Oracle® Database Express Edition

2 Day + Application Express Developer's Guide Release 4.0

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Oracle Database Express Edition 2 Day + Application Express Developer's Guide, Release 4.0

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Preface

Oracle Database Express Edition 2 Day + Application Express Developer's Guide introduces you to application development using Oracle Application Express. This guide shows you how to set up your development environment and 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.

Topics:

- Topic Overview
- Audience
- Documentation Accessibility
- Related Documents
- Conventions

Topic Overview

This document contains the following sections:

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

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

Audience

Oracle Database Express Edition 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 must have a general understanding of relational database concepts and the operating system environment under which Oracle Application Express is running.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/accessibility/.

Accessibility of Code Examples in Documentation

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

Access to Oracle Support

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

Related Documents

For more information, see these Oracle resources:

- Oracle Database Express Edition Installation Guide for Microsoft Windows
- Oracle Database Express Edition Installation Guide for Linux
- Oracle Database Express Edition Getting Started Guide
- Oracle Application Express Release Notes
- Oracle Application Express Application Builder User's Guide
- Oracle Application Express SQL Workshop Guide
- Oracle Application Express API Reference

- Oracle Application Express Migration Guide
- Oracle Application Express Administration Guide

Conventions

The following text conventions are used in this document:

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

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 guide assumes that you have installed Oracle Database XE on your Windows or Linux system as described in Oracle Database Express Edition Installation Guide for Microsoft Windows and Oracle Database Express Edition Installation Guide for Linux.

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.

Understanding Oracle Application Express Architecture

Oracle Application Express installs within Oracle Database Express Edition (Oracle Database XE) and is comprised of data in tables and PL/SQL code.

Whether you run the Oracle Application Express development environment or an application 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.

Topics:

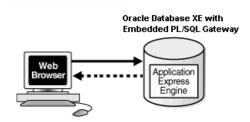
- **Understanding Web Server Options**
- About the Application Express Engine

Understanding Web Server Options

In order to run Oracle Application Express, you must have access to the embedded PL/SQL gateway, Oracle Application Express Listener, or Oracle HTTP Server and mod_plsql. By default, the version of Oracle Application Express that ships with Oracle Database XE is configured to work with the embedded PL/SQL gateway.

About the Embedded PL/SQL Gateway

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



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

Advantages of the embedded PL/SQL gateway:

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

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

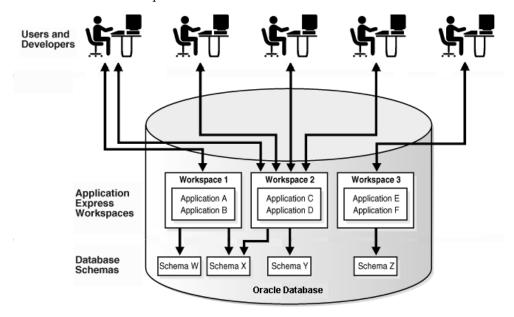
Oracle Application Express enables a single Oracle database to become a shared workgroup database service. Multiple users can access it using a Web browser without installing additional software.

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.

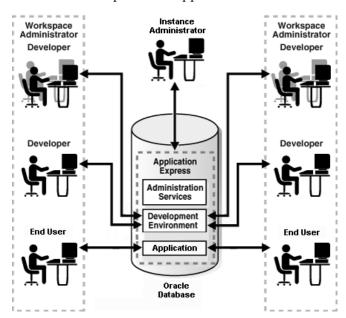
About Oracle Application Express User Roles

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

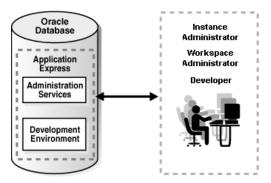
- Workspace administrators are users who perform administrator tasks specific to a workspace such as managing user accounts, monitoring workspace activity, and viewing log files.
- Developers are users who create and edit applications and modify database objects. Developers can have their own workspace 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.

Instance administrators are superusers that manage an entire hosted instance using the Application Express Administration Services application.

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



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



Overview of the Application You Build

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

Accessing Your Development Environment

This section guides you through the steps needed to access an Oracle Application Express development environment.

This chapter assumes that you have installed Oracle Database Express Edition (Oracle Database XE) on your Windows or Linux system, as described in Oracle Database Express Edition Installation Guide for Microsoft Windows and Oracle Database Express Edition Installation Guide.

Topics:

- Before You Begin
- Accessing Oracle Application Express from the Database Home Page
- Understanding and Configuring Your Local Environment
- Creating Additional User Accounts

Before You Begin

Before you begin this section, do the following:

- Install Oracle Database XE as described in Oracle Database Express Edition Installation Guide for Microsoft Windows and Oracle Database Express Edition *Installation Guide.*
- Read Oracle Database Express Edition Getting Started Guide.
- Read "Introducing Oracle Application Express" on page 1.
- Confirm your Web browser supports JavaScript and the HTML 4.0 and Cascading Style Sheet (CSS) 1.0 standards. The following browsers meet this requirement:
 - Microsoft Internet Explorer 7.0 or later version
 - Mozilla Firefox 3.5 or later version
 - Google Chrome 4.0 or later version
 - Apple Safari 4.0 or later version
- Enable cookies for your Web browser.

Accessing Oracle Application Express from the Database Home Page

The Database Home page is a Web browser-based interface that enables you to perform various database administration operations, including monitoring database storage, monitoring database sessions, and viewing database initialization parameters. In Oracle Database XE, you use the Database Home page to initially access Oracle Application Express.

Topics:

- Creating Login Credentials from the Database Home Page
- About the URL Where You Access Oracle Application Express
- Logging in to Application Express with an Existing Account

Creating Login Credentials from the Database Home Page

This section explains how to create a workspace and log in to Oracle Application Express from the Database Home page. Once you create a workspace, username, and password, you can access Oracle Application Express directly from your Web browser as described in "Logging In to Application Express Administration Services" on page 2-5 and "Logging In to the Application Express Development Environment" on page 2-8.

To create login credentials from the Database Home page:

- Navigate to the system menu:
 - Windows From the Start menu, select Programs (or All Programs), then Oracle Database 11g Express Edition, and then Get Started.
 - Linux Click the **Application** menu (on Gnome) or the **K** menu (on KDE), then point to Oracle Database 11g Express Edition, and then Get Started.

The Oracle Database XE home page appears.



For detailed information about using database-level operations, see Oracle Database Express Edition 2 Day DBA.

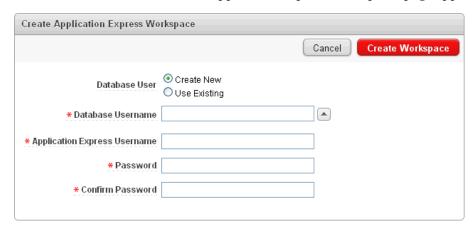
Click the **Application Express** button.

The Login page appears.

- **3.** On the Login page:
 - Username Specify a database user who has been granted the DBA database role (for example, SYSTEM).
 - Password Enter the database user password you created during the installation process.

c. Click Login.

The Create Application Express Workspaces page appears.



- On the Create Application Express Workspaces page:
 - Database User Select Create New.
 - Database Username Enter TWODAYPLUS
 - Application Express Username Enter a unique username (for example, TWODAYPLUS).
 - **d.** Password Enter a password.
 - Confirm Password Re-enter the password.

Tip: Make a note of your login credentials.

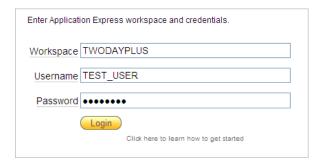
Click **Create Workspace**.

The Database Home page appears. A message appears at the top of the page.

Click the **click here** ink in the message that displays:

Successfully created workspace 2DAYPLUS. To begin, click here to login.

- Change your password and click **Apply Changes**.
- 7. Click **Return**.
- Enter the your new login credentials and click **Login**.



The Workspace home page appears.

About the URL Where You Access Oracle Application Express

Make a note of the URL that displays in your Web browser when the Workspace home page appears. You can use this URL to log into Oracle Application Express directly. The URL appears in the format:

http://hostname:port/apex

Where:

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

See Also: "Logging In to Application Express Administration Services" on page 2-5 and "Logging In to the Application Express Development Environment" on page 2-8.

Logging in to Application Express with an Existing Account

To log in to Oracle Application Express from the Database Home page using an existing account:

- **1.** Navigate to the system menu:
 - Windows From the Start menu, select Programs (or All Programs), then Oracle Database 11g Express Edition, and then Get Started.
 - Linux Click the **Application** menu (on Gnome) or the **K** menu (on KDE), then point to Oracle Database 11g Express Edition, and then Get Started.

The Oracle Database XE home page appears.

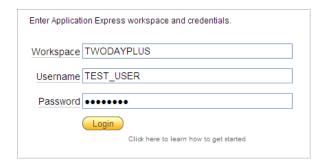
2. Click the **Application Express** button.

The Login page appears.

- On the Login page:
 - **a.** Username Specify a database user which has been granted the DBA database role (for example, SYSTEM)
 - **b.** Password Enter the database user password you created during the installation process.
 - c. Click Login.
- Under Getting Started:
 - Click the **Already have an Account? Login Here** button.

A login page appears.

b. Enter your login credentials.



c. Click Login.

The Workspace home page appears.

Understanding and Configuring Your Local Environment

Instead of using the Database Home page to access Oracle Application Express, you can also access and configure Oracle Application Express directly.

Note: This tutorial explains a simplified approach for setting up your development environment so that you can begin using Oracle Application Express. However, to set up your development environment to accommodate real-life development needs, review "Oracle Application Express Hosted Instance Administration" in Oracle Application Express Administration Guide.

Topics:

- Logging In to Application Express Administration Services
- Viewing an Existing Workspace
- Creating a New Workspace
- Logging In to the Application Express Development Environment

Logging In to Application Express Administration Services

In Oracle Application Express, you can create multiple areas (or workspaces) where you develop applications. You configure and manage an Oracle Application Express instance by logging in to Oracle Application Express Administration Services.

To log in to the Oracle Application Express Administration Services:

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

By default, Oracle Database XE uses the Embedded PL/SQL gateway:

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.

The Login page appears.

- **2.** On the Login page:
 - a. Username Enter admin
 - b. Password Enter the SYS or SYSTEM database account password you created during the installation process.
 - **c.** Click **Login**.
- **3.** If prompted, change your password and click **Apply Changes**.
- **4.** Enter you new login credentials and click **Login**.

Oracle Application Express Administration Services appears.

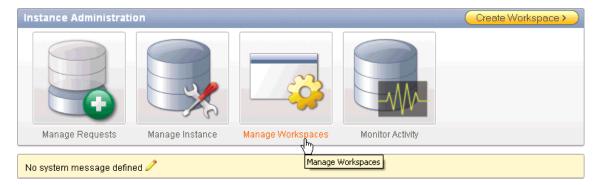
Tip: Make a note of your revised Oracle Application Express Administration Services login credentials.

Viewing an Existing Workspace

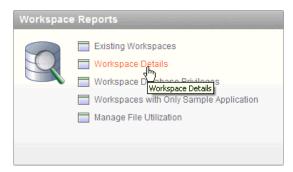
You can view the workspace you just created on the Existing Workspaces page.

To view existing workspaces:

- 1. Log in to Oracle Application Express Administration Services. See "Logging In to Application Express Administration Services" on page 2-5.
- 2. Click Manage Workspaces.



- Locate the section **Workspace Reports**.
- Under Workspace Reports, click Workspace Details.



The Workspace Details page appears.

From Workspace, select **TWODAYPLUS** and click **Set**.

The Workspace Summary Report appears.

Creating a New Workspace

The most direct way to create a workspace is to log in to Oracle Application Express Administration Services. 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.

If you want to start developing the application shown in this guide, skip this section and go to "Logging In to the Application Express Development Environment" on page 2-8.

To create a workspace:

1. Log in to Oracle Application Express Administration Services. See "Logging In to Application Express Administration Services" on page 2-5.

The Instance Administration page appears.

- Click **Manage Workspaces**.
- Under Workspace Actions, click **Create Workspace**.



The Create Workspace Wizard appears.

- For Identify Workspace, enter the following:
 - a. Workspace Name Enter a unique 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.** Workspace ID Leave Workspace ID blank to have the new Workspace ID automatically generated. A Workspace ID must be a positive integer greater than 100000.
- Workspace Description Enter a workspace description.
- Click Next.
- For Identify Schema, enter the following:

- **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. 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:
 - **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 2-9.
 - **b.** Administrator Password Enter a case-sensitive password.
 - Enter the remaining information, including a valid email address.



d. 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 Workspace**.
- **8.** Click **Logout** to exit Oracle Application Express Administration Services.

Logging In to the Application Express Development Environment

To log in to 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

To log in to Oracle Application Express:

1. In a Web browser, go to the Oracle Application Express Login page. By default, Oracle Database XE uses the Embedded PL/SQL gateway:

By default, Oracle Database XE uses the Embedded PL/SQL gateway:

http://hostname:port/apex/apex_admin

Where:

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

The Login page appears.

Enter the your login credentials.

Enter Application Express workspace and credentials.
Workspace TWODAYPLUS
Username TEST_USER
Password
Login
Click here to learn how to get started

3. Click Login.

Creating Additional User Accounts

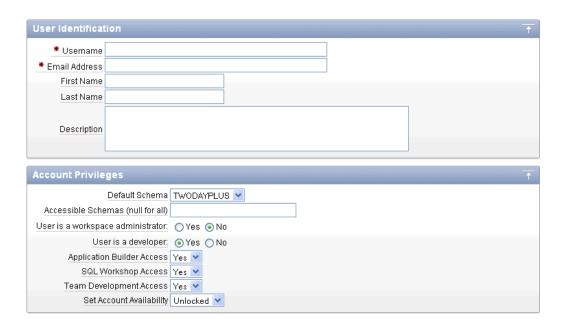
As an administrator, you inherit all the privileges associated with the developer role. If you want to start developing the application shown in this guide, skip this section and go to "Logging In to the Application Express Development Environment" on page 2-8.

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 a user account:

- Log in to the Workspace where you want to add users. See "Logging In to the Application Express Development Environment" on page 2-8.
 - The Workspace home page appears.
- **2.** Click **Administration**.
- 3. Click Manage Users and Groups.
- 4. Click Create User.

The Create User page appears.



- **5.** Under User Identification, enter:
 - **a. Username** Enter the username used to log in to the system. Restrictions
 - Maximum length of 100 characters
 - No spaces
 - Only these special characters are permitted: ampersand (@) and period (.)
 - **b. Email Address** Enter the valid email address for this user.
 - **c.** First Name Enter the first or given name to further identify the user (optional).
 - **d.** Last Name Enter the last or family name to further identify the user (optional).
 - **e. Description** Enter comments about this user (optional).
- **6.** Under Account Privileges:
 - **a. Default Schemas** Specify the default schema used for data browsing, application creation, and SQL script execution.
 - When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.
 - **b.** Accessible Schemas (null for all) Leave this blank to enable the end user to access all applications in the workspace, or enter a colon-delimited list of schemas for which this user has permissions when using the SQL Workshop.
 - **User is a workspace administrator** Specify if this user should have workspace administrator privileges.
 - Administrators are given access to all components. Additionally, they can manage user accounts, groups, and development services. Components may not be available if they are switched off by Instance Administrators.
 - **d. User is a developer** Specify if this user should have developer privileges.

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

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

7. Under Password:

- **Password** Enter a case sensitive password.
- **Confirm Password** Enter the password again.
- Require Change of Password On First Use Select No to not require this user to change his or her password at first log in. Select Yes to require the user to change the password immediately after logging in the first time.
- **8.** Under User Groups, optionally select a user group.
- 9. Click Create User or Create and Create Another.

See also: "Managing Application Express Users" in *Oracle* Application Express Administration Guide

Getting Started with Oracle Application Express

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

Before you begin, log in to Oracle Application Express. For instructions, see "Accessing Your Development Environment" on page 2-1.

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 large icons display 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.
- **SQL Workshop**. Use the SQL Workshop to access tools for viewing and managing database objects.
- **Team Development.** Use Team Development to track new features, non-feature to dos, bugs, and milestones. Users can also provide real-time feedback which then can be categorized into features, to do tasks, or bugs.
- **Administration** links to the Workspace Administration page.

About Learn More

Click the **Learn More** button to view an informative introduction to Oracle Application Express. Topics covered include architecture, self service, security, websheets, application development, SQL Workshop, Team Development, administration, and managing development.

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.

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.

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:

In your Web browser, go to:

http://www.oracle.com/technetwork/developer-tools/apex/applicationexpress/packaged-apps-090453.html

- Under Sample Code, click **OEHR Sample Objects**.
- Download and save the oehr_sample_objects.zip file to your computer.
- 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 Application Express Development Environment" on page 2-8.

On the Workspace home page, click **Application Builder**.

The Application Builder home page appears.

- Click the **Import** button.
- For Specify File, specify the following:
 - Import file Click Browse and navigate to the oehr_sample_objects_ installer.sql file.
 - File Type Select Database Application, Page, or Component Export.
 - File Character Set Select the correct character set.
 - d. Click Next.

Next, you install the imported file.

5. To install an imported file, click **Next**.

The Install Application Wizard appears.

- **6.** For Install Application, 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**.

Once you install the application, you must install the supporting objects.

- **7.** For Supporting Objects, select **Yes** and click **Next**.
- Confirm your selections by clicking **Install**.
- 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.

- To remove all associated objects and sample data, select **Remove Application Definition** and **Deinstall Supporting Objects**.
- 6. Click Deinstall.

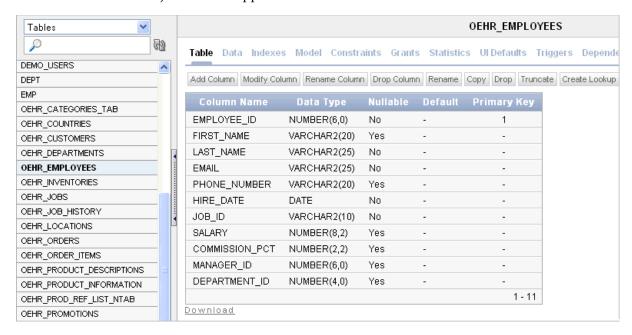
Viewing Your Database Objects

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:

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

Object Browser appears.



Object Browser is divided into two sections:

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

The Detail pane lists the tables in your current schema.

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

The Detail pane shows details about the table.

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.

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



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

See also: "Managing Database Objects with Object Browser" in Oracle Application Express SQL Workshop Guide

Building Your Application

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

Before you begin this section:

- Read "Getting Started with Oracle Application Express" on page 3-1.
- Ensure you have installed the database objects as described in "Installing the Sample Objects" on page 3-2.

Topics:

- About the Application You Build in This Tutorial
- Creating the Initial Application
- Modifying the Departments Report
- Using an Interactive Report
- Adding an Employees Report and Form
- **Editing the Employees Report**
- Adding a Link on the Home Page to the Employees Report
- Adding a Department Column to the Employees Report
- Linking a Column Value to Another Page
- Adding a List of Values to the Employees 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 tasks:

- Creating the Initial Application: Create an application that includes a Home page and a basic Departments report.
- 2. Modifying the Departments Report: Expand the report to pull in data from other tables.
- Using an Interactive Report: Run and use the Interactive Report.
- Adding an Employees Report and Form: Build an Employee form and report based on the OEHR EMPLOYEES table.
- Editing the Employees Report: Add calculated fields to the Employees report.
- Adding a Link on the Home Page to the Employees Report: Add a link on the Home page.

- 7. Adding a Department Column to the Employees Report: Modify the Employees report to enable the user to select a department.
- **8.** Linking a Column Value to Another Page: Add a link on the Departments report that navigates the user to the Employees report.
- **9.** Adding a List of Values to the Employees Report: Add a report as a region that displays department details.
- 10. Adding Your Company Name: Add your company name so that it appears on all pages in your application.
- 11. Switching Themes to Change the User Interface: Switch the theme for your application.

Creating the Initial Application

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

The pages created in this section include:

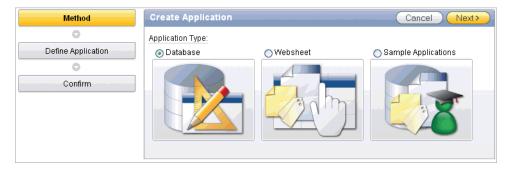
- Home This page is the first page displayed when the application is run. This page contains a link to the Departments report.
- Departments This page is an interactive report of all departments.

There are two types of reports, interactive and classic. Interactive is the default when creating applications, converting forms, and creating report regions. Interactive reports should be selected when you want to provide user customizations such as filters, sorting, compilation and so on. If you have limited need for this functionality, you are best served by using a classic report.

To create your initial application:

- **1.** Log in to Oracle Application Express. For instructions, see "Logging In to the Application Express Development Environment" on page 2-8.
- On the Workspace home page, click **Application Builder**.
- **3.** Click the **Create** button.

The Create Application Wizard appears.



Note that each page within a wizard displays the title of the wizard (for example, Create Application). Each wizard page also displays a series of blocks on the left, representing the sequence of steps. The highlighted block indicates the step you are performing.



To orient you, each step in these exercises generally begin 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.

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

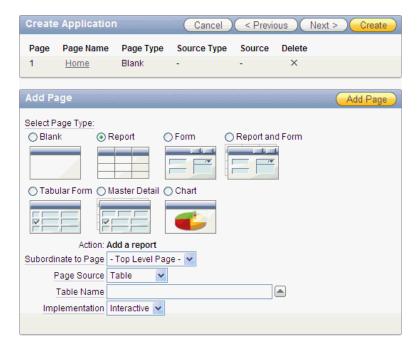
Next, add a page to your application.

- For Pages, specify the following in the Add Page section:
 - 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.
- 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.

- In the Add Page section, specify the following:
 - Select Page Type Select **Report**.
 - Subordinate to Page Select **Home (1)**.

This sets up the hierarchy among the pages in your application.

- Page Source Accept the default, **Table**.
- Table Name Select **OEHR_DEPARTMENTS**.

The list shows all tables and views in the schema associated with the application.

- **e.** Implementation Accept the default **Interactive**.
- 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.

- Click the **Oehr Departments** link.
- 10. Under Page Definition, change the Page Name to Departments and click Apply Changes.
- **11.** In the Create Application section, click **Next**.

Next, define some application-level settings.

- 12. For Tabs, select No Tabs and click Next.
- **13.** For Shared Components, accept the default, **No**, and click **Next**.
- **14.** For Attributes, make these changes:
 - Authentication Scheme Accept the default, **Application Express**.

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.

- **b.** Language Accept the default, **English (en)**
- **c.** User Language Preference Derived From Accept the default, **Use** Application Primary Language.
- **d.** Date Format Click the up arrow and select **12-JAN-04**.
- Click Next.
- **15.** For User Interface, select **Theme 2** and click **Next**.
- **16.** 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 report instead of as icons, click the **View Report** icon. 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 a specific page, click the **Run Page** icon.



To preview your application:

1. On the Application home page, click **Run Application**.

The first time you run an application you are prompted to enter a user name and password. To continue, simply enter your workspace user name and password and then click Login.

The first time you run an application you are prompted to enter a user name and password. To continue, simply enter your workspace user name and password and then click **Login**.

You can run the application using your Application Express login credentials because you chose Application Express Authentication when creating the application.

The Home page of your application appears.



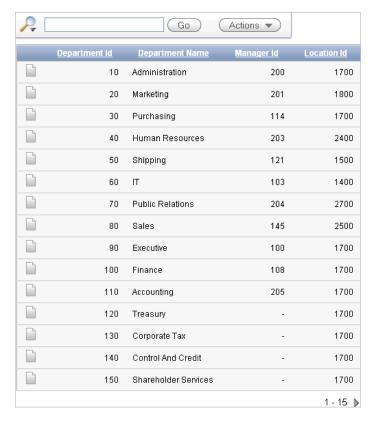
Notice that a link to the Departments page appears on the Home page because you set up that hierarchy.

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.

Click the **Departments** link.

The Departments report appears.



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.

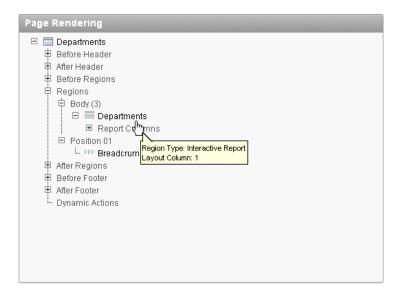
In this exercise, you modify the query for the Departments report to include information from the OEHR_EMPLOYEES table. Three columns from the OEHR_ EMPLOYEES table, Number of Employees, Manager Name and Location, are added to the Departments report. The Manager Name column replaces the Manager Id column and the Location column replaces the Location Id column.

To modify the Departments report:

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 3-2.

- Under Page Rendering, locate Regions.
- Expand Region and locate Departments.



Right-click **Departments** and select **Edit**.

Tip: You can also double-click **Departments**.

The Region Definition appears.

5. Scroll down to Source, and replace the default Region Source script with the following:

```
SELECT d.DEPARTMENT_ID,
   d.DEPARTMENT_NAME,
   (select count(*) from oehr_employees where department_id = d.department_id)
"Number of Employees",
   substr(e.first_name,1,1)||'.'||e.last_name "Manager Name",
   c.COUNTRY_NAME "Location"
FROM OEHR_DEPARTMENTS d,
  OEHR_EMPLOYEES e,
  OEHR_LOCATIONS 1,
  OEHR COUNTRIES C
WHERE d.LOCATION_ID=1.LOCATION_ID
   AND 1.COUNTRY_ID=c.COUNTRY_ID
   AND d.DEPARTMENT_ID=e.department_id
   AND d.manager_id=e.employee_id
   AND instr(upper(d.department_name),upper(nvl(:P2_REPORT_
SEARCH, d.department_name)))>0
```

- Click **Apply Changes**.
- **7.** Click **Apply Changes** to confirm.
- Right-click **Departments** and select **Edit Report Attributes**.
- Click the **Edit** icon next to Number of Employees.
- **10.** Under Column Definition, select **center** for Column Alignment.
- 11. Click Apply Changes.

Run the Report to View Added Columns

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.



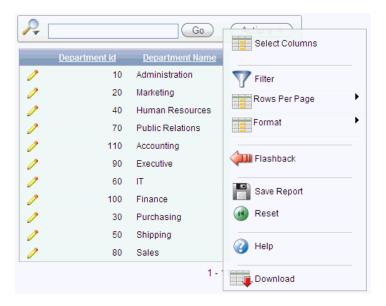
The revised Departments report appears.



Note that the Manager Id and Location Id columns are not available. Also note that the three new columns do not display on the revised report: Number of Employees, Manager Name, and Location. The following steps are required to add these columns to the display and reorder them.

To add the new columns, click the **Actions** menu.

The list of Actions appear.



Select **Select Columns**.

The columns that were added by the new SQL query are in the **Do Not Display**

Click the **Move All** icon to add these three columns to the **Display in Report** box. The Move All icon looks like the following figure.



- Verify if the columns are in the following order. If they are not, click up and down arrows to the right of the Display in Report to change the order:
 - Department ID
 - Department Name
 - Number of Employees
 - Manager Name
 - Location



Click **Apply**.

The Departments page appears and includes the new columns.



Using an Interactive Report

This exercise guides you through some commonly used report options available to users when they run interactive reports. These options allow the user to perform certain tasks quickly.

Topics:

- Save Report Settings as the Default
- Create a Filter
- Change the Sort Order
- Add a Control Break
- Display the Single Row View
- Reset Report Settings

You already used the Select Column option from the Actions menu to add columns to the report display. In this section, you run the application and use some of the various search, sort, highlight and reset features to manipulate the Departments interactive report.

This tutorial only touches on some of the most prominent functionality available with interactive reports. For complete details see Oracle Application Express Application Builder User's Guide.

Save Report Settings as the Default

Both developers and end users can save an interactive report. However, only a developer can save the report that initially displays, called the Primary Default report.

You can save four types of interactive reports:

- Primary Default (Developer Only). The Primary Default is the report that initially displays. Primary Default reports cannot be renamed or deleted.
- Alternative Report (Developer Only). Enables developers to create multiple report layouts. Only developers can save, rename, or delete an Alternative Report.

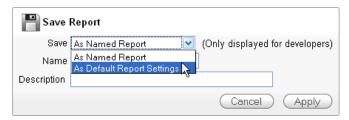
- Public Report (End user). Can be saved, renamed, or deleted by the end user who created it. Other users can view and save the layout as another report.
- **Private Report** (End user). Only the end user that created the report can view, save, rename or delete the report.

To save current report settings as the default:

- Click the **Actions** menu.
- Select **Save Report**.

The Save Report settings appear.

3. From Save, select **As Default Report Settings**.



The Default Report Type settings appear

4. Select **Primary** and click **Apply**.

The report will show all columns when the user selects the **Reset** option from the Actions menu or when the page is reset by a Reset Interactive Report command, RIR.

Create a Filter

This exercise demonstrates how to add a filter to the Departments report. This example creates a filter to show all departments with the exception of departments with an Id of 60.

There is more than one way a user can create a filter. The user can add a filter from the:

- Search Bar
- Actions Menu
- Column Heading

The Actions menu offers more options than the others. For a quick filter using the equals operator, the Search Bar or column heading are the quickest methods. For anything else, use the Filter option from the Actions menu.

To create a filter for all departments not equal to 60:

- Click the **Actions** menu.
- 2. Select Filter.

The filter settings display. Note you can also click the column heading link to create a filter for that column. Creating a filter from the column heading menu, however, is limited to the equal operator.



- From Operator, select the not equals operator (!=).
- From Expression, select 60.
- Click **Apply**.

The Departments report is displayed with the Department_Id!=60 filter applied. All departments, accept for the IT department with a Department Id of 60, are included in the report.



Notice the filter displays at the top of the report. You can edit, disable, or delete this filter. To edit, click on the filter name. To disable, deselect the check box. To delete, click on the Delete icon that looks like an X over the filter icon.

Deselect the check box next to the Department Id!=60 filter to disable it. The report shows data for all Department Ids.

Change the Sort Order

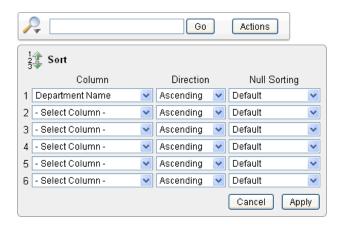
In this exercise, you learn how the user can reorder the data for each column.

To change the sort order:

- Click the **Actions** menu.
- Select **Format** and then **Sort**.

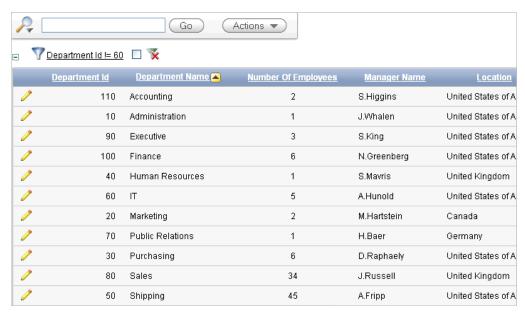
The sort settings are displayed. Note this option is also available for each column by clicking the column heading. The Actions menu is quicker when changing the sort order for multiple columns.

Select **Department Name** for the first column entry.



4. Click Apply.

The report shows the Department Name column in ascending alphabetical order.



Notice the up arrow icon after the Department Name that indicates the column has been sorted in ascending order. You can click on this arrow to resort the column.

Add a Control Break

Another way to reformat a report is to create a control break. A control break enables the user to delineate data into clearly visible groups.

To add a control break:

- 1. Click the **Location** column heading. The column heading menu appears.
- Click the **Control Break** icon as shown below.

Note this same option is also available from the Actions, Format menu.



The report is reformatted to show a break after each group of rows that share the same location.



Note the Location control break report setting displays under the Search bar.

Display the Single Row View

You can also display details for a row by selecting the Single Row icon.

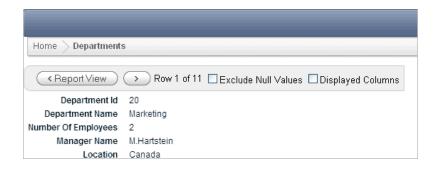
To display the single row view:

1. Locate the **Single Row View** icon for the first row.



Select the **Single Row View** icon for the first row.

The details page for the first row appears.



Reset Report Settings

You can revert the report settings back to the saved default settings. When an interactive report is reset, the default settings are applied to the report. An interactive report can be reset by the user and by the developer under the following conditions:

- A user can reset an interactive report if the Reset option is available from the Actions menu. This option is enabled or disabled by the developer.
- A developer can specify that an interactive report be reset when it is called from another page. The Reset Interactive Report command, RIR, is used for this purpose.

To return to the default settings:

- **1.** Click the **Report View**.
- Click the **Actions** menu and select **Reset**.
- When prompted to restore the default settings, click **Apply**. The report goes back to the default report settings saved in the previous section.

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:

- Click the **Application ID** link on the Developer toolbar (at the bottom of the page). The Application home page appears.
- 2. Click Create Page.
- **3.** For Page:
 - 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.

- Click Next.
- For Table/View Owner, accept the default and click **Next**. This specifies the schema owner.
- For Table/View Name, select **OEHR EMPLOYEES** and click **Next**.
- **6.** For Define Report Page, make these changes:

- Implementation Select **Interactive**.
- Page Name Change to Employees. b.
- Region Title Change to Employees.
- Breadcrumb Select **Breadcrumb**.

The Create Breadcrumb Entry section appears.

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

- Click Next.
- For Define Report Page, accept the default, **Do not use tabs**, and click **Next**.
- 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 when the page is run.

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.

- **10.** For Define Form Page, edit the following:
 - a. Page Name Enter Create/Edit Employee
 - **b.** Region Title Enter Create/Edit Employee
 - Entry Name Enter Create/Edit Employee
 - d. Click Next.
- 11. For Primary Key, accept the defaults and click Next.
- **12.** In Define the source for the primary key columns, accept the default, **Existing** trigger, and click Next.

Your table, OEHR_EMPLOYEES, already has a trigger that populates the primary key.

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

These columns appear in the Create/Edit Employee form when the page is run.

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

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

15. For Confirm, verify the information and click **Finish**.

Previewing the Pages

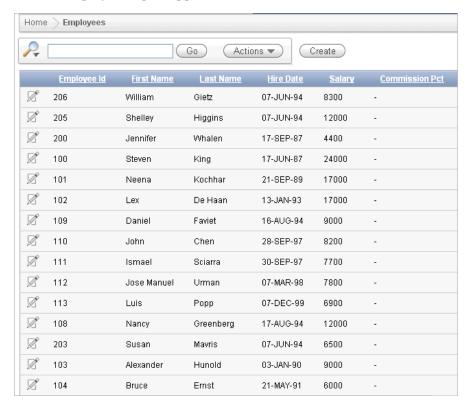
To preview the two pages you just created, run the current page. From the Employees report, you can then preview the form.

To preview the pages:

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



The Employees report appears.



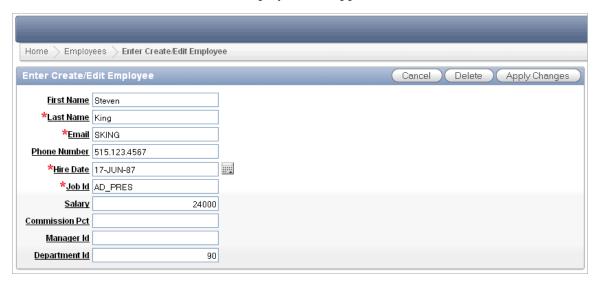
Note the following about the Employees report:

- The Search Bar with the Actions menu appears at the top. For more information, see "Using an Interactive Report" on page 4-11.
- The column headings are links that enable the user to quickly perform various sorting, filtering and reformatting operations. For more information, see "Using an Interactive Report" on page 4-11.
- The Edit icon you selected appears in each row. You can click the Edit icon to update the employee record. Since you created a form based on a table with a report, the wizard automatically linked the report to the form. If you create just a report, as is done in the previous section, "Creating the Initial Application" on page 4-2, the wizard automatically links the report to the single row view.

- 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 six 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.

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



Note the following about the Create/Edit Employee form:

- The form includes Cancel, Delete, and Apply Changes buttons.
- The Hire Date field displays a calendar, which is included because the data type of the underlying column is DATE.
- Fields labeled in red require are mandatory and cannot be left blank or null.

Editing the Employees Report

In this exercise, you create a new column entitled Remuneration to display employee salaries in the Employees report.

Topics:

- 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 **Home** link on the Developer toolbar.
- Click **SQL Workshop** and then **SQL Commands**.

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

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

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

When copying and pasting this SQL, make sure there is not an empty line before the first statement, CREATE OR REPLACE FUNCTION.

4. Click Run.

The Results section displays this message:

Function created.

Add a Column

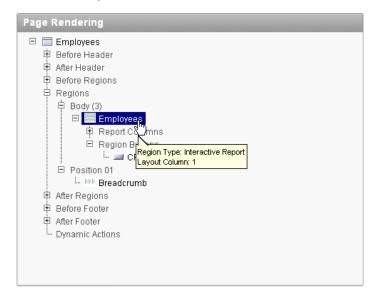
Next, add a column to display the results of the employees' salary calculations.

To add a column:

- Navigate to the Page Definition for page 3:
 - **a.** Click the **Application Builder** tab.
 - **b.** Select the **AnyCo Corp** application.
 - c. Click 3 Employees.

The Page Definition for page 3 appears.

2. Under Regions, locate **Employees**.



Right-click **Employees** and select **Edit**.

The Region Definition appears.

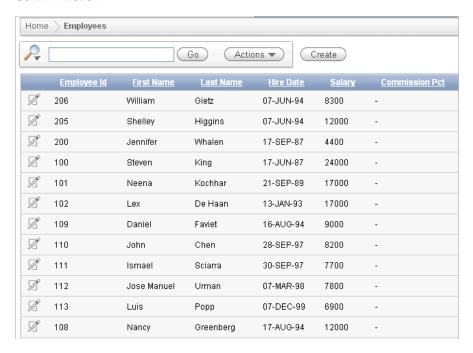
Scroll down to Source, and replace the existing code with the following:

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

- Click **Apply Changes**.
- Click **Apply Changes** to confirm.

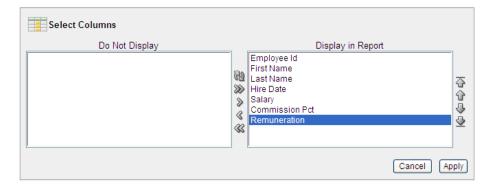
Previewing the Page

To preview the page, click the Run Page icon in the upper right corner. Notice the Remuneration column does not appear. You must add the column by using the Select Column action.



To display the Remuneration column:

- Click the **Actions** menu.
- Select the **Select Columns** action.
- Move the **Remuneration** column from the Do Not Display box to the Display in Report box.



4. Click Apply.

The Employees Report is displayed and includes 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.
- 2. Under Regions, right-click **Employees** and select the **Edit Report Attributes**. The Report Attributes page appears.
- 3. Locate the Column Attributes section.

Next, change the format of the value in the Salary and Remuneration columns.

- To edit the Salary format:
 - Click the **Edit** icon next to SALARY.
 - **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.
- **5.** Repeat the previous step for REMUNERATION.
- Click the **Run Page 3** 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 and include commas and decimals.



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:

- Navigate to the Page Definition for the Home page, page 1:
 - Click the **Application ID** link on the Developer toolbar (at the bottom of the page).
 - On the Application home page, click **1 Home**.
- 2. Under Regions, right-click Navigation and select Edit List.
- On the Entries by List page, click the **Create List Entry** button.
- On the Create/Edit List page, edit the following:
 - Sequence Change to 20.
 - List Entry Label Enter Employees
 - Page Select 3.
- Click Create.
- Run the page.



Notice that your Home page now includes a link to Employees.

Click **Employees** to test the link. 7.

The Employees report appears.

Adding a Department Column to the Employees Report

In this exercise, you link the Employees and Departments reports. When you complete this section, the Employees report will have a Departments column showing which department each employee belongs to.

To perform this task, you create a column on the Employees page to enable the user to select a department. You then run the Employees report and add the Departments column to the report. The report settings are saved as the default.

Topics:

- Add a Column
- Display Column in the Report
- Save Report Settings as the Default

Add a Column

In order to filter the Employees report by department, add a Department column to the report.

To add a column:

- 1. Click on **Edit Page 3** in the Developer toolbar.
- Under Regions, right-click **Employees** and select **Edit**.

The Region Definition appears.

- **3.** Scroll down to Source.
- Replace Region Source with the following SQL:

```
SELECT e.EMPLOYEE ID,
  e.FIRST_NAME,
   e.LAST_NAME,
   e.HIRE_DATE,
   e.SALARY,
   e.COMMISSION_PCT,
   calc_remuneration(salary, commission_pct) REMUNERATION,
   e.DEPARTMENT_ID,
   d.DEPARTMENT_NAME
FROM OEHR_EMPLOYEES e,
   OEHR_DEPARTMENTS d
WHERE e.DEPARTMENT_ID=d.DEPARTMENT_ID
```

- 5. Click Apply Changes.
- **6.** Click **Apply Changes** to confirm.

The next section explains how to add the column to the report display and how to use this column to filter employee reports.

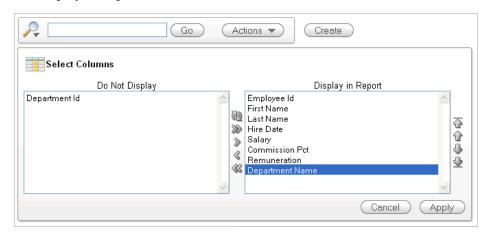
Display Column in the Report

When you first run this report, use the Select Columns action to add the Department Name column to the display. Once this column is visible on the report, make this report the default and filter by department.

To add the Department Name column to the report:

1. Click the **Run Page 3** icon.

- Click the **Actions** menu and select **Select Columns**.
- Move Department Name from the Do Not Display box to the last entry in the Display in Report box.



Click **Apply**.

The Employees Report is displayed and includes the Department Name column.



Next, make these report settings the default.

Save Report Settings as the Default

This section describes how to save the current report settings as the Primary Default report. Report settings are any setting made through the Actions menu including: selected columns, filters, sorting, rows per page, format setting such as sort control breaks, highlighting, and so on, and flashback.

Both developers and end users can save interactive reports. However, only a developer can save the report that initially displays, called the Primary Default report.

Once the default settings are saved, these columns are the default display in this report.

To save the current report settings as the default:

- Run the Employees report page.
 - The current report default does not include the Department Name column when the report is displayed.
- Click the **Actions** menu.

- **3.** Select **Save Report**.
- For Save, select **As Default Report Settings** from the list.
- Accept the Default Report Type setting, **Primary**, and click **Apply**.

Note: If a reset is performed on this page, these default report settings are used. The Department Name column is displayed by default.

Linking a Column Value to Another Page

In this exercise, you add a link to the Number of Employees column on the Departments report that navigates the user to the Employees report. It also sets the focus to the selected department. The column link includes a Clear Interactive Report command, CIR, to clear the Employees report, when shown, of any filters, control breaks, highlights, aggregates, computed columns, chart settings and flashback settings.

Topics:

- Change Column Value to a Link
- Run the Departments Report
- Create a Highlight to Test Clear Interactive Report Command

Change Column Value to a Link

To make this change, you edit the report attributes on the Departments report to change the value for the Number of Employees column to a link.

To change the column value to a link:

- 1. Click the **Application ID** link on the Developer toolbar.
- Click **2** -Departments.
- Under Regions, right-click **Departments** and select **Edit Report Attributes**. The Report Attributes page appears.
- Locate the Column Attributes section.
- In the Column Attributes section, click the **Edit** icon next to Number of Employees.
- **6.** Scroll down to the Column Link section.
- Under Column Link, make these changes:
 - a. Link Text Select #Number of Employees#.
 - **b.** Page Enter 3.
 - **c.** Select the **Reset Pagination** check box.
 - d. Clear Cache Enter:

3,CIR

The 3 means the cache for page 3 is cleared and the string CIR clears the Employees interactive report of any filters, control breaks, highlights,

aggregates, computed columns, chart settings or flashback settings when the report is displayed.

Note: If you want to reset the interactive report to the default report settings instead of clear the report, replace CIR with RIR. The last saved default report settings are applied to the interactive report.

Item 1, Name - Enter IR_DEPARTMENT_ID

By prefixing the item name with IR_, the URL item will be associated with an interactive report column rather than an item on the page.

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 of the Employees report.
- On the Employees report, the selected department is in focus.
- The Employees report is cleared. This means any filters, control breaks, highlights, aggregates, computed columns, chart settings or flashback settings are removed.
- The user is returned to the first set of employee records when the user selects another department.

Click **Apply Changes**.

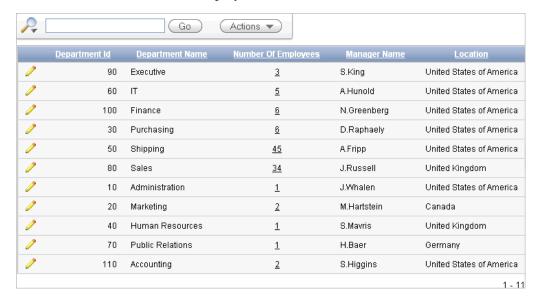
Note that in the Column Attributes section, the Number of Employees row contains a check mark in the Link column, reflecting the change you just made.

Run the Departments Report

Now, run the report and test the Number of Employees column link from the Departments report. The Employees report is displayed showing all employees that belong to the selected department.

1. Click the Run Page 2 icon.

The Departments report is displayed. Note that end users can now drill down on the data in the Number of Employees column.



2. In the Number of Employees column, click the 3 for the Executive row. All employees that belong to the Executive department appear in the Employees report.



The Department Id filter is displayed because this report is filtered by the Department Id value for the Executive department, 90, passed to this report from the Departments report. Notice the Clear Interactive Report command is included at the end of the URL in your browser, as shown in this example:

f?p=9257:3:3672543193352902::NO:RP,3,CIR:IR_DEPARTMENT_ID:90

Create a Highlight to Test Clear Interactive Report Command

This exercise demonstrates how to use the CIR command to clear a highlight before displaying the Employees report. To show this, you highlight any rows containing the first name of Neena, then display the Employees report from the Number of Employees column on the Departments report.

To highlight rows in the Employees report:

- 1. Click the **Actions** menu and select **Format** and then **Highlight**. The Highlight options appear.
- For Highlight options make these changes:
 - a. Name Enter Neena

- Background Color Select [yellow]
- Text Color Select [red]
- Column Select First Name
- Operator Select =
- Expression Select Neena
- Click **Apply**.

The Employees report appears with the row for Neena highlighted.



- Click the **Home** breadcrumb.
- Click **Departments** link.
- Click **Number of Employees** in the Executive row.

The Employees report is displayed with the highlighting cleared, due to the CIR command specified in the column link.

Next, remove the filters you just created.

- Click the **Remove Filter** icon to the right of **DepartmentID** = 90.
- **7.** Click **Application ID** on the Developer toolbar.

Adding a List of Values to the Employees Report

In this exercise, you add a list of values to the Employees page to display employees by department. You also change the Employees report query, edit the column link on the Department report, and turn off pagination.

Topics:

- Add a List of Values
- Add an Item to Display List of Values
- Change Employees Report Query
- Change Column Link on Department Report
- **Turning Off Pagination**

Add a List of Values

In this section, you create a list of values that is used to select which department details to view. This is a dynamic list that queries the OEHR_DEPARTMENTS table for a list of all the department names.

To create a list of values:

- 1. Click Shared Components icon.
- Under User Interface, select **Lists of Values**.
- **3.** Click the **Create** button.
- **4.** Accept the default, **From Scratch**, and click **Next**.
- **5.** For Name, enter DEPARTMENTS and select **Dynamic**.
- 6. Click Next.
- **7.** For the Query, enter the following SQL:

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

8. Click Create List of Values.

Add an Item to Display List of Values

Now, you create an item in the Department Details region to display the list of departments.

To add an item:

- 1. Navigate to the Page Definition for page 3, Employees.
- Under Region, right-click **Employees** and select **Create Page Item**.
- 3. Select Select List and click Next.
- **4.** For Create Item:
 - a. Item Name Enter P3_DEPARTMENT_ID
 - **b.** Sequence Enter 10
 - c. Region Select Employee (1) 10
 - d. Click Next.
- **5.** For Item Attributes:
 - a. Label Enter Department
 - **b.** Accept the remaining defaults and click **Next**.
- **6.** For Settings:
 - **a.** Value Required Select **No**.
 - **b.** Page Action when Value Changed Select **Redirect and Set Value**.
 - c. Click Next.
- **7.** For Identify List of Values, make these changes:
 - a. Named LOV Select **DEPARTMENTS**
 - **b.** Display Null Option Select **Yes**
 - **c.** Null Display Value Enter:
 - No Department Assigned -
 - d. Null Return Value Enter:

-1

- Click Next.
- Click Create Item.

Change Employees Report Query

Now, you change the Employees report query to display employees that belong to the selected department.

To change the query:

- Under Regions, right-click **Employees** and click **Edit**.
- Enter the following SQL for Region Source:

```
SELECT e.EMPLOYEE ID,
       e.FIRST_NAME,
       e.LAST_NAME,
       e.HIRE_DATE,
       e.SALARY,
       e.COMMISSION_PCT,
       calc_remuneration(salary, commission_pct) REMUNERATION,
       e.DEPARTMENT_ID,
      d.DEPARTMENT_NAME
 FROM OEHR_EMPLOYEES e,
      OEHR_DEPARTMENTS d
WHERE e.DEPARTMENT_ID = d.DEPARTMENT_ID(+) AND
       (e.DEPARTMENT_ID = :P3_DEPARTMENT_ID or
       (e.DEPARTMENT_ID is null and nvl(:P3_DEPARTMENT_ID,'-1') = '-1'))
```

Click **Apply Changes**.

Change Column Link on Department Report

Because the Employees query has changed, the Number of Employees column link needs to initialize the P3_DEPARTMENT_ID item to the value of DEPARTMENT_ID.

To change the column link for Number of Employees:

- **1.** Click the **Application ID** breadcrumb.
- 2. Click 2 Departments.
- Under Regions, right-click **Departments** and select **Edit Report Attributes**.
- Click the **Edit** icon for Number of Employees.
- 5. Scroll down to Column Link.
- **6.** For Item 1, select **P3_DEPARTMENT_ID**.
- Click **Apply Changes**.

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:

Click the **Application ID** breadcrumb.

- **2.** Click **3 Employees**.
- Under Regions, right-click **Employees** and select **Edit Report Attributes**.
- Scroll down to Pagination.
- For Pagination Type, select No Pagination Selected -.
- Click **Apply Changes**.
- Run the page. 7.
- From the Department list, select **No Department Assigned**.



Employee Kimberely Grant appears. This employee is not currently assigned to a department.

Tip: If no records initially display, reload the page and try again.

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:

- Navigate to the Application home page. Click **Application ID** on the Developer toolbar (at the bottom of the page).
- Click the **Edit Application Properties** button.

The Edit Application Definition page appears.

- **3.** Under Logo:
 - **a.** Logo Type Select **Text**.
 - **b.** Logo Enter AnyCo Corp.
 - **c.** Logo Attributes Select **Black Text** from the pop up list.
- 4. Click Apply Changes.
- Click the **1 Home**.
- Click the **Run Page** icon in the upper right corner.



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

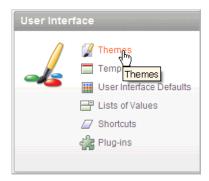
Switching Themes to Change the User Interface

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

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 the **Application** link on the Developer toolbar (at the bottom of the page).
- On the Application home page, click **Shared Components**.
- Under User Interface, click **Themes**.



First you need to select the theme from the Theme Repository and then switch to

- Select a theme from the Theme Repository:
 - **a.** On the Themes page, click **Create**. The Create Theme Wizard appears.
 - **b.** For Method, select **From the Repository** and click **Next**.

- **c.** For Identify Theme, select **Theme 22** and click **Next**.
- d. For Confirm, click Create.
- Switch to a new theme:
 - a. Click Switch Theme.
 - **b.** For Identify Theme, select **22. Bluejay** and click **Next**.
 - **c.** 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.

- **d.** For Confirm Switch, click **Switch Theme**.
- **6.** 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.

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:

- Collect your supporting object definitions (CREATE object statements, sample data, images, files, and so on). Review the Database Object Dependencies report to determine which supporting objects to move. See "Viewing Underlying Database Objects" 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.
- Export the application with its supporting objects.
- 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.

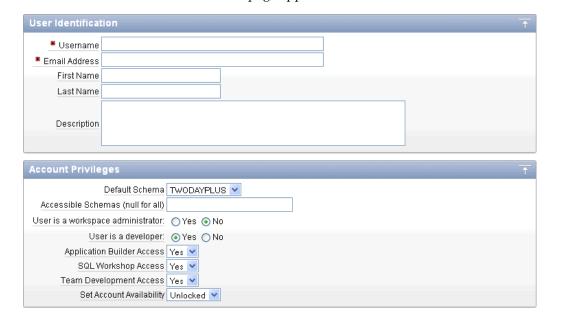
Creating End Users

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:

- Navigate to the Workspace home page.
- Click **Administration**.

- 3. Click Manage Users and Groups.
- **4.** Click the **Create User** button. The Create User page appears.



- **5.** Under User Identification, enter:
 - **a.** Username Enter the username used to log in to the system. Restrictions include:
 - Maximum length of 100 characters
 - No spaces
 - Only these special characters are permitted: ampersand (@) and period (.)
 - **b. Email Address** Enter the valid email address for this user.
 - **c. First Name** Enter the first or given name to further identify the user (optional).
 - **d.** Last Name Enter the last or family name to further identify the user (optional).
 - **e. Description** Enter comments about this user (optional).
- Under Account Privileges:
 - **a. Default Schemas** Specify the default schema used for data browsing, application creation, and SQL script execution.
 - When using workspaces that have more than one schema available, this schema is the default. This setting does not control security, only the user's preference.
 - Accessible Schemas (null for all) Leave this blank to enable the end user to access all applications in the workspace, or enter a colon-delimited list of schemas for which this user has permissions when using the SQL Workshop.
 - **User is a workspace administrator -** Specify if this user should have workspace administrator privileges.

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

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

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

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

7. Under Password:

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

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

For example:

http://127.0.0.1:8080/apex/f?p=108:1:1161480875580775

Where:

- 127.0.0.1 is the name of the system where Oracle XML DB HTTP server is installed.
- 8080 is the port number assigned to Oracle XML DB HTTP server.

- apex is the database access descriptor (DAD) defined in the configuration file.
- 108 is the application being called.
- 1 is the page within the application to be displayed.
- 1161480875580775 is the session number, which is unique for every user's access to the application. Do not include session numbers as a part of the URL communicated to end users.

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

http://127.0.0.1:8080/apex/f?p=108:1

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

About Globalization

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

Topics:

- About Language Identification and Rendering
- Specifying the Method for Global Identification

See also: "Managing Application Globalization" in *Oracle Application* Express Application Builder User's Guide

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:

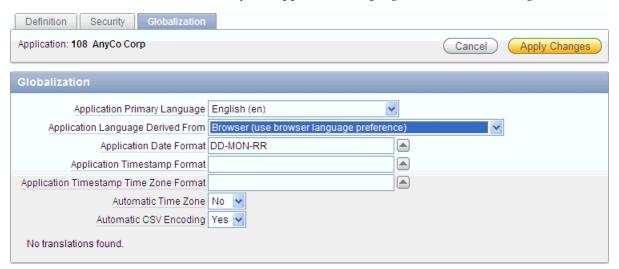
- Click **Application Builder** and then select the application.
- Click **Shared Components**.
- Under Globalization, click Globalization Attributes.
- Under Globalization, specify the following:

- **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.

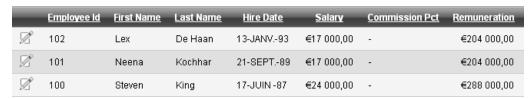
- Application Date Format Determines the date format to be used in the application.
- **d.** Application Timestamp Format Determines the timestamp format to be used in the application.
- **e.** Application Timestamp Time Zone Format Determines the timestamp with time zone format to be used in the application.
- **f.** Automatic Time Zone Controls the setting of the database session time zone. When set to Yes, the client time zone is derived from the client's Web browser and set for the duration of the Application Express session.
- **g.** 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).



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.

Specifying the Method for Global Identi	ification
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Next Steps

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

Note: Consider deleting the sample objects required to complete this tutorial, which will free up space in your workspace. For instructions, see "Deleting the OEHR Sample Objects Application" on page 3-4.

Additional Resources

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

Oracle Learning Library

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

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

Training Courses

You can attend training courses for Oracle Application Express. To review these courses, go to the following Web site and enter Application Express in the search criteria field:

http://education.oracle.com

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
- News and magazine articles related to Oracle Application Express

To access the Oracle Application Express page on OTN, go to the following Web site:

http://www.oracle.com/technetwork/developer-tools/apex/overview/index.h

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