

Oracle® Database

2 Day + Application Express Developer's Guide

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Preface

Oracle Database 2 Day + Application Express Developer's Guide introduces you to application development using Oracle Application Express. This guide shows you how to set up a development environment or access a hosted demonstration environment to use with this guide. It then walks you through building an initial application, modifying it, and previewing it.

After completing this guide, you will be familiar with the Application Express user interface, basic product functionality, and some underlying concepts that enable you to develop professional, fast, and secure applications.

This preface contains these topics:

- [Topic Overview](#)
- [Audience](#)
- [Documentation Accessibility](#)
- [Related Documents](#)
- [Conventions](#)

Topic Overview

This document contains the following sections:

Title	Description
Introducing Oracle Application Express	Describes Oracle Application Express, its architecture and the environment for using the product. It also introduces you to some concepts and terms used in this guide.
Accessing Your Development Environment	Leads you through the steps to access a development environment for your use.
Getting Started with Oracle Application Express	Introduces you to areas of the user interface. It also leads you through installing the sample objects to use with this guide.
Building Your Application	Leads you through the steps for building an application, modifying it, and previewing it at different points during the development process.
About Deploying Your Application	Describes some basic information about deploying your application. It also leads you through the steps to create end users and to determine the URL of your application.

Title	Description
About Globalization	Describes some basic information about globalization. It also leads you through the steps to specify how the application determines global identification.
Next Steps	Describes additional resources to expand your knowledge of Oracle Application Express and boost your productivity.

Audience

Oracle Database 2 Day + Application Express Developer's Guide is intended for:

- *Workspace administrators* who want to set up the Oracle Application Express development environment
- *Application developers* who want to learn how to build database-centric Web applications using Oracle Application Express

To use this guide, you should have a general understanding of relational database concepts and the operating system environment under which you are running Oracle Application Express.

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Related Documents

For more information, see these Oracle resources:

- *Oracle Database Installation Guide*
- *Oracle Database Application Express Release Notes*
- *Oracle Database Application Express User's Guide*
- *Oracle Database Application Express Advanced Tutorials*
- *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*

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

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

Printed documentation is available for sale in the Oracle Store at

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

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

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

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

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<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.

Introducing Oracle Application Express

This section describes Oracle Application Express, its architecture, and the environment for using the product. It also introduces you to concepts and terms used in this guide when discussing Application Express.

This section contains the following topics:

- [About Oracle Application Express](#)
- [Understanding Oracle Application Express Architecture](#)
- [About the Oracle Application Express Environment](#)
- [About Oracle Application Express User Roles](#)
- [Overview of the Application You Build](#)

About Oracle Application Express

Oracle Application Express is a rapid Web application development tool for the Oracle database. Using only a Web browser and limited programming experience, you can develop professional applications that are both fast and secure. Thanks to built-in features such as user interface themes, navigational controls, form handlers, and flexible reports, Oracle Application Express accelerates the application development process.

From the end user's perspective, the deployed applications require only a browser and access to an Oracle database running Application Express.

Note: This guide describes only a subset of Application Express functionality. For a complete list of features, see "What is Application Express?" in *Oracle Database Application Express User's Guide*.

Understanding Oracle Application Express Architecture

Oracle Application Express installs with your Oracle database and is comprised of data in tables and PL/SQL code.

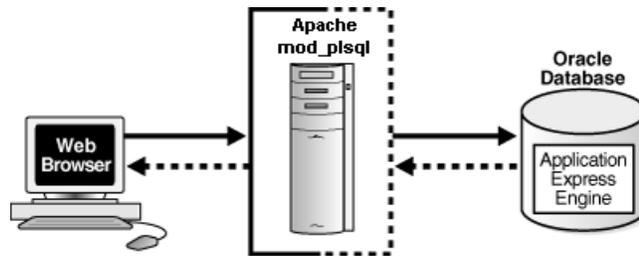
Whether you are running the Oracle Application Express development environment or an application you built using Oracle Application Express, the process is the same. Your browser sends a URL request that is translated into the appropriate Oracle Application Express PL/SQL call. After the database processes the PL/SQL, the results are relayed back to your browser as HTML. This cycle happens each time you request or submit a page.

The application session state is managed in the database tables within Application Express. It does not use a dedicated database connection. Instead, each request is made through a new database session, consuming minimal CPU resources.

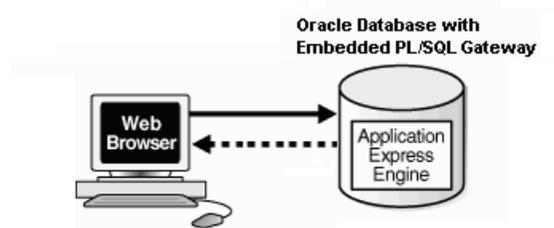
About Oracle HTTP Server (Apache) and the Embedded PL/SQL Gateway

The version of Oracle Database you use determines how the URL is translated:

- Versions before to Oracle Database 11.1 require Oracle HTTP Server (Apache) with `mod_plsql`. The following illustration shows that architecture.



- With Oracle Database 11.1 or higher or Oracle Database 10g Express Edition, you can remove Oracle HTTP Server (Apache) from the architecture and replace it with the embedded PL/SQL gateway. The following illustration shows the architecture using the embedded PL/SQL gateway.



The embedded PL/SQL gateway provides Oracle Database with a Web server and also the necessary infrastructure to create dynamic applications. The embedded PL/SQL gateway runs in the XML DB HTTP server in the Oracle database and includes the core features of `mod_plsql`, but does not require the Oracle HTTP Server powered by Apache. Inclusion of the embedded PL/SQL gateway simplifies the architecture and eliminates the middle tier.

About the Application Express Engine

The Application Express engine renders and processes pages. It also performs these tasks:

- Session state management
- Authentication services
- Authorization services
- Page flow control
- Validations processing

About the Oracle Application Express Environment

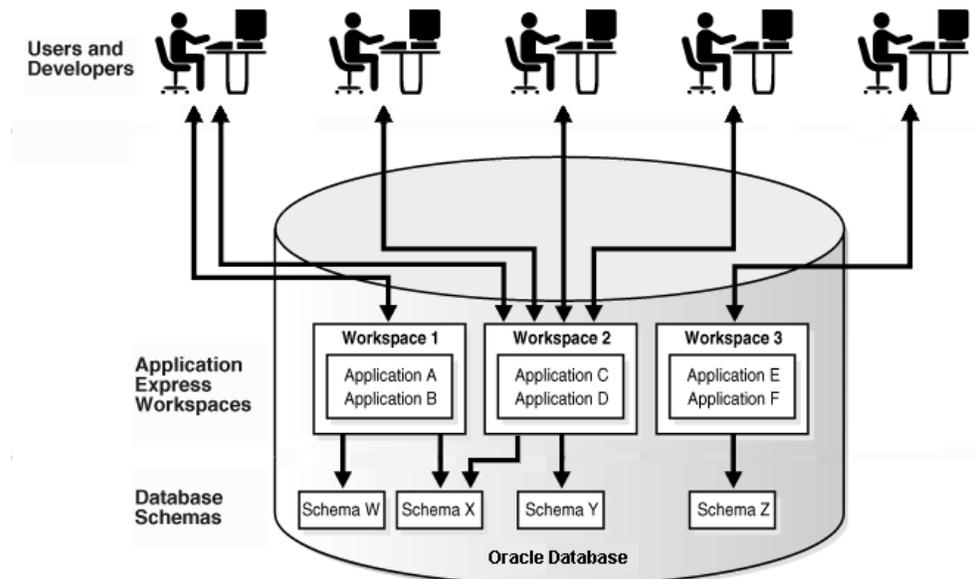
Oracle Application Express enables a single Oracle database to become a shared workgroup database service. Multiple users can access it using a Web browser without installing additional software.

About Workspaces

The area where you develop applications is called a workspace. A **workspace** is a virtual private database that enables multiple users to work within the same Oracle Application Express installation while keeping their objects, data, and applications private.

In a typical development environment, you might create a single workspace for all your developers to share. However, you can also create dedicated workspaces for specific developers or projects. Creating a dedicated workspace limits access to the workspace objects to only those users associated with the workspace.

The following illustration shows the relationship among users and developers, workspaces, and database schemas.



When you create a workspace, you associate it with a new or existing schema. A **schema** is a logical container for database objects such as tables, views, and stored procedures. A single schema can be associated with one or more workspaces.

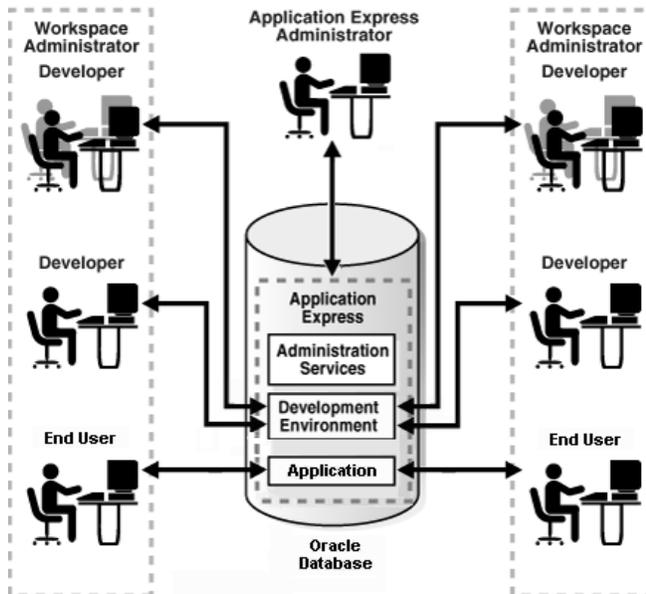
About Oracle Application Express User Roles

When setting up Application Express users at a large organization, you assign roles and privileges to specific users. The roles within Application Express include the following:

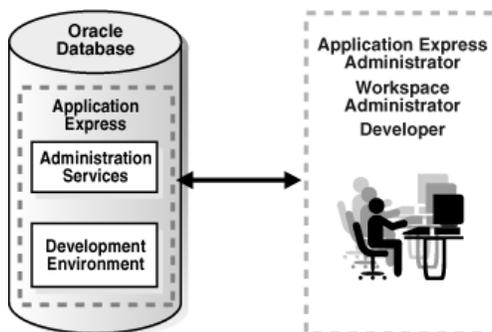
- **Workspace administrators** are users who perform administrator tasks specific to a workspace such as managing user accounts, monitoring workspace activity, and viewing log files. For this guide, you will be acting as the workspace administrator when setting up the development environment.
- **Developers** are users who create and edit applications. Developers can have their own workspace or share a workspace.

- **End users** have no development privileges. You define end users so that they can access applications that do not use an external authentication scheme.
- **Oracle Application Express administrators** are superusers that manage an entire hosted instance using the Application Express Administration Services application.

The following illustration shows multiple users with various roles accessing the Application Express development environment, Application Express Administration Services, and the published applications.



For this guide, you must have the privileges usually associated with three roles: Application Express Administrator, Workspace Administrator, and Developer. The following illustration shows an Application Express instance with a single user.



Overview of the Application You Build

In "[Building Your Application](#)" on page 4-1, you create a simple Human Resources (HR) application for a fictitious company called *AnyCo Corp*. The application manages departmental and employee information stored in the department and employees tables that you create. The tutorial shows you how to build the application, modify it, and then preview it.

Accessing Your Development Environment

This section guides you through the steps to access an Oracle Application Express development environment for your use. Then, you and other developers can begin building applications within Oracle Application Express.

This section contains the following topics:

- [Before You Begin](#)
- [Accessing the Hosted Demo Environment](#)
- [Setting Up Your Own Local Environment](#)
- [Creating Additional User Accounts](#)

Before You Begin

Before you begin this section, do the following:

- Determine which environment you want to use:
 - Oracle provides a hosted demonstration (demo) environment where you can try out Application Express.

Using the demo environment is the fastest way to access a development environment. You request a workspace from an Application Express Web site and provide some basic user information. Shortly after you submit your request, you receive your login credentials in an email. This option does not require installing any software.

For instructions on getting started with the demo environment, see "[Accessing the Hosted Demo Environment](#)" on page 2-2.

Note: Do not use the hosted demonstration environment for your production work.

- Set up your own local instance of Application Express. To do that, you install the product and then follow the steps in "[Setting Up Your Own Local Environment](#)" on page 2-3.

For instructions on installing Application Express, review the installation guide for your operating environment. See "[Related Documents](#)" on page -vii.
- Read "[Introducing Oracle Application Express](#)" on page 1-1.

- To view or develop Oracle Application Express applications, use a Web browser that supports JavaScript and the HTML 4.0 and Cascading Style Sheet (CSS) 1.0 standards. The following browsers meet this requirement:
 - Microsoft Internet Explorer 6.0 or higher
 - Firefox 1.0 or higher
- Enable cookies for your Web browser.

Accessing the Hosted Demo Environment

To try out Oracle Application Express without installing the product locally, go to the hosted demo environment and sign up for a workspace.

To access the hosted demo environment:

1. In a Web browser, go to:

<http://apex.oracle.com>

2. Under the Login button, click **Sign up for an account**.

The Registration Wizard appears. Note the steps included in the wizard appear in a flowchart on the left side of the page. The highlighted block indicates the step you are performing.

3. On the Welcome page, review the information and click **Next**.

4. For Identify Administrator, enter valid information and click **Next**.

The system will generate an email with your login credentials and send it to the email address you enter.

5. For Workspace, enter a name for your workspace.

Workspace names must be unique. Requesting a duplicate name might delay your request. In general, enter a name that is significant to you. For example, enter your own name, your company name, or the name of the project or department to which your applications pertain.

To use the same name for your workspace and your schema (defined in the next step) use alphabetic characters when naming your workspace. Schema names are restricted to alphabetic characters.

6. For New or Existing Schema, select **Request a new schema** and click **Next**.

7. For Database Schema, do the following:

- a. New schema to create - Enter a name containing only alphabetic characters.
- b. Initial Space Allocation - Select at least 10 MB to accommodate the space needed for creating the objects required for this guide.
- c. Click **Next**.

8. For Service Description, enter the requested information and click **Next**.

9. For Confirmation:

- a. Enter the displayed numeric and alphabetic characters in the Verification Code field. Be sure to use the correct capitalization because the verification code is case-sensitive.



- b. Review the information and click **Submit Request**.

You will receive an initial email that contains a link. Click the link to complete the workspace provisioning process. This step verifies that your email address is valid before approving a workspace. After that, you will receive an email with your login credentials. Use those credentials to log in to the hosted demo environment and begin using Application Express.

Logging In to the Hosted Demo Environment

Using the login credentials you received in an email, log in to your dedicated workspace on the hosted demo environment.

To log in to the hosted demo environment:

1. In a Web browser, go to:
<http://apex.oracle.com>
2. On the Login page, enter your login credentials.
3. Click **Login**.

The Workspace home page appears. You might be prompted to change your password. If not, you can change it manually by clicking the **Change Password** link on the right side of the Workspace home page. Then, enter in the information requested on the page that appears.

To continue with the tutorials, skip the rest of this section and go to "[Getting Started with Oracle Application Express](#)" on page 3-1.

Setting Up Your Own Local Environment

Instead of using the hosted demo environment, you can install Oracle Application Express locally. If you do a local installation, you must set up your development environment. The general steps you need to perform include:

1. Log in to Oracle Application Express Administration Services, as described in "[Logging In to Administration Services](#)" on page 2-4.
2. Create a workspace, as described in "[Creating a Workspace](#)" on page 2-5.
3. (Optional) Create additional users with developer or administrator privileges, as described in "[Creating Additional User Accounts](#)" on page 2-8.

Note: This tutorial explains a simplified method for setting up your development environment so that you can begin using Application Express. However, when you want to set up your development environment to accommodate your real-life development needs, review "Managing an Oracle Application Express Hosted Service" in *Oracle Database Application Express User's Guide*.

Logging In to Administration Services

To set up your local development environment, you first need to log in to Oracle Application Express Administration Services. This is a separate application for managing an entire Oracle Application Express instance.

To log in to the Oracle Application Express Administration Services:

1. In a Web browser, go to the Oracle Application Express Administration Services application. By default, Oracle Application Express Administration Services installs to one of the following locations:

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

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

Where:

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

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

See Also: "Verifying the Oracle XML DB HTTP Server Port" in *Oracle Database Application Express User's Guide*

- If your setup uses the Oracle HTTP Server (Apache) 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 Oracle HTTP Server. In a default installation, this number is 7777. You can find information about your Oracle HTTP Server installation's port number from either of the following files:

```
ORACLE_BASE\ORACLE_HOME\install\portlist.ini
```

```
ORACLE_BASE\ORACLE_HTTPSERVER_HOME\Apache\Apache\conf\httpd.conf
```

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

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

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

See Also: "Managing Oracle Database Port Numbers" in *Oracle Database Application Express Installation Guide* and `ORACLE_BASE\ORACLE_HTTPSERVER_HOME\Apache\modplsql\conf\dads.readme` for more information on database access descriptors

The Login page appears.

2. In Username, enter the username you specified when you installed Oracle Application Express.
3. In Password, enter the Oracle Application Express administrator account password you specified when you installed Oracle Application Express.
4. Click **Login**.

Oracle Application Express Administration Services appears.

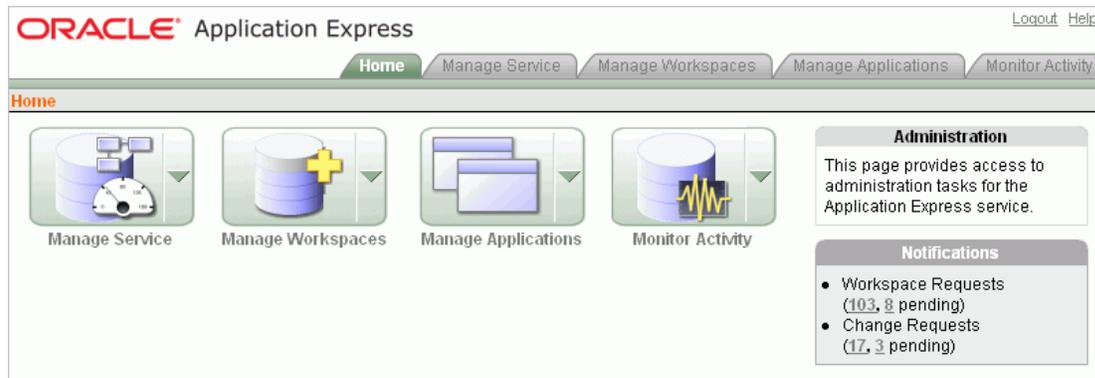
Creating a Workspace

From Administration Services, you need to create a workspace. A **workspace** is a shared work area within the Oracle Application Express development environment that has a unique ID and name. All users in the workspace can access all its applications and scripts. For more information about workspaces, see "[About Workspaces](#)" on page 1-3.

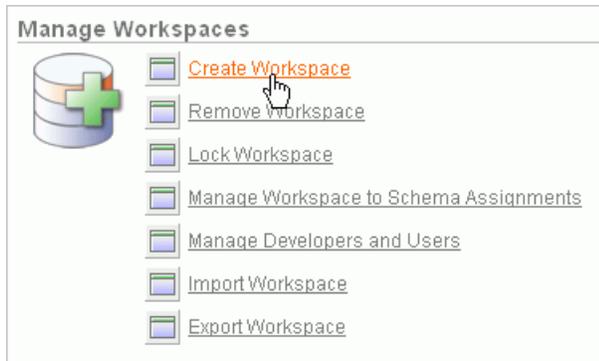
To create a workspace:

1. Log in to Oracle Application Express Administration Services.

The Home page appears for Administration Services.



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



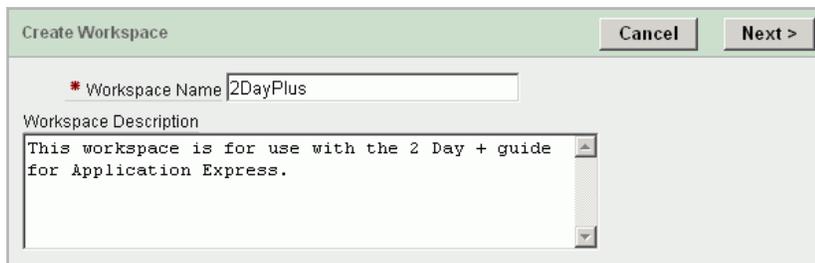
The Create Workspace Wizard appears.

4. For Identify Workspace, enter the following information:
 - a. Workspace Name - Enter a unique workspace name. This guide uses **2DayPlus** for the workspace name.

In general, you want to enter a workspace name that is significant to you. For example, you might enter your own name, your company name, or the name of the project or department to which your application pertains.

If you want to use the same name for both your workspace and schema, enter a workspace name that contains only alphabetic characters. Schema names are restricted to alphabetic characters.

- b. Description - Enter a workspace description.
 - c. Click **Next**.



5. For Identify Schema, enter the following information:
 - a. Re-use existing schema - Select **No** if you are creating your first workspace.

A **schema** is a logical container for database objects. In this step, you are creating the container for database objects you will add later.
 - b. Schema Name - Enter a schema name. This guide uses **TWODAYPLUS** for the schema name.

You must use only alphabetic characters in your schema name.
 - c. Schema Password - Enter a case-sensitive password.
 - d. Space Quota (MB) - Select at least 10 MB to accommodate the necessary space for creating the objects required for this guide.
 - e. Click **Next**.

6. For Identify Administrator, enter the following information:

- a. Administrator Username - Accept the default, **ADMIN**, or enter another user name to be used in Application Express.

You are creating an account for only one user, yourself as an administrator, at this time. To see instructions for creating additional users, see "[Creating Additional User Accounts](#)" on page 2-8.

- b. Administrator Password - Enter a case-sensitive password.

- c. Enter the remaining information, including your valid email address, and click **Next**.

The login credentials for accessing Oracle Application Express will be sent to the email address you enter here, if you have configured the email settings for your Application Express environment.

7. Confirm your selections and click **Create**.

Logging In to Your Local Instance

To log in to your local instance of Application Express, you must have this information:

- URL where you can access Application Express
- Workspace name you use to develop applications
- Username set up for you for this workspace within Application Express
- Password set up for you for this workspace within Application Express

If you set up your development environment, you have your login credentials. Otherwise, contact the person who created your user account to supply the information.

To log in to Oracle Application Express:

1. In a Web browser, go to the Oracle Application Express Login page. By default, Oracle Application Express installs to one of the following locations:

- If your setup uses the embedded PL/SQL gateway:

`http://hostname:port/apex`

- If your setup uses the Oracle HTTP Server (Apache) with `mod_plsql`:

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

For an explanation of the URLs, see "[Logging In to Administration Services](#)" on page 2-4.

The Login page appears.

2. Under Login, enter your login credentials.

3. Click **Login**.

Creating Additional User Accounts

As an administrator, you inherit all the privileges associated with the developer role. If you want to start developing the application shown in this guide, skip this section and go to "[Logging In to Your Local Instance](#)" on page 2-7.

However, you might want to create user accounts for other developers who will be sharing this workspace. Associating users with the workspace grants them access to all applications and scripts within that workspace. You can also create additional user accounts for workspace administrators.

To create user accounts:

1. Log in to the Workspace where you want to add users. See "[Logging In to the Hosted Demo Environment](#)" on page 2-3 or "[Logging In to Your Local Instance](#)" on page 2-7.

The Workspace home page appears.

2. From the Administration links list on the right, click **Manage Application Express Users**.
3. Under the Tasks list on the right, click either the **Create Developer** or **Create Workspace Administrator** link.

The Create User page appears.

4. Under Account Control:
 - Set Account Availability - Select **Unlocked**.
 - Require Change of Password On First Use - Select **No** if you do not want to force this user to change his or her password at first log in.
5. Under User Identification, enter the appropriate information:
 - a. User Name - Enter a user name for this end user.
 - b. Password and Confirm Password - Enter a case-sensitive password for this account.
 - c. Email Address - Enter the valid email address for this end user.
This email address must be valid so that users can receive the login credentials to log in to the application.
6. Under Developer Privileges:
 - a. Accessible Schemas (null for all) - Leave this blank to allow the end user to access all applications in the workspace, or enter a colon-delimited list of schemas to restrict the end user's access.
If a user does not have access to the schema that an application is built on, the user cannot access the application.
 - b. Default Schema - Accept the default, the schema you set up for this guide.
 - c. User is a developer - Accept the default.
 - d. User is a workspace administrator - Accept the default.
7. Under User Groups, you can select a user group.
You can use groups to restrict access to parts of an application. Groups are primarily useful when using Application Express Authentication.
8. Under Additional Attributes, you can enter additional user information.
9. Click **Create User** or **Create and Create Another**.

See also: "Managing Application Express Users" in *Oracle Database Application Express User's Guide*

Getting Started with Oracle Application Express

This section introduces you to areas of the Oracle Application Express user interface. It also shows you how to install the sample objects to use with this guide.

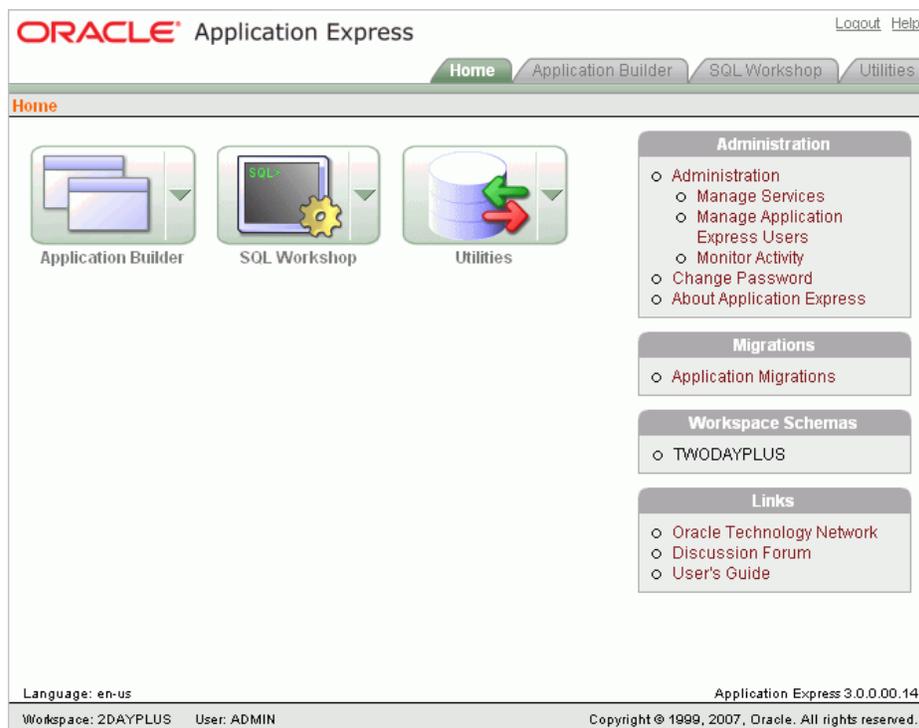
Before you begin, log in to either the host demo environment or your local instance of Oracle Application Express. For instructions, see "[Accessing Your Development Environment](#)" on page 2-1.

This section contains the following topics:

- [About the Workspace Home Page](#)
- [What Is Application Builder?](#)
- [Installing the Sample Objects](#)

About the Workspace Home Page

When you log in to Oracle Application Express, the Workspace home page appears.



Take a few minutes to explore the product. The following three large icons appear in the center of the page:

- **Application Builder.** Use Application Builder to assemble an HTML interface (or application) on top of database objects such as tables and procedures. Most exercises in this guide use Application Builder.
- **SQL Workshop.** Use the SQL Workshop to access tools to view and manage database objects. Click **SQL Workshop** to access the following database tools:
 - **Object Browser.** View, create, modify, browse, and drop database objects. Use the PL/SQL editor to edit and compile packages, procedures, functions, and triggers while taking advantage of error reporting.
 - **SQL Commands.** Run SQL commands and anonymous PL/SQL, scripts, and saved queries.
 - **SQL Scripts.** Create, edit, view, run, and delete script files. You can also upload and download scripts from your local file system.
 - **Query Builder.** Search and filter database objects, select objects and columns, create relationships between objects, view formatted query results, and save queries with little or no SQL knowledge, using Query Builder’s graphical user interface.
- **Utilities.** Import and export data from the database, generate DDL, view object reports, restore dropped database objects, and perform other tasks.

Note that your workspace and username appear in the lower left corner.

About the Administration List

An Administration list appears on the right side of the Workspace home page. Use the links to administer your application development environment.

If you have administrator or developer privileges, these links appear:

- **Administration.** Click this link to view a list of administrative tasks. If you are a developer, you have limited access to these features.
 - **Manage Services.** Click this link to manage session state, log files, preferences, and application models.
 - **Manage Application Express Users.** Click this link to manage Application Express user accounts as well as user groups.
 - **Monitor Activity.** Click this link to monitor page view and application changes.
- **Change Password.** Click this link to open a popup window where you can change your workspace password.
- **About Application Express.** Click this link to see version and configuration information for both Oracle Application Express and your database.

About the Migrations Link

Use the Migrations link to migrate a Microsoft Access application and generate an Oracle Application Express application from the retrieved objects.

About the Workspace Schemas List

The Workspace Schemas list displays the database schemas that are associated with, and therefore accessible to, this workspace.

About the Links List

The Links list contains links to resources to expand your knowledge of Oracle Application Express.



- **Oracle Technology Network** opens the Oracle Application Express section of Oracle Technology Network. Use this page to access additional information and resources about using Oracle Application Express.

Tip: Use this link to check for newer versions of Oracle Application Express, to download packaged applications you can use with Application Express, and to take advantage of sample code to accelerate your development process. For more information, see "[Next Steps](#)" on page 7-1.

- **Discussion Forum** opens the Oracle Application Express Discussion Forum. This is an excellent resource for research and finding answers to questions or answering questions from other users.
- **User's Guide** opens an HTML-based online Help system. You can also access online Help by clicking the **Help** link in the upper right corner of any page in Oracle Application Express.

What Is Application Builder?

You use the Application Builder component of Oracle Application Express to build your application. Through wizards or your direct input, you can assemble an HTML interface (or application) on top of database objects such as tables and procedures. Each application is a collection of pages linked together using tabs, buttons, or hypertext links.

A **page** is the basic building block of an application. Pages also contain user interface elements such as tabs, lists, buttons, items, and regions. To see the definition of each page belonging to your application, you use the Page Definition page.

The screenshot displays the Oracle APEX Page Designer interface in the Page Definition view. At the top, there is a search bar for 'Page 1', navigation buttons, and a 'View' dropdown set to 'Definition'. Action buttons for 'Run', 'Copy', 'Delete', and 'Create >' are visible. The right side shows 'Last Updated: 2 hours ago' and 'Page Comments: 0'. The main workspace is divided into three columns:

- Page Rendering:** Contains metadata for the page, including Page Name (Sample Application), Title (Oracle Sample Application), HTML Header, HTML Body, Help Text, Page Group, Template (Application default), Header Text, Footer Text, Build Option, Authorization (No), and Cached (No).
- Page Processing:** Lists logic controls such as Computations, Validations, Processes, and Branches.
- Shared Components:** Lists reusable components like Tabs (Tab Set: TS1 with Home, Customers, Products, Orders, Charts, Admin), Lists of Values, Breadcrumbs (Main Menu: No corresponding region), Lists (Tasks), Templates (Page: One Level Tabs, Region: Reports Region, Region: Sidebar Region, Report: Standard, Alternating Row Colors, List: Vertical Unordered List with Bullets), and Theme.

Below the Page Rendering section, there are sections for Regions, Buttons, and Items. The Regions section shows two display points: 'Page Template Body (2)' with items 'My Top Orders' and 'Report (Column 2)', and 'Region Position 03' with items 'Sample Application HTML' and 'Tasks List'. The Items section shows items for the 'My Quota' region, including 'P1 QUOTA' and 'P1 TOTAL SALES', both marked as 'Hidden'.

The Page Definition contains three main areas:

- **Page Rendering** lists user interface controls and logic that are executed when a page is rendered. Page rendering is the process of generating a page from the database.
- **Page Processing** lists logic controls (such as computations and processes) that are evaluated and executed when the page is processed.
- **Shared Components** lists components used by the current page that can also be referenced by other pages within your application.

Installing the Sample Objects

In Oracle Application Express, users log in to a workspace. You can think of each workspace as a shared work area that separates your objects, data, and applications into a virtual private database.

Before performing any tasks in this guide, you need to create the appropriate sample objects within your workspace. These sample objects are copies of the objects that are typically installed in two schemas:

- Human Resources (HR)

The HR schema contains information about the employees and the facilities where they work. Each employee has an identification number, email address, job identification code, salary, and manager. Employees are assigned to a department, and each department is associated with one location that has a full address, including the street name, postal code, city, state or province, and country code.

- Order Entry (OE)

The OE schema tracks product inventories and sales of a company's products, including the product identification number, the product name, the associated associates product category, product descriptions, the weight group (for shipping

purposes), the warranty periods, the suppliers, the availability status, and a minimum price.

To create the objects locally in your workspace, you need to import the *OEHR Sample Objects* application.

This section contains the following topics:

- [Downloading OEHR Sample Objects](#)
- [Importing the OEHR Sample Objects](#)
- [Viewing Your Database Objects](#)

Downloading OEHR Sample Objects

To import the *OEHR Sample Objects* application, you first need to download it from the Oracle Technology Network (OTN):

To download the *OEHR Sample Objects* application from OTN:

1. In your Web browser, go to:

http://www.oracle.com/technology/products/database/application_express/packaged_apps/oehr_sample_objects.zip

2. Save the `oehr_sample_objects.zip` file to your computer.
3. Unzip and extract the `oehr_sample_objects_installer.sql` file:
 - Microsoft Windows - Double-click the `oehr_sample_objects.zip` file
 - UNIX or Linux - Enter the following command:

```
$ unzip oeher_sample_objects.zip
```

Importing the OEHR Sample Objects

After you download and unzip the *OEHR Sample Objects* application, you need to import it into Application Express. During the import process, specify that you want to install both the application and the supporting objects. Installing the application creates the objects and sample data needed to complete the exercises in this guide.

To import and install the *OEHR Sample Objects* application:

1. Log in to Oracle Application Express.

For instructions, see "[Logging In to the Hosted Demo Environment](#)" on page 2-3 or "[Logging In to Your Local Instance](#)" on page 2-7.
2. On the Workspace home page, click **Application Builder**.

The Application Builder home page appears.
3. Click the **Import** button.
4. For Specify File, specify the following:
 - a. Import file - Click **Browse** and navigate to the `oehr_sample_objects_installer.sql` file.
 - b. File Type - Select **Application, Page, or Component Export**.
 - c. File Character Set - Select the correct character set.
 - d. Click **Next**.

Next, you need to install the imported file.

5. To install an imported file, click **Next**.
The Install Application Wizard appears.
6. In the Install Application Wizard, specify the following:
 - a. Parse As Schema - Select the schema you created when you set up your development environment.
 - b. Build Status - Select **Run and Build Application**.
 - c. Install As Application - Select **Auto Assign New Application ID**.
 - d. Click **Install**.
7. For Install Supporting Objects, select **Yes** and click **Next**.
8. Confirm your selections by clicking **Install**.
9. After the installation is completed, click the **Home** breadcrumb link at the top of the page.
The Application Builder home page appears.

Checking Your Workspace Storage Space

If you experience problems installing the *OEHR Sample Objects* application, verify the available space in your workspace. You may need to request additional storage space.

If you are a workspace administrator, you can:

- Determine if you need to request additional storage space. See "Viewing the Workspace Overview Report" in *Oracle Database Application Express User's Guide*.
- Request additional storage space. See "Requesting Additional Storage" in *Oracle Database Application Express User's Guide*.

Deleting the OEHR Sample Objects Application

Deleting the *OEHR Sample Objects* application and deinstalling the supporting objects completely removes all associated objects and sample data.

To delete the *OEHR Sample Objects* application:

1. Log in to Oracle Application Express.
2. On the Workspace home page, click **Application Builder**.
The Application Builder home page appears.
3. Click the **OEHR Sample Objects** icon.
4. On the Tasks list, click **Delete this Application**.
The Deinstall page appears.
5. To remove all associated objects and sample data, select **Remove Application Definition** and **Deinstall Supporting Objects**.
6. Click **Deinstall**.

Using HR Schema Instead of OEHR Sample Objects

If you are using a locally installed instance of Application Express release 2.2.1.1 or higher (not the hosted demo environment) and have the HR schema installed, you can perform the exercises in this guide directly against the HR schema.

To do so, you must associate the HR schema with your workspace instead of performing the steps described in this section to download and import the sample objects.

To associate the HR schema with your workspace:

1. From the Workspace home page, click **Manage Services** from the Administration link list on the right.
2. Click **Request Database Schema**.
3. For Identify Schema:
 - a. Select **Use an existing schema**.
 - b. Select **HR** from the Schema Name select list.
 - c. Click **Next**.
4. For Confirmation, click **Finish**.

This sends a request to your Application Express administrator to associate the schema with your workspace.

If your request is approved, you will receive an email notifying you that the association has been completed. Then, you can proceed with the exercises in this guide.

Note: The table names in the HR schema do not include the OEHR prefix (EMPLOYEES versus OEHR_EMPLOYEES). Because this guide outlines all the steps using the OEHR schema, you will need to adjust your selections and code accordingly.

Also, note that other users may be using the HR schema. Therefore, the objects or data within the objects may differ from that shown in this guide.

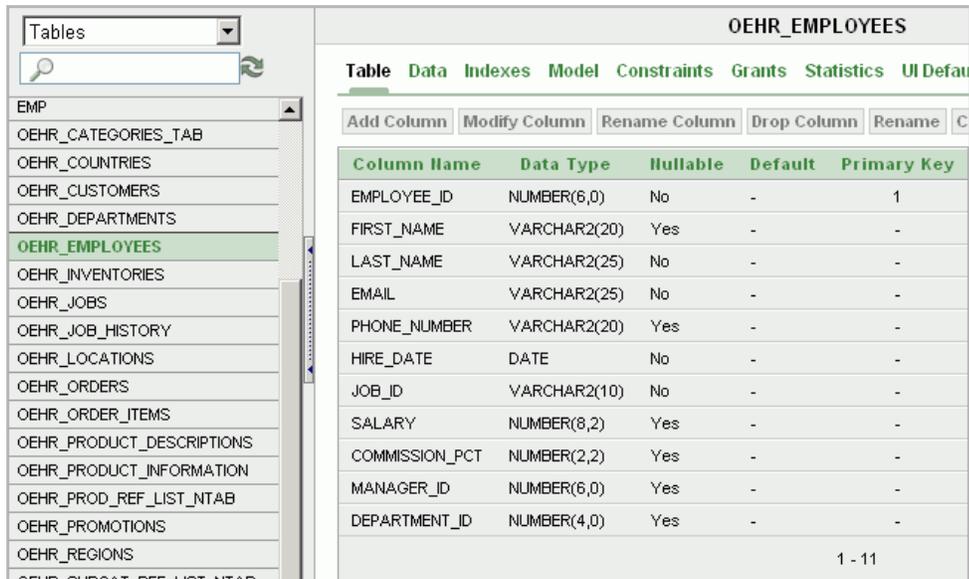
Viewing Your Database Objects

Review the objects you just created by going to Object Browser. Object Browser enables you to browse, create, and edit objects in your database.

To view the objects:

1. On the Workspace home page, click **SQL Workshop**.
2. Click **Object Browser**.

Object Browser appears.



Object Browser is divided into two sections:

- Object Selection pane displays on the left side of the Object Browser page and lists database objects of a selected type within the current schema.
- Detail pane displays to the right of the page and displays detailed information about a selected object.

3. From the list in the Object Selection pane on the left, select **Tables**.

The Detail pane lists the tables in your current schema.

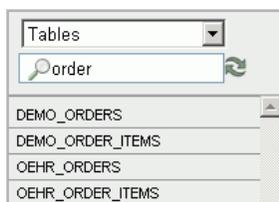
4. In the Object Selection pane, click **OEHR_EMPLOYEES** from the list.

The Detail pane shows details about the table.

5. Click the **Data** tab at the top of the Details pane.

The data in the OEHR_EMPLOYEES table appears. Note that other tabs show additional details about the object you select.

6. To search for an object name, enter a case-insensitive term in the Search field.



7. To view all objects, leave the Search field blank.

See also: "Managing Database Objects with Object Browser" in *Oracle Database Application Express User's Guide*

Building Your Application

In this tutorial, you create a Human Resources (HR) application for a fictitious company called *AnyCo Corp*. This section shows you how to build the application, modify it, and preview it at different points during the development process.

Before you begin this section:

- Read "[Getting Started with Oracle Application Express](#)" on page 3-1.
- Ensure you have installed the database objects as described in "[Installing the Sample Objects](#)" on page 3-4. This applies to both the hosted demo environment and local instance.

This section contains the following topics:

- [About the Application You Build in This Tutorial](#)
- [Creating the Initial Application](#)
- [Modifying the Departments Report](#)
- [Adding an Employees Report and Form](#)
- [Editing the Employees Report](#)
- [Displaying Items as Select Lists](#)
- [Adding a Link on the Home Page to the Employees Report](#)
- [Linking the Employees and Departments Reports](#)
- [Linking a Column Value to Another Page](#)
- [Adding a Conditional Department Details Report](#)
- [Adding Your Company Name](#)
- [Switching Themes to Change User Interface](#)

About the Application You Build in This Tutorial

This tutorial guides you through the development of a Human Resources (HR) application for a fictitious company called *AnyCo Corp*. The application enables users to view and modify employee information stored in the `OEHR_DEPARTMENTS` and `OEHR_EMPLOYEES` tables.

When building the application, you perform these steps:

1. Create an application that includes a Home page and a basic Departments report. See "[Creating the Initial Application](#)" on page 4-2.

2. Expand the report to pull in data from other tables. See ["Modifying the Departments Report"](#) on page 4-7.
3. Build an Employee form and report based on the OEHR_EMPLOYEES table. See ["Adding an Employees Report and Form"](#) on page 4-8.
4. Add calculated fields to the Employees report. See ["Editing the Employees Report"](#) on page 4-12.
5. Edit items on the Employees form to display as select lists (with lists of values). See ["Displaying Items as Select Lists"](#) on page 4-15.
6. Add a link on the Home page. See ["Adding a Link on the Home Page to the Employees Report"](#) on page 4-18.
7. Modify the Employees report to enable the user to select a department. See ["Linking the Employees and Departments Reports"](#) on page 4-19.
8. Add a link on the Departments report that navigates the user to the Employees report. See ["Linking a Column Value to Another Page"](#) on page 4-21.
9. Add a report as a region that displays department details. See ["Adding a Conditional Department Details Report"](#) on page 4-23.
10. Add your company name so that it appears on all pages in your application. See ["Adding Your Company Name"](#) on page 4-25.
11. Switch the theme for your application. See ["Switching Themes to Change User Interface"](#) on page 4-26.

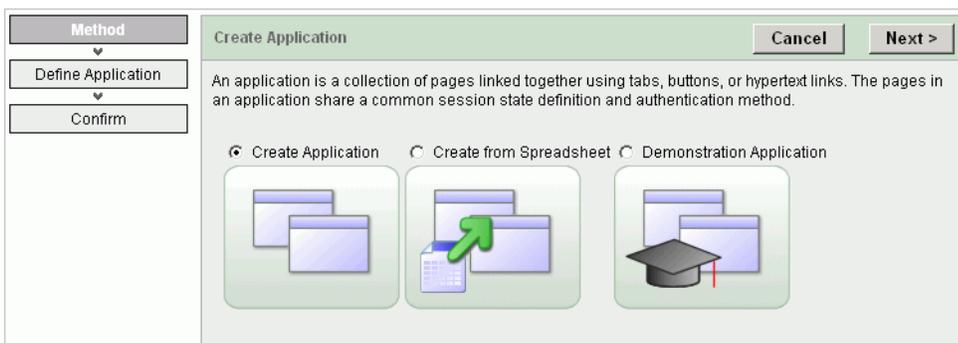
Creating the Initial Application

This first exercise guides you through creating your initial application. Using the Create Application Wizard, you create two pages as well as specify basic application functionality.

To create your initial application:

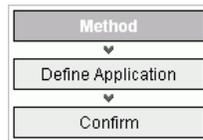
1. Log in to Application Express.
For instructions, see ["Logging In to the Hosted Demo Environment"](#) on page 2-3 or ["Logging In to Your Local Instance"](#) on page 2-7.
2. On the Workspace home page, click **Application Builder**.
3. Click the **Create** button.

The Create Application Wizard appears.



Note that each page within a wizard displays the title of the wizard (for example, *Create Application*). Each wizard page also displays a series of blocks on the left,

representing the sequence of steps. The highlighted block indicates the step you are performing.



To orient you, each step in these exercises generally begins with the block label. For example, the first step in the Create Application Wizard highlights the word *Method*. Therefore, the next step orients you by beginning with the words *For Method*.

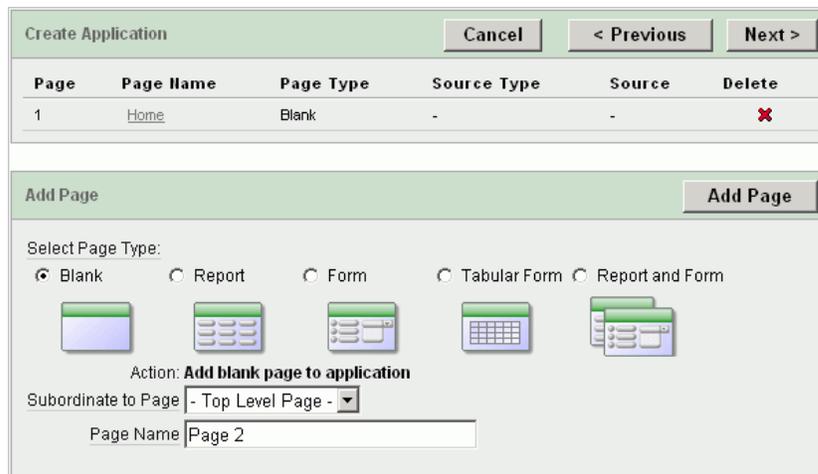
4. For Method, accept the default, **Create Application**, and click **Next**.
5. For Name:
 - a. Name - Enter AnyCo Corp.
 - b. Application - accept the default ID. The system provides a unique ID for each application you create in this workspace.
 - c. Create Application - Accept the default, **From scratch**.
 - d. Schema - Select the schema that contains the objects for this tutorial (for example, **TWODAYPLUS**).
 - e. Click **Next**.

Next, add a page to your application.

6. For Pages, specify the following in the Add Page section:
 - a. Select Page Type - Accept the default, **Blank**.

Tip: Explanatory information for each option appears on the right side of the page. This page-level help appears throughout the application.
 - b. Page Name - Enter Home.
 - c. Click **Add Page**.

The new page is listed in the top area. Also, note that the Add Page area appears so you can continue adding pages to your initial application.



Next, add a report page on the OEHR_DEPARTMENTS table.

7. In the Add Page section, specify the following:
 - a. Select Page Type - Select **Report**.
 - b. Subordinate to Page - Select **Home**.

This sets up the hierarchy among the pages in your application.
 - c. Page Source - Accept the default, **Table**.
 - d. Table Name - Select **OEHR_DEPARTMENTS**.

The list shows all tables and views in the schema associated with the application.
 - e. Include Analysis Pages - Do not select.

If selected, you are prompted for information about additional summary reports and charts you can add to this page.
 - f. Click **Add Page**.

Notice that the pages listed in the Create Application section reflect the hierarchy of the pages in your application.

Next, change the default page name, OEHR_DEPARTMENTS, to Departments.
 - g. Click the **OEHR_DEPARTMENTS** link.
 - h. Under Page Definition, change the Page Name to `Departments`.
 - i. Click **Apply Changes**.
 - j. In the Create Application section, click **Next**.

After adding your initial pages, define some application-level settings.
8. For Tabs, select **No Tabs** and click **Next**.
9. For Shared Components, accept the default, **No**, and click **Next**.
10. For Attributes, accept all the defaults and click **Next**.

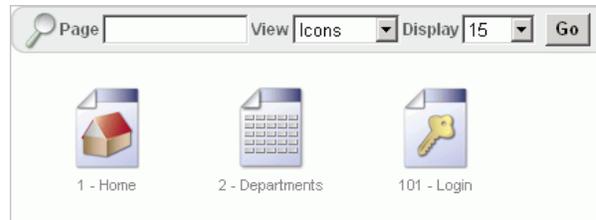
Note that Application Express is the default Authentication Scheme. The authentication scheme option enables you to control users' access to the application using Application Express authentication or another type of authentication.
11. For User Interface, select **Theme 18** and click **Next**.
12. For Confirm, verify the information and click **Create**.

The two pages you created, Home and Departments, appear as icons by default.

Note: To view the pages in a list instead of as icons, from the View list select **Details** and click **Go**. Your view setting is retained from session to session.

Because these steps use the default setting, switch back to Icons view before continuing.

Notice that Application Express adds a Login page automatically to your application.



Congratulations! You created your first application using Application Express. Next, you will preview the application to see the application the way it would appear to end users.

Previewing Your Application

You preview your application by running it. Running the application displays the rendered version of the application as end users would see it.

As you create new pages, you can view them by running the page individually or by running the entire application. When you run a page or application, the Application Express engine dynamically renders it into viewable HTML based on data stored in the database.

- To run the application, click the **Run Application** icon.



Run Application

- To run the page, click the **Run Page** icon.

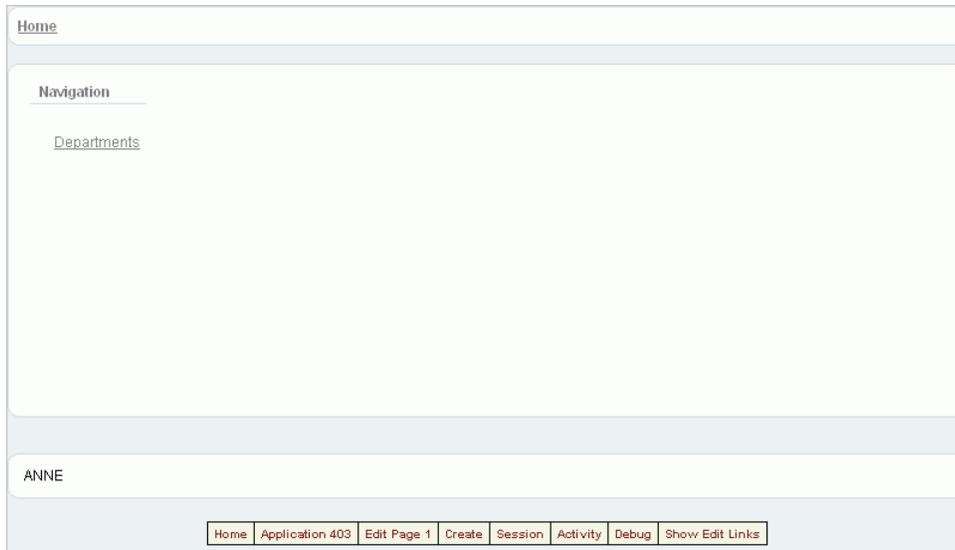


To preview your application:

1. On the Application home page, click **Run Application**.
2. On the Login page, enter your workspace username and password.

You can run the application using your Application Express login credentials because you chose Application Express Authentication when creating the application. For more information, see "Establishing User Identity Through Authentication" in *Oracle Database Application Express User's Guide*.

The Home page of your application appears.

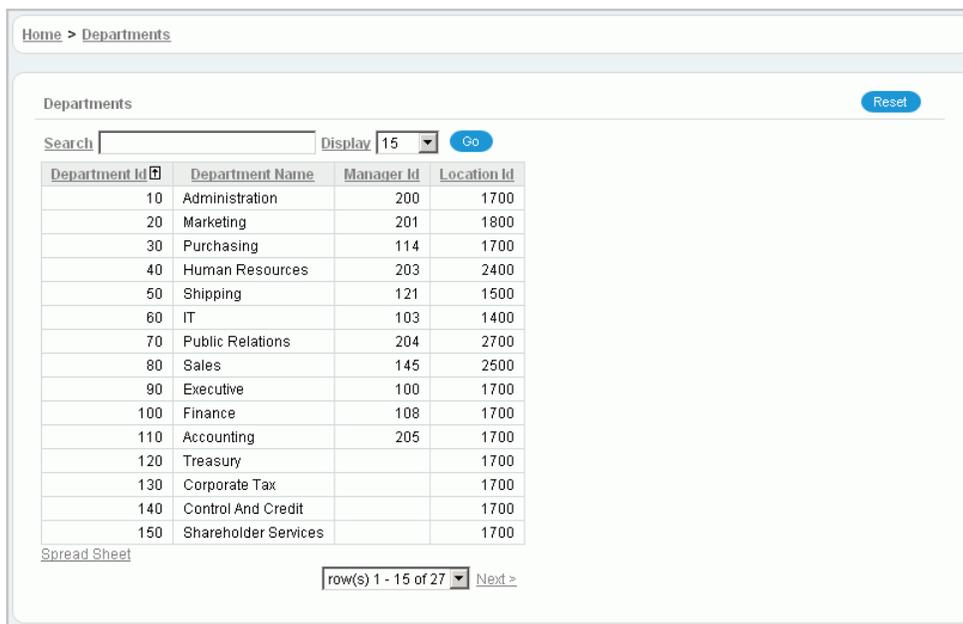


Notice that a link to the Departments page appears on the Home page because you set up that hierarchy.

Also notice the Developer toolbar at the bottom of the page. These links appear when you run an application within the development environment. The Developer toolbar offers a quick way to edit the current page; create a new page, region, or page control; view session state; or toggle in and out of Debug mode.

3. To continue previewing your application, click the **Departments** link on the Home page.

The Departments page appears.



Notice that Application Express includes several features that let you perform certain tasks quickly:

- Breadcrumbs - Display the hierarchy and path of the pages. Click a breadcrumb to move to a previous page.

- Sort - Click a column heading to sort the data.
- Search - Enter data to locate a record within the table. Search is *not* case sensitive.
- Display - Select the number of records you want to view on the page.
- Spread Sheet - Click the link to save the data to a CSV file.
- Next and Previous - Click the links to move quickly from one set of records to another.
- Row list - Select which set of records to view on the page.

Modifying the Departments Report

When you run the Create Application Wizard, the wizard creates forms and reports based on the selections you make. Behind the scenes, Application Express writes a query for you to extract the appropriate data from the database.

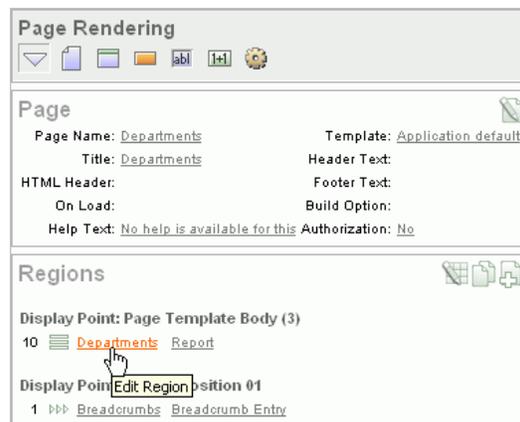
In this exercise, you modify the query for the Departments report to include information from the OEHR_EMPLOYEES table.

To modify the Departments report:

1. Click the **Edit Page 2** link on the Developer toolbar (at the bottom of the page).

The Page Definition for Page 2 appears. A **page** is the basic building block of an application. Pages contain user interface elements such as tabs, lists, buttons, items, and regions. To see the definition of each page belonging to your application, you use the Page Definition page. For more information, see "[What Is Application Builder?](#)" on page 3-3.

2. Under Page Rendering, locate the Regions section.



3. Click **Departments**.
4. Scroll down to Source, and replace the default Region Source script with the following:

```
SELECT d.department_id           "Department ID",
       d.department_name        "Department Name",
       count(e2.employee_id)    "Number of Employees",
       substr(e.first_name,1,1)||'. '|| e.last_name "Manager Name",
       c.country_name           "Location"
FROM   oeHR_departments d,
       oeHR_employees e,
       oeHR_locations l,
       oeHR_countries c,
```

```

oehr_employees e2
WHERE d.manager_id = e.employee_id
AND d.location_id = l.location_id
AND d.department_id = e2.department_id
AND l.country_id = c.country_id
AND instr(upper(d.department_name), upper(nvl(:P2_REPORT_SEARCH, d.department_
name))) > 0
GROUP BY d.department_id,
d.department_name,
substr(e.first_name,1,1)||'. '||e.last_name, c.country_name

```

5. Click **Apply Changes**.

Running the Page

To see how the page looks to end users, run the page. When you run a page, the Application Express engine dynamically renders and processes the page to display viewable HTML.

To run the page:

- Click the Run Page icon in the upper right corner.



The revised Departments report appears.

Home > Departments

Departments Reset

Search Display 15 Go

Department Id	Department Name	Number Of Employees	Manager Name	Location
110	Accounting	2	S. Higgins	United States of America
10	Administration	1	J. Whalen	United States of America
40	Human Resources	1	S. Mavris	United Kingdom
80	Sales	34	J. Russell	United Kingdom
90	Executive	3	S. King	United States of America
70	Public Relations	1	H. Baer	Germany
20	Marketing	2	M. Hartstein	Canada
100	Finance	6	N. Greenberg	United States of America
30	Purchasing	6	D. Raphaely	United States of America
60	IT	5	A. Hunold	United States of America
50	Shipping	45	A. Fripp	United States of America

[Spread Sheet](#) 1 - 11

Note that the revised report has three new columns: Number of Employees, Manager Name, and Location. Also note that your data might appear in a different order. You can ignore this difference and continue with the steps.

Adding an Employees Report and Form

In this exercise, you add a report to display employee information and a form to create, update, and delete employee information.

To add an employee report and form:

1. Click the **Application** link on the Developer toolbar (at the bottom of the page).
The Application home page appears.
2. Click **Create Page**.
3. For Page:
 - a. Select **Form** and click **Next**.
 - b. Select **Form on a Table with Report**.
This option creates two pages, a report and form, based on a single table or view.
 - c. Click **Next**.
4. For Identify Table or View:
 - a. For Table/View Owner, accept the default and click **Next**. This specifies the schema owner.
 - b. For Table/View Name, select **OEHR_EMPLOYEES** and click **Next**.
5. For Define Report Page, edit the following:
 - a. Page Name - Change to *Employees*.
 - b. Region Title - Change to *Employees*.
 - c. Breadcrumb - Select **Breadcrumb**.
The Create Breadcrumb Entry section appears.
 - d. For Select Parent Entry, click the **Home** link.
Home appears in the Parent Entry field.
 - e. Click **Next**.
6. For Define Report Page, accept the default, **Do not use tabs**, and click **Next**.
7. For Define Report Page, press the **Ctrl** key, select the following columns, and click **Next**:
 - EMPLOYEE_ID
 - FIRST_NAME
 - LAST_NAME
 - HIRE_DATE
 - SALARY
 - COMMISSION_PCTThe columns you selected will appear on the Report page.
8. For Define Report Page, accept the defaults and click **Next**.
Note that the default Edit Link image resembles a small piece of paper and pencil.
Next, define the page and region information for the form.
9. For Define Form Page, edit the following:
 - a. Page Name - Enter *Create/Edit Employee*.
 - b. Region Title - Enter *Create/Edit Employee*.

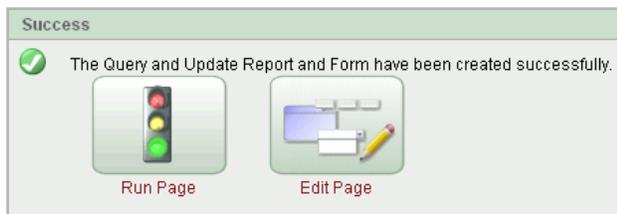
- c. Entry Name - Enter Create/Edit Employee.
- d. Click **Next**.
- 10. In Tab Options, accept the default, **Do not use tabs**, and click **Next**.
- 11. In Primary Key, accept the defaults and click **Next**.
- 12. In Define the source for the primary key columns, accept the default, **Existing trigger**, and click **Next**.
Your table, OEHR_EMPLOYEES, already has a trigger that populates the primary key.
- 13. In Select Column(s), select all columns and click **Next**.
These columns will appear in the Create/Edit Employee form.
- 14. In Identify Process Options, accept the defaults and click **Next**.
These selections enable users to add, update, and create employee records.
- 15. For Confirm, verify the information and click **Finish**.

Previewing the Pages

To preview the two pages you just created, run the current page. From the Employees report, you can then preview the form.

To preview the pages:

- 1. Click the **Run Page** icon.



The Employees report appears.

Home > Employees

Employees Create

Edit	First Name	Last Name	Hire Date	Salary	Commission Pct
	Steven	King	17-JUN-87	24000	
	Neena	Kochhar	21-SEP-89	17000	
	Lex	De Haan	13-JAN-93	17000	
	Alexander	Hunold	03-JAN-90	9000	
	Bruce	Ernst	21-MAY-91	6000	
	David	Austin	25-JUN-97	4800	
	Valli	Pataballa	05-FEB-98	4800	
	Diana	Lorentz	07-FEB-99	4200	
	Nancy	Greenberg	17-AUG-94	12000	
	Daniel	Faviet	16-AUG-94	9000	
	John	Chen	28-SEP-97	8200	
	Ismael	Sciarra	30-SEP-97	7700	
	Jose Manuel	Urman	07-MAR-98	7800	
	Luis	Popp	07-DEC-99	6900	
	Den	Raphaely	07-DEC-94	11000	

row(s) 1 - 15 of 107 Next >

Note the following about the Employees report:

- The Edit icon you selected appears in each row. You can click the Edit icon to update the employee record.
- The Create button appears in the upper right corner. You can click the Create button to add an employee to the underlying table.
- The Employees report includes the five columns you specified. When you selected the columns and applied the changes, Application Express created the appropriate SQL code in the background to produce this result.

Your data might appear in a different order. If so, ignore this difference and continue with these steps.

2. To review the form you also created, click the **Edit** icon in an Employee row. The Create/Edit Employee form appears.

Home > Employees > Create/Edit Employee

Create/Edit Employee Cancel Delete Apply Changes

First Name

Last Name

Email

Phone Number

Hire Date

Job Id

Salary

Commission Pct

Manager Id

Department Id

Note the following about the Create/Edit Employee form:

- The form includes Cancel, Delete, and Apply Changes buttons.
- The Hire Date field displays a calendar, which is included because the data type of the underlying column is DATE.

Editing the Employees Report

In this exercise, you run a SQL script to create a function that calculates employees' salaries. Then you add a column, Remuneration, to display that calculation in the Employees report.

Topics in this section include:

- [Create a Function](#)
- [Add a New Column](#)
- [Previewing the Page](#)
- [Changing the Column Format](#)

Create a Function

First, create a function to calculate employees' salaries.

To create a function:

1. Click the **Application** link on the Developer toolbar (at the bottom of the page).
The Application home page appears.
2. Click the **Home** breadcrumb link in the title bar.

Home > Application Builder > **Application 24955**

3. Click **SQL Workshop** and then **SQL Commands**.

SQL Commands provides a window where you can run PL/SQL against the database.

4. In the SQL editor, enter the following script:

```
CREATE OR REPLACE FUNCTION calc_remuneration(
  salary IN number, commission_pct IN number) RETURN NUMBER IS
BEGIN
  RETURN ((salary*12) + (salary * 12 * nvl(commission_pct,0)));
END;
/
```

5. Click **Run**.

The Results section displays this message:

```
Function created.
```

Add a New Column

Next, add a new column to display the results of the employees' salary calculations.

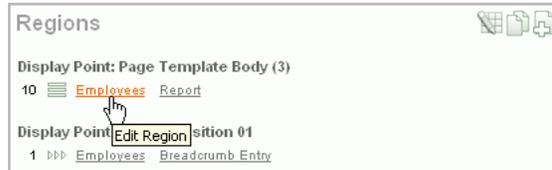
To add a new column:

1. Navigate to the Page Definition for page 3:
 - a. On the SQL Commands page, click the **Home** breadcrumb link.

- b. On the Workspace home page, click **Application Builder**.
- c. Select the **AnyCo Corp** application.
- d. Click **3 - Employees**.

The Page Definition for page 3, Employees, appears.

- 2. Under Regions, click the **Employees** link (next to Report).



The Region Definition appears.

- 3. Scroll down to Source, and replace the existing code with the following:

```
SELECT "EMPLOYEE_ID",
       "FIRST_NAME",
       "LAST_NAME",
       "HIRE_DATE",
       "SALARY",
       "COMMISSION_PCT",
       calc_remuneration(salary, commission_pct) REMUNERATION
FROM "#OWNER#"."OEHR_EMPLOYEES"
```

- 4. Click **Apply Changes**.

Previewing the Page

To preview the page, click the **Run Page** icon in the upper right corner. Notice the addition of the new column, Remuneration.

Home > Employees

Employees Create

Edit	First Name	Last Name	Hire Date	Salary	Commission Pct	Remuneration
	Steven	King	17-JUN-87	24000		288000
	Neena	Kochhar	21-SEP-89	17000		204000
	Lex	De Haan	13-JAN-93	17000		204000
	Alexander	Hunold	03-JAN-90	9000		108000
	Bruce	Ernst	21-MAY-91	6000		72000
	David	Austin	25-JUN-97	4800		57600
	Valli	Pataballa	05-FEB-98	4800		57600
	Diana	Lorentz	07-FEB-99	4200		50400
	Nancy	Greenberg	17-AUG-94	12000		144000
	Daniel	Faviet	16-AUG-94	9000		108000
	John	Chen	28-SEP-97	8200		98400
	Ismael	Sciarra	30-SEP-97	7700		92400
	Jose Manuel	Urman	07-MAR-98	7800		93600
	Luis	Popp	07-DEC-99	6900		82800
	Den	Raphaely	07-DEC-94	11000		132000

row(s) 1 - 15 of 107 Next >

Changing the Column Format

Next, change the format of the columns that contain numeric values.

To change the column format:

1. Click **Edit Page 3** on the Developer toolbar (at the bottom of the page).
The Page Definition appears.
2. Under Regions, click **Report**.
The Report Attributes page appears.
3. Locate the Column Attributes section.
Next, change the column and heading alignment for the appropriate columns.
4. For Column Alignment, select **right** for SALARY, COMMISSION_PCT, and REMUNERATION.
5. For Heading Alignment, select **center** for SALARY, COMMISSION_PCT, and REMUNERATION.
Next, edit the format of the value in the column.
6. To edit the format of SALARY:
 - a. Under Column Attributes, click the **Edit** icon next to SALARY.



The Column Attributes page appears.

- b. For Number/Date Format, select **\$5,234.10** from the list.
Notice that the appropriate format mask appears in the field.
 - c. Click **Apply Changes**.
7. Repeat the previous step for REMUNERATION.
8. Click the **Run Page** icon in the upper right corner to preview the page.
Notice that the numbers in the Salary and Remuneration columns now appear with the dollar sign, include commas and decimals, and are correctly aligned.

Edit	First Name	Last Name	Hire Date	Salary	Commission Pct	Remuneration
	Steven	King	17-JUN-87	\$24,000.00		\$288,000.00
	Neena	Kochhar	21-SEP-89	\$17,000.00		\$204,000.00
	Lex	De Haan	13-JAN-93	\$17,000.00		\$204,000.00
	Alexander	Hunold	03-JAN-90	\$9,000.00		\$108,000.00
	Bruce	Ernst	21-MAY-91	\$6,000.00		\$72,000.00
	David	Austin	25-JUN-97	\$4,800.00		\$57,600.00
	Valli	Pataballa	05-FEB-98	\$4,800.00		\$57,600.00
	Diana	Lorentz	07-FEB-99	\$4,200.00		\$50,400.00
	Nancy	Greenberg	17-AUG-94	\$12,000.00		\$144,000.00
	Daniel	Faviet	16-AUG-94	\$9,000.00		\$108,000.00
	John	Chen	28-SEP-97	\$8,200.00		\$98,400.00
	Ismael	Sciarra	30-SEP-97	\$7,700.00		\$92,400.00
	Jose Manuel	Urman	07-MAR-98	\$7,800.00		\$93,600.00
	Luis	Popp	07-DEC-99	\$6,900.00		\$82,800.00
	Den	Raphaely	07-DEC-94	\$11,000.00		\$132,000.00

Displaying Items as Select Lists

In this exercise, you edit fields (items) on the Create/Edit Employee page to display as select lists. Select lists are drop-down lists that contain lists of values that users can select to populate a field in the application.

Displaying items as select lists consists of two general steps:

1. Create the list of values (LOVs) for each item.
2. Edit the item to display as a select list and reference the appropriate list of values you created.

Topics in this section include:

- [Creating Lists of Values](#)
- [Editing Items to Display as Select Lists](#)

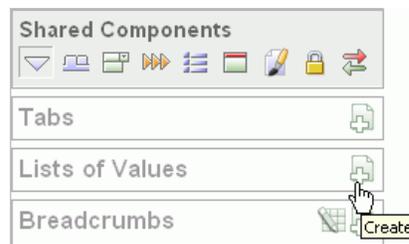
Creating Lists of Values

Next, you create lists of values for jobs, employees, and departments.

Creating a List of Values for Jobs

To create a list of values for jobs:

1. Click **Application** on the Developer toolbar (at the bottom of the page).
2. Click **4 - Create/Edit Employee**.
3. Under Shared Components, Lists of Values, click the **Create** icon. The **Create** icon resembles a plus sign (+) that overlaps a small page.



The Create List of Values Wizard appears.

4. For Source, accept the default, **From Scratch**, and click **Next**.
5. For Name and Type:
 - a. Name - Enter **JOBS**.
 - b. Type - Select **Dynamic**.
 - c. Click **Next**.
6. For Query or Static Values, replace the existing text with this:

```
SELECT job_title d, job_id v
FROM oehr_jobs
ORDER BY d
```

Note that the first column selected is the one displayed to the user (d), and the second is the value stored in or retrieved from the database (v).

7. Click **Create List of Values**.

Shared Components do not appear on this Page Definition until they are explicitly added to this page. You will do that later in this tutorial.

Creating a List of Values for Employees

To create a list of values for employees:

1. Under Lists of Values, click the **Create** icon.
2. For Source, accept the default, **From Scratch**, and click **Next**.
3. For Name and Type:
 - a. Name - Enter EMPLOYEES.
 - b. Type - Select **Dynamic**.
 - c. Click **Next**.
4. For Query or Static Values, replace the existing text with this:

```
SELECT first_name || ' ' || last_name d, employee_id v
FROM oehr_employees
ORDER BY last_name
```

5. Click **Create List of Values**.

Creating a List of Values for Departments

To create a list of values for departments:

1. Under Lists of Values, click the **Create** icon.
2. For Source, accept the default, **From Scratch**, and click **Next**.
3. For Name and Type:
 - a. Name - Enter DEPARTMENTS.
 - b. Type - Select **Dynamic**.
 - c. Click **Next**.
4. For Query or Static Values, replace the existing text with this:

```
SELECT department_name d, department_id v
FROM oehr_departments
ORDER BY d
```

5. Click **Create List of Values**.

Editing Items to Display as Select Lists

After you create the lists of values, you need to edit these items so that they display as select lists. By default, the items display as text fields.

You also rename the P4_JOB_ID, P4_MANAGER_ID, and P4_DEPARTMENT_ID items.

To edit the job item:

1. Under Page Rendering, scroll down to the Items section.



Notice that the Items section lists all the items for this page. Currently all but two items show the default type of Text field.

2. Click **P4_JOB_ID**.

The Edit Page Item page appears.

3. Under Name, select **Select List** from Display As.

4. Under Label, change Label to Job.

5. Scroll down to List of Values.

6. From Named LOV, select **JOBS**.

7. Click **Apply Changes**.

To edit the manager item:

1. Under Items, click **P4_MANAGER_ID**.

2. Under Name, select **Select List** from Display As.

3. Under Label, change Label to Manager.

4. Under List of Values:

a. Named LOV - Select **EMPLOYEES**.

b. Display Null - Select Yes.

c. Null display value - Enter the following:

- No Manager Assigned -

Note that you did not include this information for Jobs because the Job column is mandatory. For optional columns, such as Manager and Department, you need to specify that the select list display a null record. You can also provide meaningful text to display to the user when this situation occurs.

5. Click **Apply Changes**.

To edit the department item:

1. Under Items, select **P4_DEPARTMENT_ID**.

2. Under Name, select **Select List** from Display As.

3. Under Label, change Label to Department.

4. Under List of Values:

a. Named LOV - Select **DEPARTMENTS**.

Linking the Employees and Departments Reports

In this exercise, you link the Employees and Departments reports. To do this, you create a new region and new item on the Employees page to allow the user to select a department. You then modify the Employees report to only display the employees that belong to the selected department.

Topics in this section include:

- [Creating a Region](#)
- [Creating an Item](#)
- [Linking the Item to the Report](#)
- [Creating a Branch](#)

Creating a Region

First, create a region on the Employees page to hold the Department select list.

To create a region:

1. Navigate to the Page Definition for the Employees page, page 3.
2. In the Regions section, click the **Create** icon.
3. For Region:
 - a. Identify the type of region to add to this page - Accept the default, **HTML**, and click **Next**.
 - b. Select the type of HTML region container you wish to create - Accept the default, **HTML**, and click **Next**.
4. For Display Attributes:
 - a. Title - Enter *Department*.
 - b. Region Template - Select **No Template**.
This option adds a region *without* a region title.
 - c. Sequence - Change to 5 so that this region displays above Employees.
 - d. Accept the remaining defaults and click **Next**.
5. Click **Create Region**.

Note the Regions section now lists a Department region of type HTML.



Creating an Item

Next, create an item in the new Department regions. The item is a select list using the Department list of values.

To create an item:

1. Under Items, click the **Create** icon.

2. For Item Type:
 - a. Select Item Type - Select **Select List** and click **Next**.
 - b. Select List Control Type - Select **Select List with Submit** and click **Next**.
This option refreshes the page whenever a change is made to the select list.
3. For Display Position and Name:
 - a. Item Name - Change to P3_DEPARTMENT_ID.
 - b. Sequence - Accept the default, **10**.
 - c. Region - Select **Department**.
 - d. Click **Next**.
4. For List of Values:
 - a. Named LOV - Select **DEPARTMENTS**.
Departments appears in the select list because you created it as a shared component, which enables you to use it in other pages.
 - b. Display Null Option - Accept the default, **Yes**.
 - c. Null Text - Enter the following:
- No Deparment Assigned -
 - d. Null Value - Enter the following:
-1

Entering a null value makes it easier for you to write your query and to default your value to that entry. In this case, whenever a user selects - **No Department Assigned** -, the session state for this item is set to -1, and you can use that value in a query.
 - e. Click **Next**.
5. For Item Attributes, change the Label to `Department` and click **Next**.
6. For Source:
 - a. Default - Enter -1.
 - b. Accept the remaining defaults.
 - c. Click **Create Item**.

Linking the Item to the Report

At this point, you have created the item, but it is not linked to the report. To link it to the report, you need to edit the Region Source and add a `WHERE` clause.

To link the item to the report:

1. Under Regions, click the **Employees** link (next to Report).
2. Scroll down to Source.
3. In Region Source, add the following at the end of the existing code:

```
WHERE nvl(DEPARTMENT_ID, '-1') = nvl(:P3_DEPARTMENT_ID, '-1')
```

This `WHERE` clause changes the query to display only those employees that belong to the selected department.

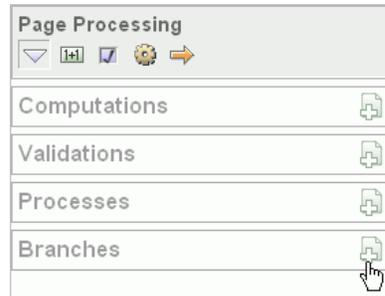
4. Click **Apply Changes**.

Creating a Branch

When a page is submitted, the branches defined for the page determine which page to display next. Because you want this page to redisplay when a user submits it, create a branch to the same page.

To create a branch:

1. Under Page Processing, Branches, click the **Create** icon.



2. For Point and Type, accept the defaults and click **Next**.
3. For Target:
 - a. Page - Enter 3.
 - b. Select the **reset pagination for this page** check box.

When you select the reset pagination option, the application displays the first set of data meeting a user's new query. Otherwise, if the user was on the third page of data and then selected another department, the user would see the third page of data for the new or revised query.

- c. Click **Next**.
4. Click **Create Branch**.
 5. Run the page.
 6. From the Department select list, select **Accounting**.

Note that the list displays only those employees belonging to that department.

 A screenshot of a software application showing a report for the 'Accounting' department. At the top, there is a dropdown menu labeled 'Department' with 'Accounting' selected. Below it, the word 'Employees' is displayed. A table with seven columns is shown: Edit, First Name, Last Name, Hire Date, Salary, Commission Pct, and Remuneration. The table contains two rows of data. At the bottom right of the table area, it says '1 - 2'.

Edit	First Name	Last Name	Hire Date	Salary	Commission Pct	Remuneration
	Shelley	Higgins	07-JUN-94	\$12,000.00		\$144,000.00
	William	Gietz	07-JUN-94	\$8,300.00		\$99,600.00

Linking a Column Value to Another Page

In this exercise, you add a link on the Departments report that will navigate the user to the Employees report. It will also set the focus to the selected department.

To make this change, you edit report attributes on the Departments report.

To change the column value to a link:

1. Navigate to the Page Definition for the Departments page, page 2.
2. Under Regions, click **Report**.
The Region Attributes page appears.
3. Locate the Column Attributes section.
4. From Column Alignment, select **right** for Number of Employees.
5. Click the **Edit** icon next to Number of Employees.
6. Scroll down to the Column Link section.
7. Under Column Link:
 - a. Link Text - Select **#Number of Employees#**.
 - b. Link Attributes - Enter the following:
alt="View Employees" title="View Employees"
 - c. Page - Enter 3.
 - d. Select the **Reset Pagination** check box.
 - e. Item 1, Name - Select **P3-DEPARTMENT_ID**.
 - f. Item 1, Value - Select **#Department ID#**.

The Column Link section shows all the options you selected.

In summary, these options enable the following behavior when the end user clicks the link:

- The end user is navigated to page 3, the Employees report.
- On the Employees report, the selected department is in focus.
- The user is returned to the first set of employee records when the user selects another department.

g. Click Apply Changes.

Note that in the Column Attributes section, the Number of Employees row contains a check mark in the Link column, reflecting the change you just made.

8. Run the page.

Note that end users can now drill down on the data in the Number of Employees column.

Number Of Employees
1
2
6
1
45
5
1
34
3
6
2

9. In the Number of Employees column, click a number to test the link.
Only those employees that belong to the department you selected appear in the Employees report.

Adding a Conditional Department Details Report

In this exercise, you add a report as a region that displays department details. You also create a condition so that the report displays department information only if you select a department. If you select **No Department Assigned**, the Department Details report does not appear.

Topics in this section include:

- [Creating the Report and Condition](#)
- [Turning Off Pagination](#)

Creating the Report and Condition

First, create the report and set it to conditionally display.

To create the report and condition:

1. Navigate to the Page Definition for page 3, Employees.
2. Under Regions, click the **Create** icon.
3. For Region:
 - a. Identify the type of region to add to this page - Select **Report** and click **Next**.
 - b. Report Implementation - Accept the default, **SQL Report**, and click **Next**.
4. For Display Attributes:
 - a. Title - Enter `Department Details`.
 - b. Region Template - Select **No Template**.
 - c. Sequence - Enter 7.
 - d. Accept the remaining defaults and click **Next**.
5. For Source:
 - a. Enter the following query:

```
SELECT count(e2.employee_id) "Number of Employees:",
       substr(e.first_name,1,1)||'. '|| e.last_name "Manager Name:",
       c.country_name "Location:"
```

```

FROM   oehr_departments d,
       oehr_employees e,
       oehr_locations l,
       oehr_countries c,
       oehr_employees e2
WHERE  d.manager_id    = e.employee_id
       AND d.location_id = l.location_id
       AND d.department_id = e2.department_id
       AND l.country_id = c.country_id
       AND nvl(d.department_id, '-1') = nvl(:P3_DEPARTMENT_ID, '-1')
GROUP BY substr(e.first_name,1,1)||'. '||e.last_name, c.country_name

```

- b. Report Template - Select **default: vertical report, look 1 (include null columns)**.

This selection displays the list vertically.

- c. Accept the remaining defaults and click **Next**.

Next, you create a condition that does not display department details when the user selects the **No Department Assigned** option.

- 6. For Conditional Display:

- a. Condition Type - Select **Value of Item in Expression 1 != Expression 2**.

Note the exclamation point (!) included after Expression 1 in the option to select.

- b. Expression 1 - Enter:

P3_DEPARTMENT_ID

- c. Expression 2 - Enter:

-1

- d. Click **Create Region**.

Turning Off Pagination

Next, turn off pagination for the Department Details report, because only one record (the department details report) displays at a time. If pagination is on, the region that displays the department details includes the information *row 1 - 1*.

To turn off pagination:

1. Under Regions, click **Report** (next to Department Details).
2. Scroll down to Layout and Pagination.
3. For Pagination Scheme, select - **No Pagination Selected**.
4. Click **Apply Changes**.
5. Run the page.
6. From the Department list, select **No Department Assigned**.

Department - No Department Assigned - ▾

Employees

Edit	First Name	Last Name	Hire Date	Salary	Commission Pct	Remuneration
	Kimberely	Grant	24-MAY-99	\$7,000.00	\$0.15	\$96,600.00

1 - 1

Employee Kimberely Grant appears. This employee is not currently assigned to a department. Therefore, no department details appear. The 1 - 1 you see on this form is part of the Employees report, not part of the Department Details region you just edited.

- From the Department list, select **Marketing**.

Department Marketing ▾

Number of Employees: 2

Manager Name: **M. Hartstein**

Location: **Canada**

Note the details under Department.

Adding Your Company Name

You can add a graphical logo or text to your application so that it will display on each page. Your page template determines the display location.

In this exercise, you add your company name to your application.

To add your company name to your application:

- Navigate to the Application home page. Click the **Application** link on the Developer toolbar (at the bottom of the page).
- Click **Shared Components**.
- Under Application, click **Definition**.
The Edit Application Definition page appears.
- Under Logo:
 - Logo Type - Select **Text**.
 - Logo - Enter **AnyCo Corp.**
 - Logo Attributes - Select **Black Text**.
- Click **Apply Changes**.
- Run the application.



The company name now appears on each page in your application.

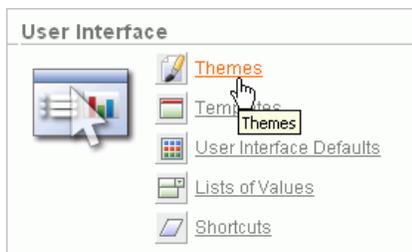
Switching Themes to Change User Interface

In this exercise, you switch the current theme to another one for your application. A **theme** is a collection of templates that defines the application user interface. Each theme contains templates for every type of application component and page control, including individual pages, regions, reports, lists, labels, menus, buttons, and list of values.

Application Express separates presentation (or user interface themes) from the application logic. You can design your application in one theme, change to another supplied theme, or create and use your own custom theme. By separating the application logic (such as queries, processes, and branches) from the HTML rendering, your application can take advantage of new designs and other technological advances without an application rewrite. Each theme provides a complete set of templates that accommodate every user interface pattern that may be needed in an application.

To switch the theme:

1. Click **Application** on the Developer toolbar (at the bottom of the page).
2. On the Application home page, click **Shared Components**.
3. Under User Interface, click **Themes**.



4. On the Themes page, click **Create**.
The Create Theme Wizard appears.
5. For Method, accept the default, **From the Repository**, and click **Next**.
6. For Identify Theme, select **Theme 11** and click **Next**.
7. For Confirm, click **Create**.
8. Click **Switch Theme**.
9. For Identify Theme, accept the default, **11. Round Green**, and click **Next**.
10. For Verify Compatibility, review the information, accept the defaults, and click **Next**.

The wizard verifies that corresponding templates exist in the new theme for all templates used in your current application. If a template is missing, it warns you with a message in the Status column. For this tutorial, you can ignore this message because Application Express maps missing region templates to existing ones.

11. For Confirm Switch, click **Switch Theme**.
12. Run the page.

ANNE : [Logout](#) AnyCo Corp

Home > Employees

Department: -- No Department Assigned --

Employees Create

Edit	First Name	Last Name	Hire Date	Salary	Commission Pct	Remuneration
	Kimberely	Grant	24-MAY-99	\$7,000.00	.15	\$96,600.00

1 - 1

The new color scheme and display layouts are changed in all your pages.

About Deploying Your Application

This section describes basic information about deploying your Oracle Application Express application. It also shows you how to create end users and to determine the URL of your application.

This section contains the following topics:

- [Overview of Deploying Your Application](#)
- [Creating End Users](#)
- [About Publishing the Application URL](#)

Overview of Deploying Your Application

After building your application in your development environment, you need deploy it so that end users can begin using it. Deploying involves the following steps:

1. Collect your supporting object definitions (CREATE object statements, sample data, images, files, and so on). Review the Database Dependencies report to determine which supporting objects to move. See "Viewing Application Reports" in *Oracle Database Application Express User's Guide*.
2. Define your supporting objects. This includes the object definitions you collected in the previous step as well as other supporting objects, such as messages and prerequisites.
3. Export the application with its supporting objects.
4. Import and install the exported files.

Using Application Express greatly simplifies the deployment process. It enables you to migrate the application definition, associated files, and all supporting objects in just a few steps.

See also: "Deploying an Application" in *Oracle Database Application Express User's Guide*.

Creating End Users

After moving your application to a production environment, you need to create user accounts within Oracle Application Express for all your end users.

To create end user accounts:

1. Navigate to the Workspace home page.

2. From the Administration links list on the right, click **Manage Application Express Users**.
3. Under the Tasks list on the right, click the **Create End User** link.

The Create User page appears.

4. Under Account Control:
 - Set Account Availability - Select **Unlocked**.
 - Require Change of Password On First Use - Select **No** if you do not want to force this user to change his or her password at first log in.
5. Under User Identification, enter the appropriate information:
 - a. User Name - Enter a user name for this end user.
 - b. Password and Confirm Password - Enter a case-sensitive password for this account.
 - c. Email Address - Enter the valid email address for this end user.
6. Under Developer Privileges:
 - a. Accessible Schemas (null for all) - Leave this blank to allow the end user to access all applications in the workspace, or enter a colon-delimited list of schemas to restrict the end user's access.

If a user does not have access to the schema that an application is built on, the user cannot access the application.
 - b. Default Schema - Accept the default value, that is, the schema you set up for this guide.
 - c. User is a developer - Accept the default, **No**.
 - d. User is a workspace administrator - Accept the default, **No**.

Selecting No limits the user to only accessing and using the application, not modifying the application itself.
7. Under User Groups, you can select a user group.

You can use groups to restrict access to various parts of an application. Groups are primarily useful when using Application Express Authentication.

8. Under Additional Attributes, you can enter additional user information.
9. Click **Create User** or **Create and Create Another**.

See also: "Managing Application Express Users" in *Oracle Database Application Express User's Guide*

About Publishing the Application URL

After deploying your application, you need to publish its URL so end users know how to access it.

To determine the URL:

1. Log in to Application Express on the production environment.
2. Select the application.
3. On the Application home page, position the mouse over the **Run Application** icon.
4. Note the URL that displays in the status bar at the bottom of the page.

For example:

```
http://apex.oracle.com/pls/apex/f?p=11563:1:3397731373043366363
```

Where:

- `apex.oracle.com` is the URL of the server.
- `pls` is the indicator to use the `mod_plsql`.
- `apex` is the database access descriptor (DAD) name. The DAD describes how Oracle HTTP Server connects to the database server so that it can fulfill an HTTP request. The default value is `apex`.
- `f?p=` is a prefix used by Oracle Application Express.
- `11563` is the application being called.
- `1` is the page within the application to be displayed.
- `3397731373043366363` is the session number, which is unique for every user's access to the application. Do not include session numbers as a part of the URL communicated to end users.

To run this example application, you would go to this URL:

```
http://apex.oracle.com/pls/apex/f?p=11563:1
```

See also: "Deploying an Application" in *Oracle Database Application Express User's Guide*

About Globalization

This section describes some basic information about globalization. It also leads you through the steps to specify how the application will determine global identification.

This section contains the following topics:

- [About Language Identification and Rendering](#)
- [Specifying the Method for Global Identification](#)

About Language Identification and Rendering

You can develop applications in Application Builder that run concurrently in different languages. This feature enables different users to view the application in their own language and data in the appropriate formats.

When rendering a page in the application, Oracle Application Express first determines the language for an application based on the method you specified. Then, the Application Express engine alters the session language and territory settings for a specific page request. It then looks for a translated application in the appropriate language. If the Application Express engine finds that language, it renders the application using that definition. Otherwise, it renders the application in the base (or primary) application language.

Even if your application is not translated, the language display determines the format for displaying data so that end users view numbers, dates, and currency in the appropriate formats.

Specifying the Method for Global Identification

As part of the application definition settings, you can specify how the application determines which language and formats to display. You can base it on the user's browser language preference or restrict it to the language you specify.

To specify the method for determining global identification:

1. Click **Application Builder** and then select the application.
2. Click **Shared Components**.
3. Under Globalization, click **Edit Attributes**.
4. Under Globalization, specify the following:
 - a. **Application Primary Language** - Select the language you used when developing the application.

- b. Application Language Derived From - Select **Browser (use browser language preference)**.

This option enables users to view the application in the language specified in their browsers.

- c. Automatic CSV Encoding - Select **Yes** or **No**.

Automatic CSV Encoding controls the encoding of all comma-delimited (CSV) report output in an application. If Automatic CSV Encoding is set to Yes, CSV report output will be properly converted to a character set compatible with localized desktop applications. The character set for the CSV encoding is determined by the Application Language Derived From setting.

For example, the end user whose browser setting is German (de) will see these changes on the Employees page of AnyCo Corp:

- The euro currency symbol appears for the amounts in the Salary and Remuneration columns.
- The amounts reflect the formatting used in Germany (commas and decimals).
- The Hire Date reflects the date format used in Germany.

Employees						
Edit	First Name	Last Name	Hire Date	Salary	Commission Pct	Remuneration
	Matthew	Weiss	18.07.96	€8.000,00		€96.000,00
	Adam	Fripp	10.04.97	€8.200,00		€98.400,00
	Payam	Kaufling	01.05.95	€7.900,00		€94.800,00
	Shanta	Vollman	10.10.97	€6.500,00		€78.000,00

Note that the application fields are not yet translated. For instructions on translating your application, see "Managing Application Globalization" in *Oracle Database Application Express User's Guide*.

Next Steps

Now that you have completed this guide, you are ready to take advantage of other resources to expand your knowledge of Oracle Application Express and boost your productivity. This section describes those resources.

This section contains the following topics:

- [Downloading Public Packaged Applications and Sample Code](#)
- [Additional Resources](#)

Downloading Public Packaged Applications and Sample Code

If you are using Oracle Application Express 2.2 or higher, you can download packaged applications and sample code from the Oracle Application Express Web site. Packaged applications are fully functional applications that you can view, use, and customize. Sample code is provided as packaged applications that contain code examples to explain a solution.

To download public packaged applications and sample code:

1. In a Web browser, go to the following Web sites:

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

2. Scroll down to review the available applications or code.
3. Click the link for the file you want to download, and save the file to your computer.
4. Unzip the file.
5. Log in to the workspace in Oracle Application Express where you want to use the packaged application or code.
6. Import and install the application.

Follow the same steps you performed when installing the sample objects for this guide. See "[Importing the OEHR Sample Objects](#)" on page 3-5.

Additional Resources

To continue learning about Oracle Application Express, review these additional resources designed for Application Express users.

Advanced Tutorials

This guide provides exercises to expand your understanding of Oracle Application Express. See *Oracle Database Application Express Advanced Tutorials*.

Training Courses

You can attend training courses for Oracle Application Express.

To review the training courses:

1. In a Web browser, go to the Oracle Application Express Web site:
http://www.oracle.com/technology/products/database/application_express/index.html
2. Under More Information, click the **Oracle University Training** link.

Oracle Technology Network

Oracle Technology Network (OTN) is a central Web site for Application Express resources and information. In addition to downloading the latest product version, sample code, and packaged applications, the OTN site includes:

- Discussion forum, where you can post questions and search for solutions
- How-to documents, which are technical notes written by subject matter experts
- Quick tour of the product
- Oracle by Example provides step-by-step tutorials which demonstrate common tasks
- News and magazine articles related to Application Express

To access OTN for Oracle Application Express:

1. Log in to Oracle Application Express.
2. On the Workspace home page, click **Oracle Technology Network** or **Discussion Forum** in the Links section on the right side of the page.

Note: If you are not currently using Application Express, you can go directly to this OTN Web site:
http://www.oracle.com/technology/products/database/application_express/index.html

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