## Contents

Preface ........................................................................................................................................................................ v  

  Topic Overview .......................................................................................................................................................... v  
  Audience ................................................................................................................................................................. vi  
  Documentation Accessibility ...................................................................................................................................... vi  
  Related Documents ................................................................................................................................................ vii  
  Conventions .............................................................................................................................................................. viii  

1 Introducing Oracle Application Express  
  About Oracle Application Express .......................................................................................................................... 1-1  
  Understanding Oracle Application Express Architecture ......................................................................................... 1-1  
  About the Oracle Application Express Environment .............................................................................................. 1-2  
  About Workspaces ..................................................................................................................................................... 1-3  
  About Oracle Application Express User Roles .......................................................................................................... 1-3  
  Overview of the Application You Build ................................................................................................................... 1-4

2 Accessing Your Development Environment  
  Before You Begin ....................................................................................................................................................... 2-1  
  Accessing the Hosted Demo Environment .................................................................................................................. 2-2  
  Logging In to the Hosted Demo Environment .......................................................................................................... 2-3  
  Setting Up Your Own Local Environment ................................................................................................................ 2-3  
  Logging In to Administration Services ...................................................................................................................... 2-4  
  Creating a Workspace .................................................................................................................................................. 2-5  
  Logging In to Your Local Instance ............................................................................................................................ 2-7  
  Creating Additional User Accounts ................................................................................................................................ 2-8

3 Getting Started with Oracle Application Express  
  About the Workspace Home Page .......................................................................................................................... 3-1  
  What Is Application Builder? ................................................................................................................................... 3-3  
  Installing the Sample Objects ................................................................................................................................... 3-4  
    Downloading OEHR Sample Objects ....................................................................................................................... 3-5  
    Importing the OEHR Sample Objects ..................................................................................................................... 3-5  
    Checking Your Workspace Storage Space .............................................................................................................. 3-6  
    Deleting the OEHR Sample Objects Application ................................................................................................. 3-6  
    Using HR Schema Instead of OEHR Sample Objects ............................................................................................ 3-7  
    Viewing Your Database Objects ................................................................................................................................ 3-7
4 Building Your Application

About the Application You Build in This Tutorial .......................................................... 4-1
Creating the Initial Application ...................................................................................... 4-2
  Previewing Your Application ...................................................................................... 4-5
Modifying the Departments Report .............................................................................. 4-7
  Running the Page ......................................................................................................... 4-8
Adding an Employees Report and Form ...................................................................... 4-9
  Previewing the Pages .................................................................................................... 4-10
Editing the Employees Report ...................................................................................... 4-12
  Create a Function ......................................................................................................... 4-12
  Add a Column .............................................................................................................. 4-13
  Previewing the Page ..................................................................................................... 4-13
  Changing the Column Format ..................................................................................... 4-14
Displaying Items as Select Lists .................................................................................. 4-15
  Creating Lists of Values .............................................................................................. 4-15
    Creating a List of Values for Jobs ............................................................................ 4-15
    Creating a List of Values for Employees ................................................................ 4-16
    Creating a List of Values for Departments ............................................................ 4-16
  Editing Items to Display as Select Lists ................................................................... 4-17
Adding a Link on the Home Page to the Employees Report ......................................... 4-19
Linking the Employees and Departments Reports ...................................................... 4-19
  Creating a Region ........................................................................................................ 4-19
  Creating an Item .......................................................................................................... 4-20
  Linking the Item to the Report ................................................................................... 4-21
  Creating a Branch ....................................................................................................... 4-21
Linking a Column Value to Another Page .................................................................. 4-22
Adding a Conditional Department Details Report ..................................................... 4-24
  Creating the Report and Condition ......................................................................... 4-24
  Turning Off Pagination .............................................................................................. 4-25
Adding Your Company Name ...................................................................................... 4-26
Switching Themes to Change the User Interface ......................................................... 4-27

5 About Deploying Your Application

Overview of Deploying Your Application ................................................................... 5-1
Creating End Users ........................................................................................................ 5-1
About Publishing the Application URL .......................................................................... 5-3

6 About Globalization

About Language Identification and Rendering .............................................................. 6-1
Specifying the Method for Global Identification .......................................................... 6-1

7 Next Steps

Downloading Public Packaged Applications and Sample Code .................................. 7-1
Additional Resources .................................................................................................... 7-1
Oracle 2 Day + Application Express Developer’s Guide introduces you to application development using Oracle Application Express. This guide shows you how to set up 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.

Through a series of exercises, you become familiar with the Oracle 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:

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing Oracle Application Express</td>
<td>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.</td>
</tr>
<tr>
<td>Accessing Your Development Environment</td>
<td>Leads you through the steps to access a development environment for your use.</td>
</tr>
<tr>
<td>Getting Started with Oracle Application Express</td>
<td>Introduces you to areas of the user interface. It also leads you through installing the sample objects to use with this guide.</td>
</tr>
<tr>
<td>Building Your Application</td>
<td>Leads you through the steps for building an application, modifying it, and previewing it at different points during the development process.</td>
</tr>
<tr>
<td>About Deploying Your Application</td>
<td>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.</td>
</tr>
</tbody>
</table>
Audience

*Oracle 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 Oracle Application Express is running.

**Documentation Accessibility**

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

**Accessibility of Code Examples in Documentation**

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

**Accessibility of Links to External Web Sites in Documentation**

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

**TTY Access to Oracle Support Services**

To reach AT&T Customer Assistants, dial 711 or 1.800.855.2880. An AT&T Customer Assistant will relay information between the customer and Oracle Support Services at 1.800.223.1711. Complete instructions for using the AT&T relay services are available at [http://www.consumer.att.com/relay/tty/standard2.html](http://www.consumer.att.com/relay/tty/standard2.html). After the AT&T Customer Assistant contacts Oracle Support Services, an Oracle Support Services engineer will handle technical issues and provide customer support according to the Oracle service request process.
Related Documents

For more information, see these Oracle resources:

- **Oracle Application Express Installation Guide**
- **Oracle Application Express Release Notes**
- **Oracle Application Express Application Builder User’s Guide**
- **Oracle Application Express Advanced Tutorials**
- **Oracle Application Express SQL Workshop and Utilities Guide**
- **Oracle Application Express API Reference**
- **Oracle Application Express Migration Guide**
- **Oracle Application Express Administration Guide**
- **Oracle Database Concepts**
- **Oracle Database Advanced Application Developer’s Guide**
- **Oracle Database Administrator’s Guide**
- **Oracle Database SQL Language Reference**
- **SQL*Plus User’s Guide and Reference**

For additional documentation available on Oracle’s Technology Network, visit the Oracle Application Express Web site located at

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

For additional application examples, visit the Oracle by Examples (OBEs) Application Express page, located on Oracle’s Technology Network. The OBEs provide step-by-step examples with screenshots on how to perform various tasks within Application Express.


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

http://oraclestore.oracle.com/

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

The following text conventions are used in this document:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>boldface</td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td>italic</td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td>monospace</td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.</td>
</tr>
</tbody>
</table>
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 Oracle 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 Application Express Application Builder 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 run 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 Oracle Application Express. It does not use a dedicated database connection. Instead, each
request is made through a separate 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 Oracle Database 11.1 require Oracle HTTP Server (Apache) with `mod_plsql`. The following illustration shows that architecture.

- With Oracle Database 11.1 or later 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 Oracle 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 are 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.
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.
2

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 Oracle Application Express.
  
  Using the demo environment is the fastest way to access a development environment. You request a workspace from an Oracle 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 Oracle 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 Oracle 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 later
- Firefox 1.0 or later

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 generates an email with your login credentials and sends 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.

An initial email containing a link is sent to you. Click the link to complete the workspace provisioning process. This step verifies that your email address is valid before approving a workspace. After that, an email with your login credentials is sent to you. Use those credentials to log in to the hosted demo environment and begin using Oracle 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 must perform include:

1. Log in to 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 Oracle Application Express. However, when you want to set up your development environment to accommodate your real-life development needs, review “Oracle Application Express Hosted Instance Administration” in *Oracle Application Express Administration Guide*.

### Logging In to Administration Services

To set up your local development environment, you first must 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. Depending on which setup you are using, Oracle Application Express is installed to one of these 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 Application Express Application Builder 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 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, 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 add later in this tutorial.
   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 Oracle Application Express.
      You are creating an account for only one user, yourself as an administrator. 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 are sent to the email address you enter here, if you have configured the email settings for your Oracle Application Express environment.

7. Confirm your selections and click Create.

Logging In to Your Local Instance
To log in to your local instance of Oracle Application Express, you must have this information:
   ■ URL where you can access Oracle Application Express
   ■ Workspace name you use to develop applications
   ■ Username set up for you for this workspace within Oracle Application Express
   ■ Password set up for you for this workspace within Oracle 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. Depending on your setup, Oracle Application Express installs to one of these locations:
Creating Additional User Accounts

- 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 share 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 Application Express Administration Guide
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 and 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.
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 linked pages 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.

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 Oracle 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.
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 must 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, 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**

**Tip:** In order to successfully import the objects associated with the OEHR Sample Objects application, your Oracle database must include Oracle Spatial. If your database instance does not include Oracle Spatial, you can install it using Database Configuration Assistant. To learn more, see the Oracle Application Express Installation Guide for your operating environment.

### Downloading OEHR Sample Objects

To import the OEHR Sample Objects application, you must 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/
   ```

2. Click **Packaged Applications**.

3. Click **OEHR Sample Objects**.

4. Download and save the `oehr_sample_objects.zip` file to your computer.

5. 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 oehr_sample_objects.zip
     ```

### Importing the OEHR Sample Objects

After you download and unzip the OEHR Sample Objects application, import it into Oracle Application Express. During the import process, specify installation of 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 must 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. Parsing 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. If you do not have enough space, request additional storage space.

If you are a workspace administrator, you can:

- Determine if you have enough storage space. See "Viewing the Workspace Overview Report" in Oracle Application Express Administration Guide.
- Request additional storage space. See "Requesting Additional Storage" in Oracle Application Express Administration 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 Oracle Application Express release 2.2.1.1 or later (not a hosted demo environment such as [http://apex.oracle.com](http://apex.oracle.com)) 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 "Importing the OEHR Sample Objects" on page 3-5.

**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 must 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:
Installing the Sample Objects

- 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.

   ![Search Field](image)

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

   **See also:** "Managing Database Objects with Object Browser" in Oracle Application Express SQL Workshop and Utilities Guide
Installing the Sample Objects
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 the 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.


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.


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 4-22.


10. Add your company name so that it appears on all pages in your application. See "Adding Your Company Name" on page 4-26.

11. Switch the theme for your application. See "Switching Themes to Change the User Interface" on page 4-27.

Creating the Initial Application

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

To create your initial 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.

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.

<table>
<thead>
<tr>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define Application</td>
</tr>
<tr>
<td>Confirm</td>
</tr>
</tbody>
</table>

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 Home page is now 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 (1)**.
      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. Implementation - Select **Classic**.
   f. Include Analysis Pages - Leave blank.
      If selected, you are prompted for information about additional summary
      reports and charts you can add to this page.
   g. 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.

    h. Click the **OEHR_DEPARTMENTS** link.
   i. Under Page Definition, change the Page Name to **Departments**.
   j. Click **Apply Changes**.
   k. 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 Oracle Application Express adds a Login page automatically to your application.

Congratulations! You created your first application using Oracle Application Express. Next, 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 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.
- 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 Application Express Application Builder 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 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 Oracle 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:

   ```sql
   SELECT d.department_id AS Department_ID,
          d.department_name AS Department_Name,
          count(e2.employee_id) AS Number_of_Employees,
          substr(e.first_name,1,1)||'. '|| e.last_name AS Manager_Name,
          c.country_name AS 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.
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, make these changes:
   a. Implementation - Select Classic.
   b. Page Name - Change to Employees.
   c. Region Title - Change to Employees.
   d. Breadcrumb - Select Breadcrumb.

Note that the revised report has three additional 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.
The Create Breadcrumb Entry section appears.

ea. For Select Parent Entry, click the **Home** link.
   Home appears in the Parent Entry field.

f. 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_PCT

   The columns you selected 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 Primary Key, accept the defaults and click **Next**.

11. 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.

12. In Select Column(s), select all columns and click **Next**.

    These columns now appear in the Create/Edit Employee form.

13. In Identify Process Options, accept the defaults and click **Next**.

    These selections enable users to add, update, and create employee records.

14. 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.

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Hire Date</th>
<th>Salary</th>
<th>Commission Pct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steven</td>
<td>King</td>
<td>17-JUN-87</td>
<td>24000</td>
<td></td>
</tr>
<tr>
<td>Neena</td>
<td>Kochhar</td>
<td>21-SEP-89</td>
<td>17000</td>
<td></td>
</tr>
<tr>
<td>Lax</td>
<td>DeHesain</td>
<td>3-JAN-93</td>
<td>17500</td>
<td></td>
</tr>
<tr>
<td>Alexander</td>
<td>Hussaid</td>
<td>03-JAN-90</td>
<td>5900</td>
<td></td>
</tr>
<tr>
<td>Bruce</td>
<td>Ernst</td>
<td>21-MAY-91</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>David</td>
<td>Austin</td>
<td>25-JUN-97</td>
<td>4800</td>
<td></td>
</tr>
<tr>
<td>Voili</td>
<td>Palaballa</td>
<td>05-FEB-99</td>
<td>4800</td>
<td></td>
</tr>
<tr>
<td>Olana</td>
<td>Lennitz</td>
<td>07-FEB-99</td>
<td>4200</td>
<td></td>
</tr>
<tr>
<td>Nancy</td>
<td>Greenberg</td>
<td>17-AUG-94</td>
<td>12000</td>
<td></td>
</tr>
<tr>
<td>Daniel</td>
<td>Fazet</td>
<td>19-AUG-94</td>
<td>5900</td>
<td></td>
</tr>
<tr>
<td>John</td>
<td>Chen</td>
<td>28-SEP-97</td>
<td>6200</td>
<td></td>
</tr>
<tr>
<td>Ismail</td>
<td>Sultan</td>
<td>30-SEP-97</td>
<td>7700</td>
<td></td>
</tr>
<tr>
<td>Jose Manuel</td>
<td>Urman</td>
<td>02-MAR-98</td>
<td>7800</td>
<td></td>
</tr>
<tr>
<td>Ludo</td>
<td>Papp</td>
<td>02-OCT-98</td>
<td>6900</td>
<td></td>
</tr>
<tr>
<td>Dor</td>
<td>Raiplevsky</td>
<td>07-DEC-94</td>
<td>11000</td>
<td></td>
</tr>
</tbody>
</table>

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, Oracle 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.
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 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.

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:

   ```sql
   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 Column

Next, add a column to display the results of the employees’ salary calculations.
To add a 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 Remuneration column.
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.


   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.

---

**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.
Displaying Items as Select Lists

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:

   ```sql
   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 add them 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:

   ```sql
   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, edit these items so 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.

   ![Items](image)

   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, 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**.
   b. Display Null - Select **Yes**.
   c. Null display value - Enter the following:
      - **No Department Assigned** -

5. Click **Apply Changes**.

6. Run the page.

In the form, note that the Job, Manager, and Department fields now display as select lists.
Adding a Link on the Home Page to the Employees Report

In this exercise, you add a link on the Home page to take users to the Employees report. This link appears in the Navigation region on the left side of the Home page.

To add a link on the Home page to the Employees report:

1. Navigate to the Page Definition for the Home page, page 1:
   a. Click Application in the Developer toolbar (at the bottom of the page).
   b. On the Application home page, click Home.
2. Under Regions, click the List link (next to Navigation).
3. On the List Entries page, click the Create List Entry button on the right side of the page.
4. On the Create/Edit List Entry page, edit the following:
   a. Sequence - Change to 20.
   b. List Entry Label - Enter Employees.
   c. Page - Enter 3.
5. Click Create.
6. Run the page.
7. Click Employees to test the link.

Linking the Employees and Departments Reports

In this exercise, you link the Employees and Departments reports. To perform this task, you create a region and item on the Employees page to enable 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 want 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 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 (1) 5.
   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 Department 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 must 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 after the existing code:

   WHERE (DEPARTMENT_ID = :P3_DEPARTMENT_ID or
   (DEPARTMENT_ID is null and nvl(:P3_DEPARTMENT_ID,'1') = '-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 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 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.

---

**Linking a Column Value to Another Page**

In this exercise, you add a link on the Departments report that navigates the user to the Employees report. It also sets 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.
   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.
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:

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

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

6. For Report Attributes:
a. Report Template - Select default: vertical report, look 1 (include null
columns).
   This selection displays the list vertically.
b. Accept the remaining defaults and click Next.

7. 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.
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.

7. From the Department list, select Marketing.

Note the details under Department.

Adding Your Company Name

You can add a graphical logo or text to your application so that it displays 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:

1. Navigate to the Application home page. Click the Application link on the
Developer toolbar (at the bottom of the page).

2. Click Shared Components.

3. Under Application, click Definition.

The Edit Application Definition page appears.

4. Under Logo:
   a. Logo Type - Select Text.
   b. Logo - Enter AnyCo Corp.
   c. Logo Attributes - Select Black Text.

5. Click Apply Changes.

6. Run the application.
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.

Oracle 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 the latest 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 selected 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 Oracle Application Express maps missing region templates to existing ones.

11. For Confirm Switch, click **Switch Theme**.

12. Run the page.

The 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 Application Express Application Builder User’s Guide.

2. Define your supporting objects. This includes the object definitions you collected in the previous step and other supporting objects, such as messages and prerequisites.

3. Export the application with its supporting objects.

4. Import and install the exported files.

Using Oracle 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 Application Express Application Builder User’s Guide.

Creating End Users

After moving your application to a production environment, you must now 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.

   ![Create User Page](image)

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 Application Express Administration Guide

About Publishing the Application URL

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

To determine the URL:

1. Log in to Oracle 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:


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:


See also: "Deploying an Application" in Oracle Application Express Application Builder User's Guide
This section describes some basic information about globalization. It also leads you through the steps to specify how the application determines 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`.
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 is 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) sees 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.

<table>
<thead>
<tr>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Edit</strong></td>
</tr>
<tr>
<td><img src="edit.png" alt="Edit" /> Matthew</td>
</tr>
<tr>
<td><img src="edit.png" alt="Edit" /> Adam</td>
</tr>
<tr>
<td><img src="edit.png" alt="Edit" /> Payam</td>
</tr>
<tr>
<td><img src="edit.png" alt="Edit" /> Shanta</td>
</tr>
</tbody>
</table>

Note that the application fields are not yet translated. For instructions on translating your application, see "Managing Application Globalization" in Oracle Application Express Application Builder User’s Guide.
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 later, 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:
   

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 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:
2. Under More Information, click the Oracle University Training link.

Oracle Technology Network
Oracle Technology Network (OTN) is a central Web site for Oracle 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 Oracle 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 Oracle Application Express, you can go directly to this OTN Web site:
<table>
<thead>
<tr>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
</tr>
<tr>
<td>adding</td>
</tr>
<tr>
<td>an Employees form, 4-9</td>
</tr>
<tr>
<td>an Employees report, 4-9</td>
</tr>
<tr>
<td>branches, 4-21</td>
</tr>
<tr>
<td>breadcrumbs, 4-9</td>
</tr>
<tr>
<td>columns, 4-13</td>
</tr>
<tr>
<td>end users, 5-1</td>
</tr>
<tr>
<td>functions, 4-12</td>
</tr>
<tr>
<td>items, 4-20</td>
</tr>
<tr>
<td>links, 4-19</td>
</tr>
<tr>
<td>regions, 4-19</td>
</tr>
<tr>
<td>users, 2-8</td>
</tr>
<tr>
<td>workspaces, 2-5</td>
</tr>
<tr>
<td>Administration list</td>
</tr>
<tr>
<td>about, 3-2</td>
</tr>
<tr>
<td>About Application Express link, 3-2</td>
</tr>
<tr>
<td>Administration link, 3-2</td>
</tr>
<tr>
<td>Change Password link, 3-2</td>
</tr>
<tr>
<td>Manage Application Express Users link, 3-2</td>
</tr>
<tr>
<td>Manage Services link, 3-2</td>
</tr>
<tr>
<td>Monitor Activity link, 3-2</td>
</tr>
<tr>
<td>AnyCo Corp</td>
</tr>
<tr>
<td>about, 4-1</td>
</tr>
<tr>
<td>about building the application, 4-1</td>
</tr>
<tr>
<td>application</td>
</tr>
<tr>
<td>about Departments report, 4-7</td>
</tr>
<tr>
<td>about Home page, 4-6</td>
</tr>
<tr>
<td>about Login page, 4-6</td>
</tr>
<tr>
<td>adding company name, 4-26</td>
</tr>
<tr>
<td>creating, 4-1, 4-2</td>
</tr>
<tr>
<td>deploying, 5-1</td>
</tr>
<tr>
<td>globalizing, 6-1</td>
</tr>
<tr>
<td>previewing, 4-5</td>
</tr>
<tr>
<td>running, 4-5</td>
</tr>
<tr>
<td>specifying a language preference, 6-1</td>
</tr>
<tr>
<td>Application Builder</td>
</tr>
<tr>
<td>about, 3-3</td>
</tr>
<tr>
<td>Application Express engine</td>
</tr>
<tr>
<td>about, 1-2</td>
</tr>
<tr>
<td>application overview of, 4-1</td>
</tr>
<tr>
<td>architecture</td>
</tr>
<tr>
<td>understanding, 1-1</td>
</tr>
<tr>
<td>Authentication scheme</td>
</tr>
<tr>
<td>selecting, 4-5</td>
</tr>
<tr>
<td><strong>B</strong></td>
</tr>
<tr>
<td>branches</td>
</tr>
<tr>
<td>adding, 4-21</td>
</tr>
<tr>
<td>breadcrumb</td>
</tr>
<tr>
<td>creating, 4-9</td>
</tr>
<tr>
<td><strong>C</strong></td>
</tr>
<tr>
<td>code</td>
</tr>
<tr>
<td>downloading samples, 7-1</td>
</tr>
<tr>
<td>column</td>
</tr>
<tr>
<td>changing format, 4-14</td>
</tr>
<tr>
<td>creating, 4-13</td>
</tr>
<tr>
<td>Column Link, 4-23</td>
</tr>
<tr>
<td>defining Link Attributes, 4-23</td>
</tr>
<tr>
<td>defining Link Text, 4-23</td>
</tr>
<tr>
<td>company name</td>
</tr>
<tr>
<td>adding to application, 4-26</td>
</tr>
<tr>
<td>condition</td>
</tr>
<tr>
<td>creating, 4-24</td>
</tr>
<tr>
<td>Create Application Wizard</td>
</tr>
<tr>
<td>about, 4-2</td>
</tr>
<tr>
<td>Create/Edit Employee form, 4-12</td>
</tr>
<tr>
<td>creating</td>
</tr>
<tr>
<td>applications, 4-1, 4-2</td>
</tr>
<tr>
<td>branches, 4-9</td>
</tr>
<tr>
<td>columns, 4-13</td>
</tr>
<tr>
<td>end users, 5-1</td>
</tr>
<tr>
<td>functions, 4-12</td>
</tr>
<tr>
<td>items, 4-20</td>
</tr>
<tr>
<td>links, 4-19</td>
</tr>
<tr>
<td>regions, 4-19</td>
</tr>
<tr>
<td>user accounts, 2-8</td>
</tr>
<tr>
<td>workspaces, 2-5</td>
</tr>
<tr>
<td>creating branches, 4-21</td>
</tr>
<tr>
<td><strong>D</strong></td>
</tr>
<tr>
<td>deleting</td>
</tr>
<tr>
<td>sample objects, 3-6</td>
</tr>
<tr>
<td>deployment</td>
</tr>
<tr>
<td>about, 5-1</td>
</tr>
<tr>
<td>demo environment</td>
</tr>
<tr>
<td>accessing, 2-2</td>
</tr>
<tr>
<td>logging in to, 2-3</td>
</tr>
</tbody>
</table>
Department Details report, 4-24
Departments report
  linking to report, 4-19
  modifying the query for, 4-7
deploying
  an application, 5-1
  overview of, 5-1
Developer Privileges
  about, 5-2
Developer toolbar
  about, 4-6
  about Application link, 4-9
developers
  about, 1-3
development environment
  accessing, 2-1
  prerequisites, 2-1
downloading
  sample code, 7-1
  sample objects, 3-5
drop-down list
  creating, 4-15
E
embedded PL/SQL gateway
  about, 1-2
Employees form
  adding, 4-9
Employees report
  adding, 4-9
  adding a column, 4-13
  adding a link, 4-19
  changing column format, 4-14
  creating a function, 4-12
  defining source for primary key, 4-10
  editing, 4-12
  linking to Departments report, 4-19
end users
  about, 1-3
  creating, 5-1
environment
  setting up, 2-3
F
function
  creating, 4-12
G
global identification
  specifying a method, 6-1
Globalization settings
  Application Language Derived From, 6-2
  Application Primary Language, 6-2
  Automatic CSV Encoding, 6-2
H
Home page
  adding links to, 4-19
hosted demo environment
  logging in to, 2-3
hosted environment
  accessing, 2-2
  signing up, 2-2
HR schema
  about installing, 3-4
  associating with workspace, 3-7
Human Resources (HR) schema
  about installing, 3-4
I
importing
  sample objects, 3-5
installing
  sample objects, 3-4
item
  creating, 4-20
  linking to a report, 4-21
items
  displaying as select lists, 4-17
L
language
  method for determining, 6-1
  preference, 6-1
link
  adding to Home page, 4-19
  creating, 4-19
  linking to another page, 4-22
lists of values
  creating, 4-15
  specifying Display Null, 4-21
  specifying Named LOV, 4-20
  specifying Null Text, 4-21
  specifying Null Value, 4-21
local environment
  logging in to, 2-7
  setting up, 2-3
local instance, 2-7
  logging in to, 2-7
logging in to
  Application Express, 2-7
  hosted demo environment, 2-3
  local instance, 2-7
  Oracle Application Express Administration Services, 2-4
logo
  adding to an application, 4-26
LOVs
  creating, 4-15
N
name
  adding to application, 4-26
themes
  about, 4-27
  switching, 4-27
triggers
  defining, 4-10

URL
  determining, 5-3
  publishing, 5-3
user interface
  changing using themes, 4-27
user privileges
  about, 1-3
user roles
  about, 1-3
developer, 1-3
  end user, 1-3
  Oracle Application Express administrator, 1-3
  workspace administrator, 1-3
users
  relationship with schemas, 1-3
  relationship with workspaces, 1-3
users accounts
  creating, 2-8

WHERE clause
  creating, 4-21
workspace administrators
  about, 1-3
Workspace home page
  about, 3-1
  Administration list, 3-2
  Application Builder icon, 3-2
  Discussion Forum link, 3-3
  Links list, 3-3
  Oracle Technology Network link, 3-3
  SQL Workshop icon, 3-2
  User’s Guide link, 3-3
  Utilities icon, 3-2
  Workspace Schemas List, 3-2
workspaces
  about, 1-3
  checking available storage, 3-6
  creating, 2-5
  relationship with schemas, 1-3
  requesting space, 3-6
  users, 1-3