory (for example, `/i/`) and responses from the database access descriptor (for example, `/pls/apex`), as well as allowing browsers to cache files from the virtual images directory for at least 12 hours.

Converting Between Runtime and Full Development Environments

This section describes how to convert between runtime and full development environments.

- [About Runtime and Full Development Environments](#)
- [Converting a Runtime Environment to a Full Development Environment in a non-CDB or Locally in a PDB](#)
- [Converting a Full Development Environment to a Runtime Environment in a non-CDB or Locally in a PDB](#)
- [Converting a Runtime Environment to a Full Development Environment in a CDB](#)
- [Converting a Full Development Environment to a Runtime Environment in a CDB](#)

About Runtime and Full Development Environments

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

You administer an Oracle Application Express runtime environment using SQL*Plus or SQL Developer and the `APEX_INSTANCE_ADMIN` API.

See Also: ["About the Oracle Application Express Runtime Environment"](#) on page 1-13 and "Installing Exported Applications into a Runtime Environment" in *Oracle Application Express Administration Guide*

Converting a Runtime Environment to a Full Development Environment in a non-CDB or Locally in a PDB

To convert an Oracle Application Express runtime environment to a full development environment in a non-CDB or locally in a PDB:

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxdvins.sql
```

4. Follow the instructions in "[Creating or Updating Your Instance Administration Account](#)" on page 6-7.

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

Converting a Full Development Environment to a Runtime Environment in a non-CDB or Locally in a PDB

Tip: Before converting a full development environment to a runtime environment, export all Websheet applications. When you convert a development environment to runtime, existing Websheet data grids and reports will be deleted from all workspaces. Converting the environment back to a full development environment will not restore these Websheet data grids or reports.

To convert an Oracle Application Express full development environment to a runtime environment in a non-CDB or locally in a PDB:

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

- On Windows:

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

- On UNIX and Linux:

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

3. Run apxdevrm.sql. For example:

```
@apxdevrm.sql
```

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

Converting a Runtime Environment to a Full Development Environment in a CDB

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

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

- On Windows:

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

Enter password: *SYS_password*

- On UNIX and Linux:

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

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

```
@apxdvins_con.sql
```

4. Follow the instructions in "[Creating or Updating Your Instance Administration Account](#)" on page 6-7.

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

Converting a Full Development Environment to a Runtime Environment in a CDB

Tip: Before converting a full development environment to a runtime environment, export all Websheet applications. When you convert a development environment to runtime, existing Websheet data grids and reports will be deleted from all workspaces. Converting the environment back to a full development environment will not restore these Websheet data grids or reports.

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

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

- On Windows:

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

- On UNIX and Linux:

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

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

```
@apxdevrm_con.sql
```

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

Oracle Application Express Installation Troubleshooting

This section contains information on troubleshooting.

- [Reviewing a Log of an Installation Session](#)
- [Verifying the Validity of an Oracle Application Express Installation](#)
- [Downloading and Installing Patches](#)
- [Cleaning Up After a Failed Installation](#)
- [About Images Displaying Incorrectly in Oracle Application Express](#)
- [About Page Protection Violation](#)

See Also: ["Upgrading from a Previous Oracle Application Express Release"](#) on page 1-6

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_050000 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.

Downloading and Installing Patches

Check the My Oracle Support website for required patch updates for your installation.

To download required patches:

1. Use a web browser to view the My Oracle Support website:

<https://support.oracle.com/>

2. Sign in to My Oracle Support.

Note: If you are not a My Oracle Support registered user, click **Register here** and follow the registration instructions.

3. On the main My Oracle Support page, click the Patches & Updates tab.
4. In the Patch Search group, select **Product or Family** (Advanced).
5. In the Product field, select **Oracle Database**.
6. In the Release field select one or more release numbers.
7. Click **Search**.
8. Any available patch updates are displayed in the Patch Search page.
9. Select the patch number and click **ReadMe**. The README page displays and contains information about the patch set and how to apply the patches to your installation.
10. Return to the Patch Search page, click **Download**, and save the file on your system.
11. Use the unzip utility provided with Oracle Database 12c to uncompress the Oracle patch updates that you downloaded from My Oracle Support. The unzip utility is located in the \$ORACLE_HOME/bin directory.

Cleaning Up After a Failed Installation

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

```
Thank you for installing Oracle Application Express.  
Oracle Application Express is installed in the APEX_050000 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.

- [Reverting to a Previous Release After a Failed Upgrade Installation](#)
- [Removing Oracle Application Express from the Database](#)

Reverting to a Previous Release After a Failed Upgrade Installation

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

- [Verifying If You Have a Previous Release of Oracle Application Express](#)
- [Reverting to a Previous Release](#)
- [Removing the Oracle Application Express Release 5.0 Schema](#)

Verifying If You Have a Previous Release of Oracle Application Express

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

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

- On Windows:

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

- On UNIX and Linux:

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

2. Execute the following command in SQL*Plus:

```
select username from dba_users
       where regexp_like(username, '(FLOWS|APEX|_)\d{6}')
       and username <> (select table_owner from all_synonyms
                       where synonym_name = 'WWV_FLOW'
                       and owner = 'PUBLIC')
```

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

Reverting to a Previous Release

This section describes how to revert to a Oracle Application Express previous release.

- [Reverting to Release 1.5](#)
- [Reverting to Release 1.6](#)
- [Reverting to Release 2.0](#)
- [Reverting to Release 2.2](#)
- [Reverting to Release 3.0](#)
- [Reverting to Release 3.1](#)
- [Reverting to Release 3.2](#)
- [Reverting to Release 4.0](#)
- [Reverting to Release 4.1](#)
- [Reverting to Release 4.2 in a non-CDB](#)
- [Reverting to Release 4.2 in a CDB](#)

Reverting to Release 1.5 To revert to a previous Oracle Application Express release 1.5:

1. If you altered your images directory, you must point the text alias `/i/` back to images directory for the release you want to revert to. See "[Copying the Images Directory](#)" on page 6-11.
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:

```
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_010500;
exec flows_010500.wv_flow_upgrade.switch_schemas('APEX_050000', 'FLOWS_
010500');
```

4. See the next section, "[Removing the Oracle Application Express Release 5.0 Schema](#)" on page A-14.

Reverting to Release 1.6 To revert to a Oracle Application Express release 1.6:

1. If you altered your images directory, you must point the text alias /i/ back to images directory for the release you want to revert to. See "[Copying the Images Directory](#)" on page 6-11.
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:

```
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_010600;
exec flows_010600.wv_flow_upgrade.switch_schemas('APEX_050000', 'FLOWS_
010600');
```

4. Depending upon the release you are reverting to, execute the appropriate command in SQL*Plus:
5. See the next section, "[Removing the Oracle Application Express Release 5.0 Schema](#)" on page A-14.

Reverting to Release 2.0 To revert to a previous Oracle Application Express release 2.0:

1. If you altered your images directory, you must point the text alias /i/ back to images directory for the release you want to revert to. See "[Copying the Images Directory](#)" on page 6-11.
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:

```
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_020000;
exec flows_020000.www_flow_upgrade.switch_schemas('APEX_050000', 'FLOWS_
020000');
```

4. See the next section, "[Removing the Oracle Application Express Release 5.0 Schema](#)" on page A-14.

Reverting to Release 2.2 To revert to a previous Oracle Application Express release 2.2:

1. If you altered your images directory, you must point the text alias /i/ back to images directory for the release you want to revert to. See "[Copying the Images Directory](#)" on page 6-11.
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:

```
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_020200;
exec flows_020200.www_flow_upgrade.switch_schemas('APEX_050000', 'FLOWS_
020200');
```

4. See the next section, "[Removing the Oracle Application Express Release 5.0 Schema](#)" on page A-14.

Reverting to Release 3.0 To revert to a previous Oracle Application Express release 3.0:

1. If you altered your images directory, you must point the text alias /i/ back to images directory for the release you want to revert to. See "[Copying the Images Directory](#)" on page 6-11.
2. Change your working directory to apex in the 3.0 source.
3. 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
```

4. Execute the following:

```
set define '^'

@apexvalidate x x FLOWS_030000
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_030000;
exec flows_030000.www_flow_upgrade.switch_schemas('APEX_050000', 'FLOWS_
030000');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := flows_030000.www_flows_release;
    dbms_registry.downgrading('APEX', 'Oracle Application Express', 'validate_
apex', 'FLOWS_030000');
    dbms_registry.downgraded('APEX', l_apex_version);
    validate_apex;
end;
/
```

5. See the next section, ["Removing the Oracle Application Express Release 5.0 Schema"](#) on page A-14.

Reverting to Release 3.1 To revert to a previous Oracle Application Express release 3.1:

1. If you altered your images directory, you must point the text alias `/i/` back to images directory for the release you want to revert to. See ["Copying the Images Directory"](#) on page 6-11.
2. Change your working directory to `apex/core` in the 3.1 source.
3. 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
```

4. Execute the following commands:

```
@www_flow_val.plb
@www_dbms_sql.sql
@www_dbms_sql.plb
```

5. Change your working directory to `apex` in the 3.1 source.
6. 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
```

7. Execute the following:

```
set define '^'

@apexvalidate x x FLOWS_030100
ALTER SESSION SET CURRENT_SCHEMA = FLOWS_030100;
exec flows_030100.www_flow_upgrade.switch_schemas('APEX_050000', 'FLOWS_
030100');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := flows_030100.www_flows_release;
    dbms_registry.downgrading('APEX', 'Oracle Application Express', 'validate_
apex', 'FLOWS_030100');
    dbms_registry.downgraded('APEX', l_apex_version);
    validate_apex;
end;
/
```

8. See the next section, ["Removing the Oracle Application Express Release 5.0 Schema"](#) on page A-14.

Reverting to Release 3.2 To revert to a previous Oracle Application Express release 3.2:

1. If you altered your images directory, you must point the text alias `/i/` back to images directory for the release you want to revert to. See ["Copying the Images Directory"](#) on page 6-11.
2. Change your working directory to `apex/core` in the 3.2 source.
3. 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
```

4. Execute the following commands:

```
@www_flow_val.plb
@www_dbms_sql.sql
@www_dbms_sql.plb
```

5. 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
```

6. Execute the following:

```
set define '^'

@apexvalidate x x APEX_030200
ALTER SESSION SET CURRENT_SCHEMA = APEX_030200;
exec apex_030200.wv_flow_upgrade.switch_schemas('APEX_050000','APEX_030200');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := apex_030200.wv_flows_release;
    dbms_registry.downgrading('APEX','Oracle Application Express','validate_
apex','APEX_030200');
    dbms_registry.downgraded('APEX',l_apex_version);
    validate_apex;
end;
/
```

7. See the next section, ["Removing the Oracle Application Express Release 5.0 Schema"](#) on page A-14.

Reverting to Release 4.0 To revert to a previous Oracle Application Express release 4.0:

1. Change your working directory to apex/core in the 4.0 source.
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 commands:

```
@wv_flow_val.sql
@wv_flow_val.plb
@wv_dbms_sql.sql
@wv_dbms_sql.plb
```

4. Change your working directory to apex in the 4.0 source.
5. 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
```

6. Execute the following:

```
set define '^'

@apexvalidate x x APEX_040000
ALTER SESSION SET CURRENT_SCHEMA = APEX_040000;
exec apex_040000.wvw_flow_upgrade.switch_schemas('APEX_050000','APEX_040000');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := apex_040000.wvw_flows_release;
    dbms_registry.downgrading('APEX','Oracle Application Express','validate_
apex','APEX_040000');
    dbms_registry.downgraded('APEX',l_apex_version);
    validate_apex;
end;
/
```

7. See the next section, ["Removing the Oracle Application Express Release 5.0 Schema"](#) on page A-14.

Reverting to Release 4.1 To revert to a previous Oracle Application Express release 4.1:

1. If you altered your images directory, you must point the text alias /i/ back to images directory for the release you want to revert to. See ["Copying the Images Directory"](#) on page 6-11.
2. Change your working directory to apex/core in the 4.1 source.
3. 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
```

4. Execute the following commands:

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

5. Change your working directory to apex in the 4.1 source.
6. 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
```

7. Execute the following:

```
set define '^'

@apexvalidate x x APEX_040100
ALTER SESSION SET CURRENT_SCHEMA = APEX_040100;
exec apex_040100.wwv_flow_upgrade.switch_schemas('APEX_050000','APEX_040100');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := apex_040100.wwv_flows_release;
    dbms_registry.downgrading('APEX','Oracle Application Express','validate_
apex','APEX_040100');
    dbms_registry.downgraded('APEX',l_apex_version);
    validate_apex;
end;
/
```

8. See the next section, "[Removing the Oracle Application Express Release 5.0 Schema](#)" on page A-14.

Reverting to Release 4.2 in a non-CDB To revert to a previous Oracle Application Express release 4.2 in a non-CDB:

1. If you altered your images directory, you must point the text alias /i/ back to images directory for the release you want to revert to. See "[Copying the Images Directory](#)" on page 6-11.
2. Change your working directory to apex/core in the 4.2 source.
3. 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
```

4. Execute the following commands:

```
alter session set current_schema = SYS;

@core_sys_views.sql

grant select on sys.wv_flow_gv$session to APEX_040200;

@wv_flow_val.sql
@wv_flow_val.plb
@wv_dbms_sql.sql
@wv_dbms_sql.plb

begin
    dbms_utility.compile_schema('APEX_040200');
end;
/
```

5. Change your working directory to apex in the 4.2 source.

6. 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
```

7. Execute the following:

```
set define '^'

@apexvalidate x x APEX_040200
ALTER SESSION SET CURRENT_SCHEMA = APEX_040200;
exec apex_040200.wv_flow_upgrade.switch_schemas('APEX_050000', 'APEX_040200');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := apex_040200.wv_flows_release;
    dbms_registry.downgrading('APEX', 'Oracle Application Express', 'validate_
apex', 'APEX_040200');
    dbms_registry.downgraded('APEX', l_apex_version);
    validate_apex;
end;
/
```

8. See the next section, ["Removing the Oracle Application Express Release 5.0 Schema"](#) on page A-14.

Reverting to Release 4.2 in a CDB To revert to a previous Oracle Application Express release 4.2 in a CDB:

1. If you altered your images directory, you must point the text alias `/i/` back to images directory for the release you want to revert to. See ["Copying the Images Directory"](#) on page 6-11.
2. Change your working directory to `apex/core` in the 4.2 source.
3. Create a new text file in that directory named `apx42dgrd1.sql` consisting of the following:

```
alter session set current_schema = SYS;

@core_sys_views.sql

grant select on sys.wv_flow_gv$session to APEX_040200;

@wv_flow_val.sql
@wv_flow_val.plb
@wv_dbms_sql.sql
@wv_dbms_sql.plb

begin
    dbms_utility.compile_schema('APEX_040200');
end;
/
```

4. Create a second new text file in that directory named `apx42dgrd.sql` consisting of the following:

```
set define '^'

whenever sqlerror exit

column :xe_home new_value OH_HOME NOPRINT
variable xe_home varchar2(255)

set serverout on
begin
    -- get oracle_home
    sys.dbms_system.get_env('ORACLE_HOME', :xe_home);
    if length(:xe_home) = 0 then
        sys.dbms_output.put_line(lpad('-', 80, '-'));
        raise_application_error (
            -20001,
            'Oracle Home environment variable not set' );
    end if;
end;
/
whenever sqlerror continue

set termout off
select :xe_home from sys.dual;
set termout on

host ^OH_HOME/perl/bin/perl -I ^OH_HOME/rdbms/admin ^OH_
HOME/rdbms/admin/catcon.pl -b apx42dgrd apx42dgrd1.sql
```

5. Start SQL*Plus and connect to `CDB$ROOT` of 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
```

6. Execute the following commands:

```
@apx42dgrd.sql
```

7. Change your working directory to apex in the 4.2 source.**8. Create a new text file in that directory name apx42dgrd1.sql with the following contents:**

```
set define '^'

ALTER SESSION SET CURRENT_SCHEMA = SYS;

@apexvalidate x x APEX_040200

ALTER SESSION SET CURRENT_SCHEMA = APEX_040200;
exec apex_040200.wv_flow_upgrade.switch_schemas('APEX_050000','APEX_040200');
ALTER SESSION SET CURRENT_SCHEMA = SYS;
declare
    l_apex_version varchar2(30);
begin
    l_apex_version := apex_040200.wv_flows_release;
    dbms_registry.downgrading('APEX','Oracle Application Express','validate_
apex','APEX_040200');
    dbms_registry.downgraded('APEX',l_apex_version);
    validate_apex;
end;
/
```

9. Create a second new text file in that directory named apx42dgrd.sql consisting of the following:

```
set define '^'

whenever sqlerror exit

column :xe_home new_value OH_HOME NOPRINT
variable xe_home varchar2(255)

set serverout on
begin
-- get oracle_home
sys.dbms_system.get_env('ORACLE_HOME',:xe_home);
if length(:xe_home) = 0 then
    sys.dbms_output.put_line(lpad('-',80,'-'));
    raise_application_error (
        -20001,
        'Oracle Home environment variable not set ');
end if;
end;
```

```

/
whenever sqlerror continue

set termout off
select :xe_home from sys.dual;
set termout on

host ^OH_HOME/perl/bin/perl -I ^OH_HOME/rdbms/admin ^OH_
HOME/rdbms/admin/catcon.pl -b apx42dgrd apx42dgrd1.sql

```

10. Start SQL*Plus and connect to CDB\$ROOT of 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

```

11. Execute the following:

```
@apx42dgrd.sql
```

12. See the next section, ["Removing the Oracle Application Express Release 5.0 Schema"](#) on page A-14.

Removing the Oracle Application Express Release 5.0 Schema

After you have reverted to the prior release you can remove the Oracle Application Express 5.0 schema.

- [Removing the Oracle Application Express Release 5.0 Schema from a Non-CDB](#)
- [Removing the Oracle Application Express Release 5.0 Schema from a CDB](#)

Removing the Oracle Application Express Release 5.0 Schema from a Non-CDB To remove the release 5.0 schema from a non-CDB:

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

– On Windows:

```

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

```

– On UNIX and Linux:

```

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

```

2. Execute the following command:

```
DROP USER APEX_050000 CASCADE;
```

Once you have removed the Oracle Application Express 5.0 schema, you can now attempt the upgrade again.

Removing the Oracle Application Express Release 5.0 Schema from a CDB To remove the release 5.0 schema from a CDB:

1. Create a new text file named `remove_apx50_usr1.sql` with the following contents:

```
alter session set current_schema = SYS;
drop user APEX_050000 cascade;
```

2. Create a second new text file named `remove_apx50_usr.sql` with the following contents:

```
set define '^'
whenever sqlerror exit
column :xe_home new_value OH_HOME NOPRINT
variable xe_home varchar2(255)

set serverout on
begin
-- get oracle_home
sys.dbms_system.get_env('ORACLE_HOME', :xe_home);
if length(:xe_home) = 0 then
sys.dbms_output.put_line(lpad('-',80,'-'));
raise_application_error (
-20001,
'Oracle Home environment variable not set' );
end if;
end;
/
whenever sqlerror continue

set termout off
select :xe_home from sys.dual;
set termout on

host ^OH_HOME/perl/bin/perl -I ^OH_HOME/rdbms/admin ^OH_
HOME/rdbms/admin/catcon.pl -b remove_apx50_usr remove_apx50_usr1.sql
```

3. 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
```

4. Execute the following command:

```
@remove_apx50_usr.sql
```

Once you have removed the Oracle Application Express 5.0 schema, you can now attempt the upgrade again.

Removing Oracle Application Express from the Database

This section describes how to remove the Oracle Application Express schema, synonyms, and users from the database without deleting the database.

Note: Do not follow these steps if you have upgraded your database from a prior release, and still want to use the prior release of Oracle Application Express. For information about reverting to a prior release, see ["Reverting to a Previous Release"](#) on page A-3. If you are not sure whether you have completed a new installation or an upgrade installation, follow the steps in ["Cleaning Up After a Failed Installation"](#) on page A-2 to verify if a previous release of Application Express exists in the database.

To remove Oracle Application Express from the database:

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

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
 - On UNIX and Linux:

```
$ sqlplus /nolog
SQL> SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```
3. Execute the following command:

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

About 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 directory where Oracle Application Express was downloaded or the images copied for ORDS to the directory defined by the first `/i/` alias.

About Page Protection Violation

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

Upgrading Oracle Application Express within Oracle Database Express Edition

Oracle Database 11g Express Edition (Oracle Database XE) includes Oracle Application Express release 4.0. Oracle strongly recommended that you upgrade to the latest Oracle Application Express release to take advantage of the latest features. This section describes how to upgrade Oracle Application Express included with Oracle Database XE.

- [Upgrading to the Latest Oracle Application Express Release](#)
- [Understanding the Differences Between Later Oracle Application Express Releases](#)

Tip: Upgrading Oracle Application Express does not change the Oracle Support policy for Oracle Database XE. Oracle Database XE is only supported on the Oracle OTN forums. Oracle Support will not answer questions about Oracle Application Express on Oracle Database XE.

See Also: Oracle Database 11g Express Edition OTN site at:

<http://www.oracle.com/technetwork/database/database-technologies/express-edition/overview/index.html>

Upgrading to the Latest Oracle Application Express Release

To upgrade to the latest Oracle Application Express release:

1. Download the latest version of Oracle Application Express from the download page. See:

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

2. Unzip downloaded zip file:

- UNIX and Linux: `$ unzip filename.zip`
- Windows: Double click `filename.zip` in Windows Explorer

Tip: Keep the directory tree where you unzip the files short and not under directories that contain spaces. For example, within Windows unzip to `C:\`.

3. Change your working directory to apex.
4. Start SQL*Plus and connect to the Oracle Database XE 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
```

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

5. Install Oracle Application Express:

```
@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/.

Example:

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

6. Log back into SQL*Plus (as described in step 4) and load images:

```
@apex_epg_config.sql APEX_HOME
```

Tip: *APEX_HOME* is the directory you specified when unzipping the file. For example, on Windows C:\.

7. Upgrade the Oracle Application Express password by running `apxchpwd.sql`:

```
@apxchpwd.sql
```

When prompted, enter a password for the ADMIN account.

8. Navigate to the Oracle Application Express Administration Services application:

- a. In a Web browser, navigate 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 Sign In page:

- Username - Enter *admin*.
- Password - Enter the Oracle Application Express administrator account password you specified in step 7.
- Click **Sign In to Administration**.

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

Understanding the Differences Between Later Oracle Application Express Releases

Oracle Database 10g Express Edition includes Oracle Application Express release 2.1. This section describes the differences between Oracle Application Express release 2.1 and later releases.

- [User Interface Differences](#)
- [Database Management Differences](#)

User Interface Differences

This section describes the differences between Oracle Application Express release 2.1 and later releases:

- **Login** - When accessing an upgraded version of Oracle Application Express, the login page that prompts you for a workspace, username, and password. The previous version only prompts for a username and password. When you log in, your *workspace* is the same as your *username*.
- **Changing Password** - Within Oracle Application Express, the change password function only changes your Oracle Application Express password, not your database password. Once you upgrade, your schema is associated with your workspace, but your database account is now separate. Note that if you create new database users, they will not automatically have access to Oracle Application Express.
- **Home Page** - The Home page displays differently in newer versions of Oracle Application Express. As noted in "[Database Management Differences](#)" on page B-4, most database administration functions are not part of Oracle Application Express. The two exceptions are that the Database Monitor and About Database which are found under the Administration menu.
- **SQL Workshop** - Object Browser and SQL are now part of the SQL Workshop.
- **Administration** - Other Administration functions pertain mostly to the administration of the workspace, not the database.

Database Management Differences

Once you upgrade Oracle Application Express within your Oracle Database XE, you lose an Oracle Application Express interface that enabled you to manage some database management functions, including the ability to create and alter users, set database parameters, and so. Most of these functions previously existed within the Oracle Database XE interface under Home, Administration.

To perform these functions when using later versions of Oracle Application Express, you must execute an alternate SQL statement when connected to Oracle Database XE in either a SQL Worksheet of SQL Developer or in SQL*Plus. Note that most of these commands must be executed as the user *SYS*.

The following database management functions that are no longer supported in later versions of Oracle Application Express:

- **Change My Password**
 - **Function:** Changes your database user password. Once you upgrade, your database account is associated with an Oracle Application Express account but the passwords are separate. A change to one account does not affect the other.
 - **Location:** Under Tasks, Database Users.
 - **SQL Statement:**

```
alter user username identified by new_password;
```

Within SQL Developer, right-click a user under Other Users, select **Edit User**, and use New Password and Confirm Password.

- **Manage HTTP Access**
 - **Location:** Under Tasks.
 - **SQL Statement:**
- **Usage Monitor**
 - **Location:** LOC.
 - **Function:** Changes your database user password. Once you upgrade, your database account is associated with your Oracle Application Express account but the passwords are separate. A change to one does not affect the other.
 - **SQL Statement:**

To set HTTP Access to Local only:

```
exec dbms_xdb.setlistenerlocalaccess  
(l_access => TRUE);
```

To set HTTP Access to support remote connects:

```
exec dbms_xdb.setlistenerlocalaccess  
(l_access => FALSE);
```

To set HTTP Access to Local only:

```
select nvl(b.tablespace_name,  
nvl(a.tablespace_name, 'UNKNOWN'))  
tablespace_name,  
kbytes_alloc kbytes,  
kbytes_alloc-nvl(kbytes_free,0)  
size_alloc_bytes,
```


- Location: Database Users.
- SQL Statement:

```
drop user username;
```

Within SQL Developer, right-click a user under Other Users under your XE-SYS connection. Select edit user and select **Account is Locked**.

- Drop Database User

- Location: Database Users.
- SQL Statement:

```
drop user username;
```

Within SQL Developer, you can also right-click the Other Users node under your XE connection and select **Drop User**.

- Lock Database Account

- Location: Database Users.
- SQL Statement:

```
alter user username account lock;
```

Within SQL Developer, right-click a user under Other Users under your XE-SYS connection. Select edit user and select **Account is Locked**.

- Unlock Database Account

- Location: Database Users.
- SQL Statement:

```
alter user username account unlock;
```

Within SQL Developer, right-click a user under Other Users under your XE-SYS connection. Select edit user and deselect **Account is Locked**.

Symbols

, 4-2

A

ACL

fixing invalid, 4-24, 5-23, 6-27

Administration Services

accessing, 6-22

accessing with embedded PL/SQL gateway, 5-18

accessing with Oracle REST Data Services, 4-19

apex_epg_config.sql, 5-7, 5-8

apex_epg_config.sql script, 5-8

APEX_PUBLIC_USER account

about, 4-8, 6-9

changing password, 4-8, 6-10

configuring, 4-7, 6-9

expiration in Oracle Database 11g, 4-9, 6-10

unlocking, 4-8, 6-9

apex_rest_config.sql, 4-11

apexins.sql, 4-4, 5-4, 6-4, 6-6

Application Express

about users, 4-19, 5-18, 6-22

about workspaces, 4-19, 5-18, 6-22

Administration Services, 4-19, 5-18, 6-22

browser requirement, 2-2

creating workspace manually, 4-20, 5-19, 6-23

database requirement, 2-1

determining release version, 1-7

disk space requirements, 2-3

download and install in CDB, 6-6

download and install in non-CDB, 5-4, 6-3, 6-4

download and install locally in PDB, 5-4, 6-3, 6-4

getting started, 4-18, 5-18, 6-21

HTTP server requirement, 2-2

incompatible versions, 3-7

installing translated versions, 4-17, 5-16, 6-20

Oracle Database requirement, 4-2, 5-1, 6-2

patching, 4-2, 5-2, 6-2

patching in CDBs, 3-7

patching in PDBs, 3-8, 3-9

pre-installation tasks, 4-2, 4-3, 5-2, 6-2, 6-3

reinstalling in CDBs, 3-4

signing in to workspace, 4-22, 5-21, 6-25

uninstalling in CDBs, 3-2

with embedded PL/SQL gateway, 5-1

with Oracle REST Data Services, 4-1

XML DB requirement, 2-3

Application Express Administration Services, 4-20,

4-21, 5-19, 5-20, 6-23, 6-24

applications

specifying compatibility mode, 1-8

upgrading, 1-7

apxchpwd.sql, 4-7, 5-6, 6-8, B-2

changing Instance Administrator account

password, 4-6, 5-6, 6-8

creating Instance Administrator account, 4-6, 5-6,

6-8

running, 4-7, 5-6, 6-8

unlocking Instance Administrator account, 4-6,

5-6, 6-8

updating Instance Administrator account, 4-6,

5-6, 6-8

apxdevrm_con.sql, 5-26, 6-30

apxdevrm.sql, 4-26, 5-25, 6-29

apxdvins_con.sql, 5-26, 6-30

apxdvins.sql, 4-25, 5-25, 6-28

apxrtins.sql, 4-5, 5-5, 6-5, 6-7

B

browser

requirement, 2-2

C

CDB

installing in, 6-6

CDBs

patching Application Express, 3-7

uninstalling Application Express, 3-2

CDBs reinstalling Application Express, 3-4

common Application Express from another

CDB, 3-10

compatibility mode

specifying for, 1-8

configuring

embedded PL/SQL gateway, 5-7

Oracle HTTP Server, 6-10

D

- database installation
 - SHARED_SERVERS parameter, 5-17
- database requirement
 - Application Express, 2-1
- determining release version, 1-7
- development environment
 - changing to runtime, 4-26, 5-25, 5-26, 6-29, 6-30
- disk space
 - requirements, 2-3

E

- embedded PL/SQL gateway
 - about, 1-11
 - apex_epg_config.sql, 5-7
 - configuring, 5-7
 - configuring behind load balancer, 5-10
 - configuring behind reverse proxy, 5-10
 - installing, 5-1
 - security considerations, 1-12
 - SHARED_SERVERS parameter, 5-17
 - verifying HTTP server port, 5-9

F

- full development environment
 - about, 4-25, 5-24, 6-28
 - converting to runtime, 4-26, 5-25, 5-26, 6-29, 6-30
 - installing, 4-4, 5-4, 6-4, 6-6

G

- getting started
 - Application Express, 4-18, 5-18, 6-21

H

- HTTP server
 - requirement, 2-2

I

- images
 - copying, 6-11
 - copying when upgrading, 6-11
- installation
 - about copying images directory, 6-11
 - configuring embedded PL/SQL gateway, 5-7
 - configuring Oracle HTTP Server, 6-10
 - downloading Oracle REST Data Services, 4-9
 - enabling network services, 4-12, 5-11, 6-15
 - installing in other languages, 4-17, 5-15, 6-20
 - managing JOB_QUEUE_PROCESSES, 4-15, 5-14, 6-18
 - overview, 1-3
 - patch sets, 1-2
 - performing security tasks, 4-15, 5-14, 6-18
 - planning, 1-1
 - point releases, 1-2

- process, 1-3
- requirements, 1-1, 2-1
- restart processes, 4-7, 5-7, 6-9
- signing in, 4-18, 5-18, 6-21
- understanding, 1-1
- updating images directory, 5-8
- verifying validity, A-1

- installation option
 - full development environment, 4-4, 5-4, 6-4, 6-6
 - runtime environment, 4-4, 5-4, 6-4, 6-6
- installation script
 - running, 4-4
- installing
 - failures, A-2
 - Oracle REST Data Services, 4-9
 - other languages, 4-17, 5-15, 6-20
- Instance Administrator
 - about, 6-8
- Instance Administrator account
 - changing password, 4-6, 6-8
 - creating, 4-6, 6-8
 - creating password, 4-6, 6-8
 - unlocking, 4-6, 6-8
- Instance administrator account
 - about, 4-6, 5-6
 - creating, 4-6, 5-5, 6-7
 - running apxchpwd.sql, 4-6, 5-6, 6-8
 - updating, 4-6, 5-5, 6-7

J

- JOB_QUEUE_PROCESSES, 4-15, 5-14, 6-18
 - changing number of, 4-16, 5-15, 6-19
 - viewing from SQL*Plus, 4-16, 5-15, 6-19
 - viewing in installation log, 4-16, 5-14, 6-19
 - viewing number of, 4-16, 5-14, 6-19
 - viewing on About page, 4-16, 5-15, 6-19

L

- log file, A-1
- login credentials
 - recovering workspace name, 1-5

M

- MEMORY_TARGET
 - checking, 2-1

N

- network services
 - enabling, 4-12, 5-11, 6-15
 - granting connect privileges, 4-13, 5-11, 6-16
 - granting connect privileges, Oracle Database 12c, 4-14, 5-12, 6-17
 - invalid ACL error, 4-14, 5-13, 6-17
- non-CDB
 - installing in, 5-4, 6-3, 6-4

O

- Oracle Application Express
 - creating users, 4-21, 5-20, 6-24
- Oracle Application Server 10g
 - editing dads.conf, 6-12
- Oracle Database requirement, 4-2, 5-1, 6-2
- Oracle HTTP Server
 - about, 1-10
 - configuring, 6-10
 - configuring behind load balancer, 6-15
 - configuring behind reverse proxy, 6-15
 - copying images directory, 6-11
 - editing dads.conf, 6-11
 - stopping and starting, 6-13
 - using with Oracle RAC, 1-12
- Oracle HTTP Server 11g
 - editing dads.conf, 6-12
- Oracle HTTP Server 12c
 - editing dads.conf, 6-12
- Oracle Real Application Clusters (Oracle RAC)
 - selecting an HTTP Server, 1-12
 - shutting down instances, 4-2, 5-2, 6-2
- Oracle REST Data Services
 - about, 1-10
 - configuring behind load balancer, 4-11
 - configuring behind reverse proxy, 4-11
 - configuring RESTful Services, 4-11
 - downloading, 4-9
 - installing, 4-1, 4-9
- Oracle REST Data Services requirement, 4-2
- Oracle Technology Network (OTN)
 - downloading from, 6-1
- Oracle XML DB Protocol Server
 - enabling, 5-9
- Oracle XML DB Protocol server
 - disabling, 4-10, 6-14
 - updating images directory, 5-8
 - verifying HTTP server port, 5-9
- ords.version.number.zip, 4-9, 4-10
- OTN installation
 - copying images, 6-11
- overview, 1-3

P

- password
 - resetting from Sing In page, 1-6
- patch sets, 1-2
- patching, 4-2, 5-2, 6-2
- PDB
 - installing in, 5-4, 6-3, 6-4
- PDBs
 - patching Application Express, 3-8, 3-9
- performance
 - optimizing, 4-24, 5-23, 6-27
- performance optimization
 - about, 4-24, 5-23, 6-27
 - expired header attribute, 4-24, 5-23, 6-27
 - gzip compression, 4-24, 5-23, 6-27
- plugging in PDBs

- Application Express from another CDB, 3-5
- Application Express in root, 3-5
- Application Express is not contained in the root container
 - local Application Express from another CDB, 3-10
- Application Express is not in the root container of the target CDB
 - non-CDB or PDB with no Application Express, 3-10
 - non-CDB with Application Express, 3-10
- Application Express not contained root, 3-10
- Application Express not in the root of CDB, 3-9
- Application Express root another CDB, 3-6
 - non-CDB with Application Express, 3-5
- Plug-in non-CDB, 3-6
- Plug-in PDB, 3-6
- point releases, 1-2
- post-installation tasks
 - installing other languages, 4-17, 5-15, 6-20
- pre-installation tasks, 4-2, 5-2, 6-2
- prior installations
 - removing when upgrading, 4-23, 5-22, 6-26

R

- release
 - determining version, 1-7
- requirements, 2-1
 - browser, 2-2
 - database, 2-1
 - disk space, 2-3
 - HTTP server, 2-2
 - MEMORY_TARGET, 2-1
 - Oracle XML DB, 2-3
- RESTful Services
 - configuring, 4-11
- reverting to previous release, 1-9
- running
 - aapxrtins.sql, 6-7
 - apex_epg_config.sql, 5-8
 - apexins.sql, 4-4, 5-4, 6-4, 6-6
 - apxchpwd.sql, 4-7, 5-6, 6-8, B-2
 - apxdevrm_con.sql, 5-26, 6-30
 - apxdevrm.sql, 4-26, 5-25, 6-29
 - apxdvins_con.sql, 5-26, 6-30
 - apxdvins.sql, 4-25, 5-25, 6-28
 - apxrtins.sql, 4-5, 5-5, 6-5
- runtime environment
 - about, 1-13, 4-25, 5-24, 6-28
 - converting to development environment, 4-25, 5-24, 5-25, 6-28, 6-29
 - installing, 4-5, 5-5, 6-5, 6-7

S

- schemas, about naming, 1-2
- Secure Sockets Layer (SSL), 4-15, 5-14, 6-18
- security considerations
 - secembedded PL/SQL gateway, 1-12

signing in, 1-4, 1-5
signing out, 1-5
SSL, 4-15, 5-14, 6-18
static file support, configuring, 6-13

T

translated version
 installing, 4-17, 5-15, 6-20
translated versions
 about installing, 4-17, 5-16, 6-20
troubleshooting, A-1
 cleaning up after failed installation, A-2
 images, A-16
 reviewing log file, A-1

U

upgrade post installation tasks, 4-22, 5-22, 6-25
 fixing invalid ACL, 4-24, 5-23, 6-27
 removing prior installation, 4-23, 5-22, 6-26
 removing schemas from prior installation, 4-23,
 5-22, 6-26
 verifying prior installation, 4-23, 5-22, 6-26
upgrading
 about, 1-6
 compatibility mode, 1-8
 copying images, 6-11
 environment clean-up, 1-8
 existing applications, 1-7
 reverting, 1-9
 sample scenarios, 1-6
 testing, 1-8
user accounts
 creating, 4-21, 5-20, 6-24
Utilizing, 3-1

W

Web browser
 requirements, 2-2
web listener
 choosing, 1-9
 comparing each, 1-12
 embedded PL/SQL gateway, 1-11
 Oracle HTTP Server, 1-10
 Oracle REST Data Services, 1-10
workspace
 creating, 4-20, 5-19, 6-23
 recovering workspace name, 1-5
 requesting, 1-4
 signing in, 1-4, 1-5, 4-22, 5-21, 6-25
 signing out, 1-5
workspace name
 recovering, 1-5

X

XML DB
 requirement, 2-3