



Integrated Cloud Applications & Platform Services



Oracle Application Express Workshop I

Student Guide – Volume II

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Unit III: Customizing Your Web Application

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Jack Designs Application Navigation

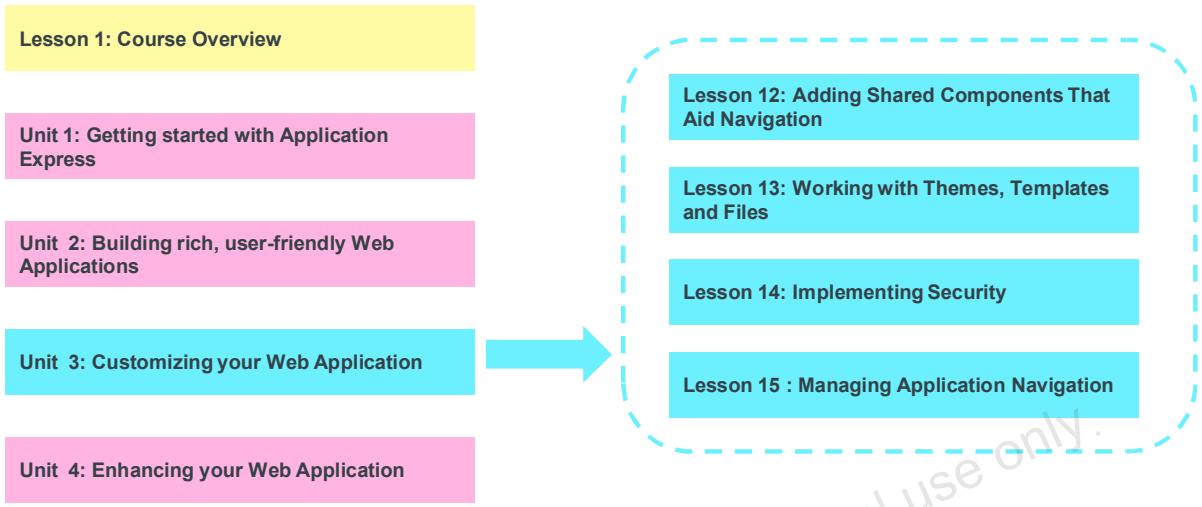


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Jack created the PTS application, which provides all the pages to meet the stated requirements. But, Jack finds that it is not too user-friendly in terms of accessing those features and, therefore, making PTS is not so impressive. Therefore, Jack starts customizing PTS with Oracle Apex.

Unit III Road Map



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In Unit 3, you include navigation in your application with the help of shared components. This unit also explains how to implement page-level authorization to make your application highly secure.

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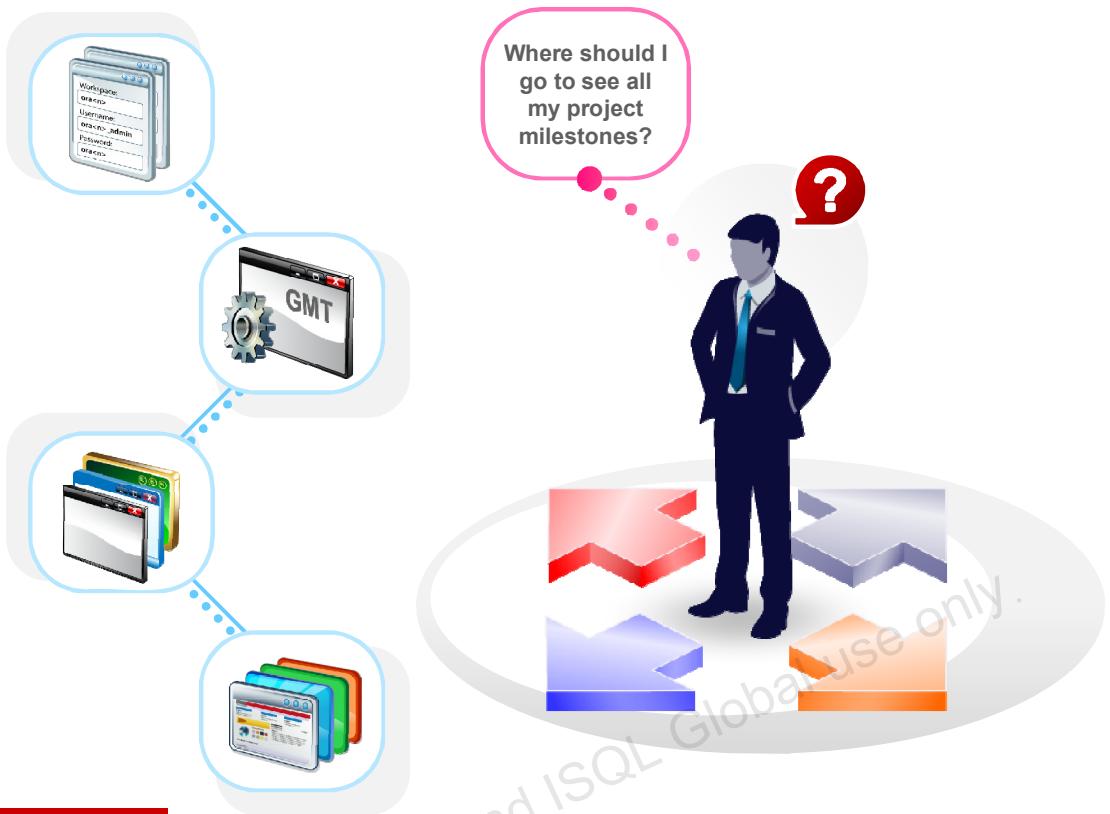
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Adding Shared Components That Aid Navigation

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Jack Builds a Navigation System into PTS



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Jack is very happy with the way PTS application has taken shape in recent days. But, he is finding it quite difficult to run the various pages that are built into PTS. Jack wants to make navigating through different pages more clear and user friendly.

You Are Here in This Course



Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 12: Adding Shared Components That Aid Navigation

Lesson 13: Working with Themes, Templates and Files

Lesson 14: Implementing Security

Lesson 15 : Managing Application Navigation

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In Unit 3, you include navigation in your application with the help of shared components. This unit also explains how to implement page-level authorization to make your application highly secure.

Objectives

After completing this lesson, you should be able to:

- Explain the use of shared components in an application
- Create and edit the following navigational shared components in an application:
 - Navigation Menu entries
 - Navigation bar entries
 - Lists and Breadcrumbs
 - Parent and standard tabs (Legacy)



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In this lesson, you learn how to create, edit, and use navigational shared components (tabs, navigation bars, lists, and breadcrumbs) in your application.

Lesson Agenda

- Introducing Shared Components
 - What Are Shared Components?
 - Navigational Shared Components
- Creating Navigation Menu entries
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar entries
- Understanding Tabs



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What Are Shared Components?

The screenshot illustrates the Oracle Application Express interface for managing shared components. On the left, the 'Shared Components' page is shown with various categories: Application Logic, Security, Navigation, User Interface, Data References, Reports, and Globalization. A red box highlights the 'Navigation' section, which includes 'List of Values', 'Plug-ins', 'Component Settings', and 'Shortcuts'. Another red box highlights the 'Data References' section, which includes 'Data Load Definitions' and 'Web Service References'. A callout labeled 'Navigation' points to the 'Navigation' section on the Shared Components page. A callout labeled 'Page Designer' points to the 'Page Shared Components' section on the right, which lists components like 'Lists', 'Authorizations', 'Build Options', 'Data Load Tables', 'Web Service References', 'Breadcrumbs', 'Navigation Menu', 'Templates', 'Page', 'Region', and 'Report Layouts'. A callout labeled 'Shared Components icon' points to the orange circular icon in the top right corner of the Page Shared Components section.

Shared Components page

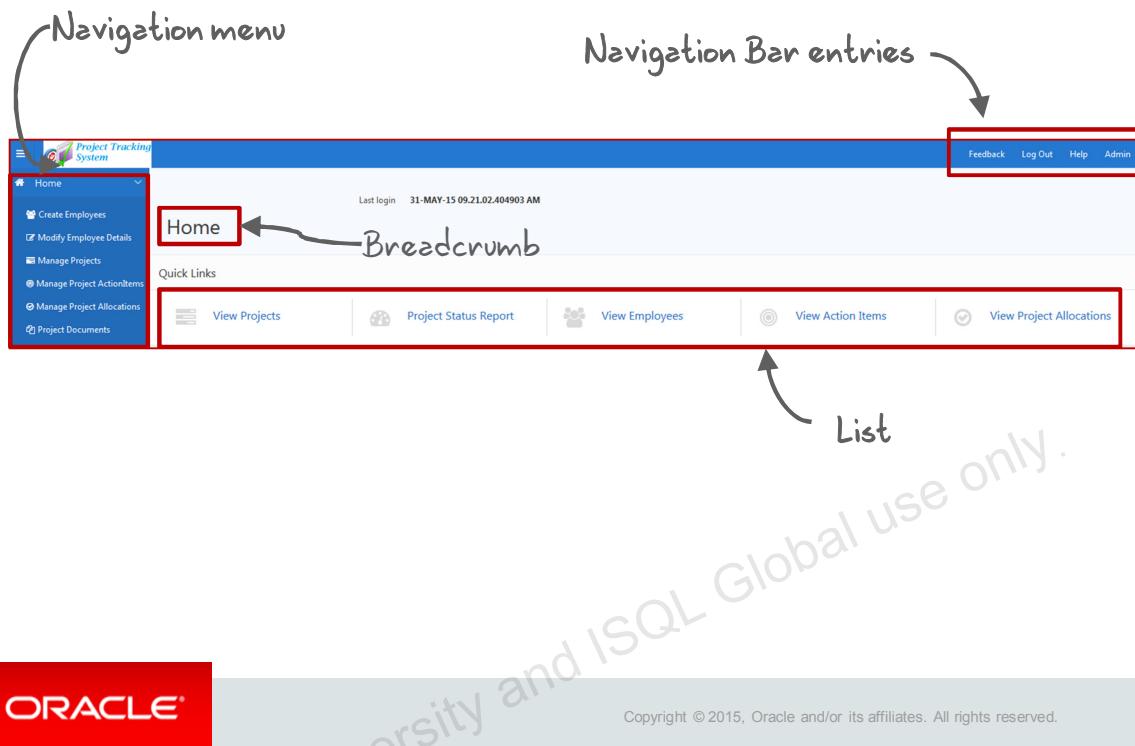
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Shared components are components that can be included on one or more pages of your application. The Shared Components Page screenshot in the slide shows the categories of shared components that you can include in your application.

In the Shared Components section of a page's definition (shown in the Page Definition screenshot in the slide), you can view the shared components that are included on that page.

In this lesson, you learn how to create navigational shared components: tabs, lists, breadcrumbs, and navigation bar entries.

Navigational Shared Components



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An application typically uses a combination of tabs, navigation menus, lists, navigation bars, and breadcrumbs.

- Navigation Menu is provided with Universal Theme by default and it is used to provide navigation between major components of the application.
- A list is a collection of links. Each list entry is associated with a page.
- Breadcrumbs are a hierarchical list of links. They show you where you are within the application.
- A navigation bar is used to link text or an image to a page. You need not reference it on every page (as you must do with the other navigational shared components). An application can have only one navigation bar.
- Tabs are used to provide navigation between the major components of an application. These are supported only by the tab-based themes, which are legacy themes.

The slide shows the Sample Application interface. Home, Create Employees, Modify Employee Details, Manage Projects, Manage Project Action Items, Manage Project Allocations, Project Documents, and PTS Admin are the Navigation Menu entries. Help, Feedback, and Logout links at the top-right of the page are the navigation bar entries. Home > is the breadcrumb used to go back and forth between the pages within the application's major components. The Quick Links on the top of the page is a list. Thus, you can use a combination of navigation menu entries, lists, navigation bar entries, and breadcrumbs to navigate within an application.

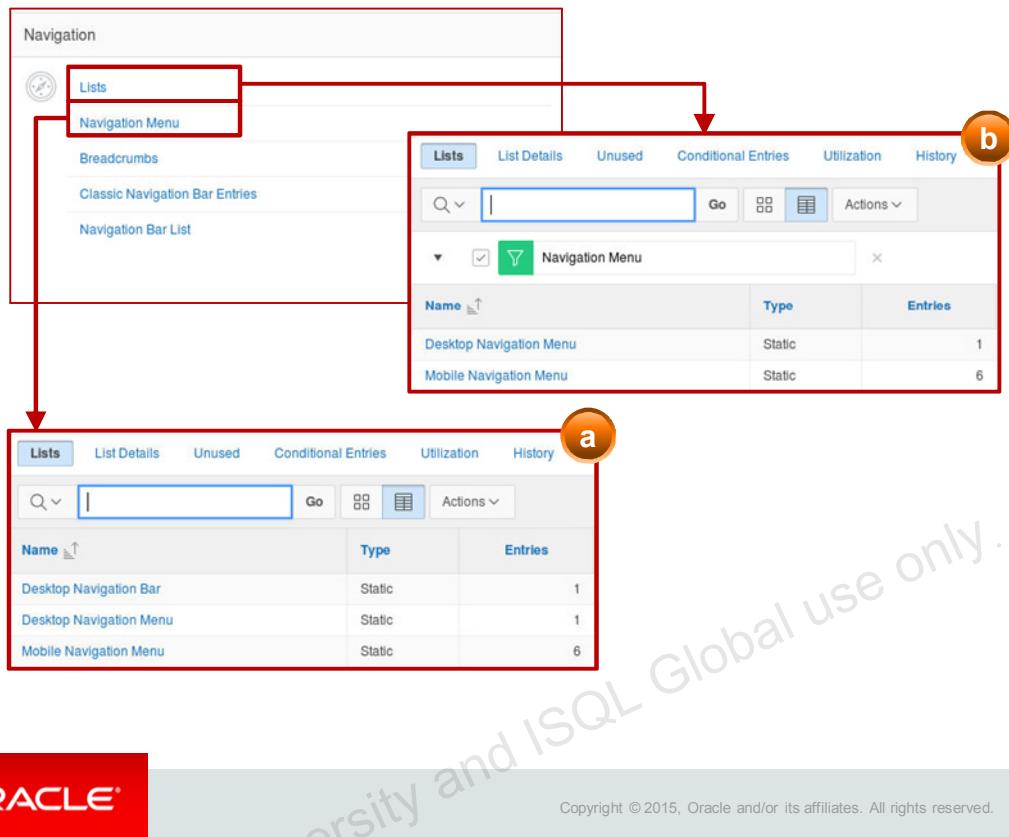
Lesson Agenda

- Using Shared Components
- Creating Navigation Menu Entries
 - Accessing Navigation Menu page
 - Creating Navigation Menu entries
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar
- Understanding Tabs



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Accessing Navigation Menu Page



To access Navigation Menu shared components:

1. Navigate to the application home page.
2. Click **Shared Components** icon on the application's home page.
3. Locate **Navigation** group and click **Navigation Menu**.

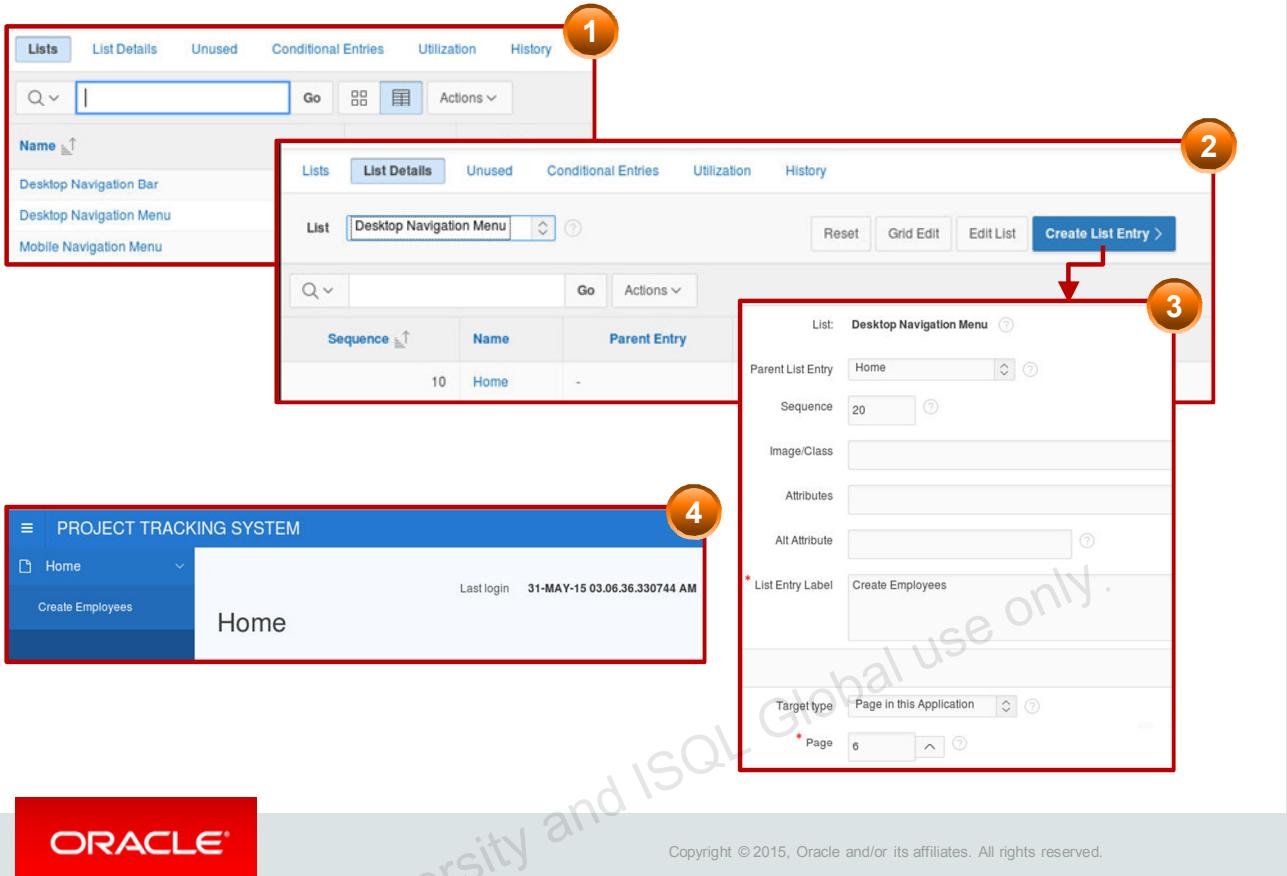
Alternatively, you can access it by following these steps:

1. Navigate to the application home page.
2. Click **Shared Components** icon on the application's home page.
3. Locate **Navigation** group and click **Lists**.

Because Jack created the PTS application as a Desktop application and later added a Mobile interface to it, Jack sees two navigation menus already created in PTS shared components. They are:

- Desktop Navigation Menu
- Mobile Navigation Menu

Creating Navigation Menu Entries



To create new Navigation Menu entries:

1. Navigate to the application home page.
2. Click **Shared Components** icon on the application's home page.
3. Locate **Navigation** group and click **Navigation Menu**.
4. Click **Desktop Navigation Menu** and then **Create List Entry**.
5. Enter details such as **Parent List Entry**, **List Entry Label**, **Target Type**, and **Target Page** details.

Jack creates new Navigation Menu entries for the PTS application such that all the Forms have an entry in the navigation menu. The Project managers can click any menu item to access the corresponding form to manage details about Projects, Employees, Action Items and so on.

Lesson Agenda

- Using Shared Components
- Creating Navigation Menu Entries
- Creating Lists
 - Accessing the Lists Page
 - Creating a Static List
 - Creating a List Entry
 - Creating a List Region
 - Creating a List Region on Global Page
- Creating Breadcrumbs
- Creating a Navigation Bar
- Understanding Tabs



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Accessing the Lists Page

Name	Type	Entries
Desktop Navigation Bar	Static	1
Desktop Navigation Menu	Static	6
Mobile Navigation Menu	Static	6

A list is a collection of links. Each link is called a list entry. For each list entry, you must specify the display text, a target URL, and other attributes that control when and how the entries in the list are to be displayed.

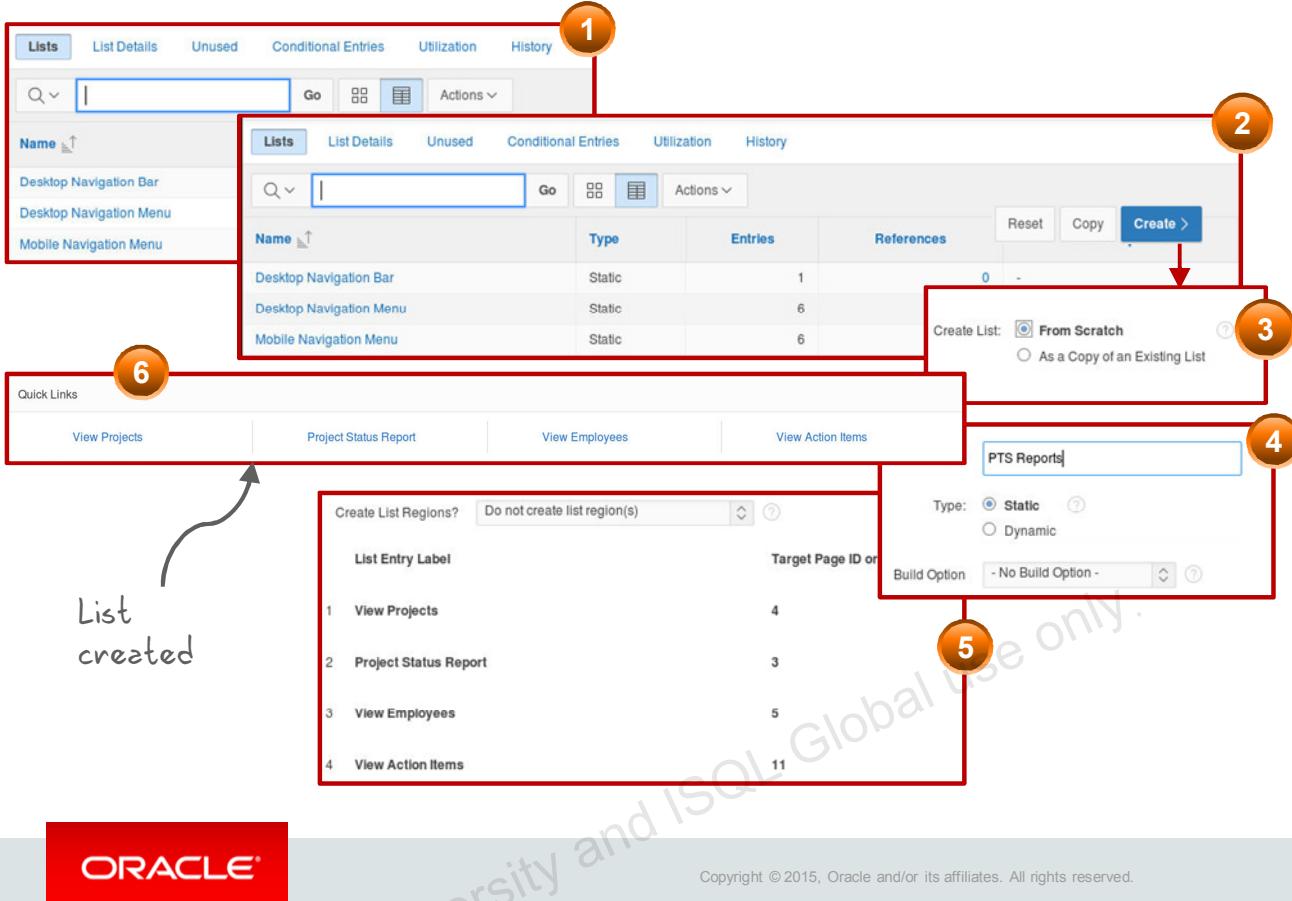
To access the Lists page, perform the following steps:

1. On the application home page, click the Shared Components icon.
2. On the Shared Components page, click the Lists link in the Navigation pane.
3. The Lists page is displayed. Existing Lists, if any, are displayed on the Lists tab. You can create a new list or copy a list from another application. (The other application must reside in the same workspace.)

Alternatively, perform the following steps:

1. On the Application home page, click a page.
2. In the Shared Components tab in the page definition, right-click the Lists node and select Create.
3. The Create List Wizard appears.

Creating a Static List

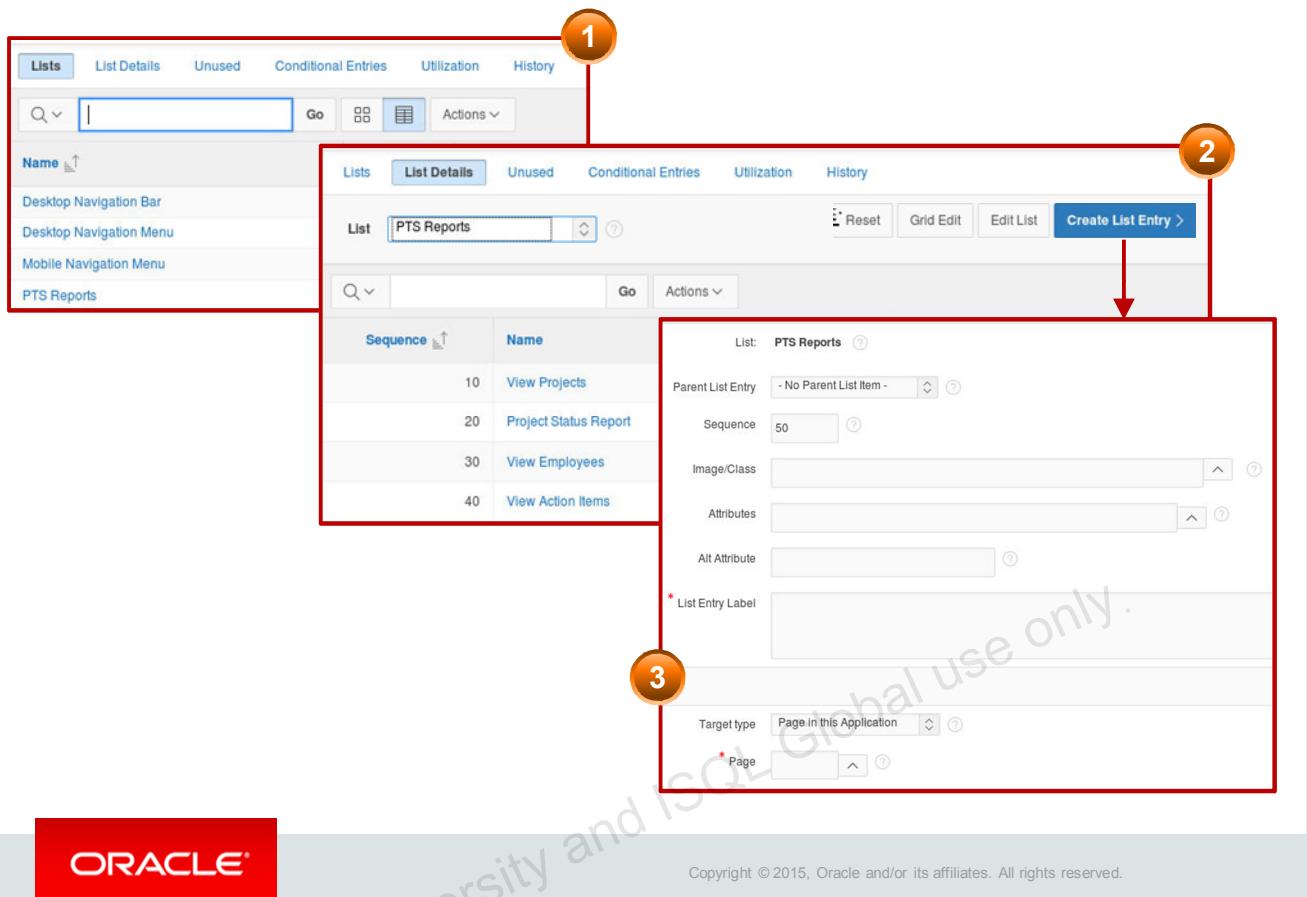


To create a static list, click the Create button on the Lists page and perform the following steps:

1. Ensure that From Scratch is selected and click Next.
2. Enter a name for the list. Accept the other defaults and click Next.
3. Enter the text for the list entries and specify the page number that you want to link with each entry. Click Next.
4. The static list is created. You can edit the list to add additional list entries.
5. A list region must be created on a page to display the list. Usually, it is done on the Home Page.
6. You can create a list region on the current page while creating the List itself.
7. Alternatively, a list region can be created separately on the page where you want to display the list.

Jack creates a static list with links for all the reports generated from PTS and creates a list region to display this list on the Home Page. This enables the PTS users to access any Report by clicking the links on the list directly.

Creating List Entries



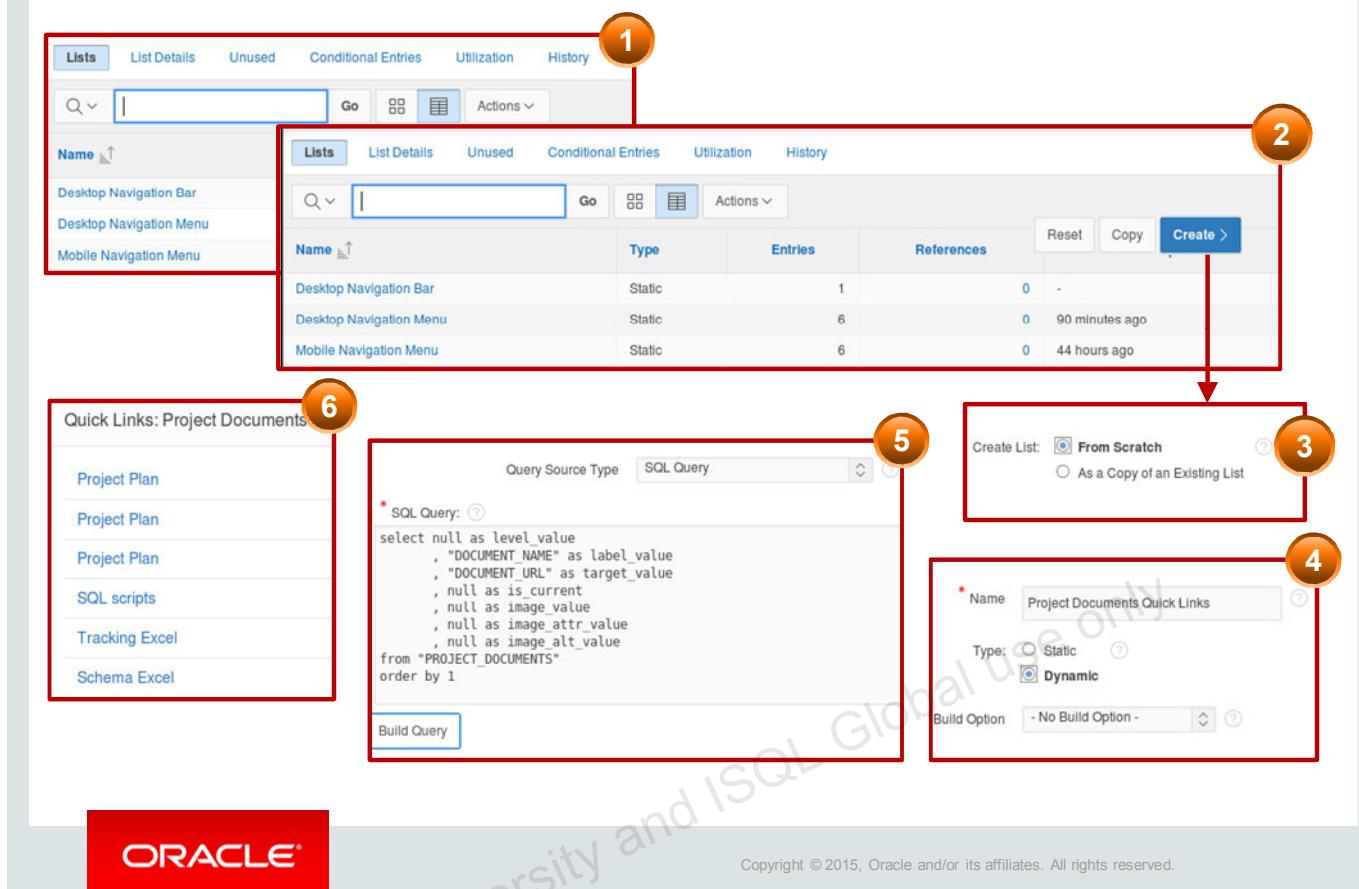
After you create a list, you can populate the list. You can also create new list entries in lists that are already populated. To create a list entry, perform the following steps:

1. Click Create List Entry on the Lists page.
2. Enter the text for the link in the List Entry Label field. On the Target tab, enter the page that you want to associate this list entry with. Click Create.

The list entry is created.

Note: On the Entry tab, if you select a list item for the Parent List Entry field, you can create a hierarchical list.

Creating a Dynamic List



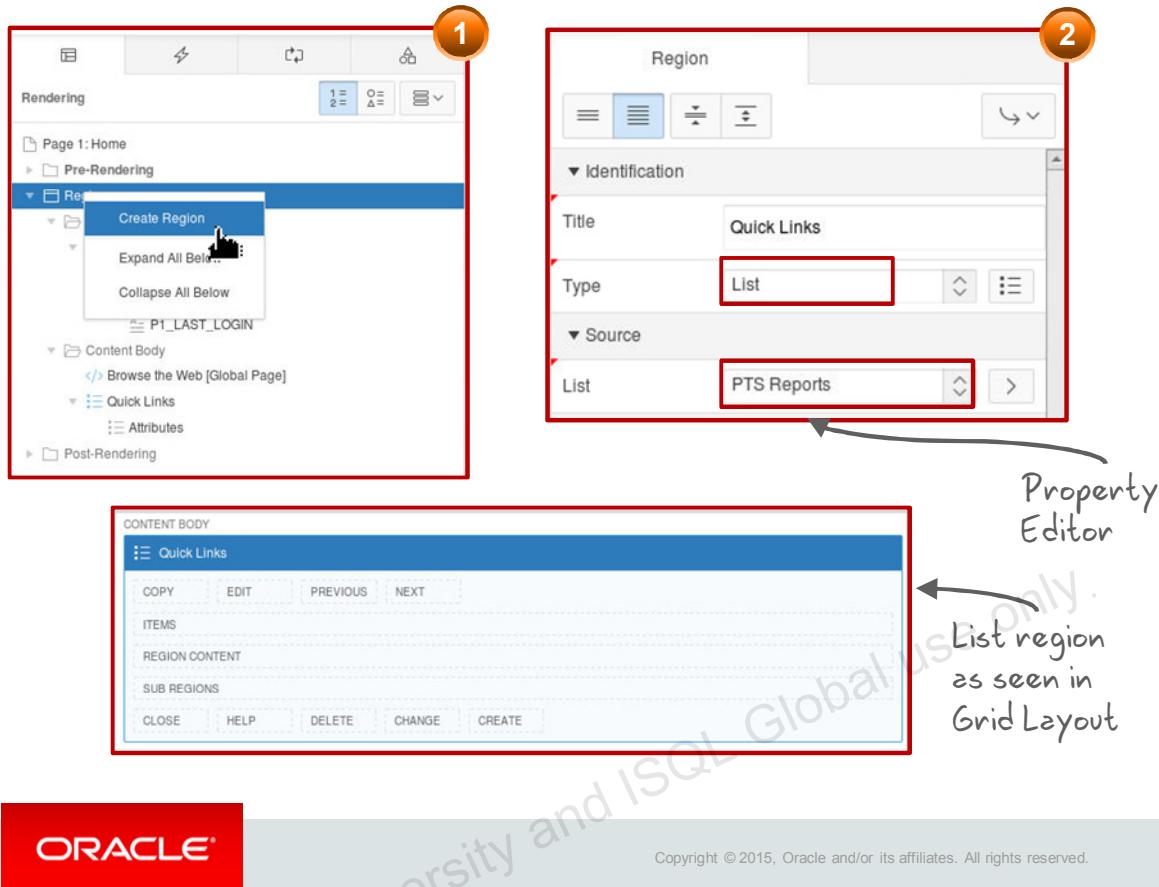
To create a dynamic list, click the Create button on the Lists page and perform the following steps:

1. Ensure that From Scratch is selected and click Next.
2. Enter a name for the list and select Dynamic for Type and click Next.
3. Enter the SQL Query to create the list and click Next. You can view examples of SQL queries by clicking the Examples link at the bottom.
4. You can create a list region on the current page. In this example, you accept the defaults and click Create.

The dynamic list is created. You can edit the query to modify the list entries.

Jack creates a dynamic list with links for all the project documents maintained in PTS applications and creates a list region to display this list on the Project Documents page. This enables PTS users to access any project document by clicking the links on the list directly.

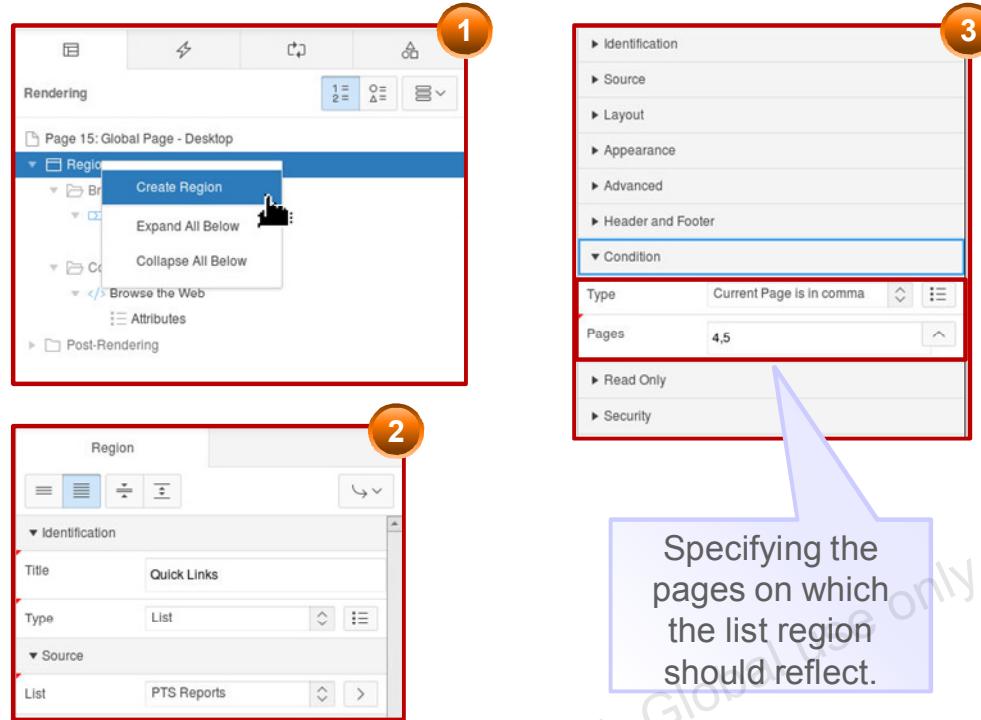
Creating a List Region



After you create a list and populate it with values, you can add the list to a page. To add the list to a page, navigate to the page's definition and perform the following steps:

1. Under Rendering, right-click Regions and click Create Region.
2. In the Property Editor of this new region, select the Type as List option and select the list from the List drop-down list.
Note: You see the list option in the List region property editor only if the application already has a list.
3. (Optional) Specify any conditions for the display of the region.
4. The list region is created on the page.

Creating a List Region on Global Page



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To display a list on a page, you must create a list region. You can either create separate list regions on individual pages or you can create a list region in global page so that it appears on all the pages. You can even specify the pages that should reflect the list region.

To create a list region, from the page definition for global page, right-click the Regions node and click Create Region. Select List in the Property Editor of the new Region. Update other properties such as Title, Position on the page and so on. The list region is created.

To specify the pages on which the list region should be displayed, select the list region node and click the Condition tab in its Property Editor. Select "Current Page is in comma delimited list" and select the pages in which you want this list region to be appeared using the pop-up LOV.

If you run the application, you should see the list region on the pages that you specified.

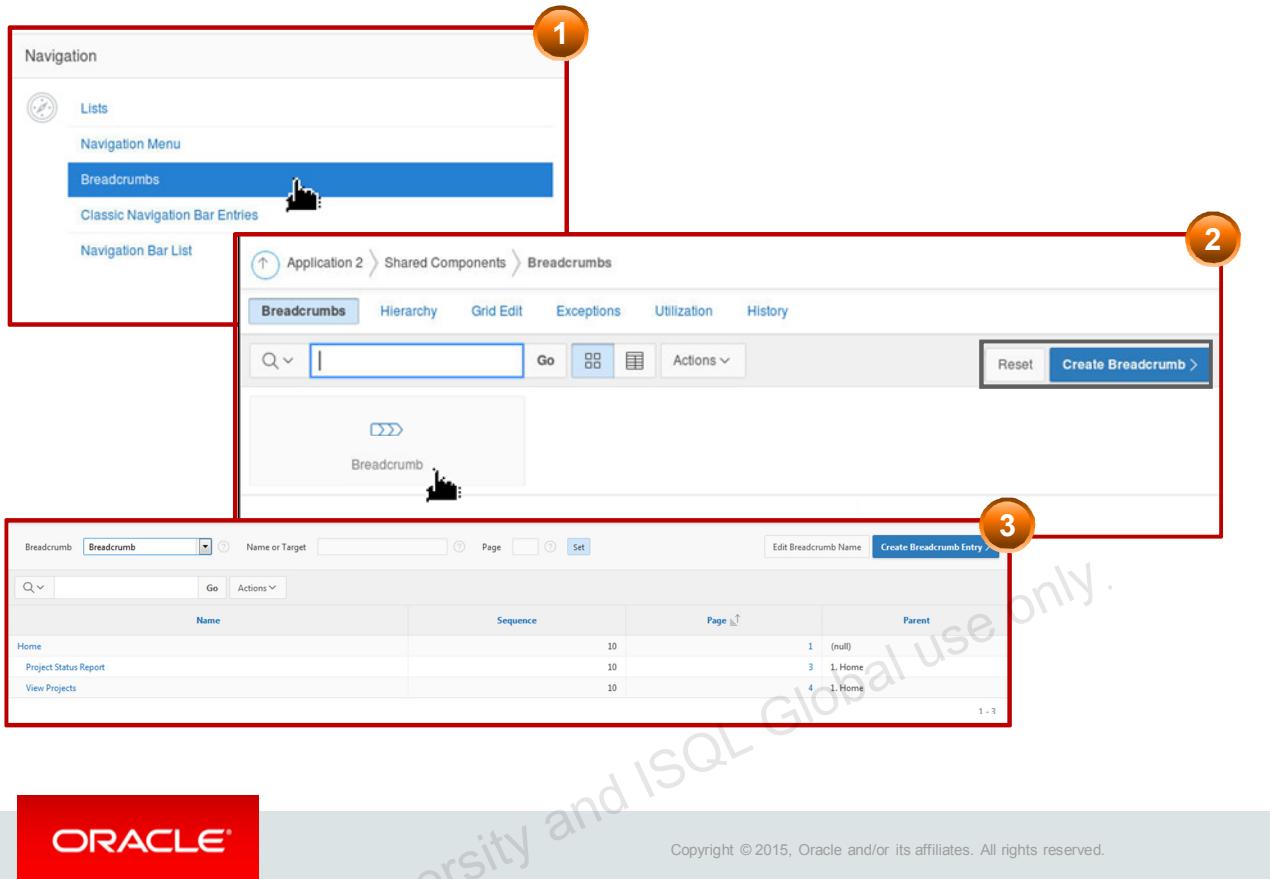
Lesson Agenda

- Using Shared Components
- Creating Navigation Menu Entries
- Creating Lists
- Creating Breadcrumbs
 - Viewing a Breadcrumb
 - Creating Breadcrumb Entries
 - Reparenting Breadcrumbs
 - Creating a Breadcrumb Region
- Creating a Navigation Bar
- Understanding Tabs



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Viewing a Breadcrumb

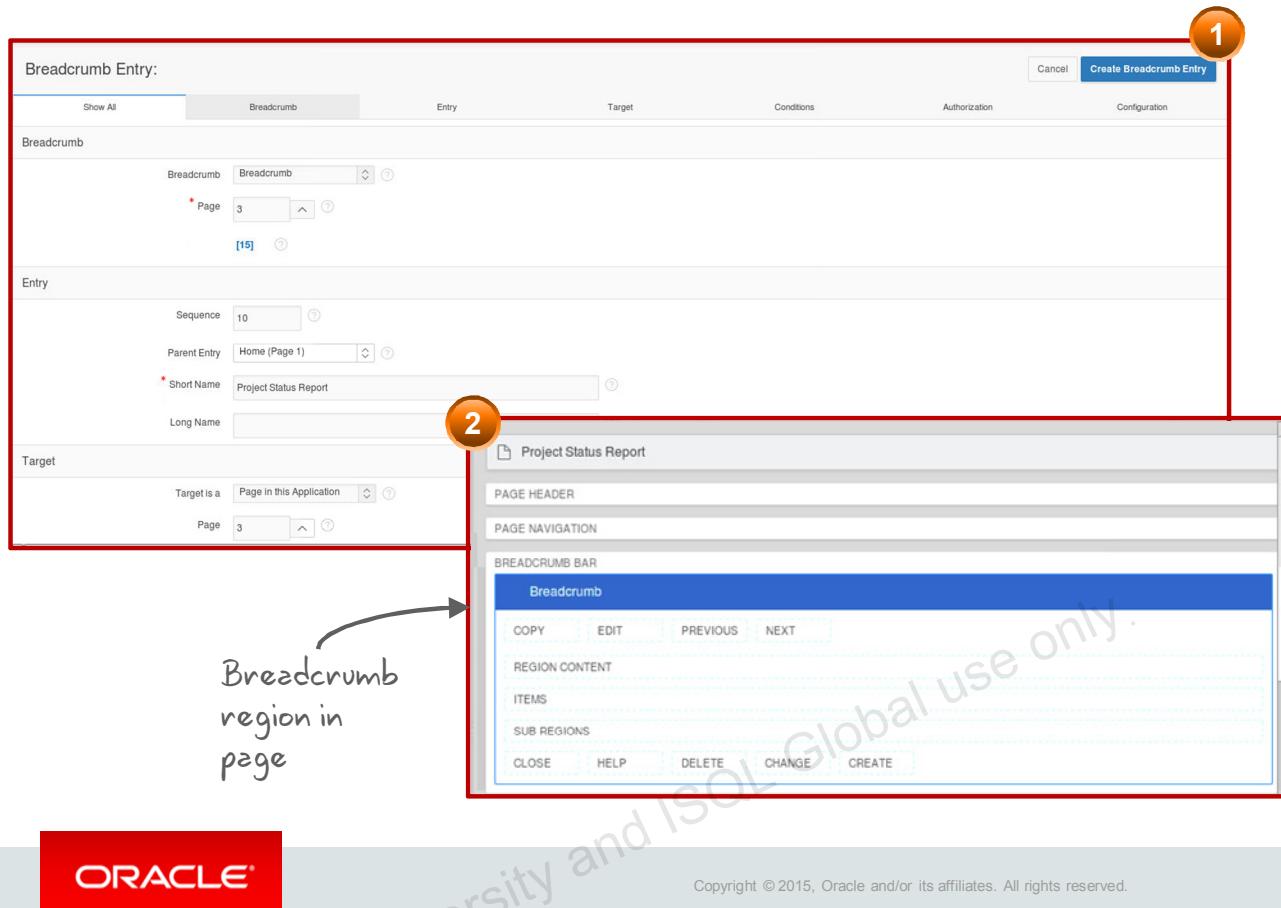


A breadcrumb is a hierarchical list of links. It shows you where you are within the application. You can click a specific page name link to view that page immediately. The breadcrumb path is displayed below the Navigation Bar at the top of each page. You can define the Breadcrumb region in global page so that it appears on all pages or on each page individually. Conditions can be defined to exclude the breadcrumb region from specific pages where they are not to be displayed, such as pop-up LOV pages.

By default, each application contains one breadcrumb. The breadcrumb contains multiple breadcrumb entries. The Create Page Wizard provides an option to create a breadcrumb entry. To view the breadcrumb for an application, perform the following steps:

1. On the Shared Components page, click the Breadcrumbs link in the Navigation pane.
2. On the Breadcrumbs page, the existing breadcrumb is listed. Click the icon to view the breadcrumb entries for the breadcrumb. To create a new breadcrumb, click the Create Breadcrumb button.
3. The Breadcrumb Entry page appears where you can define the page details for which a Breadcrumb entry is required.
4. Alternatively, you can create a breadcrumb entry for a page while creating the page using the Create Page Wizard itself.

Creating Breadcrumb Entries



To create a new entry in a breadcrumb, click the breadcrumb icon on the Breadcrumbs page. The Entries page appears. Click the Create Breadcrumb Entry button. A Create/Edit page appears (shown in the slide).

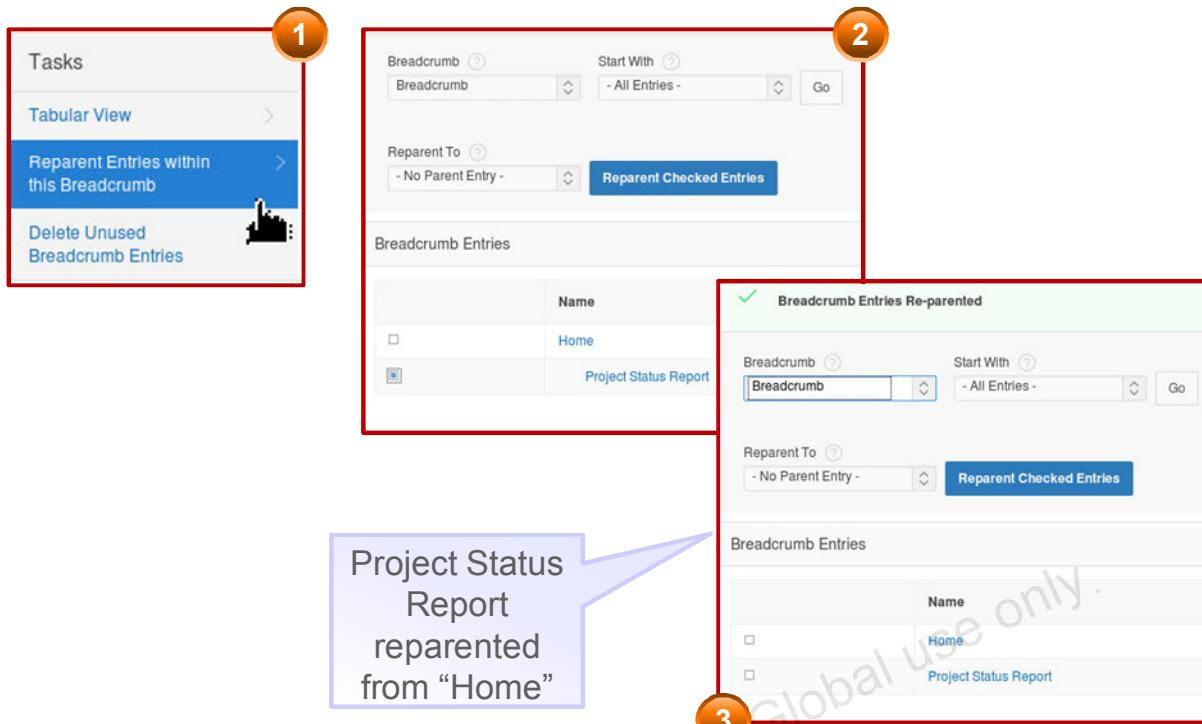
In the Breadcrumb section, ensure that the required breadcrumb is selected for the Breadcrumb field. For the Page field, enter the page on which you want the breadcrumb to appear.

In the Entry section, enter the name for the entry. You can also specify a parent entry for the entry that you are creating.

In the Target section, specify the page that should appear when the entry is clicked.

You have an option to change the title of the referenced page to the same as the breadcrumb name. To do this, select the check box for "Page Name and Title" in the Synchronize Breadcrumb With section (in the lower-left corner of the page).

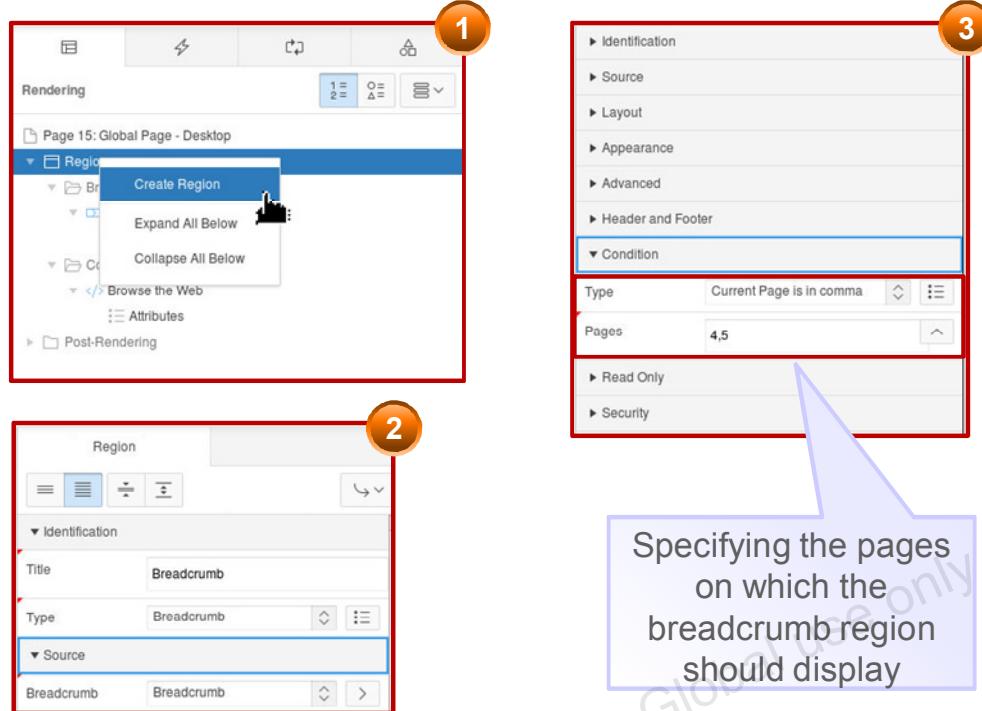
Reparenting Breadcrumbs



You can change the parent entry for one or more breadcrumb entries. To reparent the breadcrumb entries, perform the following steps:

1. On the Breadcrumb page, select “Reparent Entries within this Breadcrumb” from the Tasks menu (in the bottom-left corner of the page).
2. Select a parent entry for the Reparent To field. Select the check box for each breadcrumb that you want to reparent. Click the Reparent Checked Entries button. The entry is now listed under the new parent.

Creating a Breadcrumb Region



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To display a breadcrumb on a page, you must create a breadcrumb region. You can either create separate breadcrumb regions on individual pages or you can create the breadcrumb region in global page so that it appears on all the pages. The breadcrumb appears on the page when the application is run only if a breadcrumb was created for that page from Shared Components. You can even specify the pages that should display the breadcrumb.

To create a breadcrumb region, from the page definition for global page, right-click the Regions node and click Create Region. Select Breadcrumb in the Property Editor of the new Region. Update other properties such as Title, Position on the page and so on. The breadcrumb region is created.

To specify the pages on which the breadcrumb region should be displayed, select the breadcrumb region node and click the Condition tab in its Property Editor. Select "Current Page is in comma delimited list" and select the pages in which you want this breadcrumb region to be appeared using pop-up LOV.

If you run the application, you should see the breadcrumb region on the pages that you specified.

Note: On the page that you specified, a breadcrumb entry should have been created.

Lesson Agenda

- Using Shared Components
- Creating Navigation Menu Entries
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar
 - Accessing the Navigation Bar Entries Page
 - Creating a Help Page
 - Creating a Navigation Bar Entry
- Understanding Tabs



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Accessing the Navigation Bar Entries Page

The screenshot shows two pages from the Oracle Application Express interface. The top page is a sidebar titled 'Navigation' with links for 'Lists', 'Navigation Menu', 'Breadcrumbs', and 'Classic Navigation Bar Entries'. The 'Classic Navigation Bar Entries' link is highlighted with a blue bar and a cursor icon. A red arrow points down to the bottom page. The bottom page is titled 'Application 2 > Shared Components > Lists' and shows a table of navigation bar lists. The table has columns: Name, Type, Entries, References, Entries Updated, List Updated, Navigation Bar, and Navigation Menu. One row is visible: 'Desktop Navigation Bar' (Type: Static, Entries: 1, References: 0, Navigation Bar: Yes, Navigation Menu: No). The table has a footer '1 - 1'.

Name	Type	Entries	References	Entries Updated	List Updated	Navigation Bar	Navigation Menu
Desktop Navigation Bar	Static	1	0	-	-	Yes	No

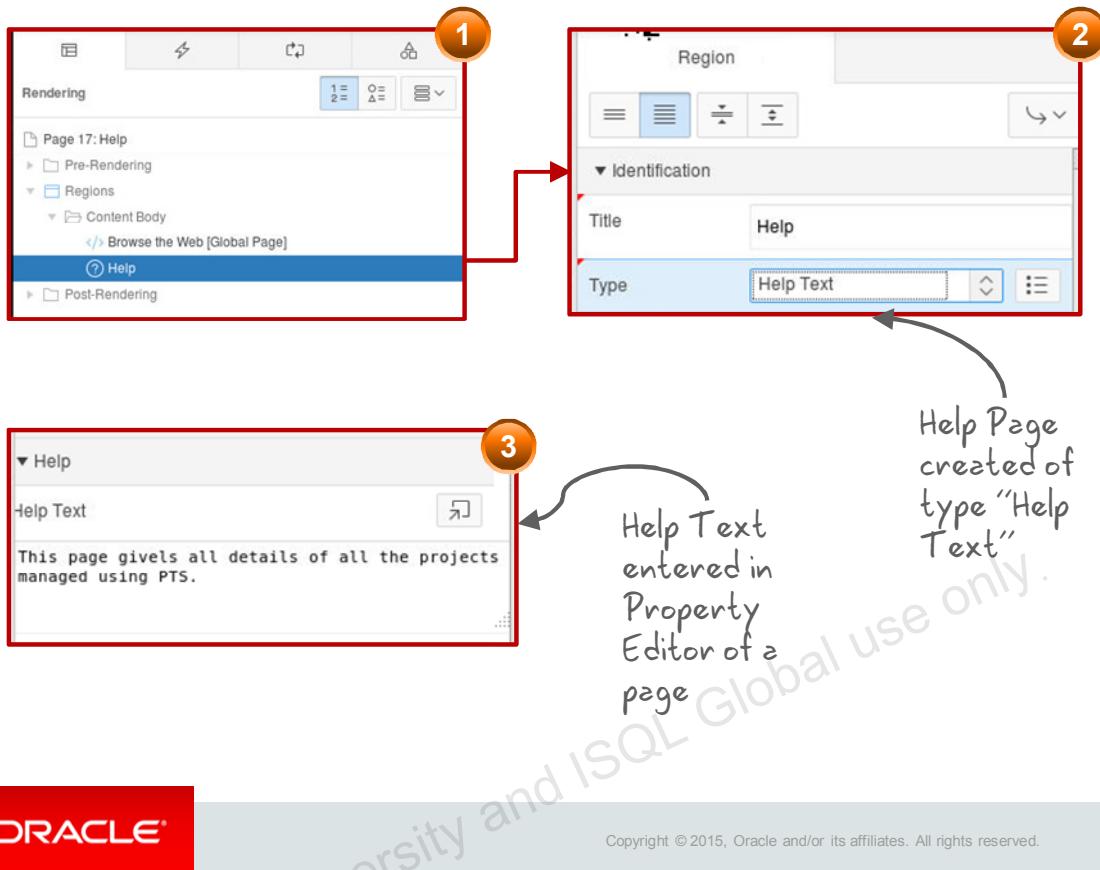


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Each application can have only one navigation bar. The items inside the navigation bar are called navigation bar entries. Some of the typical situations where you use navigation bars are accessing the home page and linking to a Help page. The location of the navigation bar depends on the associated page template. You use text or images when you create a navigation bar icon.

If you click the Navigation Bar Entries link from the application's Shared Components page, you can view the navigation bar entries for the application.

Creating a Help Page



In the next slide, you create a Help navigation bar entry. Before you do that, however, you must create a Help page in the application. Create a blank page and perform the following steps:

1. In the page definition of the blank page, right-click the Regions node and select Create Region.
2. Select Help Text as Type in its Property Editor.
3. Enter a title for the help region in the property editor.
4. This page cannot be run directly. To view the Help Text for any page, Help Text has to be entered on that page separately.
5. For example, if any Page 3 has a value entered in "Help Text" under the Help tab in its Properties Pane on the right side, this value will be displayed when the Help Page link is clicked from this page.

The Help page with a Help Text region is created. When this page is accessed, the page help and item help (if any) are displayed.

Creating a Navigation Bar Entry

Screenshot 1: Navigation Bar List page. A red box highlights the 'Desktop Navigation Bar' entry in the grid. A circled '1' is in the top right corner.

Name	Type	Entries	References	Entries Updated
Desktop Navigation Bar	Static	1	0	-

Screenshot 2: List Details tab of the Desktop Navigation Bar entry. A red box highlights the entry details. A circled '2' is in the top right corner.

Sequence	Name	Parent Entry	Target	Conditional	Updated
10	Log Out	-	&LOGOUT_URL.	-	-

Screenshot 3: Application's navigation bar. A red box highlights the 'Help' link. A circled '3' is in the top right corner. A callout points from the 'Help' link to the text 'Navigation Bar entries'.

Navigation Bar entries

Steps to create a new navigation bar entry:

1. Navigate to the application's Shared Components.
2. Click Navigation Bar List in the Navigation pane.
3. Click Desktop Navigation Bar and click Create List Entry.
4. Enter the values for List Entry Label, Target Type, and Target Page.
5. Enter &APP_PAGE_ID. for Request and click Create List Entry by retaining default values for other fields.

Run the application and click the Help link in the navigation bar to read its Help Text.

Jack creates Help Text for all the pages created in PTS and adds a Help navigation bar entry so that new users to PTS can get help on each page in the application.

Quiz



Which shared components would you use to create a shared collection of links on a page?

- a. Breadcrumbs
- b. Lists
- c. Navigation bar entries
- d. Tabs

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Answer: b

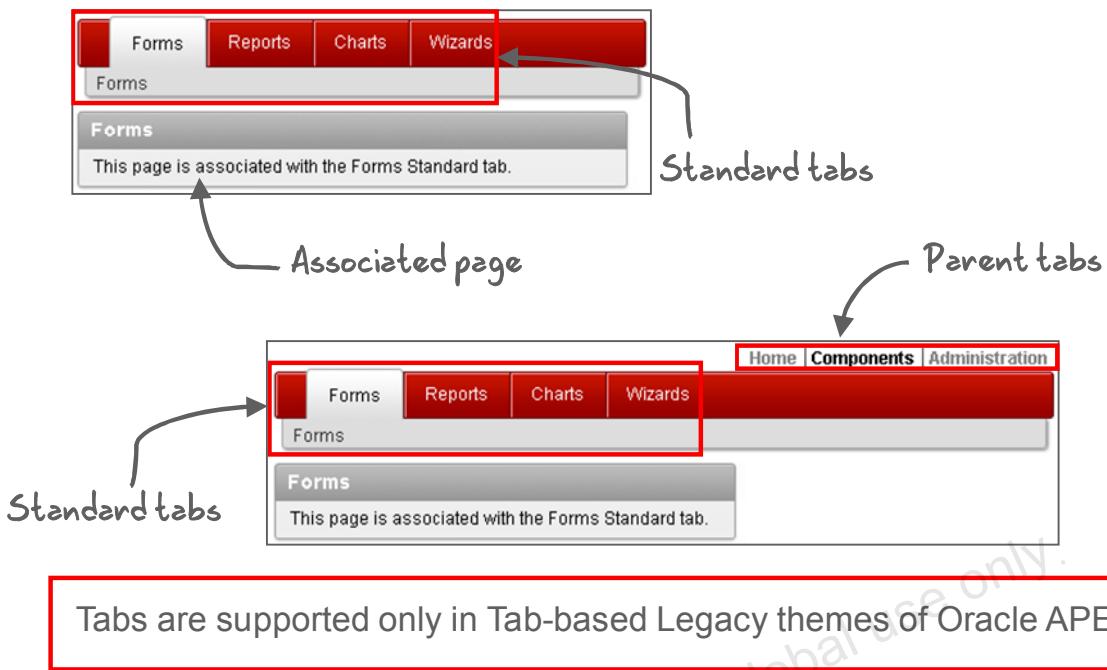
Lesson Agenda

- Using Shared Components
- Creating Navigation Menu Entries
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar
- Understanding Tabs



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Understanding Tabs in Oracle Application Express



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You create tabs to provide navigation within the major components of an application. Tabs are positioned at the top section of an application. When you click a tab, it displays the associated page.

In Oracle Application Express, you can create two types of tabs: parent and standard. If you want only one level of tabs in your application, you must create a standard tab set. Each tab is associated with a specific page. If you want two levels of tabs, you must create a parent tab. The parent tab displays a page, which has its own standard tab set.

You must make sure that your application template and page template support the type of tab that you create for an application. For example, if you create a two-level tab set with parent and standard tabs, you must ensure that the application page template has a two-level tabs option selected. Also, you must ensure that the page-level template does not override the application-level template. You learn how to view template properties and edit them in the lesson titled “Working with Themes, Templates, and Files.”

Practice12 Overview: Adding Shared Components That Aid Navigation

This practice covers the following topics:

- Creating lists and list regions
- Creating and editing navigation menu
- Creating a Help page and adding a navigation bar entry
- Adding breadcrumbs to an existing page

Summary

In this lesson, you should have learned how to:

- Provide an overview of shared components
- Include the following shared components in your application:
 - Navigation Menu and its entries
 - Lists
 - Breadcrumbs
 - Navigation bar and its entries
 - Parent and standard tabs



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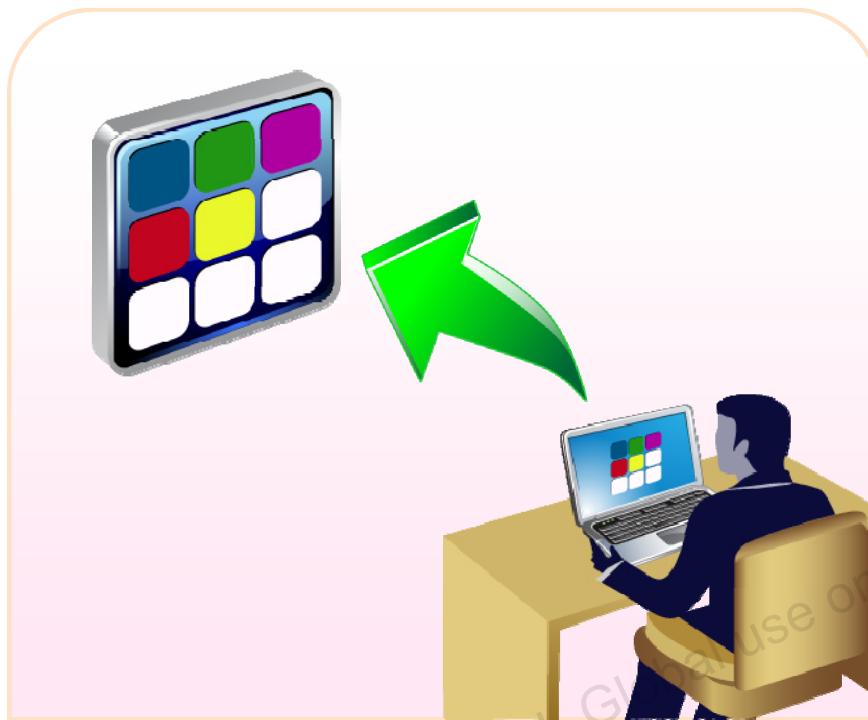
In this lesson, you learned how to create, edit, and use navigational shared components in your application.

Working with Themes, Templates, and Files

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Jack Works with Application User Interface

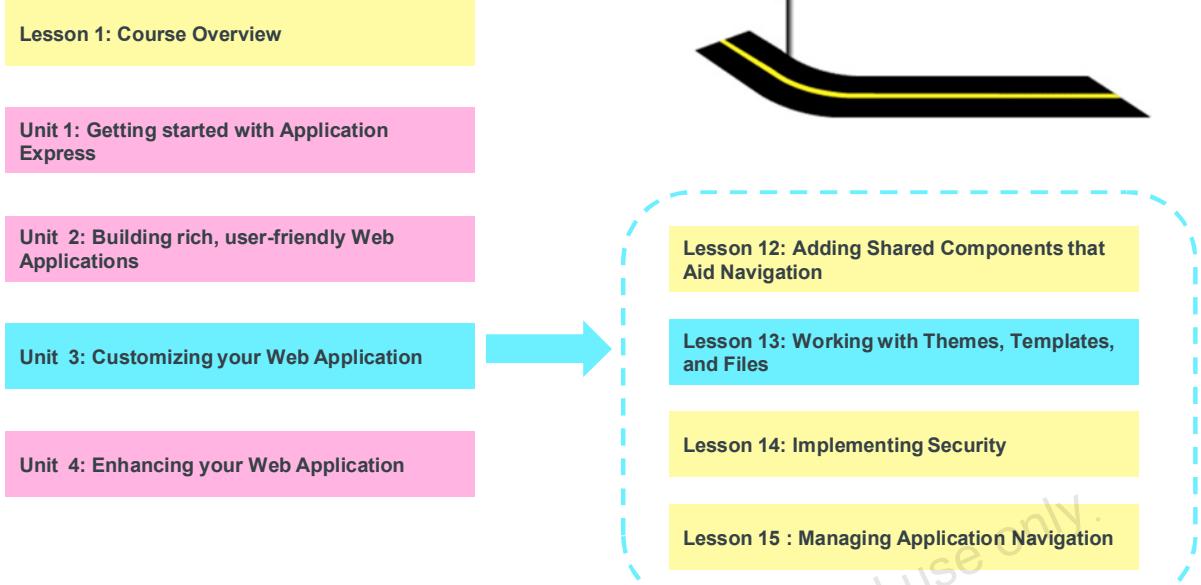


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Now that the functionality part of the PTS application is ready, Jack is looking to work on the look and the feel of the application. He explores the various themes available in APEX that he can use to enhance the user experience of the PTS application.

You Are Here in This Course



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This slide shows a graphical representation of the entire course highlighting the lesson which is dealt with in these slides.

Objectives

After completing this lesson, you should be able to:

- Define themes and their uses
- Create a new theme from the repository
- Switch to a different theme
- Explain Universal Theme and Theme Roller
- Define templates and their uses
- View existing templates
- Create and edit a template
- Upload and use a cascading style sheet and an image



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This lesson provides an overview of the themes and templates provided by Oracle Application Express.

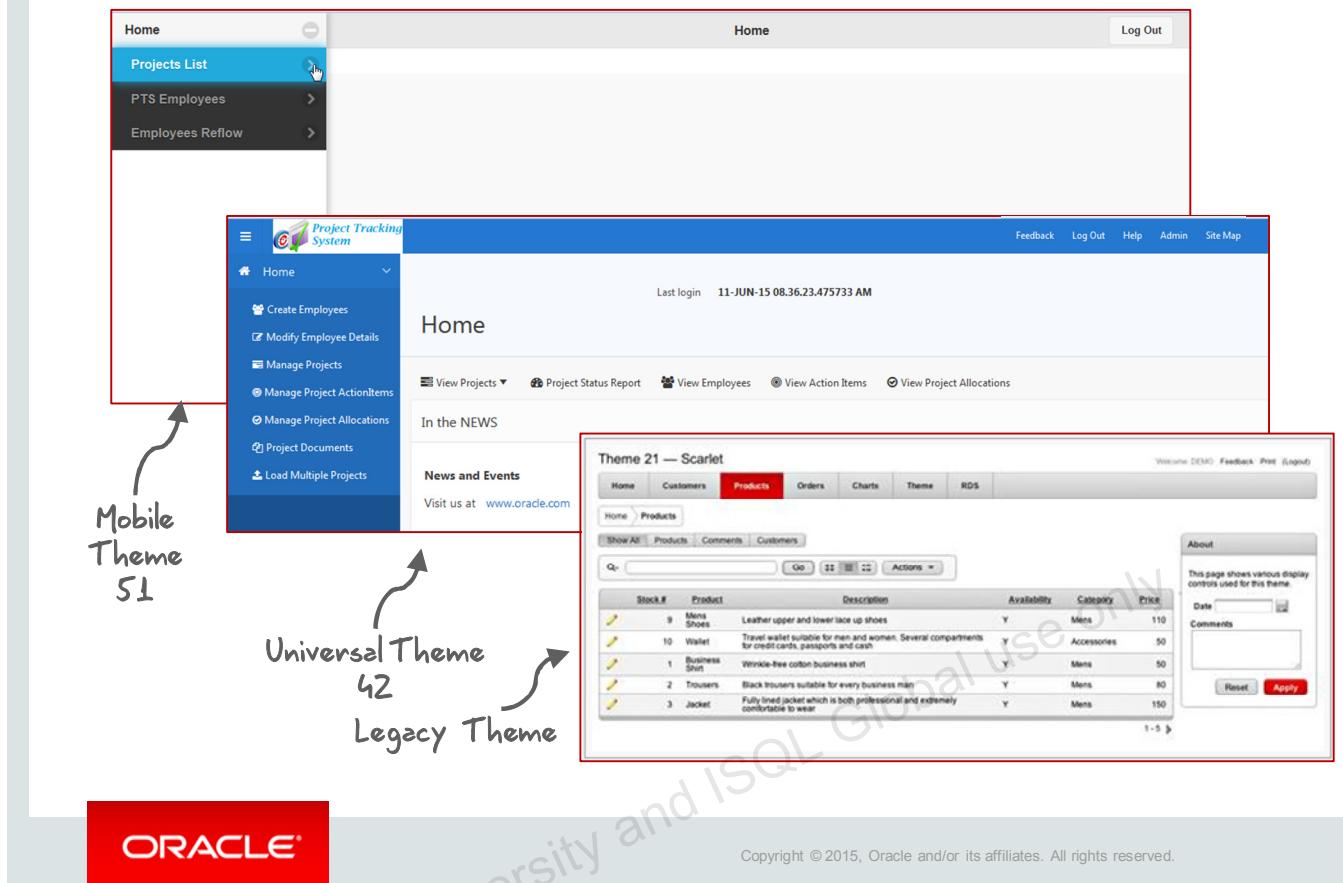
Lesson Agenda

- Using Themes
 - What Is a Theme?
 - Accessing the Themes Page
 - Creating a New Theme from the Repository
 - Switching Between Themes
 - Creating a Copy of an Existing Theme
 - Editing a Theme
 - Universal Theme and Theme Roller
- Using Templates
- Using Files



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What Is a Theme?



A theme is a collection of templates that can be used to define the layout and style of an entire application. The purpose of a theme is to provide a complete set of templates that accommodate every user interface (UI) pattern that may be needed in an application. There are two categories of themes for desktop applications. They are:

- **Standard Themes:** These are the themes supplied with Application Express.
- **Custom Themes:** These are the additional themes available for use. They can be themes created by workspace administrators for use within a workspace or created by an Instance Administrator making it available to all developers across all workspaces in that instance.

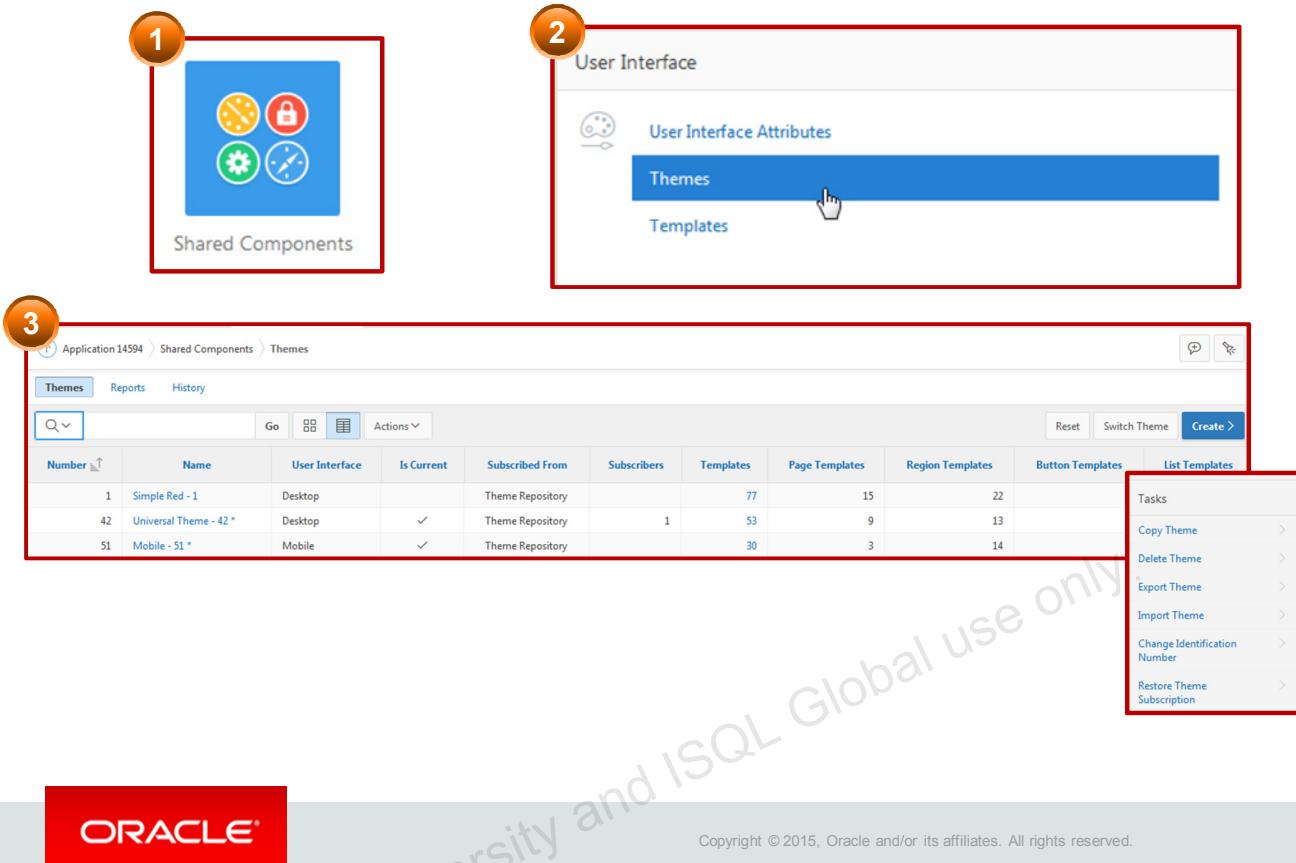
Oracle APEX 5.0 introduced a highly responsive theme called **Universal Theme (Theme 42)**, which is a list-based theme. This is the only standard theme for desktop applications in Oracle APEX 5.0 and all the other teams which are tab based are categorized as Legacy Themes.

Stand-alone mobile applications can be created using **Mobile Theme (Theme 51)** provided by Oracle APEX 5.0. Mobile Theme is also a list-based theme and responsive.

Each theme comes with one or more templates for application components, such as reports, forms, charts, and so on. You can also create a new theme from the beginning and define templates for an application. In this lesson, you learn how to use the themes and templates provided with Oracle Application Express.

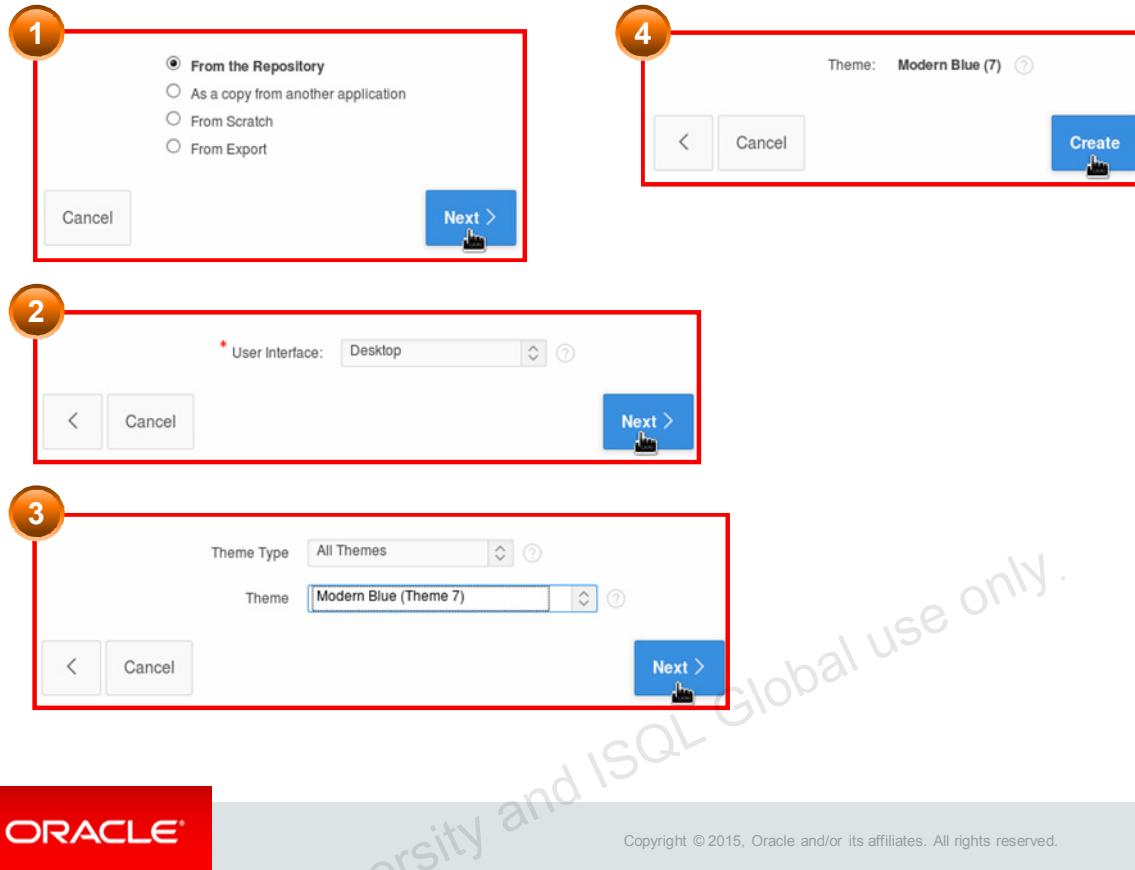
The slide shows Universal Theme, Mobile Theme, and a legacy theme (tab based) provided by Oracle Application Express. Each theme defines an application's user interface, including the tabs, reports, buttons, and other controls.

Accessing the Themes Page



To access the Themes page for an application, click Shared Components on the application's home page. Under User Interface, click Themes. The Themes page displays the themes available for the application. From the Themes page, you can create a new theme for the application and switch between these themes. You can also edit a theme, copy a theme, import or export a theme, and so on by selecting the appropriate option from the Tasks section.

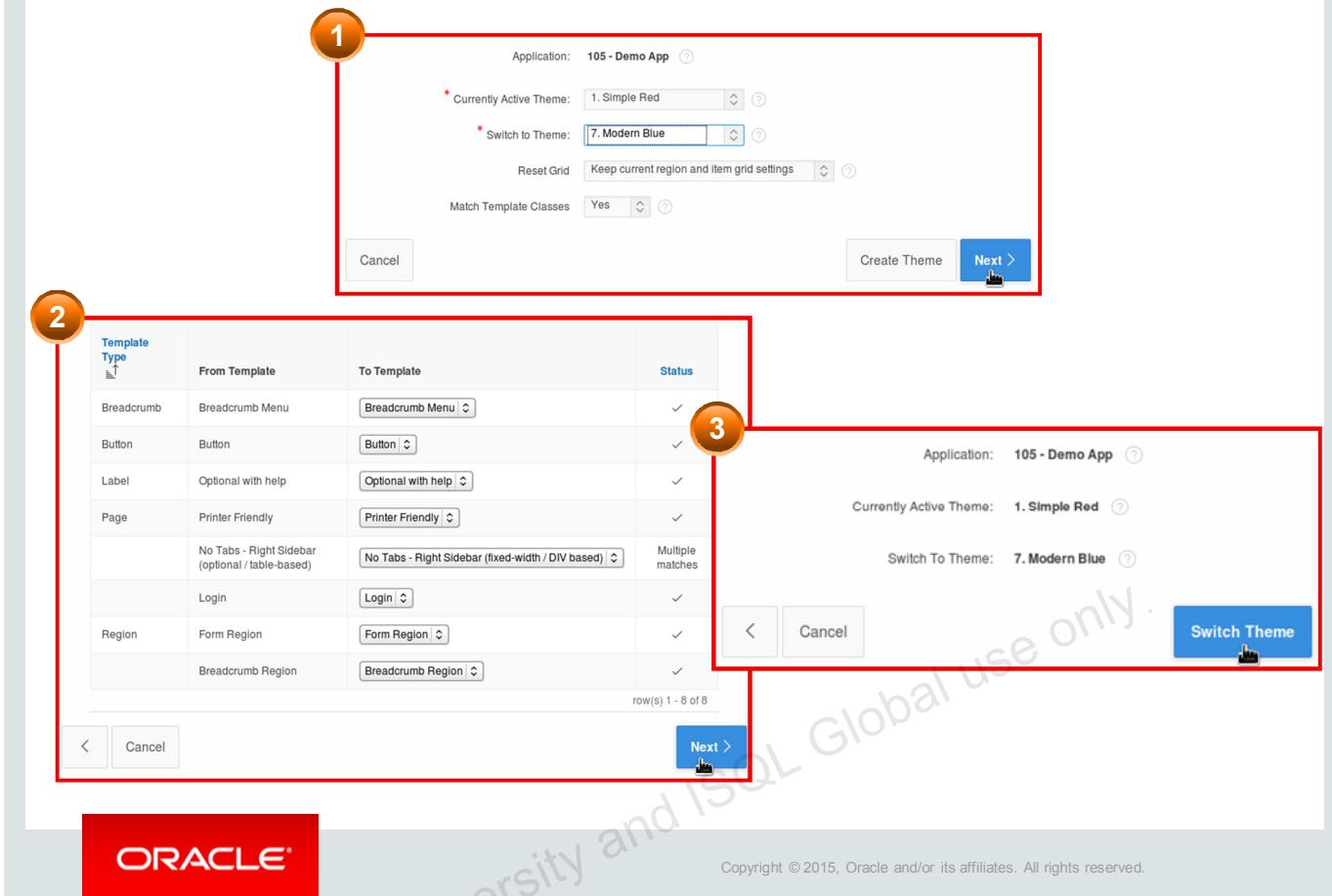
Creating a New Theme from the Repository



To create a new theme for your application from the Oracle Application Express repository, click the Create button on the Themes page and perform the following steps:

1. Select “From the Repository” and click Next.
2. Select the User Interface and click Next.
3. Select a theme and click Next.
4. Click Create to create the selected theme for the application.

Switching Between Themes



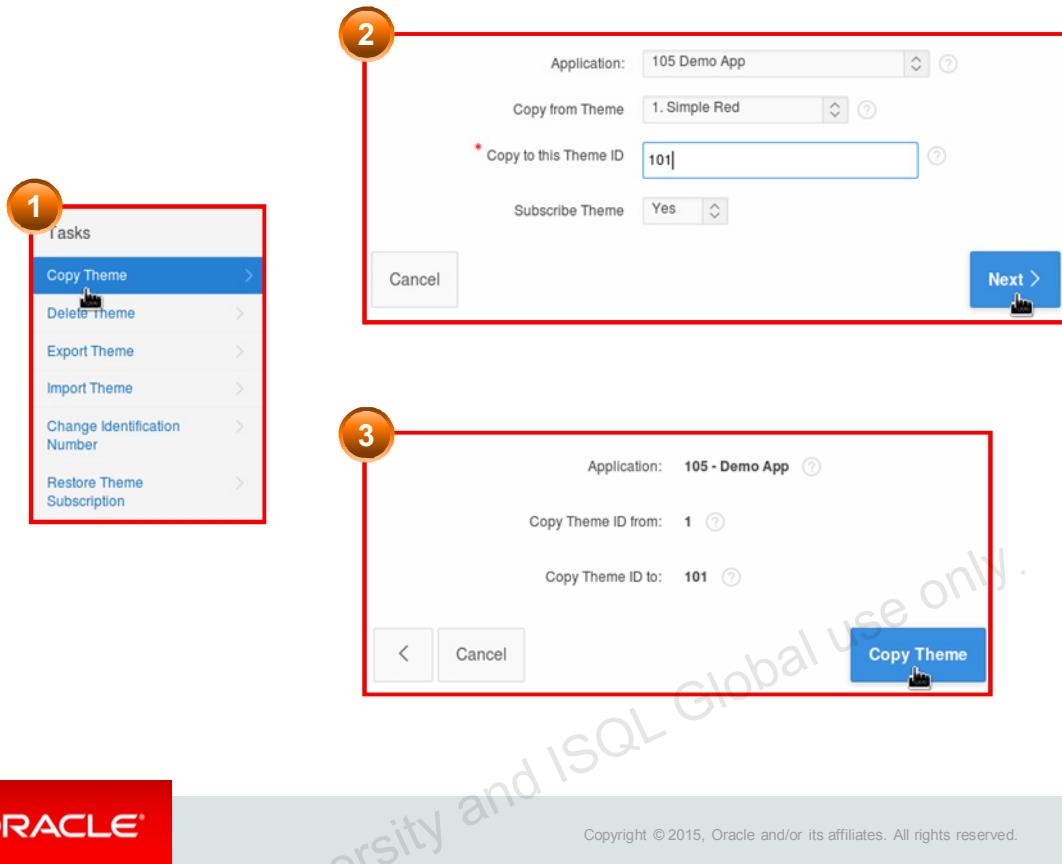
You can switch between the themes available for an application (that is, those displayed on the Themes page of an application). When you switch to a new theme, all the components that are assigned a template are assigned to a corresponding template in the new theme.

Click the Switch Theme button on the Themes page and perform the following steps:

1. Select the currently active theme and the theme to switch to from the select list and click Next.
2. Review the compatibility status report and click Next.
 - A check mark indicates that the mapping was successful.
 - A warning indicates that there is more than one template in the theme you are switching to with the identified class. The warning provides a select list from which to choose the appropriate template.
 - An error indicates that Application Builder was unable to map the class between the themes. Ensure that a class is identified for the templates in both themes.
3. Click Switch Theme.

Note: Application Express doesn't allow switching from Universal Theme to any other theme because it uses list-based navigation whereas the other themes use tab-based navigation.

Creating a Copy of an Existing Theme



Instead of creating a theme from the beginning, you can choose to copy an existing theme and make changes to it. Navigate to the Themes page and perform the following steps.

1. In the Tasks section, click Copy Theme.
2. Select the theme that you want to copy and enter a Theme ID for the theme. This number must be 100 or greater to indicate that it is a custom theme. Click Next.
3. Click Copy Theme.

The theme is copied successfully and you can make changes to it.

Editing a Theme

The screenshot shows the Oracle Application Express interface. At the top, there is a navigation bar with tabs: Themes (highlighted), Reports, and History. Below the navigation bar is a search bar and a toolbar with various icons. The main area displays a table of themes:

Number	Name	User Interface	Is Current	Subscribed From	Subscribers
1	Simple Red - 1	Desktop		Theme Repository	1
7	Modern Blue - 7	Desktop	✓	Theme Repository	
101	<u>Simple Red - 101</u>	Desktop		105	

A red box labeled '1' highlights the row for 'Simple Red - 101'. A second red box labeled '2' highlights the 'Theme' edit dialog window. This dialog contains tabs for Name, Theme ..., JavaSc..., Compo..., Region ..., Dialog ..., Global ..., Icons, Image, Styles, and Files. The 'Name' tab is selected, showing fields for Default Label (Optional with help), Optional Label (Optional with help), Required Label (Required with help), List (Vertical Unordered List with Bullets), Region (101. Reports Region), Classic Report (101. Standard), Header Toolbar (- Select Template -), and Footer Toolbar (- Select Template -). The 'Apply Changes' button is visible at the top right of the dialog.

To edit a theme, perform the following steps:

1. In the Themes page, click the theme that you want to edit.
2. The theme property opens. You can change the theme properties. Click the appropriate tab and make changes. Click Apply Changes to save your modifications.

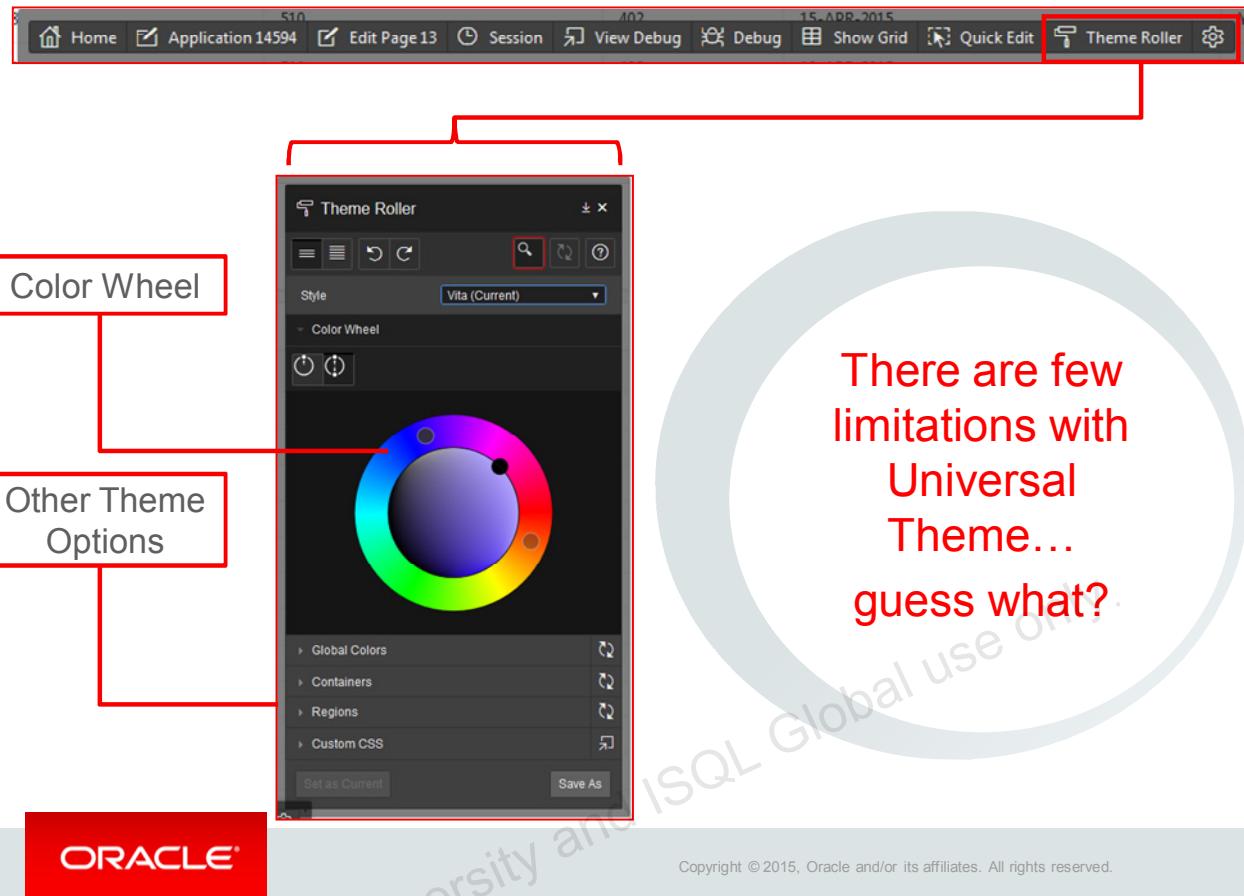
Universal Theme and Theme Roller

- Universal Theme:
 - Builds highly responsive User Interface (UI)
 - Is completely list based, does not support tabs
 - Offers in-built Navigation menu with option to add new entries
 - Supports Theme Roller: A magic wand in a developer's hand
 - Is inherently simple with lesser Template Options
- Theme Roller:
 - Allows developer to explore theme colors, fonts, and theme layouts
 - Offers easy customization of UI without getting into CSS, HTML, or JavaScript
 - Provides scope to completely change the look and feel of UI
 - Enables saving of private themes



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Universal Theme and Theme Roller



Few points to note with Universal Theme:

- Switching Templates is not possible.
- Hierarchical List with Images cannot be created. Only Font Awesome Icons can be used.

Quiz



Which of the following statements are true about themes?
(Choose all that apply.)

- a. Workspace themes are available to all developers in the workspace.
- b. You can switch from Universal Theme to a Simple Red theme.
- c. When you switch to a new theme, all the components that are assigned a template are assigned to a corresponding template in the new theme.
- d. You can copy an existing theme and make changes to the copy.

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Answer: a, c, d

Lesson Agenda

- Using Themes
- Using Templates
 - What Are Templates?
 - Types of Templates
 - Accessing the Templates Page
 - Creating a Copy of an Existing Template
 - Editing a Template
 - Applying a Template
 - Using Substitution Strings in Templates
 - Changing the Default Templates for a Theme
 - Overriding Application Defaults at the Page Level
- Working with Files



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What Are Templates?

The screenshot illustrates the Oracle Application Express interface. At the top, a side navigation menu is visible with options like Home, Create Employees, Modify Employee Details, Manage Projects, Manage Project Action Items, Project Documents, Project Charts, Salary and Service Chart, Admin, and Load Multiple Projects. A handwritten note 'Side Navigation Menu page' points to this menu.

The main area shows a 'Data Load Source' wizard with four steps: Data Load Source, Data / Table Mapping, Data Validation, and Data Load Results. The first step is active. A handwritten note 'Wizard Progress List' points to the progress bar at the top of the wizard.

Below the wizard is a 'Data Load Source' configuration screen with fields for 'Import From' (Upload file, comma separated (*.csv) or tab delimited or Copy and Paste), 'Separator' (set to '|'), and a 'Next' button.

A handwritten note 'Button' points to the 'Next' button.

To the right of the wizard is a 'Templates' list table. The table has two sections: 'Type : Breadcrumb' and 'Type : Button'. The 'Breadcrumb' section contains entries for 'Breadcrumb' and 'Breadcrumb Menu'. The 'Button' section contains entries for 'Button', 'Button, Alternative 1', and 'Button, Alternative 2'. The table includes columns for Name, Subscribed From, Subscribers, References, Updated, Updated By, Default, Preview, Theme, and Copy.

A handwritten note 'Optional and required labels' points to the 'Type' filter in the 'Templates' list header.

At the bottom of the slide is the Oracle logo and the copyright notice: 'Copyright © 2015, Oracle and/or its affiliates. All rights reserved.'

Templates define how the pages or the page components of an application are displayed. You can select templates for your page or page components from the templates available in the application's theme. Alternatively, you can customize the look and feel of the application by modifying the existing templates or creating new templates using HTML and cascading style sheets (CSS).

Templates facilitate the separation of business logic from user interface. The developers of your organization can focus on the code for the business logic, whereas the graphic artists can concentrate on the look and feel. The advantages of using templates are as follows:

- Multiple components of your application can use the templates.
- To incorporate any change in the component, a single change to the template is sufficient.

The slide shows an example of a page and the various templates associated with the page and its components. The templates used on a page can be accessed from the Shared Components region of the page definition.

Types of Templates

Type ↑	Name
Button	Button
Button	Button, Alternative 1
Button	Button, Alternative 2
Button	Button, Alternative 3
Button	HTML button (legacy - APEX 5 migration)

Type ↑	Name
Popup LOV	Popup LOV

Type ↑	Name
Legacy Calendar	Basic Calendar
Legacy Calendar	Calendar
Legacy Calendar	Calendar
Legacy Calendar	Calendar
Legacy Calendar	Calendar, Alternative

Type ↑	Name
Region	Alert
Region	Alert
Region	Blank with Attributes
Region	Blank without Attributes

Type ↑	Name
List	Badge List
List	Badge List
List	Button Control Group
List	Button List
List	Cards

Type ↑	Name
Report	Alerts
Report	Alerts
Report	Badge List
Report	Badge List
Report	Borderless Report

Type ↑	Name
Breadcrumb	Breadcrumb
Breadcrumb	Breadcrumb
Breadcrumb	Breadcrumb Menu



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Templates are first organized by template type. Oracle Application Express offers nine types of templates. Each theme comes with one or more template classes for each template type.

For example, a region template can be classified as a form region template, a report region template, and so on. Here region template is the template type whereas form region and report region are template classes.

The slide shows some of the templates available for the Page, Report, Region, and Label types. Page templates control the appearance of the navigation menu, master detail, modal dialog, page layout, and the standard tabs. Region templates control the display of region titles, buttons, and so on. Report templates control the format of the displayed report. The Label, List, Popup, Calendar, Breadcrumb, and Button templates specify how those respective components should be displayed.

Accessing the Templates Page

The screenshot shows the Oracle Application Express interface. A red box highlights the 'User Interface' section under 'Shared Components'. Within this section, a blue bar labeled 'Templates' is selected, indicated by a mouse cursor icon. A large orange circle with the number '1' is positioned above the 'Templates' bar. Below this, another red box highlights the 'Templates' page itself, which displays a list of components. The page has a header with tabs: 'Templates' (selected), 'Subscription', 'Publish', 'Utilization', and 'History'. It includes search and filter options ('Q', 'Go', 'Actions'). The main area is a table with columns: Type, Name, Subscribed From, Subscribers, References, Updated, Updated By, Default, Preview, Theme, and Copy. The table lists various components like 'Breadcrumb', 'Hierarchical Menu', and 'Button' with their respective details. An orange circle with the number '2' is positioned above the table header.

Type	Name	Subscribed From	Subscribers	References	Updated	Updated By	Default	Preview	Theme	Copy
Breadcrumb	Breadcrumb	Theme	1	4			✓		42	
Breadcrumb	Breadcrumb	Theme		1	10 days ago	demo	✓		105	
Breadcrumb	Breadcrumb Menu	Theme		1	10 days ago	demo	✓		1	
Breadcrumb	Hierarchical Menu	Theme		0	10 days ago	demo			1	
Button	Button	Theme		1	10 days ago	demo	✓		1	
Button	Button, Alternative 1	Theme		0	10 days ago	demo			1	
Button	Button, Alternative 2	Theme		0	10 days ago	demo			1	
Button	Button, Alternative 3	Theme		0	10 days ago	demo			1	

To view the Templates page, navigate to the Shared Components page of the application. Under User Interface, select Templates. The Templates page appears. You can use the drop-down lists to display templates from a specific theme or type. You can view the default templates and the referenced templates.

Copying a Template

As a best practice, copy a template and edit it rather than modifying templates supplied by Oracle Application Express.

The screenshot shows the Oracle Application Express interface. At the top, there is a navigation bar with icons for Home, Applications, Themes, and Help. Below the navigation bar, a banner reads "Oracle University and ISOL Global use only". The main content area has a title "Copying a Template". A large red box highlights the "Copy" icon in the first row of a table of templates. A second red box highlights the "Copy" button in a modal dialog titled "Copy Template". The dialog shows the original template "Standard" selected and a new name "Standard Customized" entered. The "Copy" button is highlighted with a red arrow. The bottom of the screen shows the Oracle logo and a copyright notice: "Copyright © 2015, Oracle and/or its affiliates. All rights reserved."

	Name	Subscribed From	Subscribers	References	Updated	Updated By	Default	Preview	Theme	Copy
Region	Plain (No Title)	Theme		10	3 weeks ago	demo	✓		51	
Region	Region (With Title Bar)	Theme		0	3 weeks ago	demo			51	
Region	Region (With Title)	Theme		0	3 weeks ago	demo			51	
Region	Region without Buttons and Titles	Theme		0	10 days ago	demo			1	
Region	Region without Title	Theme		0	10 days ago	demo			1	
Region	Report Filter - Single Row	Theme		0	10 days ago	demo			1	

Copy Template

Template: **Standard**

New Template Name:

Tasks

Cancel **Copy**

If you want to change one or a few of the templates supplied by Oracle Application Express, it is best to copy the template to another name, and then modify the copied template. Then associate the copied template with the desired page. You always copy a template so that you always have the original template to go back to or use in a different application.

To copy a template, perform the following steps:

1. On the Templates page, click the Copy icon for the template that you want to copy.
2. Enter a name for the template copy and click Copy. In the slide example, you create a copy of the "Standard" template.

Note: If you want to create a new template for use in your application, click the Copy Template icon for any template that can be found from the current theme's template list.

Editing a Template

1

Type	Name	Subscribed From	Subscribers	References	Updated	Updated By	Default	Preview	Theme	Copy
Region	Standard	Theme	1	33	19 minutes ago	apex_admin	✓		42	
Region	<u>Standard Customized</u>	Theme		0	7 minutes ago	apex_admin		42		
Region	Tabs Container	Theme	1	0	19 minutes ago	apex_admin		42		
Region	Title Bar	Theme	1	1	19 minutes ago	apex_admin		42		

Region Template: 55 of 64 Name: Standard Customized

Show All Name Subscription Template Options Definition Grid Layout Sub Regions Display Points Comments Substitution Strings

Definition

Template

```
<div class="t-Region #REGION_ID# #REGION_CSS_CLASSES# #REGION_STATIC_ID# #REGION_ATTRIBUTES# role="group" aria-labelledby="#REGION_STATIC_ID#_heading">
  <div class="t-Region-headerItems t-Region-headerItems--title">
    <h2 class="t-Region-title" id="#REGION_STATIC_ID#_heading">#TITLE#</h2>
  </div>
  <div class="t-Region-headerItems t-Region-headerItems--buttons">#COPY##EDIT<span class="js-maximizeButtonContainer"></span></div>
</div>
<div class="t-Region-bodyWrap">
  <div class="t-Region-buttons t-Region-buttons--top">
    <div class="t-Region-buttons-left">#PREVIOUS#</div>
    <div class="t-Region-buttons-right">#NEXT#</div>
  </div>
  <div class="t-Region-body">
    #BODY#
    #SUB_REGIONS#
  </div>
  <div class="t-Region-buttons t-Region-buttons--bottom">
    <div class="t-Region-buttons-left">#CLOSE##HELP#</div>
    <div class="t-Region-buttons-right">#DELETE##CHANGE##CREATE#</div>
  </div>
</div>
<div>ORACLE CONFIDENTIAL - INTERNAL ONLY</div>
</div>
```

2

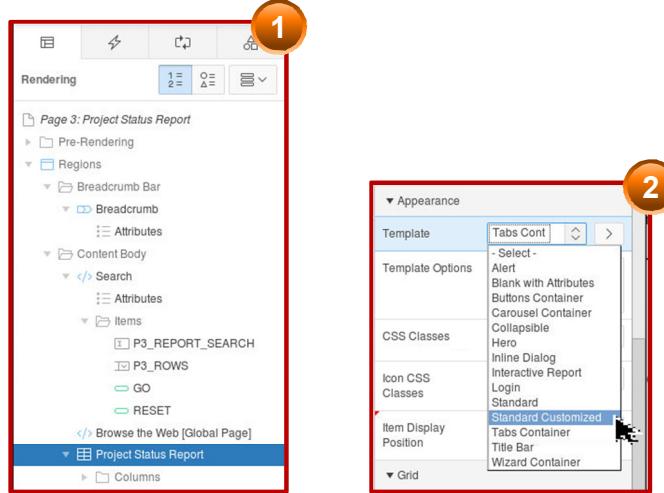
If you want to add some company-specific text or style, you can edit the template by performing the following steps:

1. On the Templates page, click the name of the template to modify.
 2. Modify the definition of the template and click Apply Changes.

In this example, you add the text Oracle Confidential – Internal Only at the bottom of the page.

Note: Please note that you cannot edit any templates provided with Application Express. The templates that are created by copying from an existing template can be modified.

Applying a Template

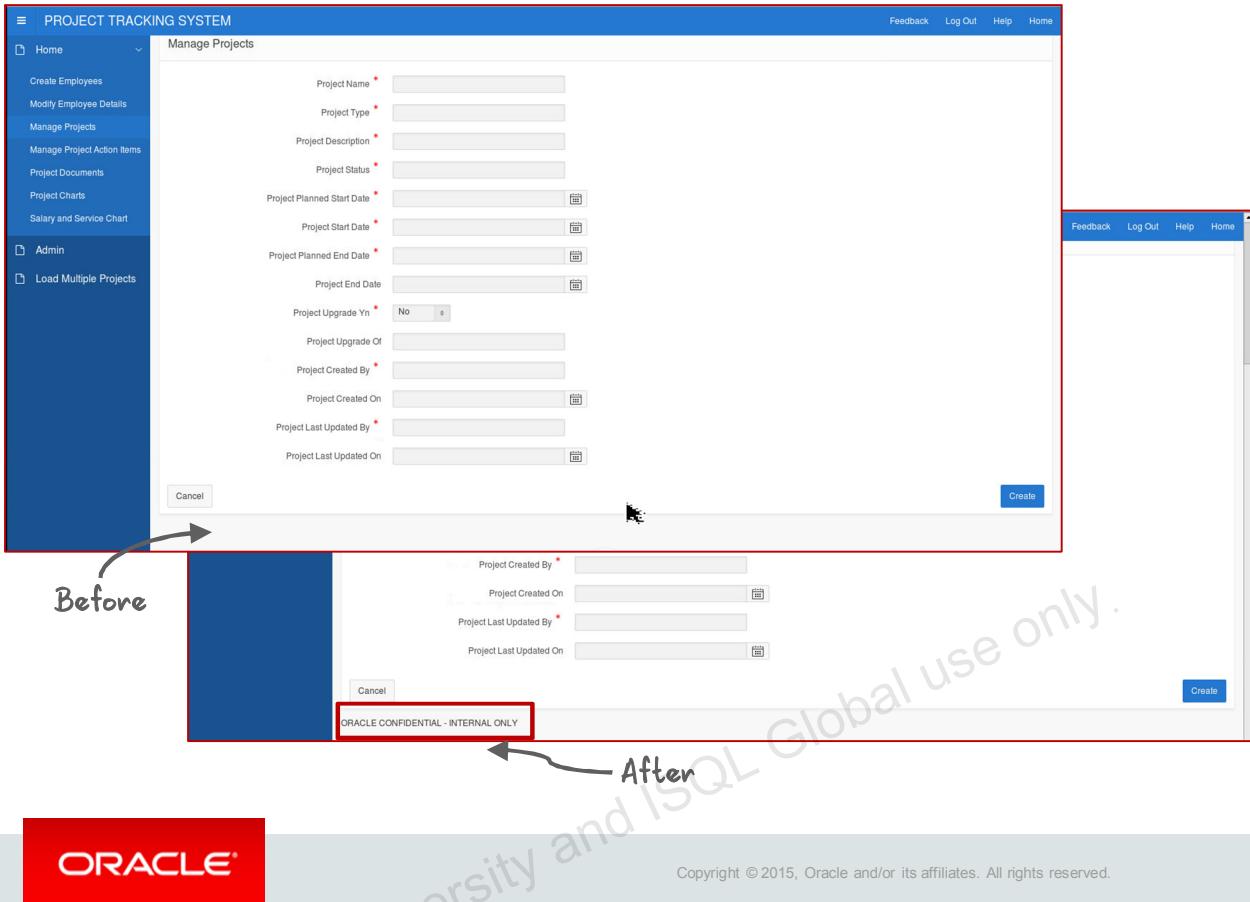


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To associate a template with a region, navigate to the page definition in page designer mode. For the region to which you want to apply a new template, click the Region node under page rendering tree. In its property editor, locate Appearance and select the new template from the Template drop-down list and click the Save and Run icon.

Applying a Template: Output



The screenshots in the slide show how a page looks before and after the modified template is applied.

Using Substitution Strings in Templates

A substitution string:

- Is a defined character string
- Is replaced by an object at run time
- Must be in uppercase
- Begins and ends with a pound (#) symbol

Example: #TITLE# is a substitution string that is replaced with the title text at run time.

```
10 <meta charset="UTF-8">
11 <title>#TITLE#</title>
12 #APEX_CSS#
13 #THEME_CSS#
14 #TEMPLATE_CSS#
15 #THEME_STYLE_CSS#
16 #APPLICATION_CSS#
17 #PAGE_CSS#
18 #FAVICONS#
19 #HEAD#
20 <meta name="viewport" content="width=device-width, initial-scale=1.0, maximum-scale=1.0, user-scalable=no"/>
21 </head>
22 <body class="t-PageBody t-PageBody--showLeft t-PageBody--hideActions no-anim #PAGE_CSS_CLASSES#" #ONLOAD# id="t_PageBody">
23 #FORM_OPEN#
24 <header class="t-Header" id="t_Header">
```



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A substitution string is a defined character string that is replaced by an object at run time. Substitution strings used within a template must be in uppercase and begin and end with a pound (#) symbol. For example, in a region template, the #TITLE# substitution string is replaced with the title of the region, and the #BODY# substitution string is replaced with the region source at run time. The region source can be static HTML, a report, or form fields. At run time, the Oracle Application Express engine replaces these strings with values, other objects, or null values.

If you are familiar with HTML, you can use HTML and, optionally, define some style definitions to customize your reports.

A basic page template must include the following four important substitution strings:

- #HEAD#
- #FORM_OPEN#
- #BOX_BODY#
- #FORM_CLOSE#

Changing Default Templates in a Theme

The screenshot shows the Oracle Application Express Themes page. At the top, there are tabs for Themes, Reports, and History. Below the tabs is a search bar and a toolbar with various icons. The main content area displays a table of themes:

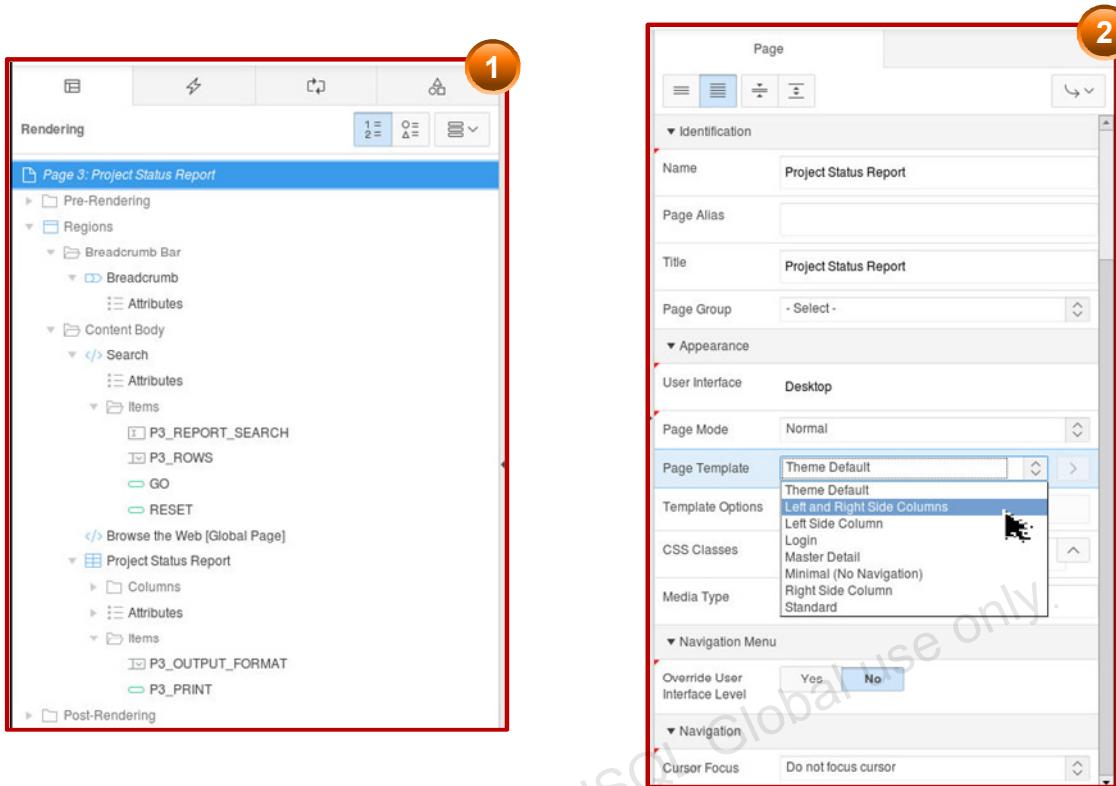
Number	Name	User Interface	Is Current	Subscribed From
1	Simple Red - 1	Desktop		Theme Repository
42	Universal Theme - 42 *	Desktop	✓	Theme Repository
51	Mobile - 51 *	Mobile	✓	Theme Repository
101	My New Theme - 101	Desktop		
105	Universal Theme - 105	Desktop		

Below the table, there is a breadcrumb trail: Application 2 > Shared Components > Themes. The page title is "Theme". There are several tabs at the top of this section: Show All, Name, Theme Subscription, JavaScript and Ca..., Component Defaults (which is selected), Region Defaults, Dialog Defaults, Global Template O..., Icons, Image, Styles, and Files. The "Component Defaults" section contains fields for various template types, each with a dropdown menu. One dropdown for "Navigation Bar List" is open, showing options like Standard, Select Template, Left Side Column, and Left and Right Side Columns. Other dropdowns include "Page" (Login), "Error Page" (Login), "Printer Friendly Page" (Standard), and "Breadcrumb" (Breadcrumb). At the bottom right of this section is a blue "Apply Changes" button.

You can change the default templates for each type of template in a theme. To do so, perform the following steps:

1. Navigate to application's shared components and click Themes under User Interface.
2. Click the name of the theme which you want to edit.
3. Click the Component Defaults tab and change the template defaults as required. You can also change a region's defaults on the Region Defaults tab.

Overriding Application Defaults at the Page Level



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There may be situations where you have defined an application-level default template; however, for a particular page, you want to use a different template. For example, you can specify a page template default to be "Left Side Column" but for a specific page, you want to use "Left and Right Side Columns". To specify the page-level template, perform the following steps:

1. Navigate to the page definition in page designer view and click the page node under the page rendering tree view.
2. The page properties will open in its property editor.
3. Locate Appearance in the property editor and select "Left and Right Side Columns" for the Page Template from the drop-down list.

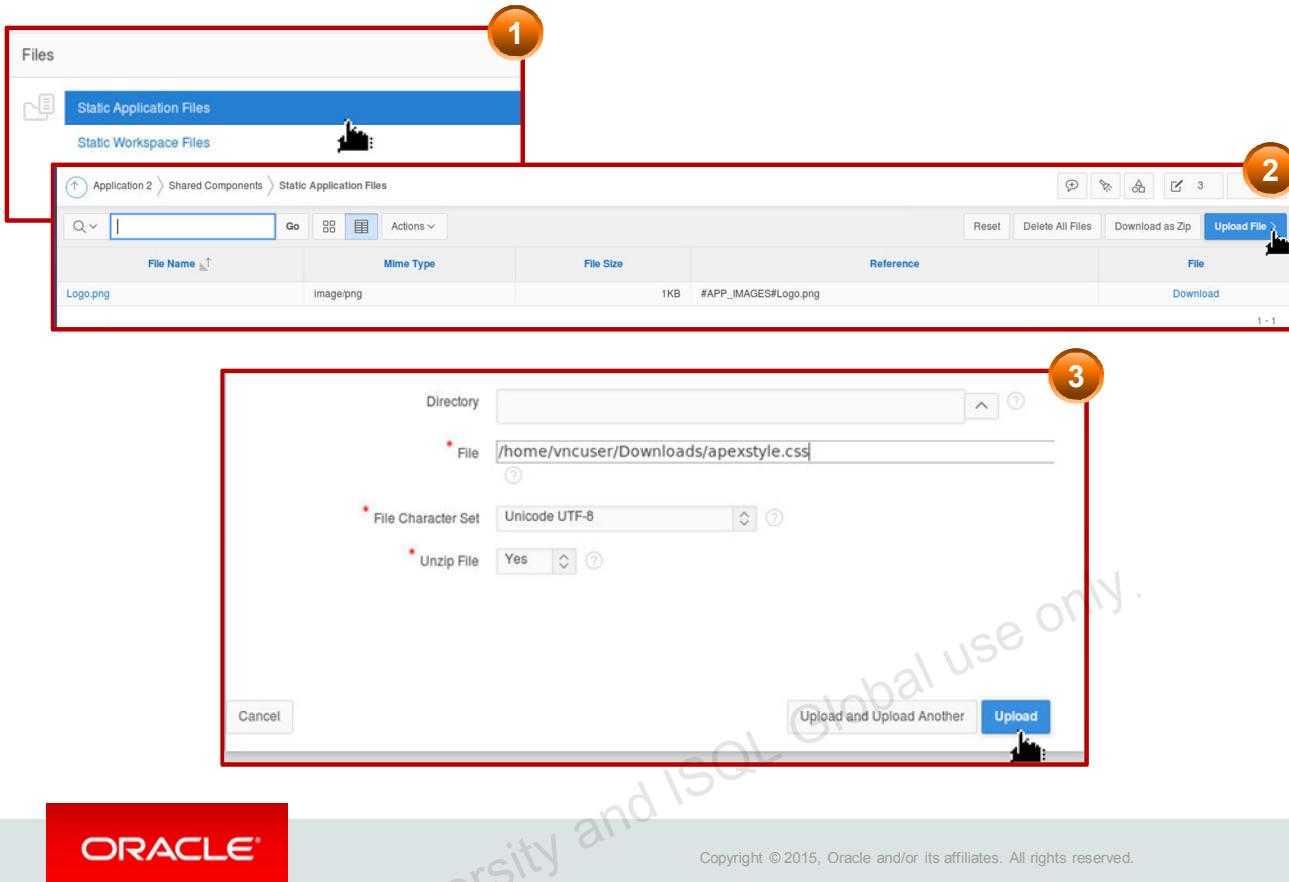
Lesson Agenda

- Using Themes
- Using Templates
- Working with Files
 - Uploading a Cascading Style Sheet
 - Referencing Cascading Style Sheets
 - Uploading an Image
 - Using the Uploaded Image



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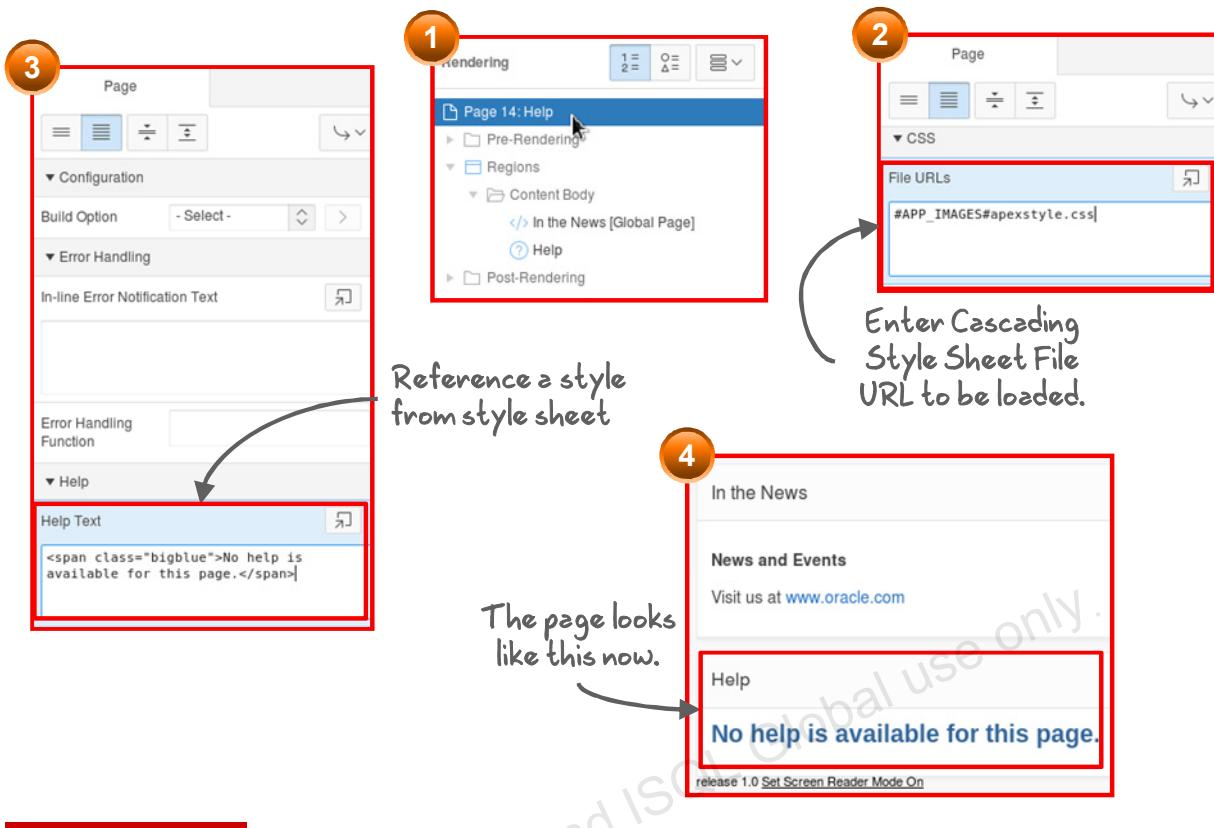
Uploading a Cascading Style Sheet



To upload a CSS, navigate to the Shared Components page of the application and perform the following steps:

1. Under Files, click Static Application Files.
 2. Click Upload File.
 3. Choose the directory where the file has to be uploaded. Leave it blank for saving it in the Root directory.
 4. Browse for the .css file and click Upload.
- The file is uploaded successfully.

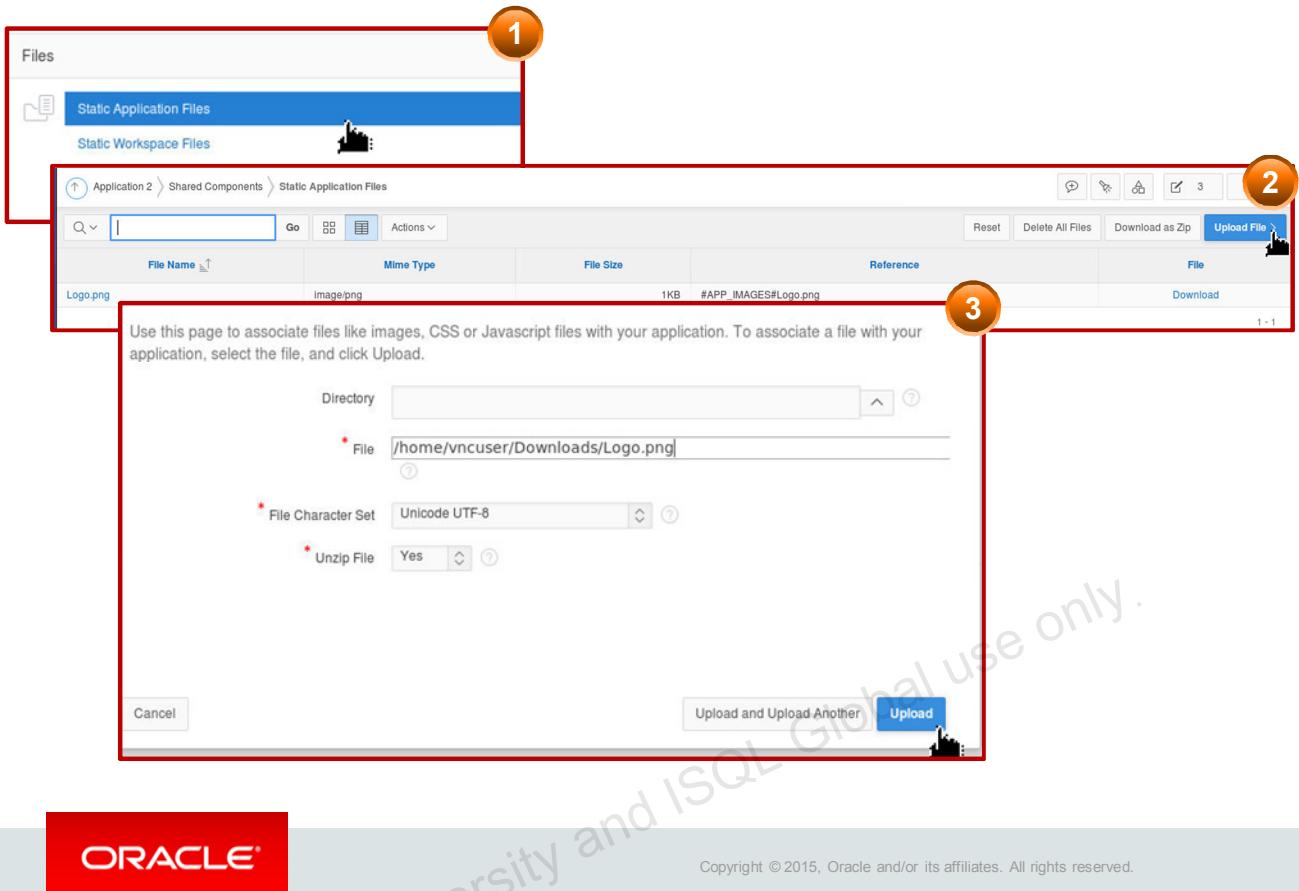
Referencing a Cascading Style Sheet



You can reference an uploaded CSS by modifying the page attributes. Perform the following steps:

1. In the page definition of the page, select the page from the Rendering pane. In this example, the Page 14 : Help is selected.
2. In the Property Editor, scroll down to the CSS subsection. Enter the reference to the uploaded file in the File URLs column.
3. Enclose the text where you would like to apply the CSS with the `` tag. In this example, the CSS "bigblue" is applied to the Help text.
4. Save and run the page. You will notice the change.

Uploading an Image



You can upload images that you want to reference in your application. To upload an image, navigate to the Shared Components page of the application and perform the following steps:

1. Under Files, click Static Application Files.
2. Click Upload File.
3. Browse for the image file and click Upload.

The file is uploaded successfully.

Using an Uploaded Image

The top screenshot shows a page edit screen for a project. A red box highlights the 'Footer Text' region, which contains the code: . A callout points to this code with the text: 'Reference the image in a page region.' To the right of the footer text is a logo placeholder labeled 'ORACLE'.

The bottom screenshot shows the 'User Interfaces' tab of the application properties screen. A red box highlights the 'Logo' section, where the 'Logo Type' is set to 'Image' and the 'Logo' field contains the value '#APP_IMAGES#PTS Logo.png'. A callout points to this field with the text: 'Reference the image as a logo.' To the right is a preview of the logo, which is a blue button with the text 'Project Tracking System' and 'Home'.

You can reference the images uploaded to a workspace on application pages or as a logo for the application. To reference an image on application pages, you can use one of the following substitution strings:

- #APP_IMAGES# is used when the uploaded image is specific to the given application.
- #WORKSPACE_IMAGES# is used when the uploaded image is shared among various applications in the given workspace.
- #IMAGE_PREFIX# is used when you want to point to the images directory distributed with Oracle Application Express.

You can also specify the uploaded image as a logo for the application. Click the Edit Application Properties button on the application home page. Select User Interface and click the Logo tab and specify the image name in the Logo field.

Note: You can get the Image file URL from the Reference column on the Files report under shared components > Files > Static Application Files or Workspace Application Files depending on whether the image is uploaded as an application file or as a workspace file.

Quiz



Which substitution string would you use to upload a CSS that is associated with a specific workspace?

- a. #IMAGE_PREFIX#
- b. #APP_IMAGES#
- c. #WORKSPACE_IMAGES#

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Answer: c

Practice 13 Overview: Working with Themes, Templates, and Files

This practice covers the following topics:

- Working with list templates
- Working with report templates
- Adding a logo to the pages
- Working with cascading style sheets

Summary

In this lesson, you should have learned how to:

- Define themes and their uses
- Create a new theme from the repository
- Switch to a different theme
- Explain Universal Theme and Theme Roller
- Define templates and their uses
- View existing templates
- Create and edit a template
- Upload and use a cascading style sheet and an image



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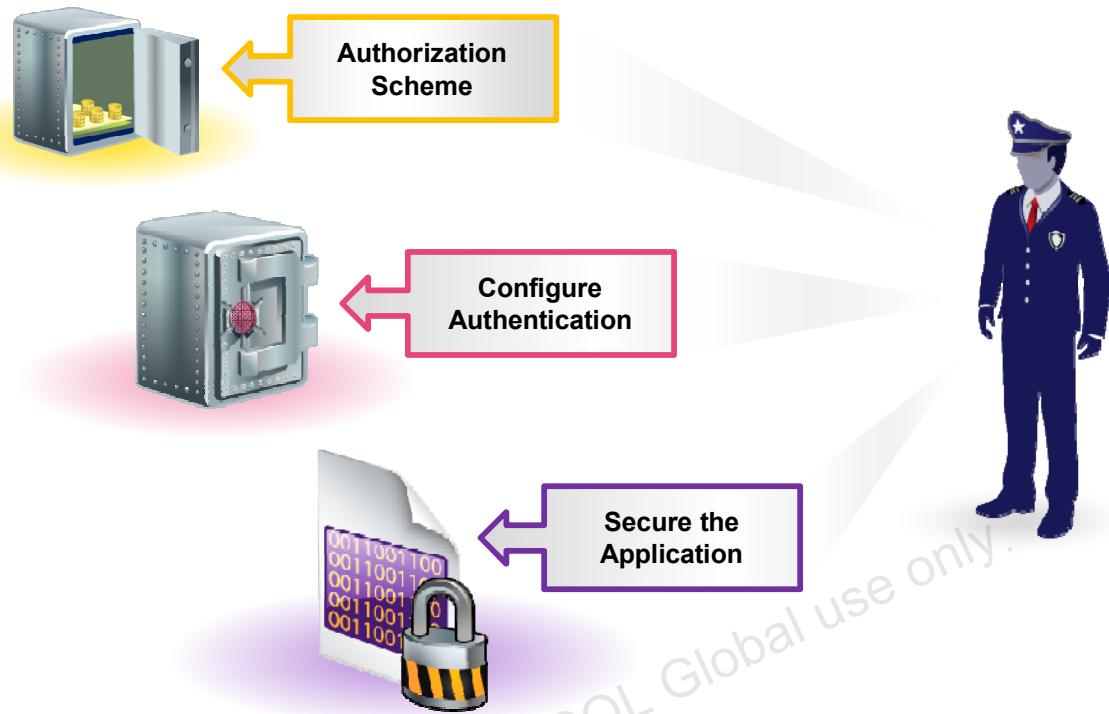
This lesson provided an overview of the themes and the page, region, report, and other templates in Oracle Application Express.

Implementing Security

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Jack Implements Security in the Application



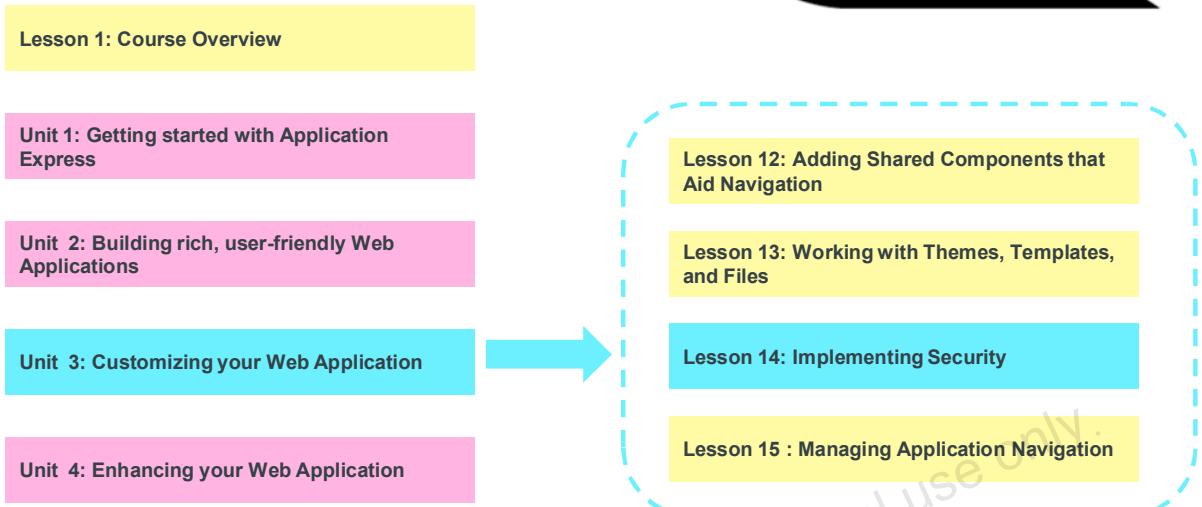
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Jack is now concerned about the security of the PTS application. He is exploring various features available in APEX that can help him in securing the application.

He is planning to add security features such as authentication and authorization for various levels of users to make the application secure before it is made available in the production server.

You Are Here in This Course



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This slide shows a graphical representation of the entire course highlighting the lesson which is dealt with in these slides.

Objectives

After completing this lesson, you should be able to:

- List the different ways to secure your application
- Differentiate between authentication and authorization
- Create an authentication scheme for your application
- Create an authorization scheme by using Access Control
- Enable and configure Session State Protection



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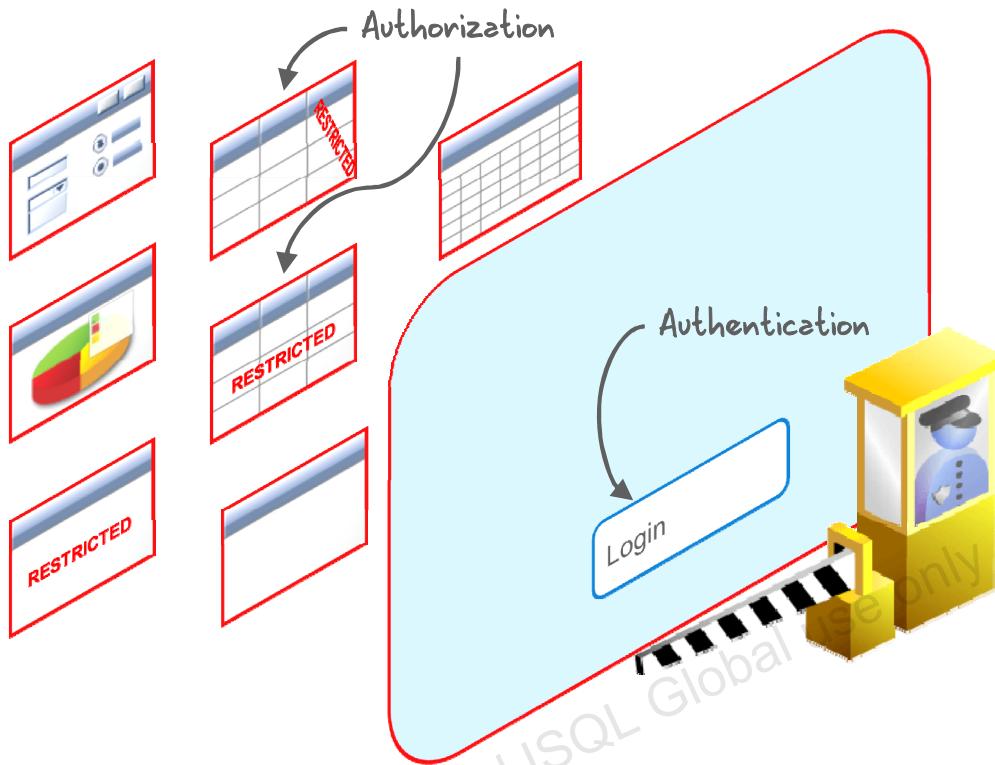
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This lesson shows you how to implement security for an application by using the security features of Oracle Application Express. You learn the difference between authentication and authorization. You also learn how to enable Session State Protection.

Lesson Agenda

- Securing an Application
 - Overview
 - Accessing the Security Tasks
- Using Authentication Schemes
- Using Authorization Schemes
- Using Session State Protection

Securing an Application: Overview



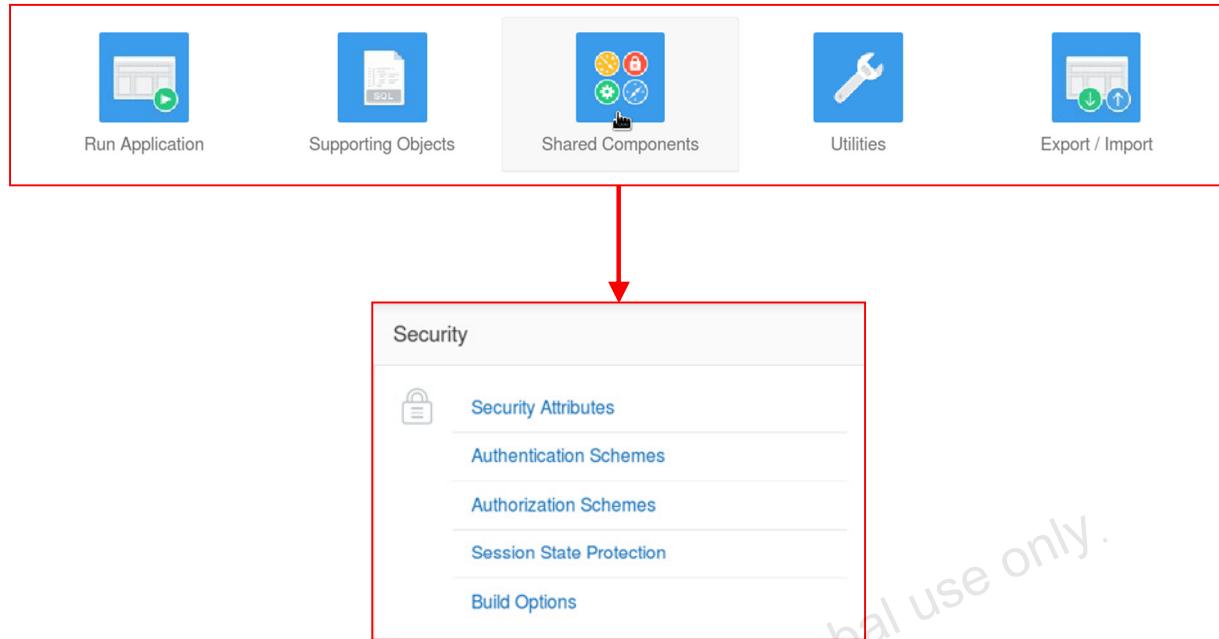
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After creating an application, you want to ensure that only authorized users can access the application. You can provide security to your application through the following methods:

- **Authentication:** Confirming user credentials before allowing access to the application. This is done through a login page. The user can view any component of the application only if the login succeeds.
- **Authorization:** Restricting access to specific pages, components (for example, forms, reports, or items), or to a particular column in a report. Only privileged users can access these components.
- **Session State Protection:** Preventing users from tampering with the URLs

Accessing Security Tasks



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Lesson Agenda

- Securing an Application
- Using Authentication Schemes
 - Authentication Schemes Page
 - Implementing Authentication
 - Preconfigured Schemes
 - Creating Authentication Based on Preconfigured Schemes
 - Copying an Authentication Scheme
- Using Authorization Schemes
- Using Session State Protection



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Authentication Schemes Page

The screenshot shows the 'Authentication Schemes' page within the Oracle Application Express interface. The page title is 'Authentication Schemes'. The top navigation bar includes links for 'Application 100', 'Shared Components', and 'Authentication Schemes'. Below the navigation is a toolbar with various icons. The main content area contains a table with the following data:

Name	Scheme Type	Subscribed From	Subscribers
Application Express Accounts - Current	Application Express Accounts		

A red box surrounds the entire page content, indicating the scope of the screenshot.

To access the Authentication Schemes page, click the Authentication Schemes link under Security on the Shared Components page of the application.

The Authentication Schemes page displays the authentication schemes available for an application.

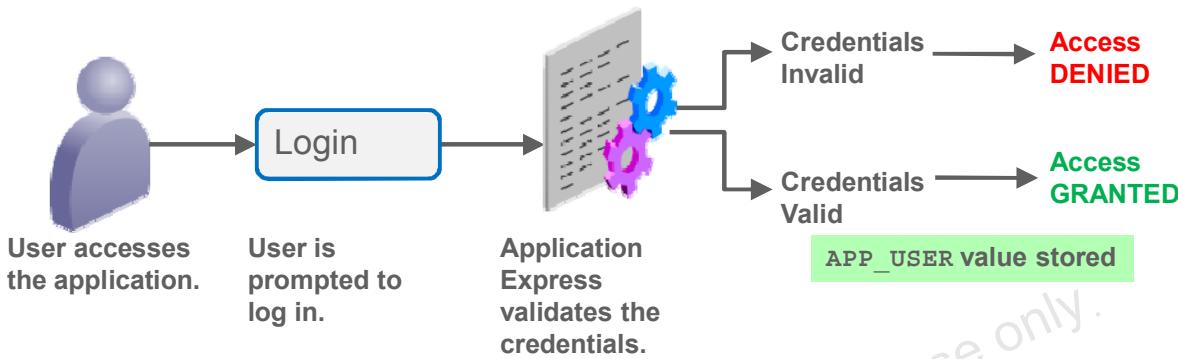
The Application Express Authentication scheme enables access to users created in Application Express. When you run an application by using this scheme, a custom login page 101 is displayed, prompting you for a username and password. You must enter the user credentials created by using Oracle Application Express for this application.

The scheme that is current for the application is appended with the word "Current." You can create more than one authentication scheme for an application, but only one scheme can be current. Click the link on the row to view details about the current authentication scheme for an application.

Implementing Authentication

You can create authentication:

- Based on a preconfigured scheme from the gallery
- As a copy of an existing authentication scheme



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When your application uses an authentication scheme, Oracle Application Express prompts each user for a username and password when the user tries to log in. The credentials are evaluated and accordingly the user is allowed or denied access to the application. After a user is identified, the Oracle Application Express engine keeps track of the user by setting the value of APP_USER. APP_USER, a built-in variable representing the current user running the application. The Oracle Application Express engine uses APP_USER to track each user's session state.

In Oracle Application Express, you can create authentication by:

- Using one of the preconfigured schemes
- Copying an authentication scheme from the same application or from a different application and then modifying the settings as needed

In this lesson, you learn to create authentication by using these two methods.

Note: If you choose not to authenticate your application, Oracle Application Express does not check user credentials. All the pages of your application are accessible to all users.

Preconfigured Authentication Schemes



Show Login Page

- Open Door Credentials
- Application Express Account Credentials
- Database Account
- LDAP Directory



No Authentication

- Using DAD



Oracle Application Server SSO

- Application Express Engine as Partner Application
- My Application as Partner Application



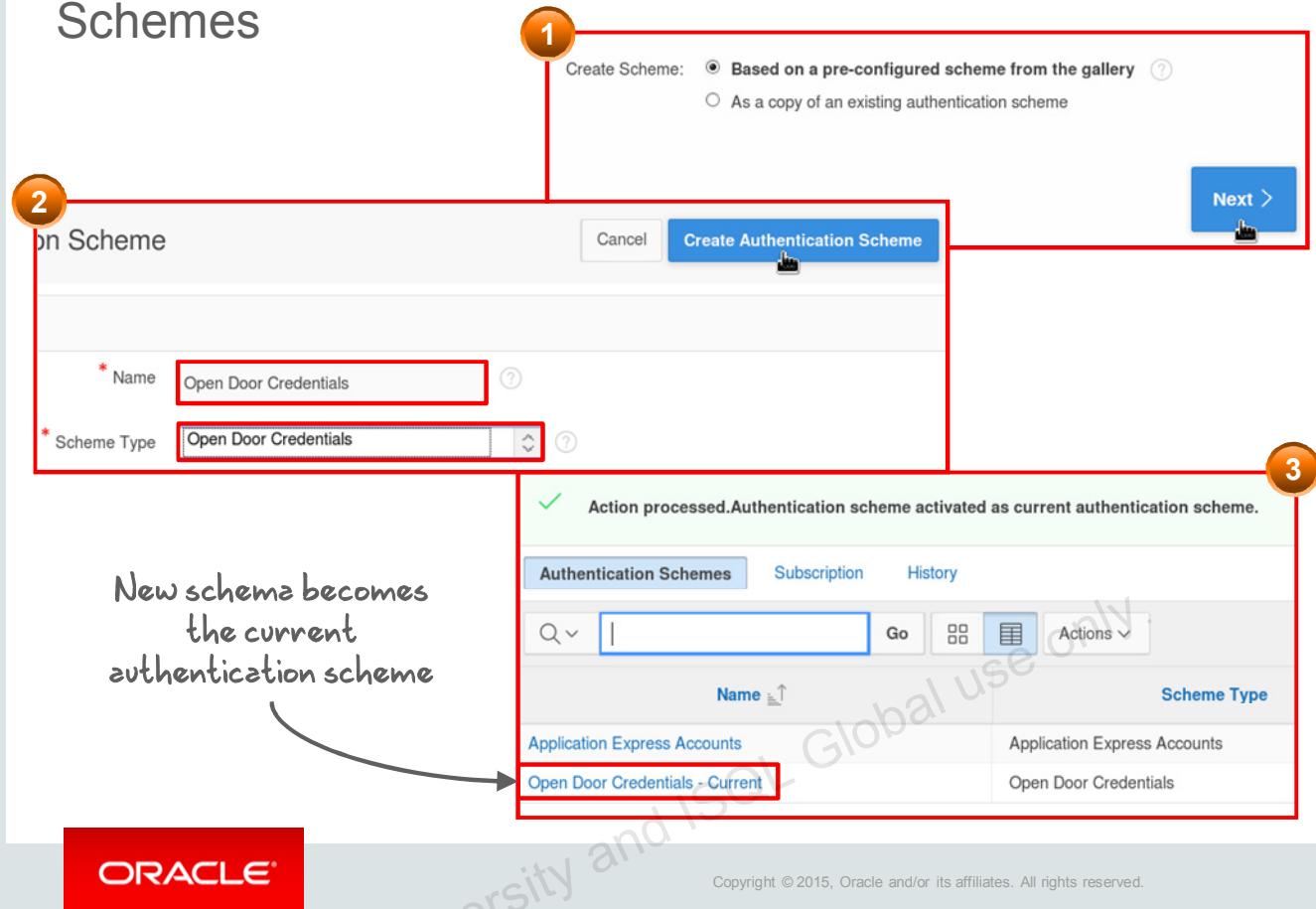
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Oracle Application Express provides some common, pretested authentication schemes that you can choose while creating an authentication scheme. For some of the schemes, you may also have to configure corresponding components:

- **Show Built-In Login Page and Use Open Door Credentials:** When you run an application with this scheme, a built-in login page is displayed and you are prompted for a username. You can enter any string, which then serves as the user identifier for the session. This scheme allows any user to access the application.
- **Show Login Page and Use Application Express Account Credentials:** To log in to an application by using this scheme, you must provide the user credentials created by using Oracle Application Express for this application. These user accounts are created and managed by an Oracle Application Express Workspace administrator. When you create this scheme, you have the option to specify whether to use a built-in login page or a custom login page.
- **Show Login Page and Use Database Account Credentials:** To log in to an application by using this scheme, you must provide database account credentials created for the local database. When you create this scheme, you have the option to specify whether to use a built-in login page or a custom login page.

- **Show Login Page and Use LDAP Directory Credentials:** This scheme validates the username and password entered on a login page by using a Lightweight Directory Access Protocol (LDAP). LDAP is an Internet protocol used to look up directory information. To use this scheme, you must have access to an LDAP directory. When creating the scheme, you must enter the LDAP host, port number, and the pattern used to construct the Domain Name Server (DNS) string.
- **No Authentication (using DAD):** This scheme provides no authentication for the application. No login page is shown, and all the pages of an application are accessible to all users. It uses Database Access Descriptor (DAD) configuration, which defines how Application Express will automatically log in to the database. This is why users will not be prompted to log in.
- **Oracle Application Server Single Sign-On (Application Express Engine as Partner App):** In this scheme, you must register the Oracle Application Express site as a partner application with the Oracle Application Server SSO server. You can then create this scheme for the application and the authentication responsibility is delegated to the SSO server.
- **Oracle Application Server Single Sign-On (My Application as Partner App):** In this scheme, you must register the Oracle Application Express application that you created with SSO as a partner application. The application authentication is delegated to the SSO server. In both these options, when a user accesses the application, the Oracle Application Express engine directs the page to the SSO login page. After the user is authenticated by SSO, the SSO components redirect your application, passing the user identity and other information to the APEX engine.

Creating Authentication Based on Preconfigured Schemes



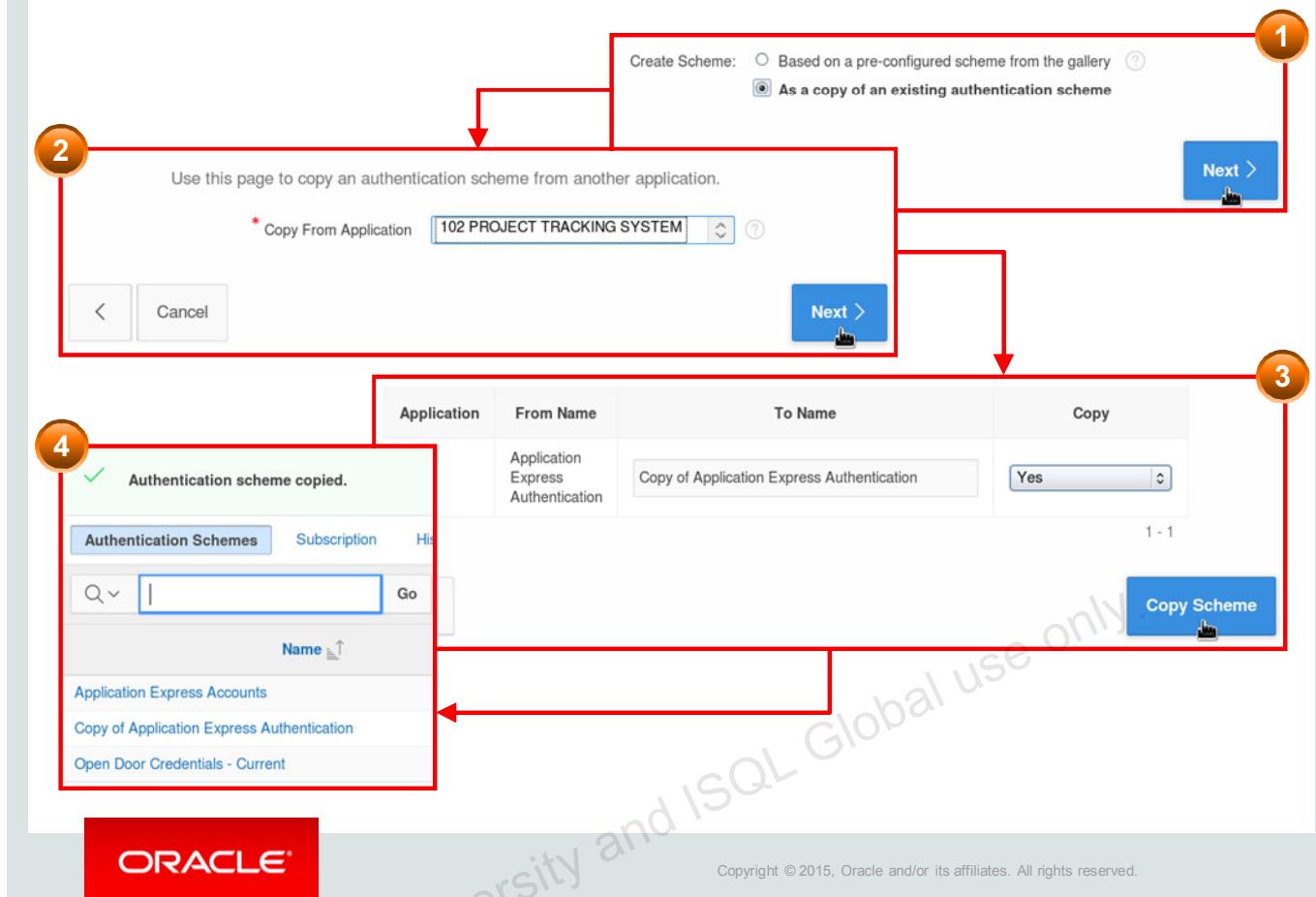
To create an authentication scheme, navigate to the Authentication Schemes page and click the Create button. The Create Authentication Scheme Wizard appears.

1. Select “Based on a pre-configured scheme from the gallery” and click Next.
2. Select a scheme depending on what user accounts you will use, enter a name for the new authentication scheme, and click Create Authentication Scheme. In this example, Open Door Credentials is used.

The authentication scheme is created successfully.

You have successfully created a new authentication scheme and selected it as the current authentication scheme for the application.

Copying an Authentication Scheme



You can copy an authentication scheme from your application or any other application in your workspace and use it to authenticate your application. You can edit the copied scheme and change the name and other settings to meet your application requirements. To copy an authentication scheme, click the Create button on the Authentication Schemes page and perform the following steps:

1. Select “As a copy of an existing authentication scheme” and click Next.
2. Select the application from which you want to copy the scheme and click Next.
3. The schemes existing in the selected application are listed. Select Yes for the scheme that you want to copy. The Copy and Subscribe option copies the authentication scheme to your application, and you can refresh it periodically to retrieve the latest changes. Click Copy Scheme to copy the scheme.

Quiz



Which authentication scheme uses the built-in users created by a workspace administrator within the workspace where the application is installed?

- a. Open Door Credentials
- b. Database Account Credentials
- c. Oracle Application Express Credentials
- d. LDAP Credentials

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Answer: c

Practice 14-1 Overview: Creating an Authentication Scheme

This practice covers the following topics:

- Creating an authentication scheme
- Switching the current authentication scheme to Application Express

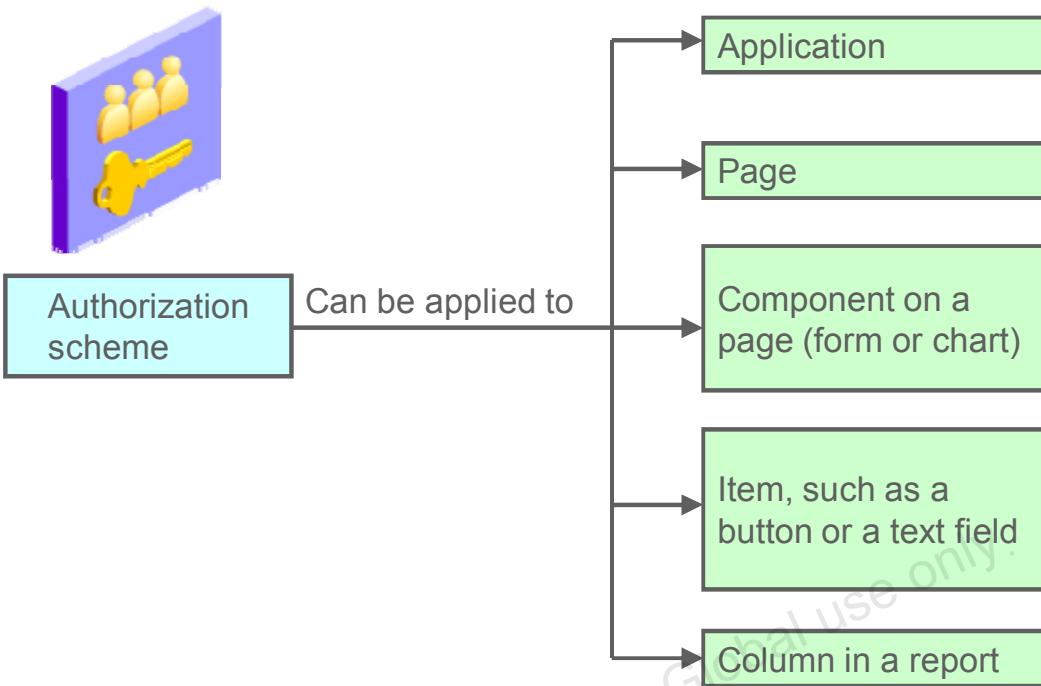
Lesson Agenda

- Securing an Application
- Using Authentication Schemes
- Using Authorization Schemes
 - Where Can You Implement Authorization?
 - Methods to Implement Authorization
 - Creating an Authorization Scheme from the Beginning
 - Creating an Access Control Page
 - Configuring the Access Control Page
 - Applying an Authorization Scheme
- Using Session State Protection



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Where Can You Implement Authorization?



Authorization controls access to resources within the application. Authorizations are implemented by using authorization schemes. You can specify an authorization scheme for an entire application, a page, or specific components such as a region, an item, a button, or a column of a report. If the component-level authorization succeeds, the user can view the component. If the application-level or page-level authorization fails, Oracle Application Express displays a predefined message. You first define the authorization scheme and then associate it with any component in your application. Two common types of authorization schemes include “exists” and “PL/SQL function returning a Boolean value.” The success or failure of authorization schemes can be cached on a per-session or per-page view to enhance performance.

You can view and modify the authorization schemes associated with a page from the Security node in the Shared Components column on the Page Definition page.

Methods to Implement Authorization

Two ways to create and implement an authorization scheme:

- Shared Components:
 - Create an authorization scheme from the beginning.
 - Copy an authorization scheme from an existing scheme.
- Access Control Administration page:
 - Create an Access Control page.
 - Set the application mode.
 - Add users to the Access Control List.
 - Apply the authorization scheme to application components.

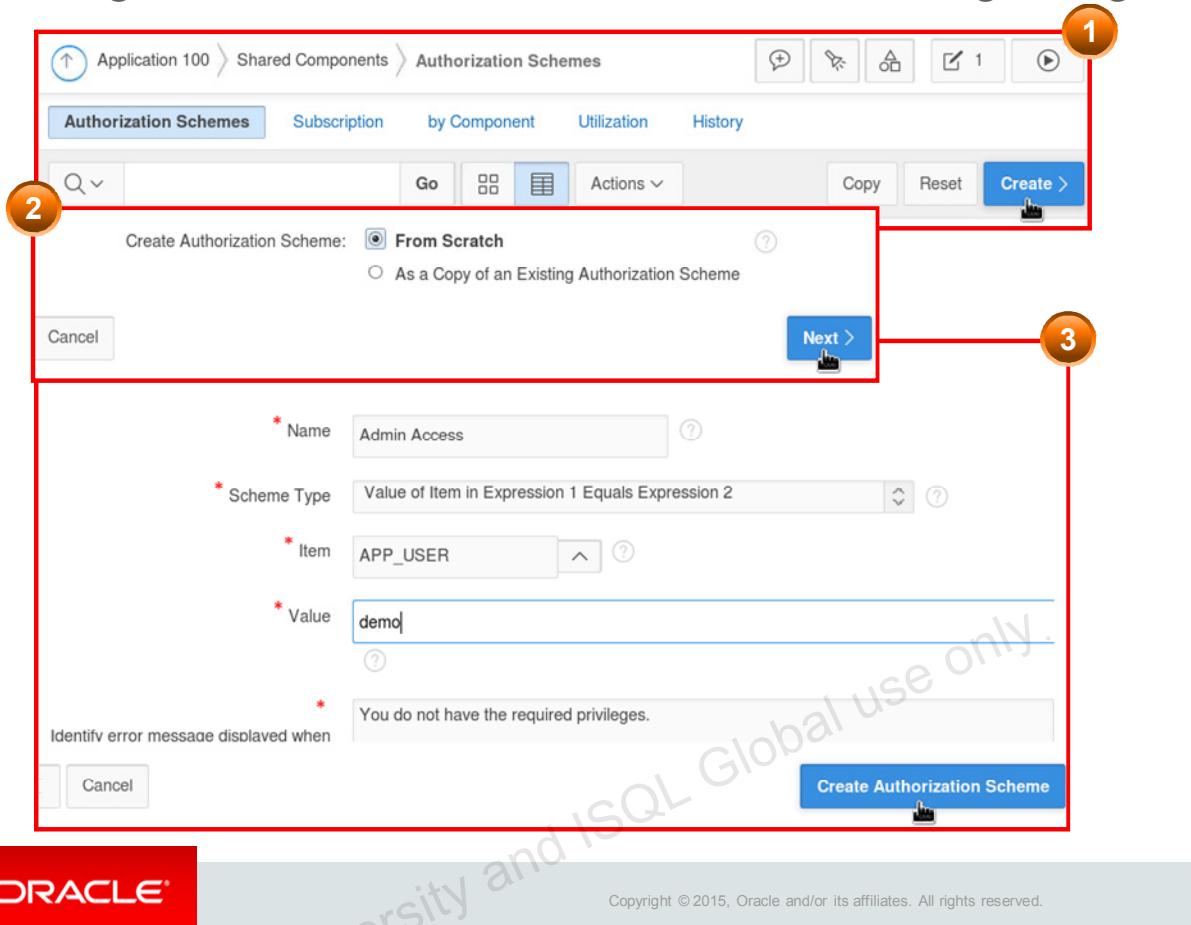


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There are two ways to create and apply an authorization scheme to an application and its components:

- You can create an authorization scheme from the beginning or from an existing scheme from the Shared Components page of an application.
- You can also create an authorization scheme through an Access Control page, which automates the step of creating the authorization schemes. The Access Control page enables you to set the mode of the application and the type of restricted access, if any, that the application should have. The page also enables you to define each user and the access that the user should have. You can also apply the authorization scheme to various application components.

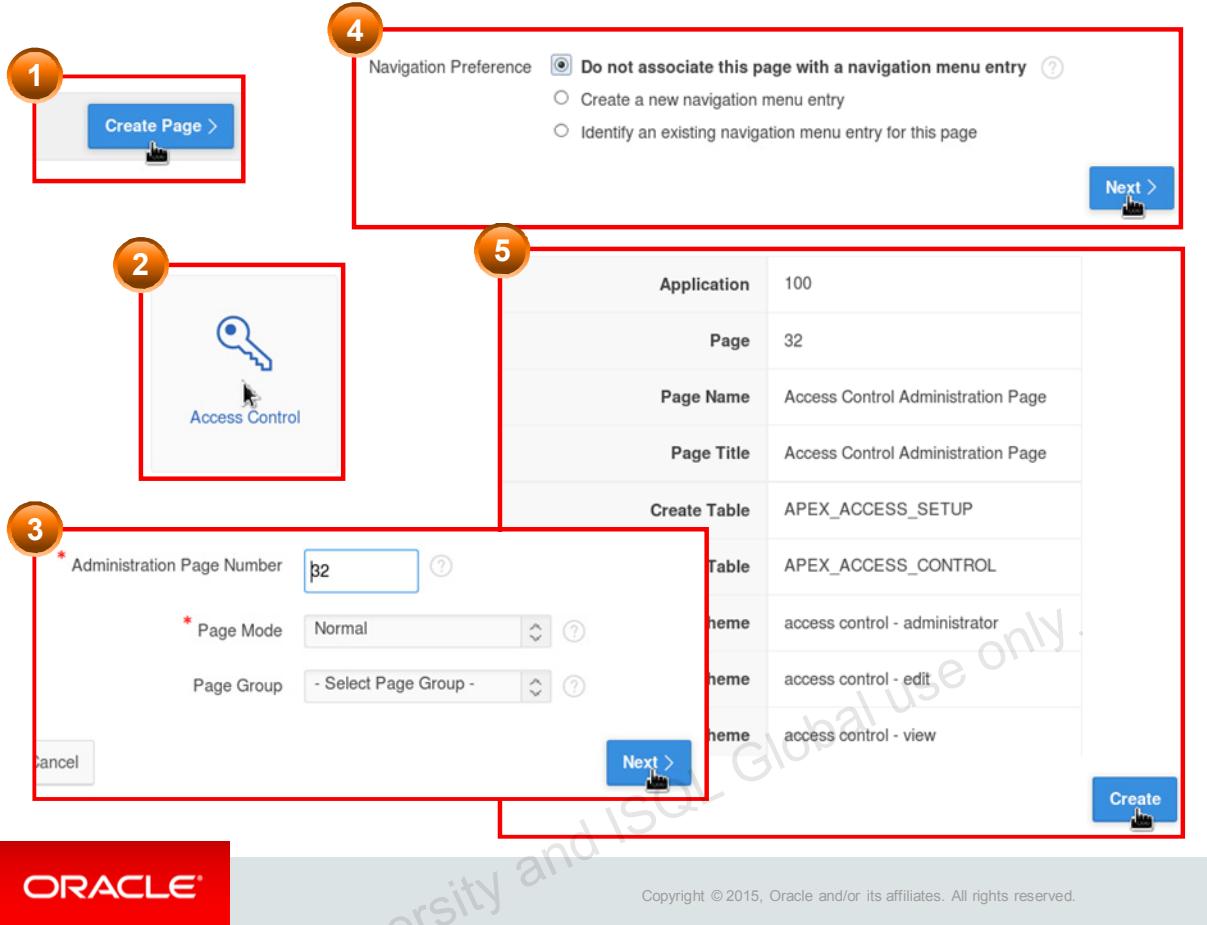
Creating an Authorization Scheme from the Beginning



You can create an authorization scheme from the beginning or copy an existing authorization scheme, and then customize it. To create a new authorization scheme from the beginning, navigate to the Shared Components page and in the Security section, click the Authorization Schemes link. From the Authorization Schemes page, perform the following steps:

1. Click the Create button.
2. Select “From Scratch” and click Next.
3. Specify the following details and click Create Authorization Scheme.
 - Enter a name for the scheme.
 - Select a scheme type that defines how the scheme will be applied. In this example, the value in Expression 1 (APP_USER) is compared to the value specified in Expression 2 (demo). If the comparison succeeds, the authorization scheme passes. If it fails, the authorization scheme fails.
 - Enter the error text to be displayed when the authorization scheme fails.
 - Specify whether the authorization scheme must be evaluated once per session or once per page view.

Creating an Access Control Page



Using an Access Control page, you can define the users who can access an application and specify privileges for each user.

To create an Access Control page for an application, perform the following steps:

1. Navigate to the application home page and click Create Page.
2. Select the Access Control page type.
3. Specify a page number or accept the given page number. Then click Next.
4. Choose your navigation preference.
5. Review the details and click Create.

You have successfully created an Access Control page for an application.

Configuring the Access Control Page

The screenshot shows the 'Application Administration' interface for Oracle Application Express. A red box highlights the 'Access Control List' section. Inside this section, a table lists users with their privileges. The row for 'user1' has both the 'Username' and 'Privilege' fields highlighted with a red box. To the right of the table are 'Add User', 'Delete', and 'Apply Changes' buttons, with 'Apply Changes' also highlighted with a red box. At the top of the page, there are options for 'Application Mode' (radio buttons for 'Full access to all, access control list not used.', 'Restricted access', 'Public read only', and 'Administrative access only.'), a 'Set Application Mode' button, and a 'Find' search bar.

	Username	Privilege	Last Changed By	Date
<input type="checkbox"/>	user1	Administrator	(null)	(null)

Find Go ?

Add User Delete Apply Changes ?

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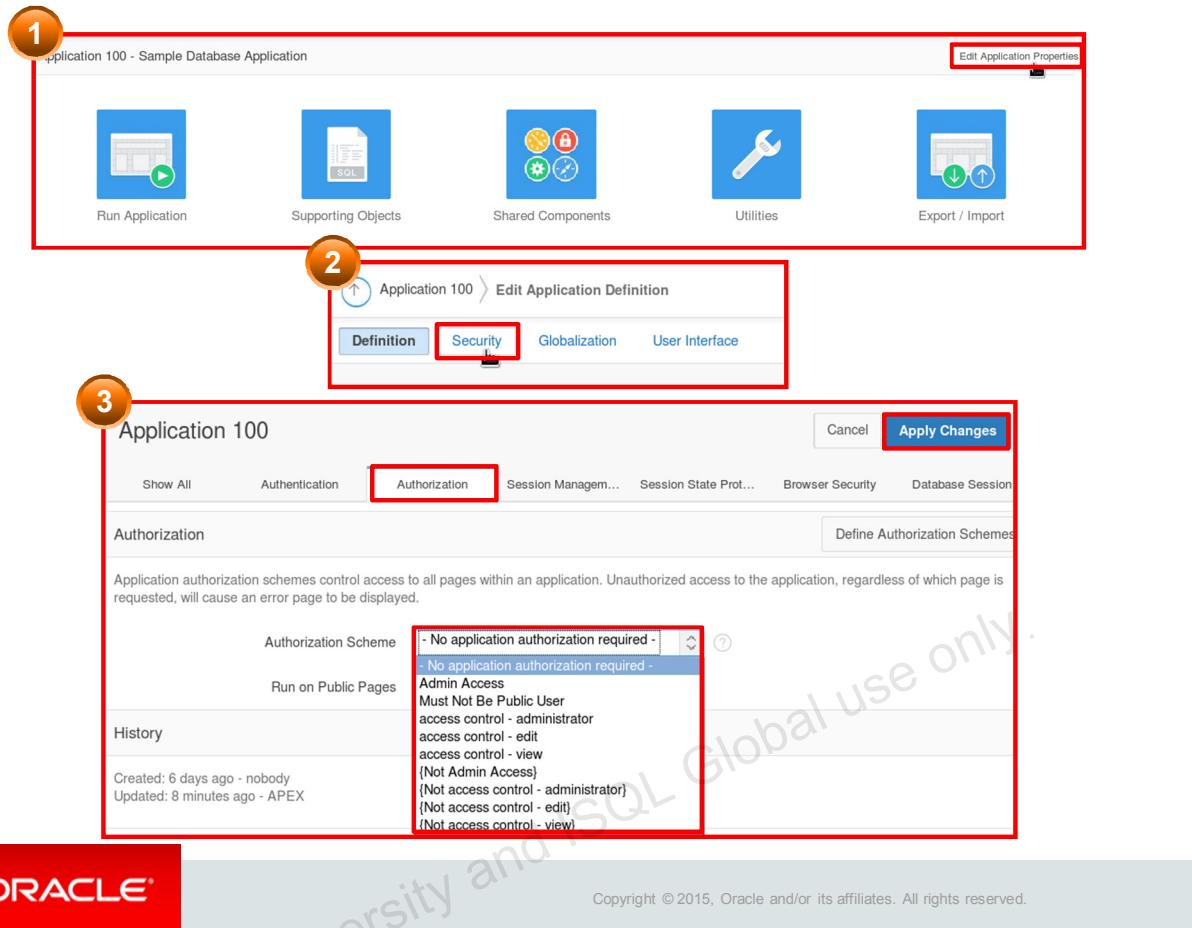
After the Access Control page has been created, you can run the page to set the application mode and add users to the Access Control List. Application mode defines what type of access you want the application to have. The options are:

- **Full access:** All users are given access, and the Access Control List (ACL) is not used.
- **Restricted access:** Only the users specified in the ACL are given access according to the privilege given to them.
- **Public read only:** All users are given access to view the application or component. They cannot make any changes. Users defined in the ACL can view and modify the application or component.
- **Administrative access only:** Only users defined in the ACL with Administrative privileges are given access.

To add users and assign privileges to those users in Access Control List, perform these steps:

1. Click Add User.
2. Enter the username and select the privilege that you want to assign.
3. Click Apply Changes.

Applying an Authorization Scheme to an Application

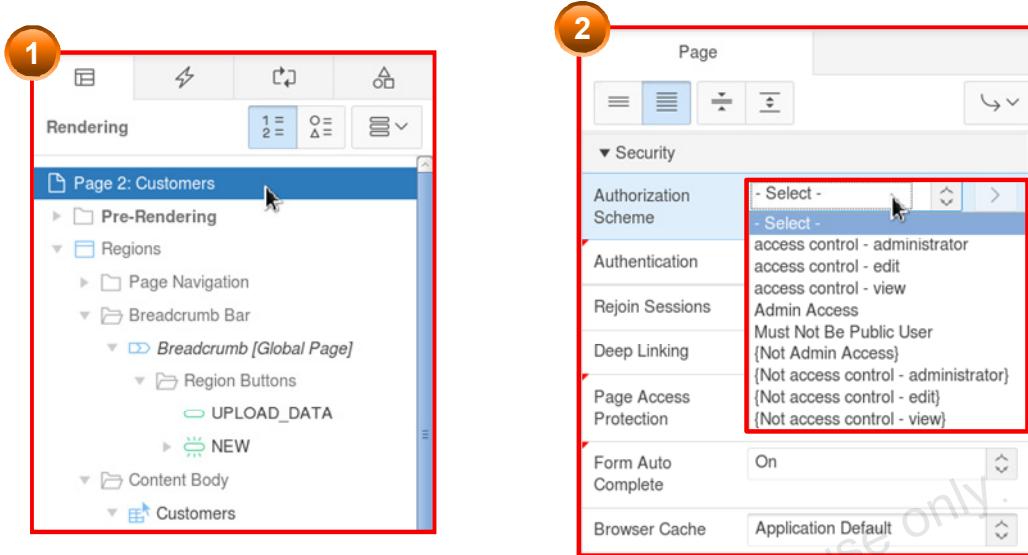


To apply an authorization scheme to an entire application, navigate to the application home page and perform the following steps:

1. Click the Edit Application Properties button.
2. Click the Security tab.
3. Click the Authorization tab. Select an authorization scheme from the Authorization Scheme drop-down list, and click Apply Changes. The authorization scheme is applied to your application.

If you apply the “access control – administrator” scheme, all users in the ACL with administrator privileges have access to the application. Application Express also lists some schemes to reverse the condition created in your scheme. For example, if you apply the “(Not access control – administrator)” scheme, all users except the users in the Access Control Administrator list are given access to the application.

Applying an Authorization Scheme to a Page

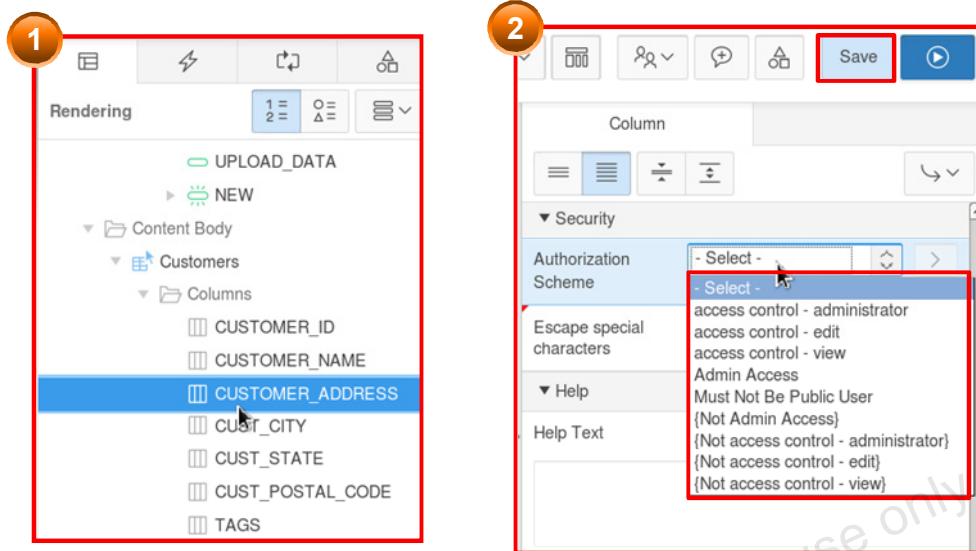


To apply an authorization scheme to a page, perform the following steps:

1. Navigate to the page definition of the page to which the authorization scheme must be attached. In the Rendering pane, select the page name.
2. In the Property Editor, scroll down to the Security tab and select a scheme from the Authorization Scheme drop-down list. This authorization scheme must evaluate to TRUE for the page to be rendered.

Save and run the page.

Applying an Authorization Scheme to a Column in a Report



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To apply an authorization scheme to a column in a report, perform the following steps:

1. Navigate to the page definition of the page that contains the report. In the Rendering pane, select the column in the report where you want to apply the authorization scheme. In this slide example, CUSTOMER_ADDRESS is selected.
2. In the Property Editor pane, scroll down to the Security tab and select a scheme from the Authorization Scheme drop-down list. Click Save.

Note that for each authorization scheme, you can set the authorization scheme to be valid when the user logging in is contained within the authorization scheme or when the user is not contained within it. This is very useful if you have a page with one region that should be displayed for users with authorization and another for users without authorization. You can conditionally display each without needing to manually code a second authorization scheme.

Quiz



Which of the following statements are true about an authorization scheme?

- a. You can attach an authorization scheme to any component or control in an application.
- b. After associating an authorization scheme with a page, you cannot modify it.
- c. You can create an authorization scheme through an Access Control page.
- d. If a page-level authorization scheme fails, Oracle Application Express displays a previously defined message.

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Answer: a, c, d

Practice 14-2 Overview: Restricting Users By Using Access Control

This practice covers the following topics:

- Creating users to add to the access control list
- Creating an access control page
- Adding users to the Access Control List
- Defining and applying the authorization schemes to each application component

Lesson Agenda

- Securing an Application
- Using Authentication Schemes
- Using Authorization Schemes
- Using Session State Protection
 - What Is Session State Protection?
 - Enabling Session State Protection
 - Configuring Session State Protection



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What Is Session State Protection?

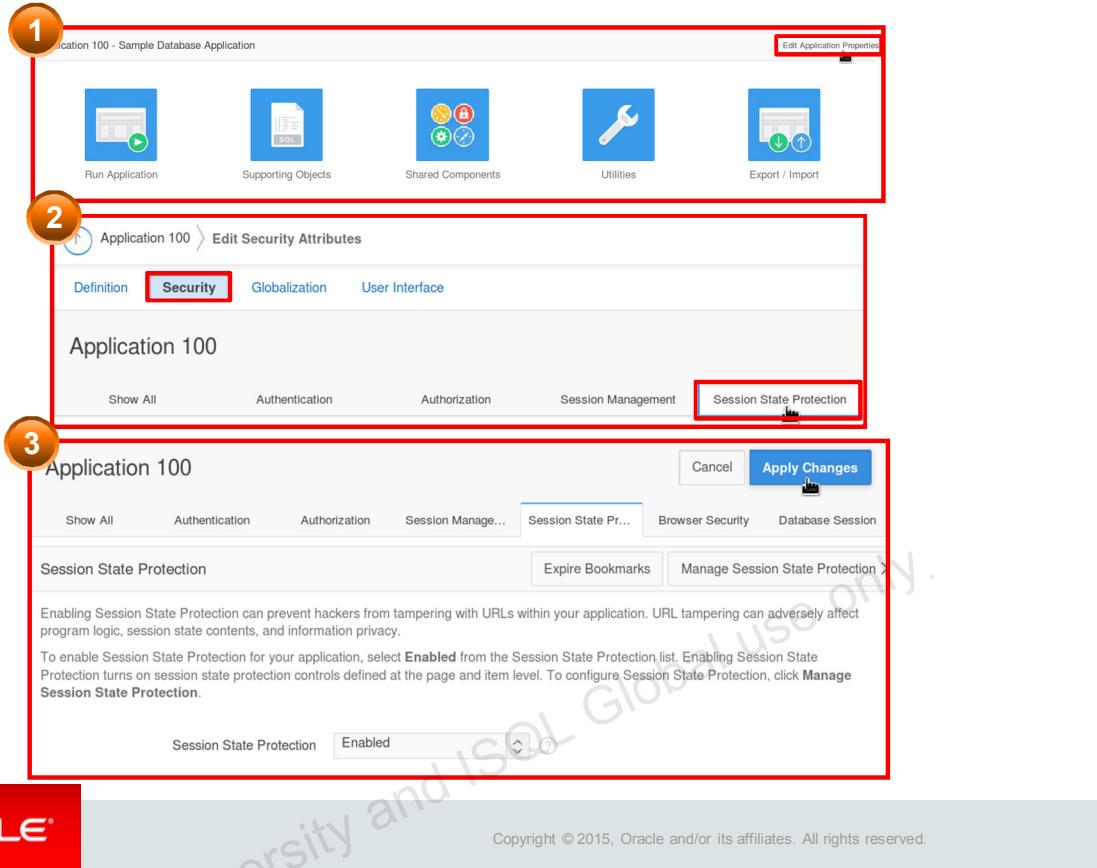
- Session State Protection is a built-in functionality that prevents hackers from tampering with the URLs within your application.
- Enabling Session State Protection is a two-step process:
 1. Enable the feature.
 2. Set the page and item security attributes.



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When enabled, Session State Protection uses the Page Access Protection attributes and the Session State Protection item attributes in conjunction with checksums positioned in f?p= URLs to prevent URL tampering and unauthorized access to and alteration of session state. When Session State Protection is disabled, the page and item attributes related to Session State Protection are ignored and checksums are not included in the generated f?p= URLs.

Enabling Session State Protection from the Edit Application Page

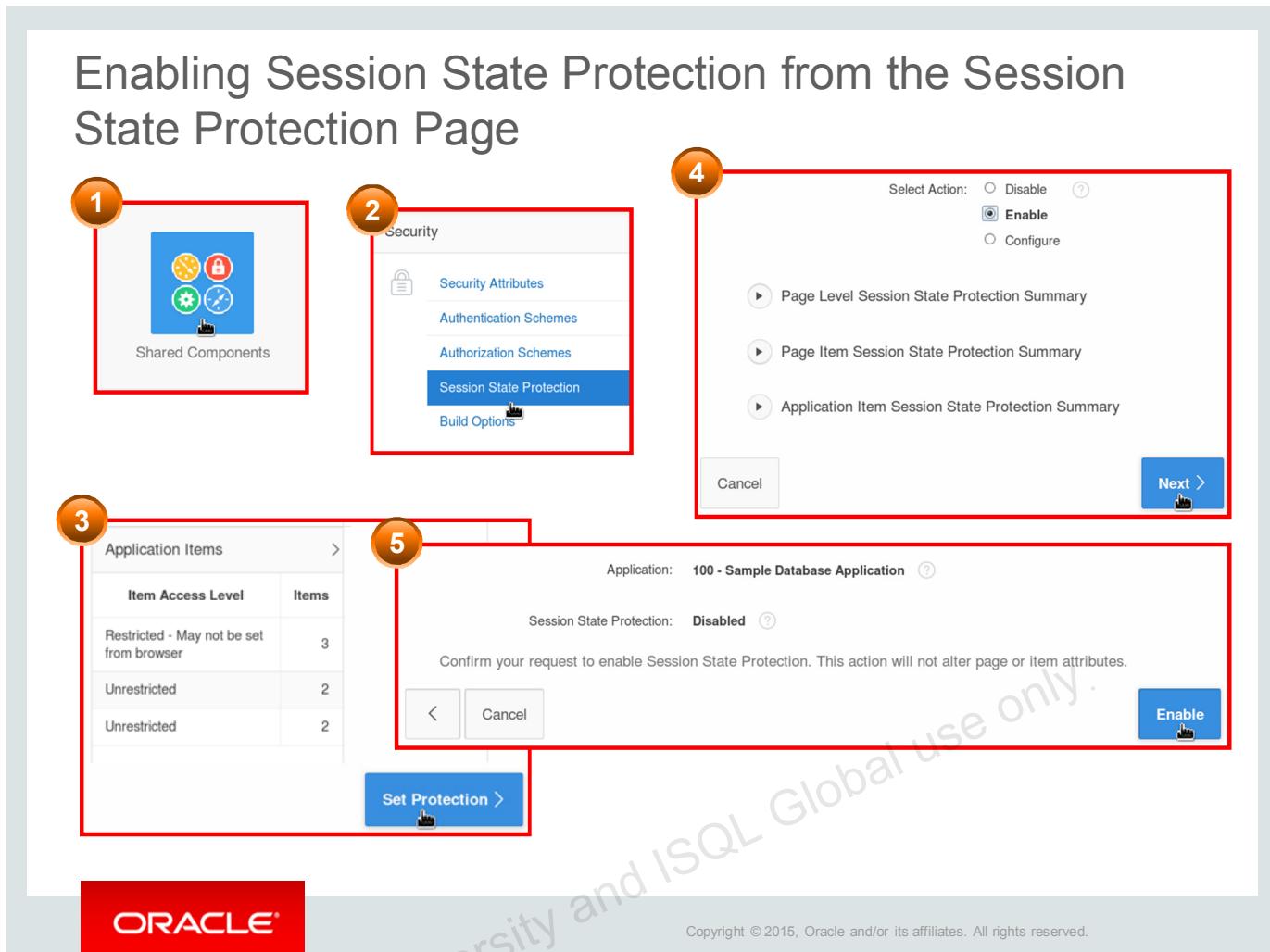


To enable Session State Protection for an application, perform the following steps:

1. Navigate to the application home page and click the Edit Application Properties button.
2. Click the Security tab and then the Session State Protection tab.
3. Select Enabled for Session State Protection and click Apply Changes.

Note: The Session State Protection is enabled by default. To disable Session State Protection, use the same procedure, but select Disabled instead of Enabled. Disabling Session State Protection will not change the existing security attribute settings, but those attributes will be ignored at run time.

Enabling Session State Protection from the Session State Protection Page



You can also access the Session State Protection page, and then enable Session State Protection for the application. Perform the following steps:

1. Click the Shared Components icon on the application home page.
2. Click the Session State Protection link in the Security list.
3. The Session State Protection page appears. Click the Set Protection button.
4. Select Enable and click Next.
5. Click the Enable button.

Configuring Session State Protection

You can configure security attributes in two ways:

- Use a wizard and select a value for specific attribute categories. Those selections are then applied to all pages and items within the application.
- Configure values for individual pages, items, or application items.

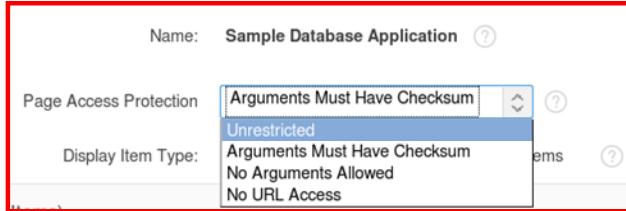


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After enabling Session State Protection, the next step is to configure the security attributes. You can configure the security attributes in two ways as mentioned in the slide.

Identifying Security Attributes

Page Attributes



Item Attributes

Label	Item Session State Protection
(null)	Unrestricted
Search	Unrestricted Checksum Required - Application Level Checksum Required - User Level Checksum Required - Session Level

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The following attributes are available for pages:

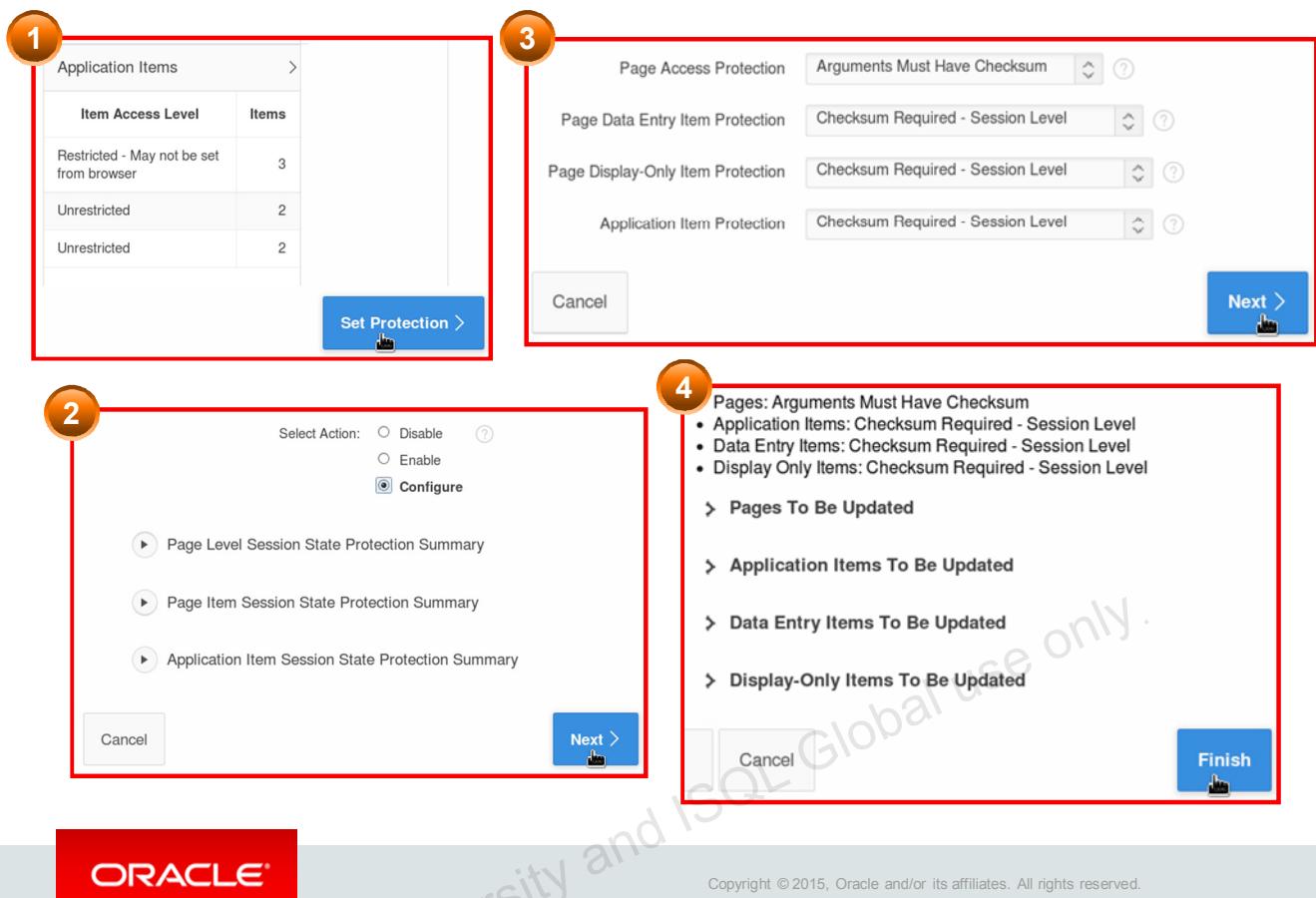
- **Unrestricted:** The URL to request the page may or may not have session state arguments.
- **Arguments Must Have Checksum:** If the session state arguments appear in the URL, a checksum must also be provided.
- **No Arguments Allowed:** The URL used to request the page must not contain session state arguments.
- **No URL Access:** The page may not be accessed by using a URL. However, the page may be the target of a Branch to Page branch type, which does not redirect the user to a URL.

The arguments specified on this page refer to the Request, Clear Cache, and Name/Value session state arguments.

To specify the way a page or an application item's session state value can be set, you have the following options:

- **Checksum Required – Application Level:** May be set in a URL if a checksum is also provided, which is specific to the workspace and application. Use this option when you want to allow the item to be set only by URLs having checksums that were generated by any user running the same application in the current workspace but in a different session.
- **Checksum Required – User Level:** May be set in a URL if a checksum is also provided that is specific to the workspace, application, and user. Use this option when you want to allow the item to be set only by URLs having checksums that were generated by the same named user, running the same application in the current workspace, but in a different session.
- **Checksum Required – Session Level:** May be set in a URL if a checksum is also provided, which is specific to the current session. Use this option when you want to allow this item to be set only by URLs having checksums that were generated in the current session.

Configuring Session State Protection by Using a Wizard



To configure Session State Protection, perform the following steps:

1. Navigate to the Session State Protection page and click the Set Protection button.
2. The Session State Protection Wizard appears. Select Configure and click Next.
3. Select the security attributes for application pages, application items, and page items. Click Next.
4. Review the attributes and click Finish.

The security attributes are applied to all pages and items within the application.

Configuring Session State Protection for Pages and Items

The screenshot illustrates the process of configuring session state protection for pages and items in Oracle Application Express. It consists of three main panels:

- Panel 1 (Left): Existing Session State Protection Settings**
- Panel 2 (Top Right): Page Access Protection Report**
- Panel 3 (Bottom Right): Set Page and Item Protection Dialog**

Panel 1: Existing Session State Protection Settings

Page Access	Pages	Item Access Level	Items
Arguments Must Have Checksum	55	Unrestricted	174
No URL Access	2	Checksum Required - Session Level	3
Unrestricted	9		
No Arguments Allowed			

Panel 2: Page Access Protection Report

Page	Name	Page Access Protection
0	Page Zero	No URL Access
1	Sample Database Application	Arguments Must Have Checksum
2	Customers	Arguments Must Have Checksum
3	Products	Arguments Must Have Checksum
4	Orders	Arguments Must Have Checksum

Panel 3: Set Page and Item Protection Dialog

Set Page and Item Protection

Application: 100 - Sample Database Application

Session State Protection: Enabled

Page: 1

Name: Sample Database Application

Page Access Protection: Arguments Must Have Checksum

Display Item Type: Data Entry Items Display-Only Items

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To configure Session State Protection for pages, perform the following steps:

1. Navigate to the Session State Protection page, and click the arrow next to Pages.
2. A report displays all the pages in the application and the security attribute set for the page. To set the security attribute for a page, click the page number link for the page.
3. You can now set the security attribute for the page. The page items for the page are also listed and you can set the attributes for each item. Click Apply Changes to save the settings.

If you click the Page Item icon on the Session State Protection page, a report displays all the page items in the application. You can click a particular item and set the attributes for that item.

Configuring Session State Protection for Application Items

To configure Session State Protection for an application item:

1. Click the arrow next to Application Items.
2. Click the Application Item link. Specify the security attribute for the items and click Apply Changes.

The screenshot shows two panels from the Oracle Application Express interface. The left panel, titled 'Application Items', displays a table of items categorized by access level: Restricted (3 items), Unrestricted (2 items each for A01 and A02). The right panel is a configuration dialog for the application item 'ENABLE_FEEDBACK'. It includes fields for Name (ENABLE_FEEDBACK) and Scope (Application), along with tabs for Security, Configuration, and Comments, and buttons for Cancel, Delete, and Apply Changes.

1 Application Items

Item Access Level	Items
Restricted - May not be set from browser	3
Unrestricted	2
Unrestricted	2

2 Application Item

A01
A02
A03

ENABLE_FEEDBACK

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Application items are named session state variables that are not specific to a particular page. From the Session State Protection page, click the Application Items icon. A report is displayed listing all the application items for the application. To configure Session State Protection for an application item, perform the steps provided in the slide.

Practice 14-3 Overview: Enabling Session State Protection

This practice covers the following topics:

- Setting Page Access Protection to No URL Access
- Creating a branch without passing the URL

Summary

In this lesson, you should have learned how to:

- List the different ways to secure your application
- Differentiate between authentication and authorization
- Create an authentication scheme for your application
- Create an authorization scheme by using Access Control
- Enable and configure Session State Protection



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In this lesson, you learned how to implement security for your application. You learned how to associate an authentication scheme with your application and also how to create and attach an authorization scheme to your application. You also learned how to enable Session State Protection and configure security attributes.

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Managing Application Navigation

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Jack Tries to Improve Application Navigation



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Jack successfully added navigation to PTS application so that any page can be run easily. While working with different options in Oracle APEX, he understood that Oracle APEX allows developers to create more visual and attractive navigation lists with images. Jack finds it quite interesting and gets into implementing those features.

Objectives

After completing this lesson, you should be able to:

- Build a hierarchical list with images
- Build a database-driven navigation report
- Build a site map
- Enforce authorization on the site map



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In this lesson, you learn to build a hierarchical list with images on the home page. You also build a database-driven navigation report and a site map, and incorporate security into your site map.

You Are Here in This Course



Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 12: Adding Shared Components that Aid Navigation

Lesson 13: Working with Themes, Templates, and Files

Lesson 14: Implementing Security

Lesson 15 : Managing Application Navigation

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In Unit 3, you include navigation in your application with the help of shared components. This unit also explains how to implement page-level authorization to make your application highly secure.

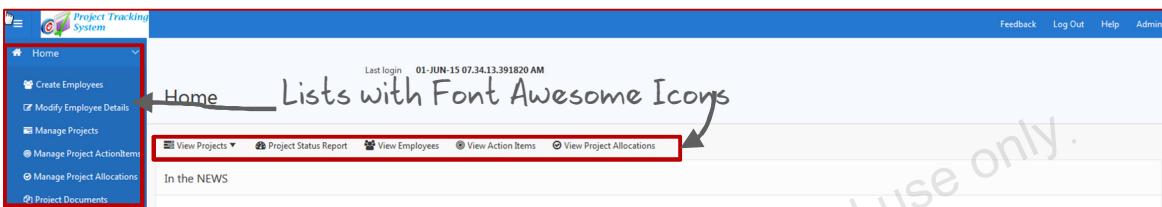
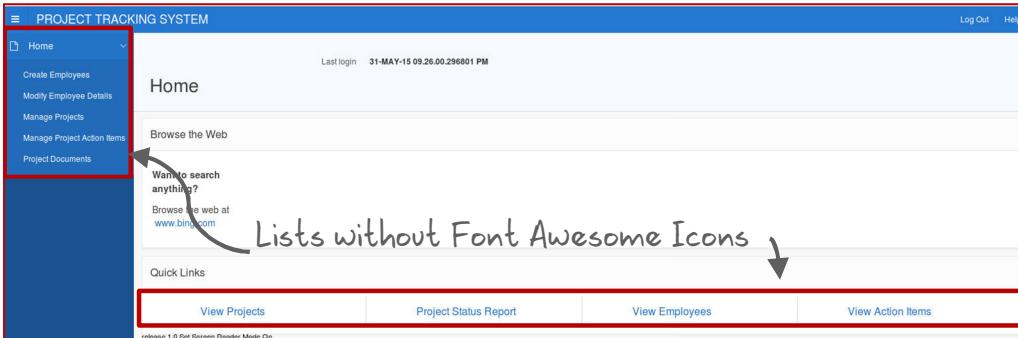
Lesson Agenda

- Building a Hierarchical List with Images
- Building a Database-Driven Navigation Report
- Building a Site Map
- Enforcing Authorization on Your Site Map



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Building a Hierarchical List with Images (Font Awesome Icons)



Universal Theme supports Font Awesome Icons instead of regular image files.

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One way to handle navigation is using a hierarchical list with images. The menu structure in Oracle Application Express uses hierarchical lists with images.

With the introduction of Universal Theme in Oracle APEX 5.0, the navigation lists can be created using “Font Awesome Icons” instead of images. This gives a more modern look to the application’s navigation lists and also does not add more weight (occupy memory) to the application.

All through the slides in this lesson, you see references to PTS application, which is created using Universal Theme. Therefore, all the slides in this lesson give reference to “Font Awesome Icons” only.

In the slide, you see the original navigation and also how the images can be used and the submenus are displayed. To accomplish the hierarchical list with images, several steps need to be performed.

Building a Hierarchical List with Images

1. Update the list with the desired sublist items.
2. Identify and upload the images to include in the list. This step is not required if “Font Awesome Icons” are used.
3. Associate an image or font awesome icon with a list item.
4. Associate the list with the list region and define region settings.



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To build a hierarchical list with images, you need to perform a series of steps:

1. Update the list with the desired sublist items.
2. Upload image files to “Static Application Files” under Shared Components. For applications using Universal Theme, this step is not needed because you can use Font Awesome Icons, which are preloaded with the application.
3. Edit the list to associate the list entries with Font Awesome Icons.
4. Associate the list with the list region on a page and set the region properties.

Building a Hierarchical List with Images

1. Update the list with the desired sublist items.

Sequence	Name	Parent Entry	Target	Conditional	Updated	Level	Authorization Scheme	Copy
10	View Projects	-	-	-	18 minutes ago	1	-	
12	Projects Master Report	View Projects	?p=&APP_ID.:4.&SESSION.:&DEBUG.::	-	17 minutes ago	2	-	
20	View Status	-	-	-	14 minutes ago	1	-	
22	Project Status Report	View Status	?p=&APP_ID.:3.&SESSION.:&DEBUG.::	-	13 minutes ago	2	-	
30	View Employees	-	-	-	11 minutes ago	1	-	
32	Employees Report	View Employees	?p=&APP_ID.:5.&SESSION.:&DEBUG.::	-	10 minutes ago	2	-	
40	View Action Items	-	-	-	9 minutes ago	1	-	
42	Action Items Report	View Action Items	?p=&APP_ID.:11.&SESSION.:&DEBUG.::	-	8 minutes ago	2	-	



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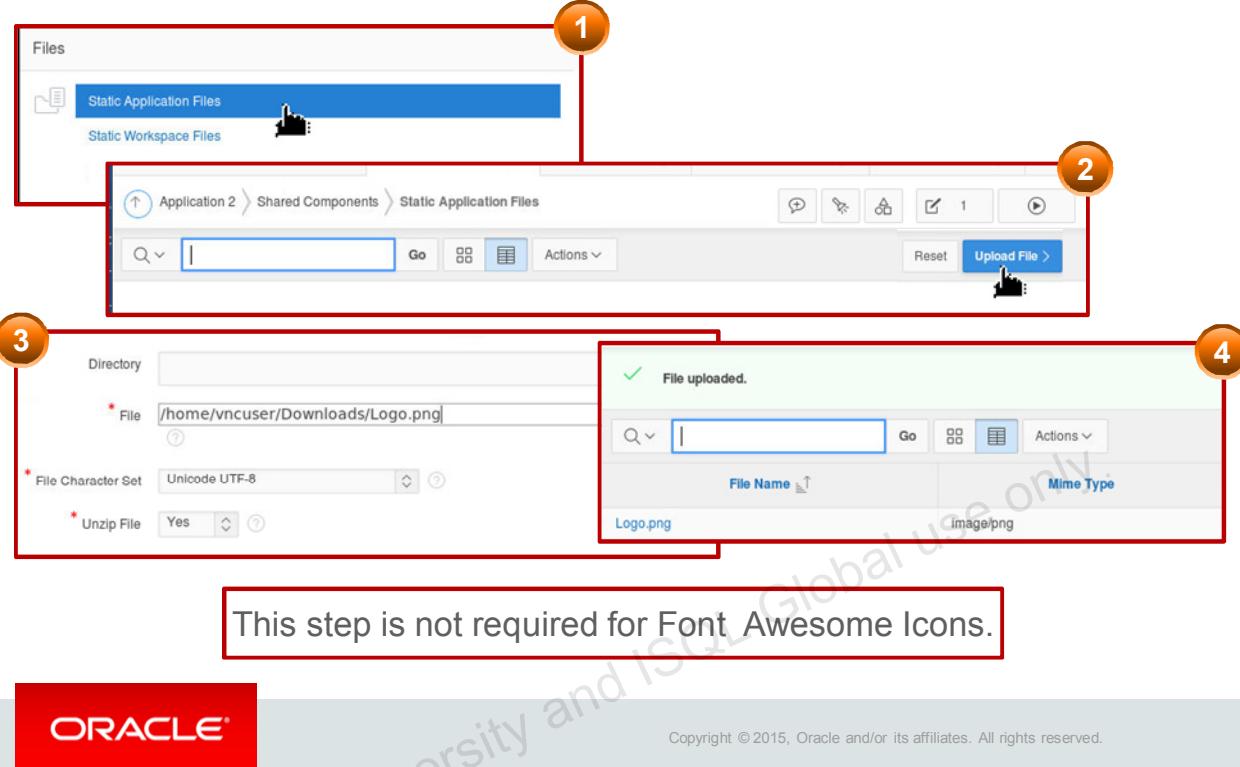
The first step is to update the list with the desired sublist items by performing the following steps:

1. On your application page, click Shared Components > Lists.
2. Select the list that exists or create one.
3. Click Create List Entry.
4. Create an entry for each item you want to include in the list. Specify a parent list entry (where appropriate) and a page to branch to when the entry is selected.

Note: The best practice is to sequence each entry by parent list entry and stagger the numbers in case a new list entry needs to be added at a later date.

Building a Hierarchical List with Images

2. Identify and upload the images to include.



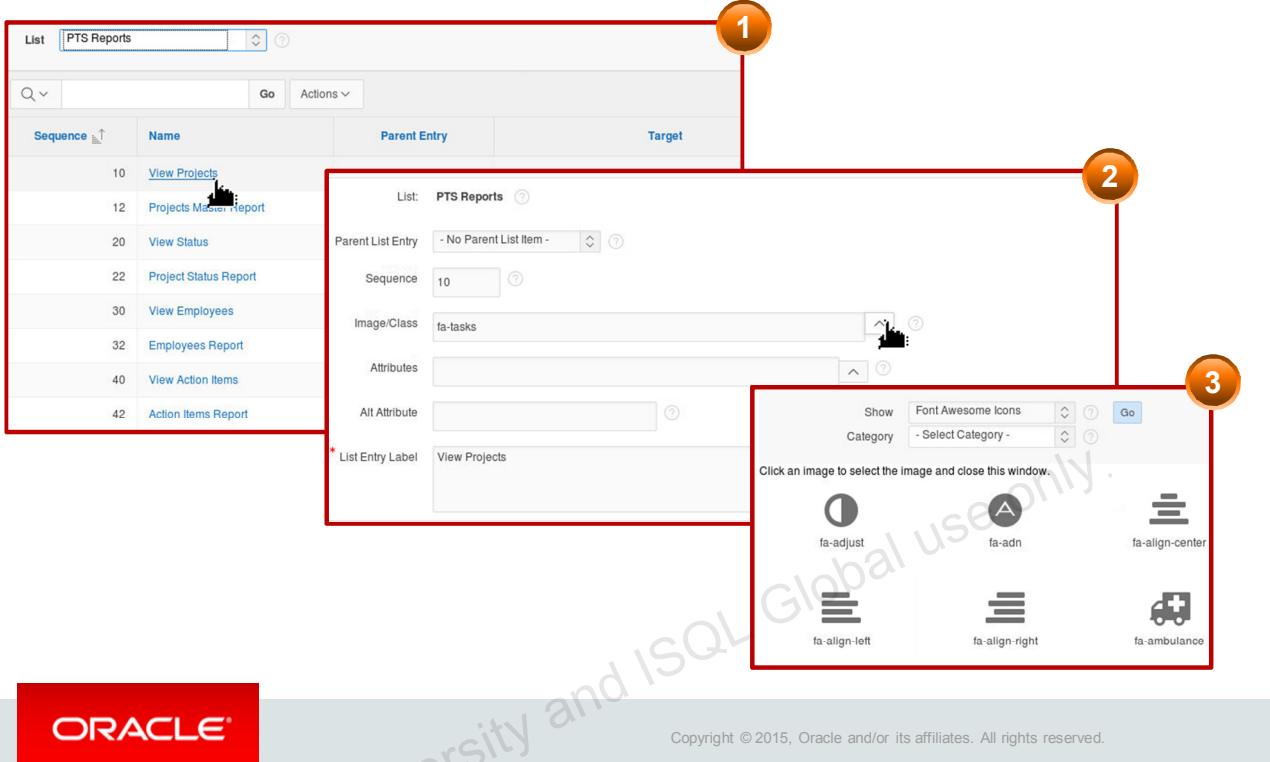
Identify the images that you want to incorporate and upload the images into Application Express.

1. On your Application page, click Shared Components.
2. Under Files, select Images.
3. For each image, click Create and select the file to upload and then click Upload.
The list of images uploaded is shown.

Note: To see the icon, change to the detail view.

Building a Hierarchical List with Images

3. Associate an image or font awesome icon with a list item.

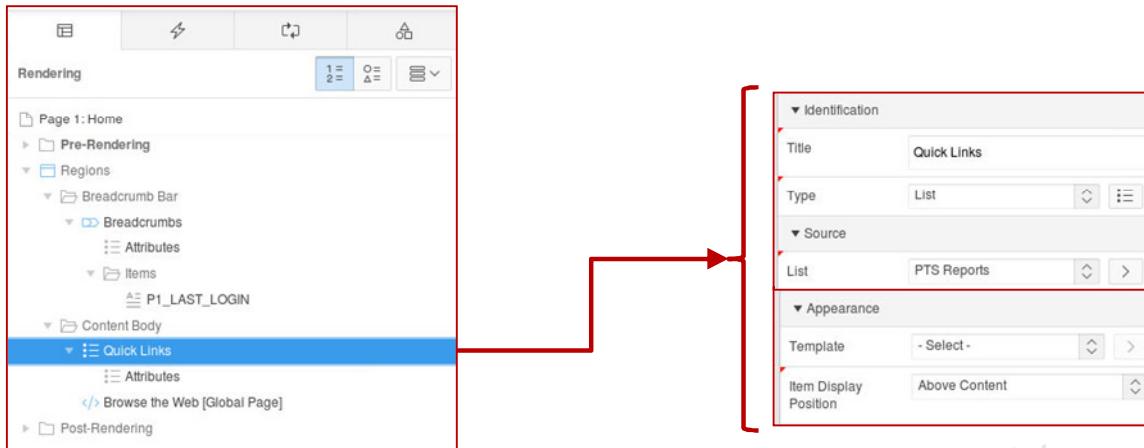


Associate an image or font awesome icon with a list item.

1. From Shared Components > List, select your list.
2. Click the list entry for which you want to associate an image or icon to edit its properties
3. Click the pop-up LOV beside the Image/Class field, browse for the image file or font awesome icon.
4. Click Apply changes.

Building a Hierarchical List with Images

4. Define list region settings.



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Define the list region settings.

1. Open the page where the list region is created in page designer mode.
2. Under Rendering, select the list region and change the template to “No Template” in its property editor.
3. Also, select your list name for the drop-down list in its property editor.
4. Select the list attributes under Rendering and choose the appropriate “List Template” in its property editor.

Practice 15-1 Overview: Building a Hierarchical List with Images

This practice covers the following topics:

- Updating the existing list
- Associating parent list entries with font awesome icons
- Changing the attributes of the navigation region

Lesson Agenda

- Building a Hierarchical List with Images
- Building a Database-Driven Navigation Report
- Building a Site Map
- Enforcing Authorization on Your Site Map



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Building a Database-Driven Navigation Report

This report is used to navigate between pages by using links defined against values in the database.

1. Create a report based on a column.
2. Create a link to page and pass an ID value.

The diagram illustrates the navigation process. On the left, a screenshot of a report titled "Database Driven Projects Navigation" shows a list of projects. A callout points to the project name "MFG Sugar Industries" with the text "Click project name.". An arrow points from this callout to the right side of the diagram. On the right, a screenshot of a form titled "Manage Projects" displays detailed information for the selected project. A callout points to the text "Displays project details" with an arrow pointing to the "Project Name" field in the form.

PROJECTS	Project Name
MFG Sugar Industries	MFG Sugar Industries
APEX4.2 Course Development	APEX4.2 Course Development
APEX5.0 Course Development	APEX5.0 Course Development
AMEX Cobrand	AMEX Cobrand
Order Management	Order Management
Super Insurance Solutions	Super Insurance Solutions
MFP Firmware Testing	MFP Firmware Testing
SPRINT P2K	SPRINT P2K
Peoplesoft	Peoplesoft
XYZ Store CRM	XYZ Store CRM
Superia Banking Solutions	Superia Banking Solutions

1 - 11

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Manage Projects

Project Name * APEX4.2 Course Development

Project Type * 302

Project Description * Developing Course Lessons for APEX 4.2

Project Status * 104

Project Planned Start Date * 15-DEC-14

Project Start Date * 20-DEC-14

Project Planned End Date * 01-APR-15

Project End Date 24-MAR-15

Project Upgrade Yn * No

Project Upgrade Of

Project Created By * 504

Project Created On 20-DEC-14

Project Last Updated By * 504

Project Last Updated On 23-MAR-15

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Often, you want to handle navigation through shortcuts. In this case, you want to show a list based on values in the database. In the example in this slide, a list of Projects shortcuts is shown. The user selects a project, which populates the project detail page based on the project.

This navigation between pages based on a value in the database is done using a report. The report also selects the ID column (in this case, `PROJECT_ID`), which is then passed to the linked page so that the page can be populated. In the example in this slide, the user selected the project name, so the `PROJECT_ID` is passed to the Manage Projects page and the information for the project is displayed.

Jack creates a navigation-based report for quick access to project information in PTS.

Building a Database-Driven Navigation Report

1. Create a report based on a column.

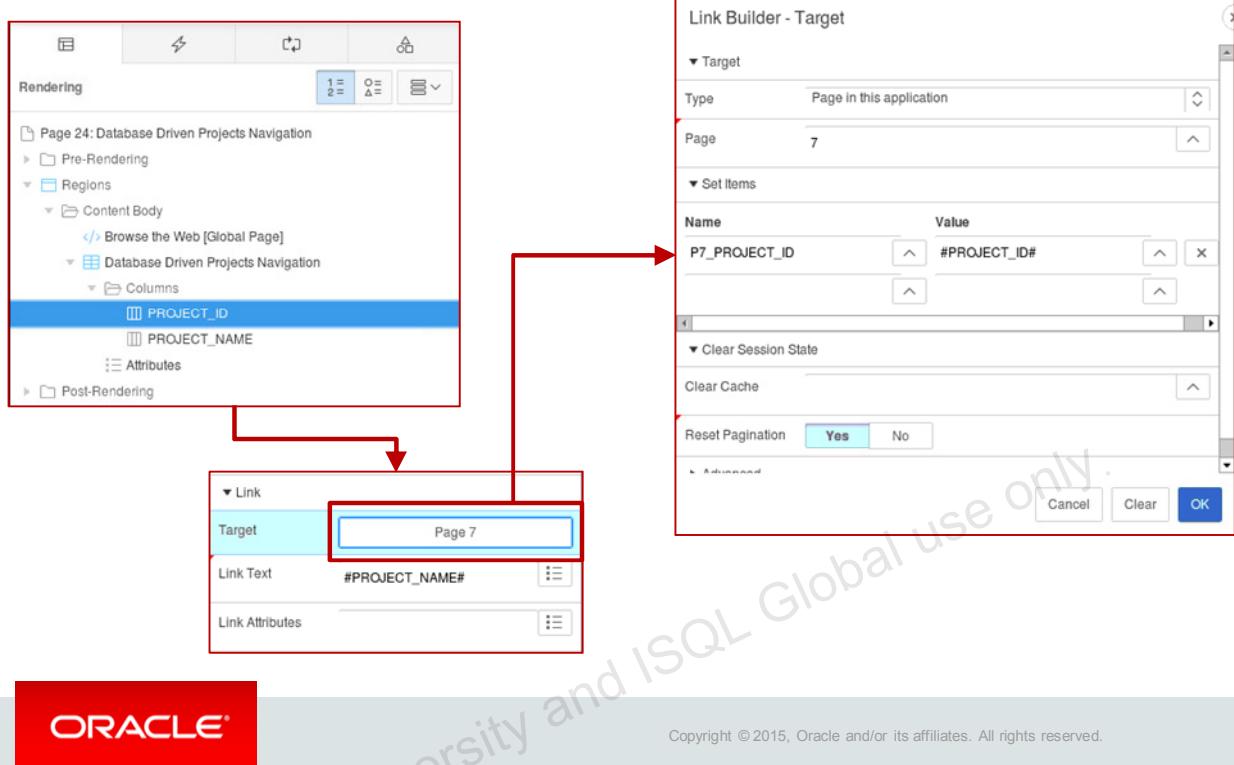
The screenshot shows the Oracle Application Express interface. At the top, a red box highlights the "Create Page" button. Below it, three options are shown: "Interactive Report" (with a grid icon), "Classic Report" (with a grid icon), and "Report on Web Service" (with a cloud icon). A blue arrow points from the "Classic Report" option to a detailed view of the report's structure. This view includes a tree navigation pane on the left and a configuration pane on the right. In the configuration pane, under the "Identification" section, the "Column Name" is set to "PROJECT_ID" and the "Type" is set to "Link". The "Heading" section contains the text "PROJECTS". A red box highlights the "PROJECT_ID" column in the tree view, and a red arrow points from this selection to the "PROJECT_ID" configuration in the pane. The Oracle logo is at the bottom left, and a copyright notice is at the bottom right.

In the example in this slide, a report was created and the `PROJECT_NAME` and `PROJECT_ID` columns were selected.

After the report is created, under Region Definition, update the properties of `PROJECT_ID` such that they will be displayed as links.

Building a Database-Driven Navigation Report

2. Create a link to a page and pass an ID value.



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The next step is to create a link from the `PROJECT_NAME` column to the Manage Projects page and pass the `PROJECT_ID` value.

Quiz



You can copy list entries from one list to another.

- a. True
- b. False

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Answer: a

Practice15-2 Overview: Building a Database-Driven Report

This practice covers the following topics:

- Building a report based on the data in a table
- Navigating to the detail

Lesson Agenda

- Building a Hierarchical List with Images
- Building a Database-Driven Navigation Report
- Building a Site Map
- Enforcing Authorization on Your Site Map



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Building a Site Map

A site map is used to navigate between pages by page title.

1. Create a page group with the pages that you want to appear in the site map.
2. From Utilities, create SQL from the APEX_APPLICATION_PAGES view.
3. Create a report that shows the page name.
4. Create a link from the item to #PAGE_ID#.

Page Name
Access Control Administration Page
Projects Master Report
Action Items Report
Project Status Report
Project Documents
Employees Report
Project Document Types



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Site maps are typically useful for applications that are display- or query-only. For larger online transaction processing (OLTP) applications, site maps may not be as useful because there are many pages that perform similar functionality.

To create a site map, you must perform the following tasks:

1. Create a page group with the pages that you want to appear in the site map.
2. Under Utilities > Application Express Views, create the SQL to select the appropriate PAGE_NAME and PAGE_ID for your PAGE_GROUP and APPLICATION_ID.
3. Create a report that shows the page name.
4. Create a link from the page name to the page it corresponds to. Pass the item value #PAGE_ID# in the Page field.
5. Modify the report to use the desired templates. In the example in this slide, the Sidebar Region Template with the Borderless Report Template is used.

Building a Site Map

1. Create a page group with the pages that you want to appear in the site map.

The screenshot shows the 'Page Assignments' tab of the Oracle Application Express interface. The 'New Group' dropdown is set to 'Site Map'. The 'Assign Checked' button is highlighted in blue. The table lists 11 pages, with the 'Group' column for pages 3, 4, 5, 8, 9, and 11 all set to 'Site Map', which is highlighted with a red box. The other pages are listed as 'Unassigned'. The columns are labeled: Page, Name, Group, Items, and Regions.

	Page	Name	Group	Items	Regions
0	Global Page - Mobile	Unassigned	0	2	
1	Home	Unassigned	3	6	
2	Home	Unassigned	0	1	
3	Project Status Report	Site Map	3	3	
4	Projects Master Report	Site Map	2	3	
5	Employees Report	Site Map	0	1	
6	Create Employees	Unassigned	12	1	
7	Manage Projects	Unassigned	15	1	
8	Project Document Types	Site Map	0	2	
9	Project Documents	Site Map	5	2	
10	Update Employees	Unassigned	0	1	
11	Action Items Report	Site Map	0	1	

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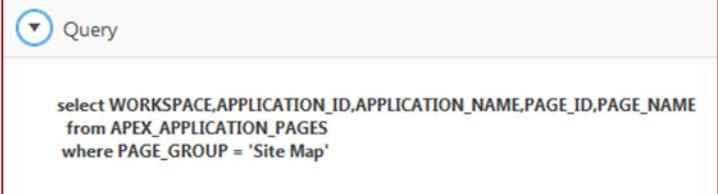
To show a list of desired pages in your site map, one technique is to use page groups. Create a page group and assign the pages that you want to appear in your site map to the page group you created.

To create a page group, perform the following steps:

1. On the application home page, click Utilities.
2. Under Page Specific Utilities, click Cross Page Utilities
3. Click Page Groups, and then click Create.
4. Enter Site Map for Name and click Create.
5. Click the Page Assignments tab.
6. Select Site Map for New Group and for all the appropriate pages, and click Assign Checked.

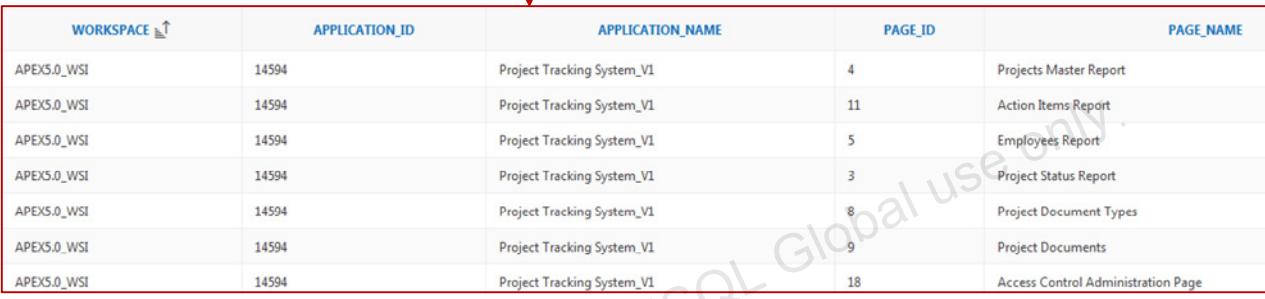
Building a Site Map

- From Utilities > Application Express Views, create SQL from the APEX_APPLICATION_PAGES view.



```
Query

select WORKSPACE.APPLICATION_ID,APPLICATION_NAME,PAGE_ID,PAGE_NAME
from APEX_APPLICATION_PAGES
where PAGE_GROUP = 'Site Map'
```



A screenshot of the Oracle Database SQL Developer interface showing the results of a query. The results are displayed in a table with the following columns: WORKSPACE, APPLICATION_ID, APPLICATION_NAME, PAGE_ID, and PAGE_NAME. The data shows multiple rows for the same application ID (14594) but different page IDs and names, corresponding to the 'Site Map' group.

WORKSPACE	APPLICATION_ID	APPLICATION_NAME	PAGE_ID	PAGE_NAME
APEX5.0_WSI	14594	Project Tracking System_V1	4	Projects Master Report
APEX5.0_WSI	14594	Project Tracking System_V1	11	Action Items Report
APEX5.0_WSI	14594	Project Tracking System_V1	5	Employees Report
APEX5.0_WSI	14594	Project Tracking System_V1	3	Project Status Report
APEX5.0_WSI	14594	Project Tracking System_V1	8	Project Document Types
APEX5.0_WSI	14594	Project Tracking System_V1	9	Project Documents
APEX5.0_WSI	14594	Project Tracking System_V1	18	Access Control Administration Page



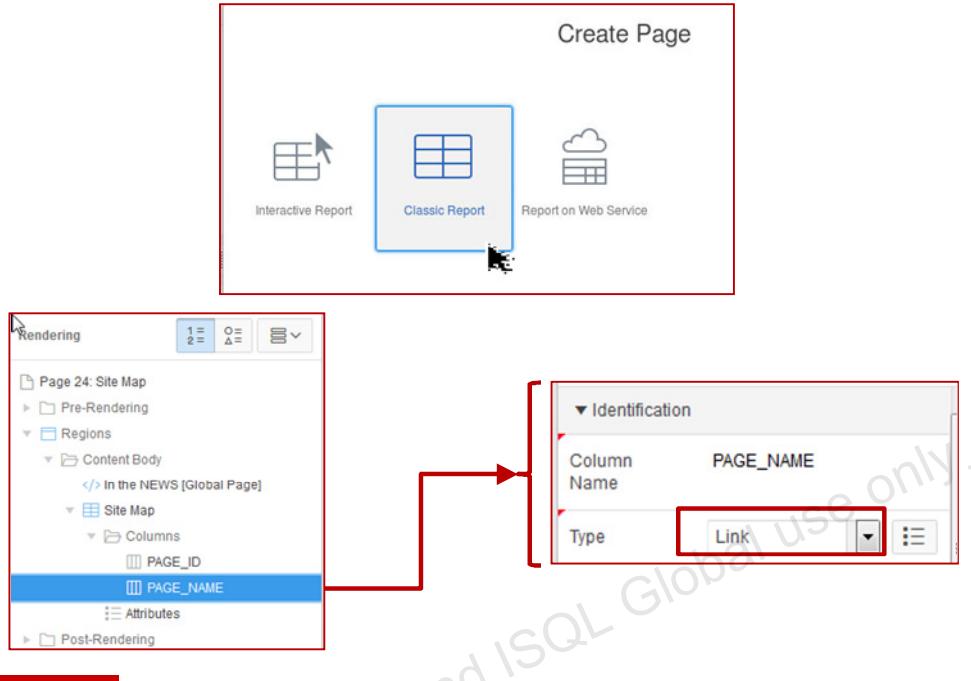
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The next step in building your site map is to generate the SQL statement that you want to run to produce the site map. To produce the SQL statement, perform the following steps:

1. Navigate to the Utilities > Application Express Views option.
2. Select the APEX_APPLICATION_PAGES view.
3. Click the Select Columns tab.
4. Deselect the default columns and select PAGE_ID and PAGE_NAME.
5. Click the Filter tab.
6. Select APPLICATION_ID from the list of columns and enter your application ID in the value field.
7. On the next line, select PAGE_GROUP from the list of columns and enter 'Site Map' in the value field.
8. Click Results to see the data result. This is the data you want to be included in your site map.
9. Click Query to review the query that was executed.

Building a Site Map

3. Create a report that lists just the page name.



The next step is to create a report that invokes the query you just generated.

1. On the Application page, click Create Page.
2. Click Report > Classic Report.
3. Enter Site Map for the name and click Next.
4. Click Next to not include tabs because this page is going to be added to the navigation bar.
5. Enter the following SQL statement and click Next:

```
select PAGE_ID, PAGE_NAME  
from APEX_APPLICATION_PAGES  
where APPLICATION_ID = &APP_ID.  
      and PAGE_GROUP = 'Site Map'
```

6. Enter Site Map for Region Name, change Column Heading Sorting to No, and click Next.
7. Click Finish.
8. Edit the page and, under Rendering, select Site Map and update its properties in the Property Editor.
9. Deselect the Show check box for PAGE_ID.

Building a Site Map

4. Create a link from the item to #PAGE_ID#.

The screenshot shows the Oracle Application Express Site Map builder. On the left, the page structure is displayed with a 'Site Map' region selected. In the center, the Site Map configuration is shown, with 'PAGE_NAME' selected as the column name and 'Link' as the type. On the right, the properties for the 'PAGE_NAME' column are being configured, setting the target to '#PAGE_ID#' and link text to '#PAGE_NAME#'. Arrows indicate the flow from the selected column in the Site Map configuration to the corresponding properties in the right pane.

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Now you need to add the link to view the page when selected.

1. Under Rendering, select PAGE_NAME under columns
2. Update the properties in Property Editor as follows:
 2. Target : #PAGE_ID#
 3. Link Text: #PAGE_NAME#
3. Select PAGE_ID under Columns (under Rendering) and change its Type to Hidden.
4. Select Attributes under Site Map region and change Pagination Type as “No Pagination (Show all rows)”.
5. Click Apply Changes.

Adding a Navigation Bar Entry

To access the site map, create a navigation bar entry:

1. From Shared Components, select Navigation Bar List.
2. Select Desktop Navigation Bar.
3. Click Create List Entry and the List Entry page opens.
4. Enter Site Map for Entry Label.
5. Select “Page in this Application” for Target Type.
6. Enter Site Map for Entry Label and click Next.
7. Select the site map page from the Page drop-down list.
8. Click Create List Entry.



The steps in the slide indicate what is necessary to create a navigation bar entry with text.

Quiz



Navigation bars are different from other shared components in that you do not need to reference them on a page-by-page basis.

- a. True
- b. False

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Answer: a

Practice15-3 Overview: Building a Site Map

This practice covers the following topics:

- Building a site map page
- Adding the page as a navigation bar entry

Lesson Agenda

- Building a Hierarchical List with Images
- Building a Database-Driven Navigation Report
- Building a Site Map
- Enforcing Authorization on Your Site Map

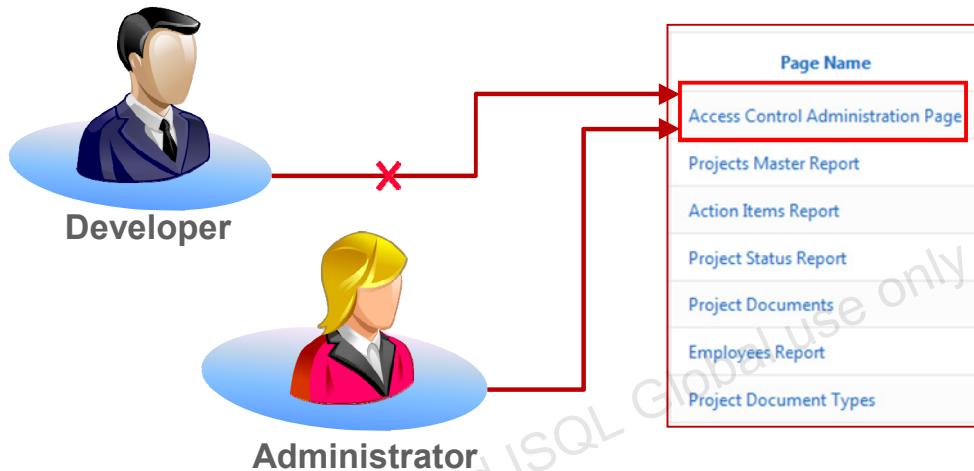


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Enforcing Authorization on Your Site Map

Showing an entry on the site map based on authorization requires the following:

1. Creating a function that checks for authorization
2. Updating the SQL query on the report to check whether the function is true



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To show only those pages that a particular user is authorized to use on the site map, you must create a function that checks the authorization scheme and then selects only those pages. The function should contain the following code:

```
create or replace function authorization_check (
    p_scheme in varchar2)
return varchar2
is
begin
    if apex_util.public_check_authorization(p_scheme) then
        return 'true';
    else
        return 'false';
    end if;
end;
```

Practice 15-4 Overview: Enforcing Authorization on the Site Map

This practice covers the following topics:

- Adding a function that determines authorization of a page in the site map
- Changing the SQL report query for the site map to make sure that the page is displayed only if authorized



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Summary

In this lesson, you should have learned how to:

- Build a hierarchical list with images
- Build a database-driven navigation report
- Build a site map
- Enforce authorization on your site map



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In this lesson, you have learned how to build a hierarchical list with images, a database-driven navigation report, a site map and authorize it.

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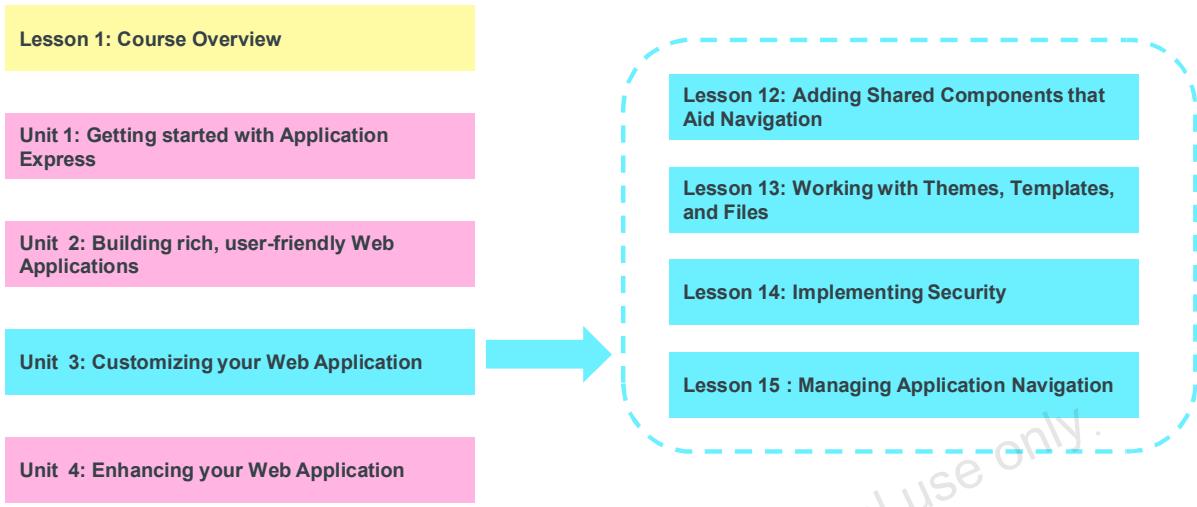


Unit III: Customizing Your Web Application

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Unit III Road Map



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In Unit 3, you completed four topics.

IV

Unit IV: Enhancing Your Web Application

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Jack Enhances Project Tracking System



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Jack is almost ready with the PTS application. As a final task, he is planning to enhance the application by extending it and adding charts, calendars, trees, dynamic actions, plug-ins, and a printing feature. He believes that after he adds these features, the PTS application will be production ready and can be used by the company.

Unit IV Road Map

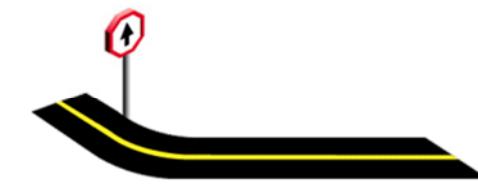
Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19 : Using Dynamic Actions and Plug-Ins

Lesson 20 : Utilizing Application Express Printing

Lesson 21 : Managing Application Feedback

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In Unit 4, you add advanced features to your application by creating dynamic actions, calendars, trees, charts, and application feedback.

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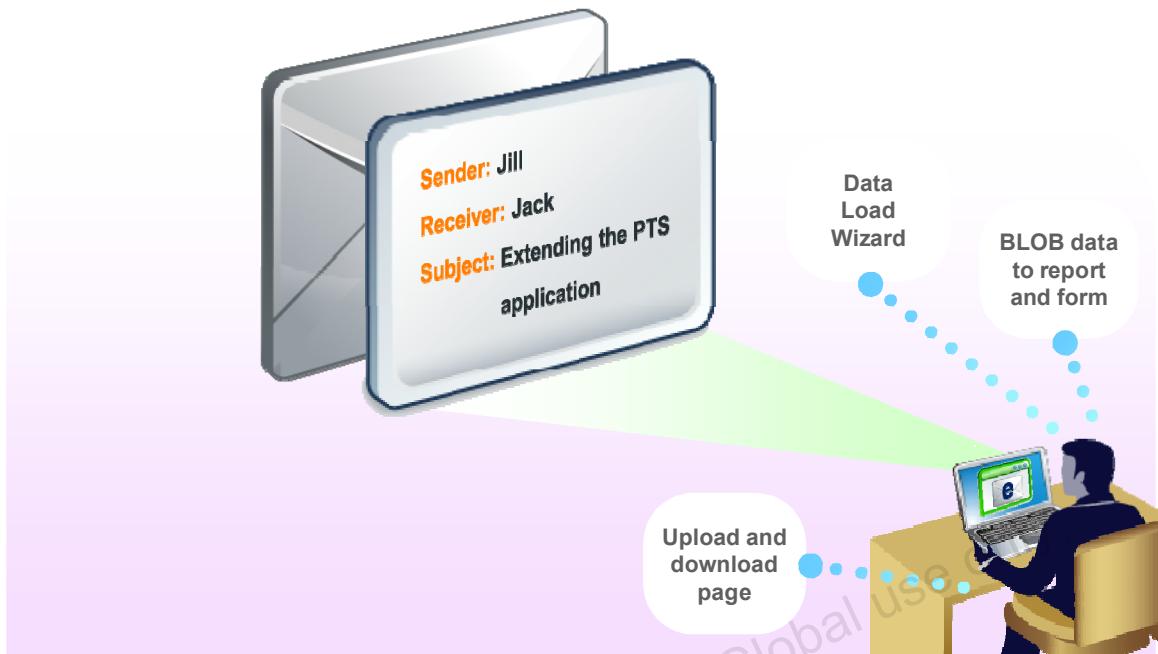
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Extending Your Application

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Jack Extends the Application



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Jack has a functional PTS application that he developed using APEX.

Jill is really happy with the application. She sends an email to Jack asking him to extend the application by adding more features to it. Now that Jack is familiar with APEX, he will be adding all the features that Jill mentions in the email, to the application.

You Are Here in This Course

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19 : Using Dynamic Actions and Plug-Ins

Lesson 20 : Utilizing Application Express Printing

Lesson 21 : Managing Application Feedback

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This slide shows a graphical representation of the entire course highlighting the lesson which is dealt with in these slides.

Objectives

After completing this lesson, you should be able to:

- Create Data Load Wizard pages
- Create an upload and download page
- Add BLOB data to an existing application
- Send an email notification



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In this lesson, you learn how to create Data Load Wizard pages and an upload and download page. You also learn how to add BLOB data in your application and how an email notification can be sent from your application.

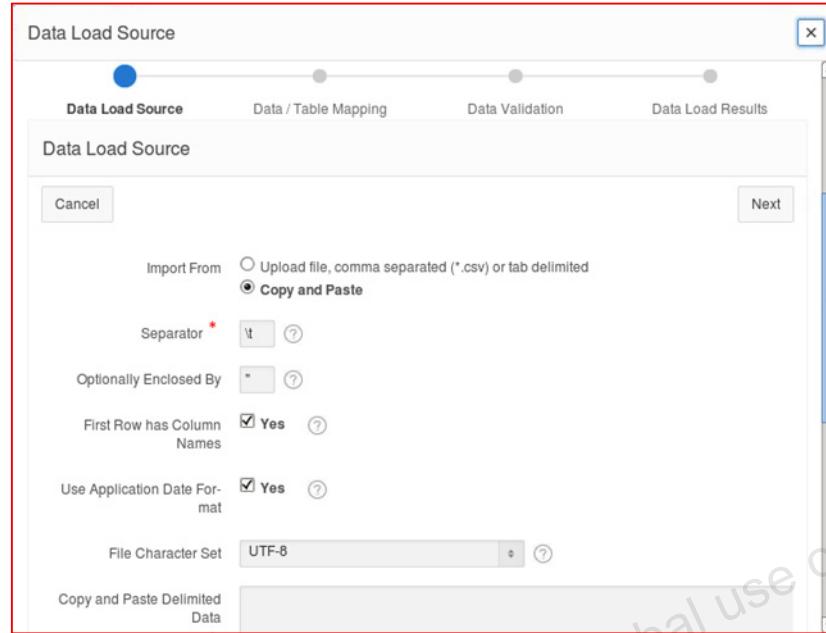
Lesson Agenda

- Creating Data Load Wizard Pages
- Creating an Upload and Download Page
- Adding Binary Large Object (BLOB) Data to an Existing Application
- Sending an Email from an Application



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Data Load Wizard

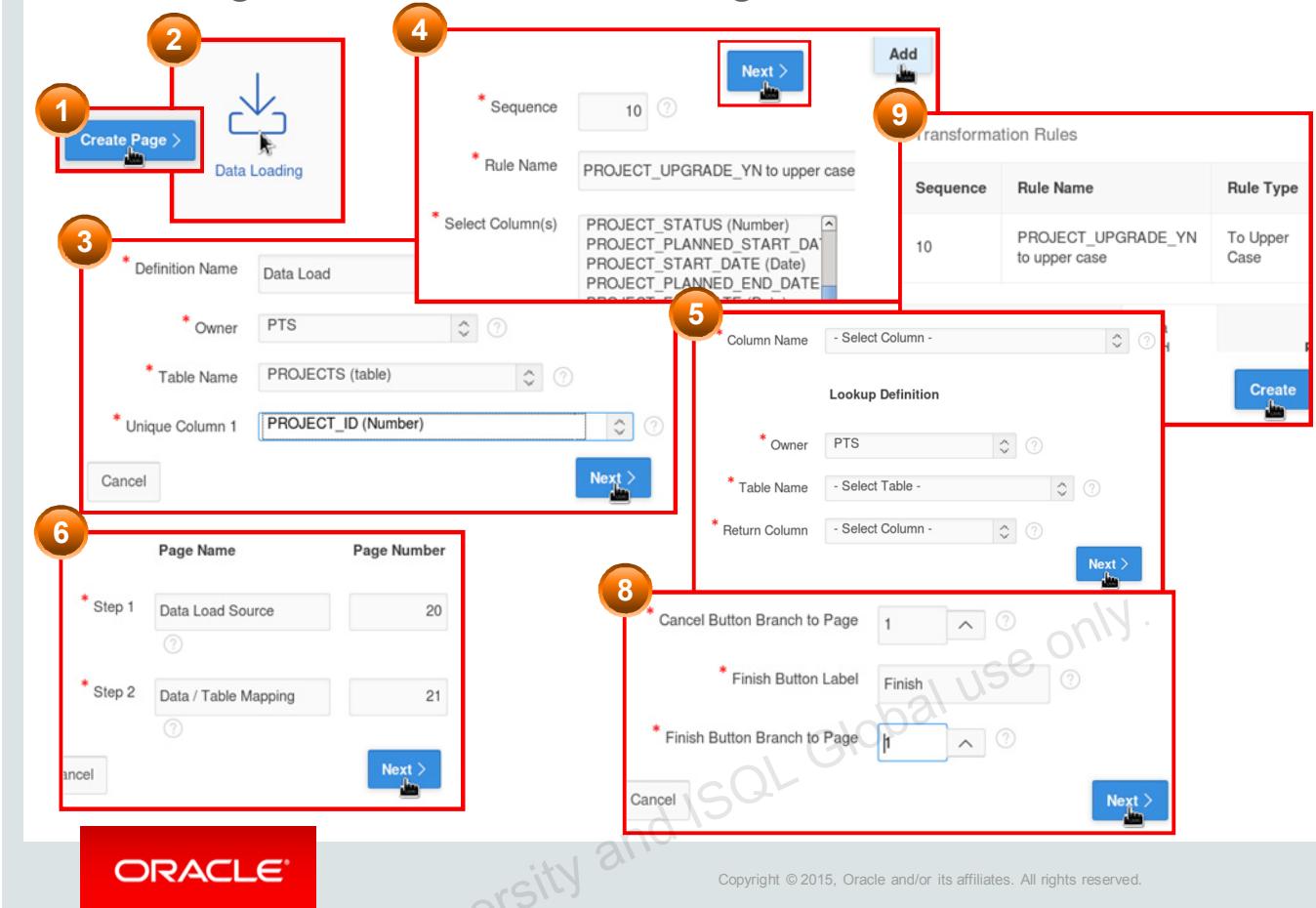


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Applications with data loading capability enable end users to dynamically import data into a table within any schema to which the user has access. To do this, end users run a Data Load Wizard that uploads data from a file or copies and pastes data entered by the end user directly into the wizard. You can create a series of Data Load Wizard pages in your application by using the Data Load Wizard. You can use this wizard to add table lookups and transformation rules that are executed when the Data Load Wizard runs.

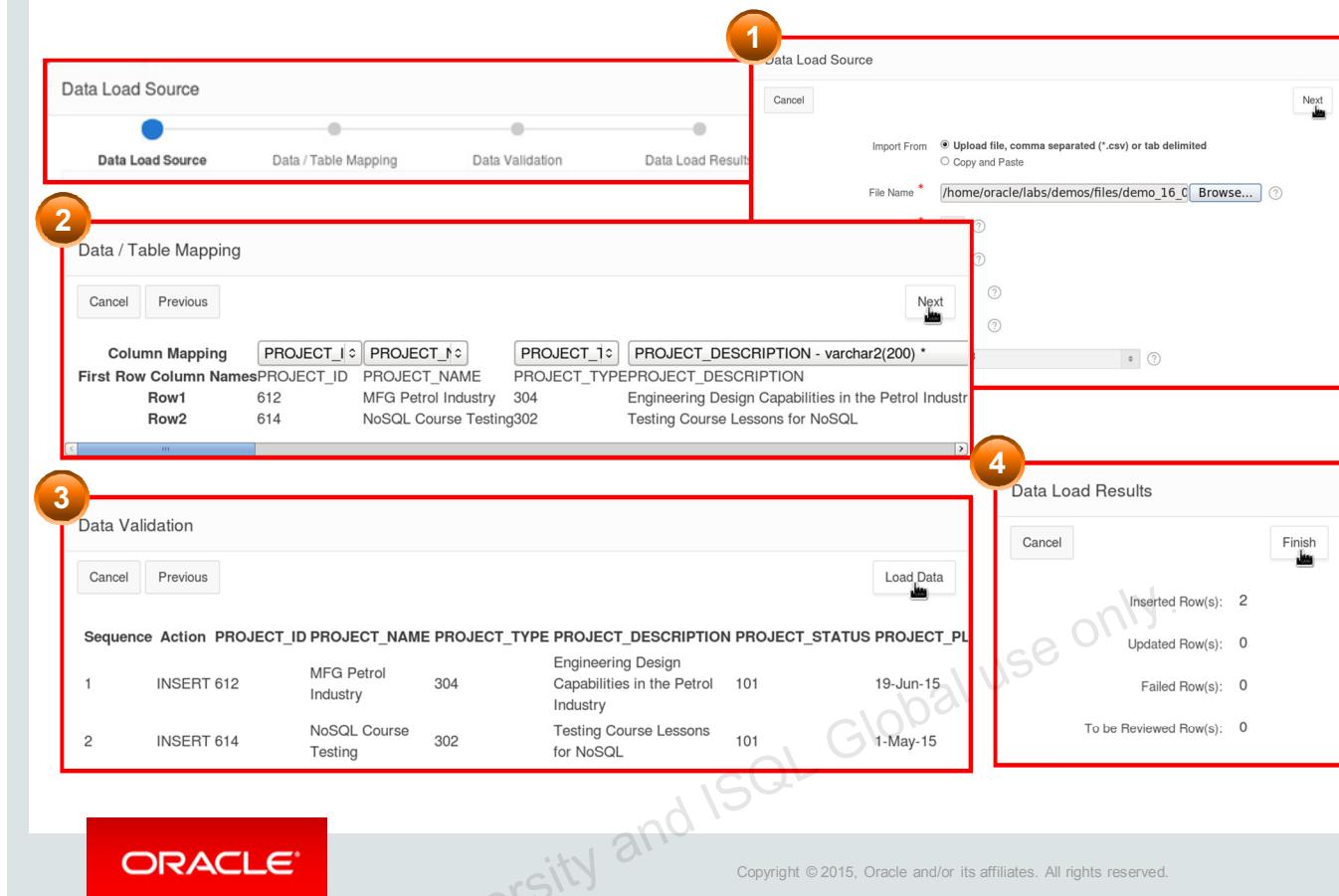
Creating Data Load Wizard Pages



To create Data Load Wizard pages, perform the following steps:

1. Navigate to the application home page and click Create Page.
2. Select Data Loading.
3. To create a new data load definition, specify a name, and select a schema owner, table name, and up to three columns that uniquely identify a row. Click Next.
4. Specify a transformation rule. Transformation rules allow you to change the data being uploaded before it is inserted into the base table. If required, you select the column to transform and then the desired rule to apply to it. Click Add and then click Next.
5. If required, you can add a new table lookup by specifying the column name and the lookup definition. Table lookups allow you to match an uploaded value against another table and use the associated key value instead of the uploaded value. In the example in the slide, the look up table is not created. Click Next.
6. A short descriptive name for each page of the Data Load Wizard to be created is provided. Click Next.
7. Select the navigation preference and click Next.
8. Provide buttons and branching options and click Next.
9. Confirm your wizard attributes and click Create.

Data Load Wizard Pages



After the Data Load Wizard pages are created, you notice the flow of the wizard. Four wizard pages are created:

1. The first wizard page is where you specify the data load source. You want to upload a file with data. Select “Upload file, comma separated (*.csv) or tab delimited” for Import From and click Browse. Select the file. Enter the separator value and click Next.
2. The Data/Table Mappings are displayed. Select the columns to match the columns in the database and click Next.
3. The Data Validation page displays the data that will be inserted into the database. Here the lookup is applied. Verify the data and click Load Data.
4. The Data Load Results page shows the rows that were inserted and updated, that failed, and that need to be reviewed. Click Finish to complete the data load process.

Practice 16-1 Overview: Creating Data Load Wizard Pages

This practice covers creating a series of wizard pages to upload data into a table.

Lesson Agenda

- Creating Data Load Wizard Pages
- Creating an Upload and Download Page
- Adding BLOB Data to an Existing Application
- Sending an Email from an Application



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Creating an Upload and Download Page

The screenshot shows the Oracle Application Express (APEX) interface. On the left, there is a preview of a page titled "Submit File". The "ITEMS" section contains a "File Browse..." button, which is highlighted with a yellow box and has a red border around the entire preview area. On the right, the "Identification" tab of the Property Editor is open for a file browse item named "P22_FILE_NAME". The "Type" field is set to "File Browse...". Under "Label", the text "File name" is entered. In the "Settings" section, "Storage Type" is set to "Table APEX_APPLIC". At the bottom, "Purge File at" is set to "End of Session".

You can create an upload and download page by adding the file browse item type to your page. When you use the file browse item type, the files that you upload are stored in a table called `APEX_APPLICATION_TEMP_FILES`. Every workspace has access to this table through a view called `APEX_APPLICATION_TEMP_FILES`.

To create the file browse item type on a page, perform the following steps:

1. In the Page Definition, drag the File Browser item from the Items gallery to under Items in the Grid Layout. Alternatively, you create the item by right-clicking the Rendering pane and selecting Create Page Item.
2. In the Property Editor, enter the item name, label, and storage type. Select `Table APEX_APPLICATION_TEMP_FILES` for Storage Type.
3. Save the page. The item is successfully created.

Practice 16-2 Overview: Adding an Upload and Download Page

This practice covers the following topics:

- Creating a form in an HTML region with a file upload item and a button
- Creating a report on the document table that has links to download documents
- Providing links to download the documents in the report

Lesson Agenda

- Creating Data Load Wizard Pages
- Creating an Upload and Download Page
- Adding BLOB Data to an Existing Application
- Sending an Email from an Application



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Adding BLOB Data to an Existing Application

The diagram illustrates the integration of BLOB data between an application form and a report. A red box encloses the 'Scott Jordan Customer Details' form, which contains fields for Cust First Name (Scott), Cust Last Name (Jordan), Cust Email (SCOTT.JORDAN@WILL), Account Manager (Cambrault, Gerald), Country (India), City (Bangalore), Phone number (+91 80 012 4869), and a Photo field with a 'Browse...' button and a 'Download' link. A yellow box labeled 'Form' points to the right edge of the red box. Below the form is a note: 'The record created or modified in this form is reflected in the Customer Report.' To the right, a red box encloses a report table with columns: Customer Id, City, Name, Account mgr, and Photo. The table has four rows with data: (496, Bangalore, Scott Jordan, Cambrault, photo thumbnail); (605, Chennai, Shammi Pacino, Cambrault, -); (606, Cochin, Sharmila Kazan, Cambrault, -); and (607, Cochin, Sharmila Fonda, Cambrault, -). A yellow box labeled 'Report' points to the left edge of the red box enclosing the table. The Oracle logo is at the bottom left, and a copyright notice is at the bottom right.

Customer Id	City	Name	Account mgr	Photo
496	Bangalore	Scott Jordan	Cambrault	
605	Chennai	Shammi Pacino	Cambrault	-
606	Cochin	Sharmila Kazan	Cambrault	-
607	Cochin	Sharmila Fonda	Cambrault	-

If you have a column in a table of the binary large object (BLOB) type that you want your user to be able to populate, you need not write all the code to load the selected file. BLOB support in Application Express for Forms and Reports is built-in. If you create a form (via the Create Application Wizard, by creating a page of the Form or Report and Form type, or by creating a region of the Form type) or add an item to an existing form, any items whose source is a database column of the BLOB type will result in an item of the File Browse type. When the form is called for insert, the file selected by the user will be loaded into the BLOB. When the form is called for update, a download link will be displayed to the right of the Browse button. This allows the user to download the file.

Adding BLOB Data

Add a BLOB column and columns for BLOB attributes:

- File name
- Mimetype
- Last Column Updated

```
alter table "CUSTOMERS" add
("PHOTO" BLOB NULL,
 "FILENAME" VARCHAR2(255) NULL,
 "MIMETYPE" VARCHAR2(255) NULL,
 "LAST_UPDATE_DATE" DATE NULL)
/
```



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Before you create your form and report, you must add the BLOB column to the table. In this example, you add a Photo BLOB column to the CUSTOMERS table. You can create three additional columns that store column attribute information about the BLOB data. In this example, you add MIMETYPE, FILENAME, and LAST_UPDATE_DATE that will store information about the BLOB so that you can efficiently retrieve and process BLOB data. MIMETYPE is important so that your browser knows how to display the BLOB, FILENAME allows the file to be saved using the original file name, and LAST_UPDATE_DATE (the date the BLOB column was last updated) facilitates browser-image caching.

Note: Character Set is another column that you can include in the BLOB definition.

Example: Creating a Form with a Report

To generate a form with a report that contains BLOB data, perform the following steps:

1. Create a form with a report.
2. Select the BLOB column. (Do not select the columns that contain the BLOB attributes.)
3. Change the BLOB format for both Form and Report.



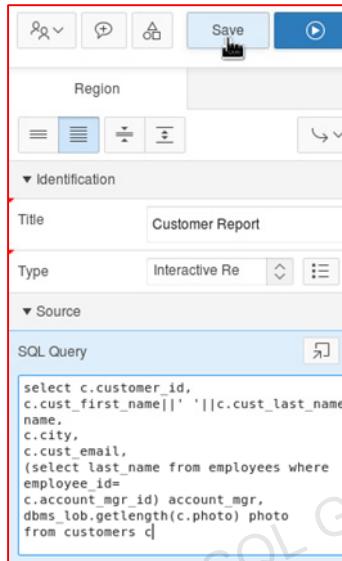
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To generate the appropriate code to store and display BLOB data declaratively, you create a form and/or form with a report by using wizards. In this example, you create a form with an interactive report. Select only the BLOB column when selecting the columns to include in the report and form. The columns that contain the metadata about the BLOB column (`MIMETYPE`, `FILENAME`, and `LAST_UPDATE_DATE`) are populated when the BLOB data is uploaded, and then used when the file is downloaded or displayed inline.

After the form and report are created, the BLOB format is changed to reflect what metadata columns to populate when a BLOB is added to the BLOB column, and then what attributes to use when the BLOB data is retrieved. For example, if you upload a `custpic.gif` file, the BLOB itself is uploaded to the BLOB column, `image/gif` is uploaded to the `MIMETYPE` column, and `custpic.gif` is uploaded to the `FILENAME` column. If you specify that you want the BLOB to be retrieved as an attachment when the download link is clicked, the download window appears with the name of the file. The appropriate software is represented based on `MIMETYPE`.

SQL Query for BLOB Data in Report

`dbms_lob.getlength(<column name>)` is generated to determine whether BLOB contains a value.



The screenshot shows the Oracle Application Express (APEX) report configuration screen. A red box highlights the 'SQL Query' section. The query is:

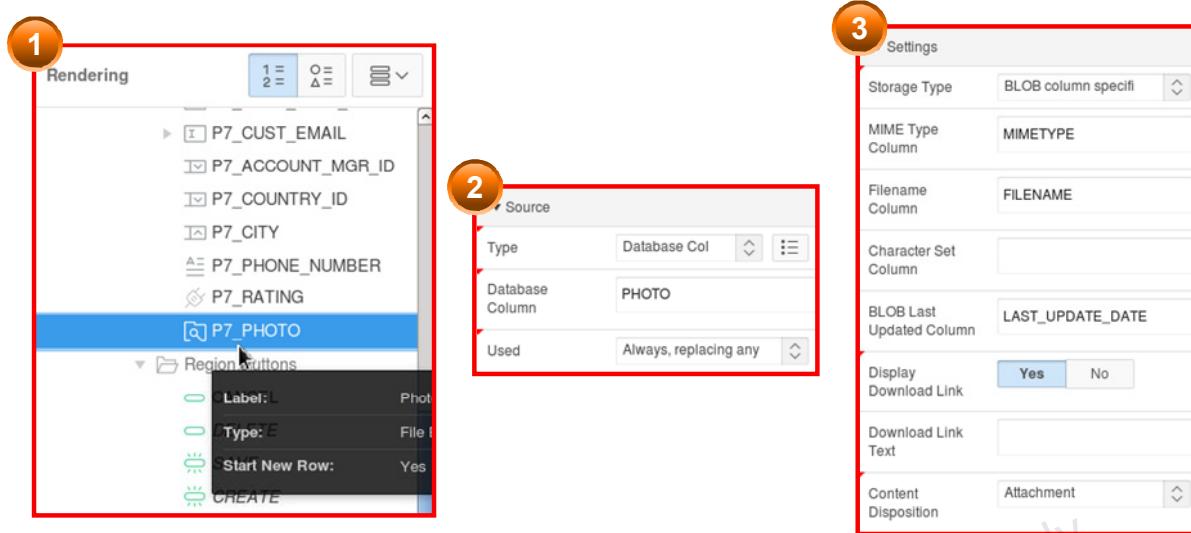
```
select c.customer_id,
       c.cust_first_name||' '||c.cust_last_name
      name,
       c.city,
       c.cust_email,
       (select last_name from employees where
        employee_id=
       c.account_mgr_id) account_mgr,
       dbms_lob.getlength(c.photo) photo
  from customers c
```



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When using the wizards, the SQL to retrieve BLOB column data is generated automatically. The report includes selection of the length of the BLOB (for example, `dbms_lob.getlength(PHOTO)`). If the length is 0, the BLOB is null and no download link is displayed.

Modifying the BLOB Format in the Form



Specify the parameters for how you want the BLOB to be stored and retrieved.

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You can also change the definition of the BLOB format for the column in your form. Perform the following steps:

1. In the Forms definition page, under Items, select the BLOB item. In this example, the P7_PHOTO item is selected.
2. In the Property Editor, under Source, note that Source Type shows Database Column and Source value or expression field includes <DB_COLUMN_NAME>.
3. Under the Settings tab, select “BLOB column specified in Item Source attribute” for Storage Type. You can specify the parameters for how you want the BLOB to be stored and retrieved. If MIMETYPE, FILENAME, BLOB Last Updated Column, and Character Set Column are specified, the information is stored in the database. When the download link is clicked, the information in these columns is retrieved from the database. In addition, the Content Disposition field indicates how the BLOB column is retrieved—inline in the browser or as an attachment allowing the user to download to another location to view. The Download Link Text is the name that appears on the form indicating that a BLOB is contained in the column.

Adding a Delete Image Region

Scott Jordan Customer Details

Cust First Name *	Scott
Cust Last Name *	Jordan
Cust Email	SCOTT.JORDAN@WIL
Account Manager	Cambrault, Gerald Bates, Elizabeth, Russell, John, Cambrault, Gerald
Country	India
City	Bangalore
Phone number	+91 80 012 4869
Rating	○ ○ ○ ○ ○
Photo	<input type="text"/> Browse... Download
The record created or modified in this form is reflected in the Customer Report.	
Photo Image	
	
<input type="button" value="Delete image"/>	

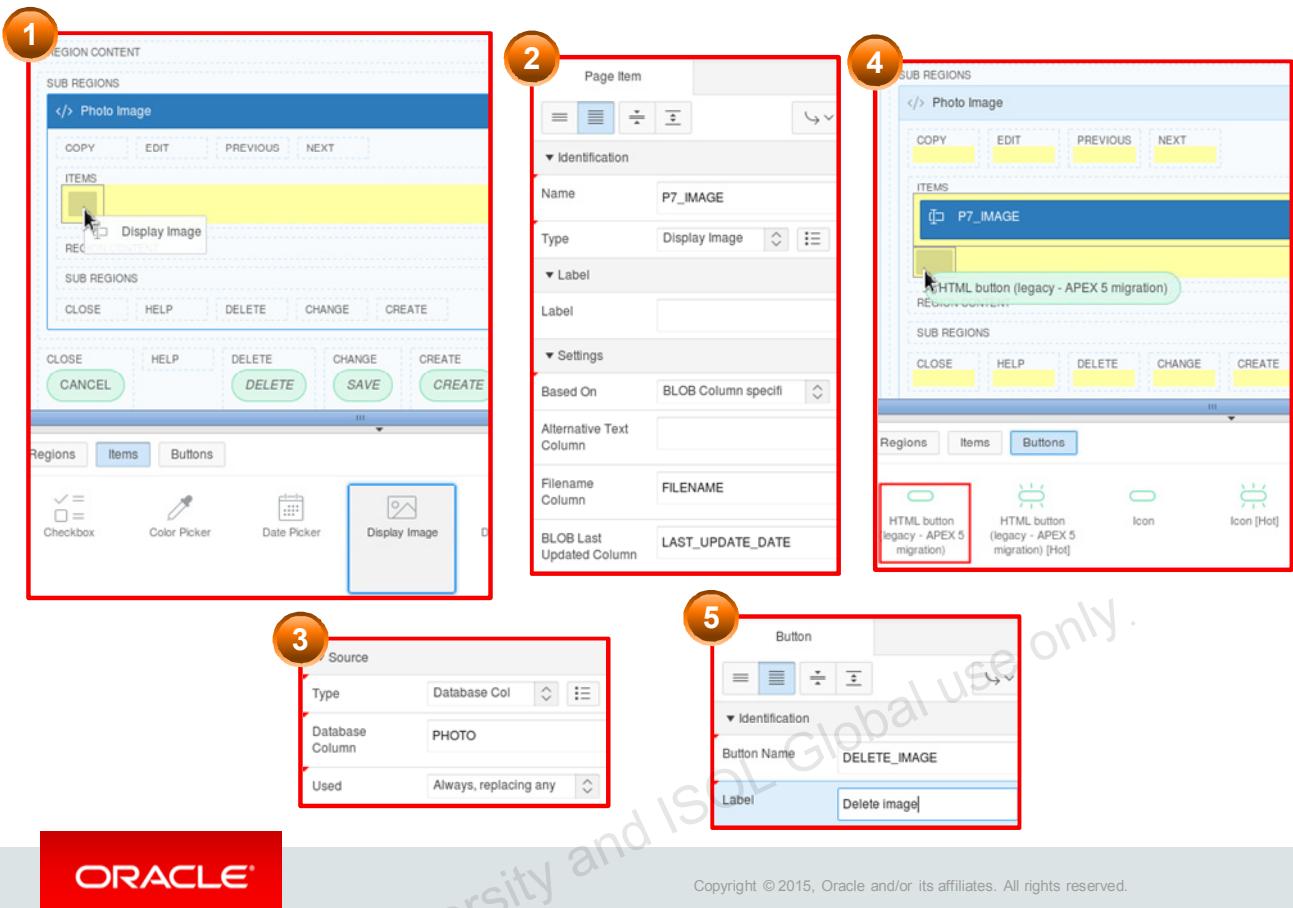
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The form created through the wizards does not allow you to update a row and set a BLOB column to null. You can add a delete image region. Perform the following steps:

1. Create an HTML region to store the image inline in column 2.
2. Create an item to show the image on the page.
3. Create a Delete button.
4. Create a Delete Image Column process to perform an update and set the BLOB, MIMETYPE, FILENAME, and LAST_UPDATE_DATE columns to null.

Adding a Delete Image Region: Creating an Item

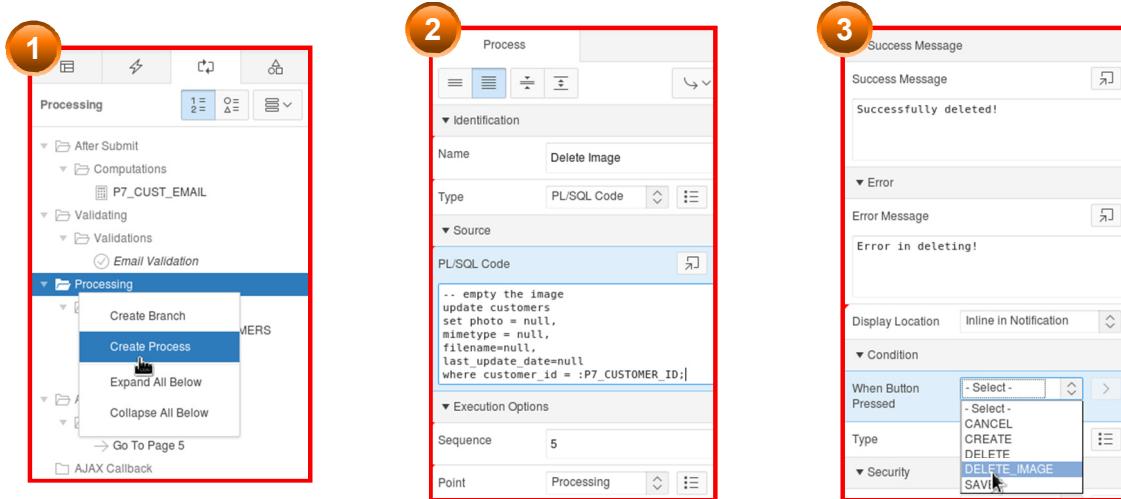


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To create an item that will store the image on the page, perform the following steps:

1. Create the Display Image item in the Grid Layout. You can drag the item from the Items gallery to the grid layout of the page definition.
2. In the Property Editor, enter a name for the item. Make sure that for Based On, “BLOB Column specified in Item Source” is selected. Enter FILENAME in Filename Column and LAST_UPDATE_DATE in BLOB Last Updated Column.
3. Select Database Column for Source Type and change the Database Column Name to PHOTO.
4. Drag HTML Button (legacy – APEX 5 migration) from the Buttons gallery to under the P7_IMAGE item in the Photo Image subregion.
5. In the Property Editor, enter the button name and other details.

Adding a Delete Image Region: Creating a Process



```
-- empty the image
update customers
set photo = null,
mimetype = null,
filename=null,
last_update_date=null
where customer_id = :P7_CUSTOMER_ID;
```

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The last step is to create a process that updates the table to set the BLOB column, as well as the MIMETYPE, FILENAME, and LAST_UPDATE_DATE columns, to null. Perform the following steps:

1. In the Processing tab of the left pane, right-click Processing and select Create Process.
2. In the Property Editor, enter a name for the process. Change the sequence number to 5 so that it will be executed first. Enter the code in the slide for PL/SQL Page Process.
3. Enter success and error messages in the Success Message and Error Message text boxes, respectively. Select the Delete button you just created, and save the page.

Quiz



If you create a form by using the Create Application Wizard, any item whose source is a database column of type BLOB will result in an item of type:

- a. Check Box
- b. Hidden
- c. File Browse
- d. Radio Group

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Answer: c

Practice 16-3 Overview: Adding BLOB Data to Your Report and Form

This practice covers the following topics:

- Adding BLOB columns to a table
- Creating a form with a report
- Modifying the BLOB format in the form and the report
- Adding a delete item region to the form

Lesson Agenda

- Creating Data Load Wizard Pages
- Creating an Upload and Download Page
- Adding BLOB Data to an Existing Application
- Sending an Email from an Application



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Contact Us Page

Send an email with values from a form:

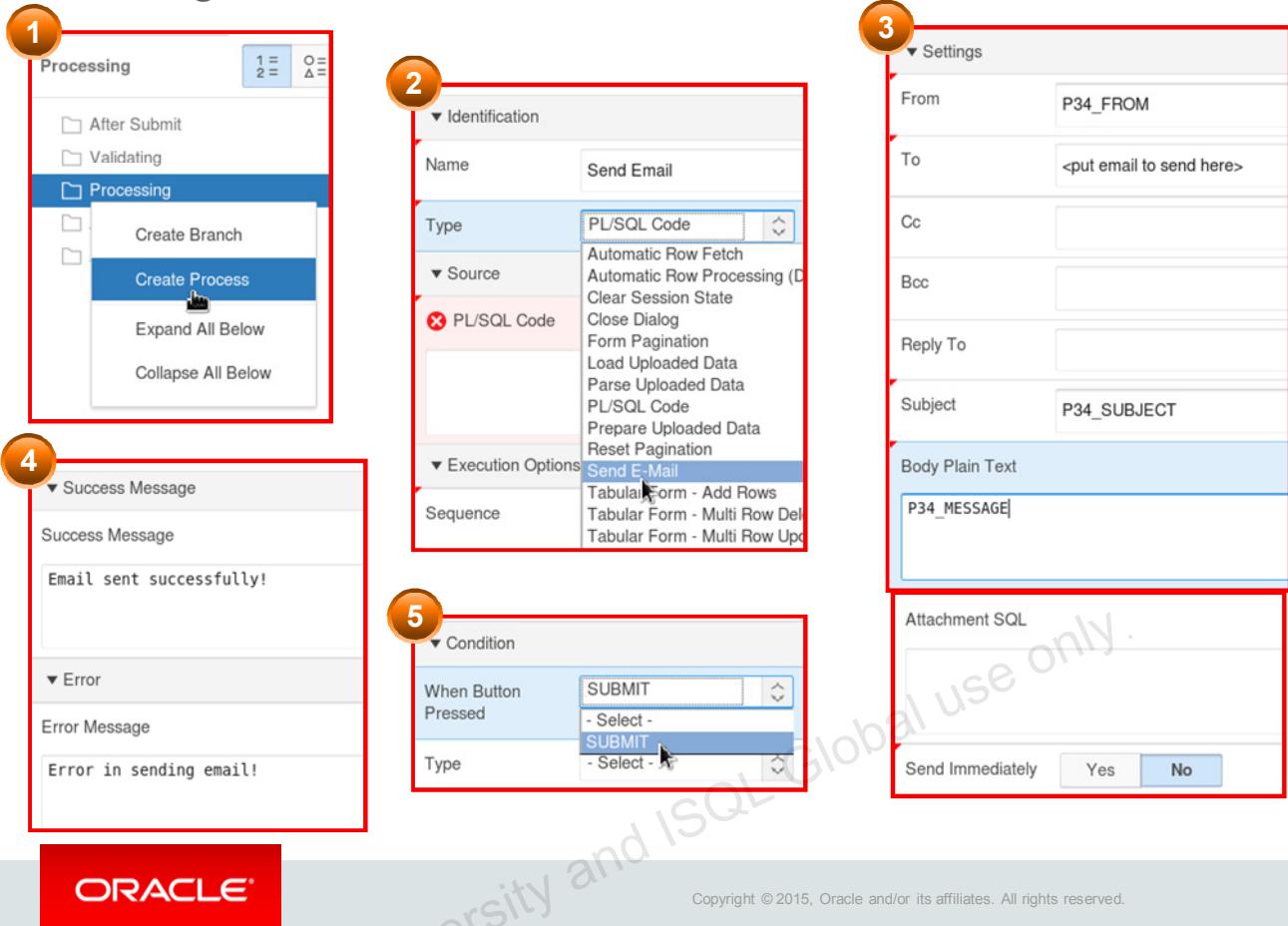
The screenshot shows the Oracle Application Express (APEX) interface. On the left, a red-bordered window displays a 'Contact Us' form with fields for 'From' (apex@oracle.com), 'Subject' (Form not working), and a 'Message' area containing the text 'Please review the form. It doesn't seem to be working correctly.' A 'Submit' button is at the bottom. On the right, a red-bordered window shows the 'Rendering' tree for the page. The tree includes nodes for 'Page 34: Contact Us', 'Pre-Rendering', 'Regions', 'Content Body', and 'Contact Us'. Under 'Contact Us', there are 'Attributes' and 'Items' sections. The 'Items' section lists four items: P34_FROM (checkbox), P34 SUBJECT (checkbox), P34_MESSAGE (checkbox), and SUBMIT (button). At the bottom of the tree, there are links for 'In the News [Global Page]' and 'Post-Rendering'.



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To gather feedback, you can create a Contact Us page, which is a form where users enter their information and then submit the page. When the page is submitted, a process is fired that will send an email to the desired recipient. There are two methods to creating the send email process: declaratively or by using the APEX_MAIL package API. In the following slide, you examine the declarative approach.

Creating a Send E-Mail Process



To create a Send E-Mail process, perform the following steps:

1. In the left pane, under Processing, right-click Processing and select Create Process.
2. The new process is created. In the Property Editor, enter a name for the process and select Send E-Mail for Type.
3. Enter a value or a page item name for all the mandatory fields and indicate whether you want the email to be sent immediately or not.
4. Enter messages for Success and Error.
5. Select Submit for When Button Pressed. Save the page.

When you click the SUBMIT button, the process is executed and the email is sent.

Summary

In this lesson, you should have learned how to:

- Create Data Load Wizard pages
- Create an upload and download page
- Add BLOB data to an existing application
- Send an email notification



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In this lesson, you should have learned how to extend your application to use advanced techniques such as creating Data Load Wizard pages, creating an upload and download page, adding BLOBs, and sending email notifications.

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Creating and Editing Charts

Introducing Visual Aids for Representing Data



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In a casual talk about PTS, Jill expresses that along with textual reports, it will be better if PTS can generate charts also which will make things clearer for any project manager who wants to get a quick snapshot of project at any point of time. To get this done, Jack looks into creating and editing charts with Oracle Apex.

Objectives

After completing this lesson, you should be able to:

- Create and use charts in desktop applications and mobile applications
- Explain some of the additional chart examples



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In this lesson, you learn how to create and use charts in desktop and mobile applications. You also learn some of the additional charting examples that can be used in your application.

You Are Here in This Course



Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19 : Using Dynamic Actions and Plug-Ins

Lesson 20 : Utilizing Application Express Printing

Lesson 21 : Managing Application Feedback

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In Unit 3, you included navigation in your application with the help of shared components. This unit also explains how to implement page-level authorization to make your application highly secure.

Lesson Agenda

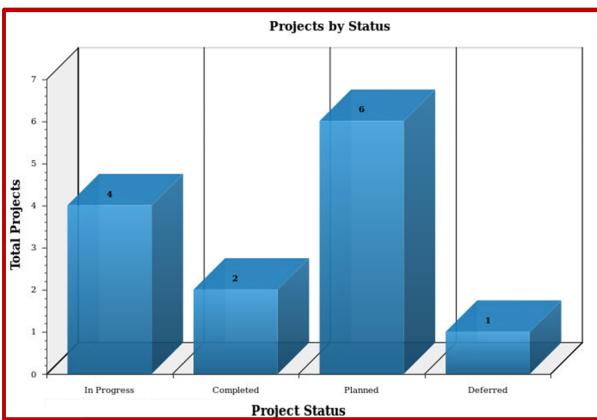
- Creating and Using Charts
 - Creating a Flash Chart
 - Viewing and Modifying Chart Attributes
 - Creating an HTML5 Chart for Mobile Applications
- Reviewing Additional Charting Examples



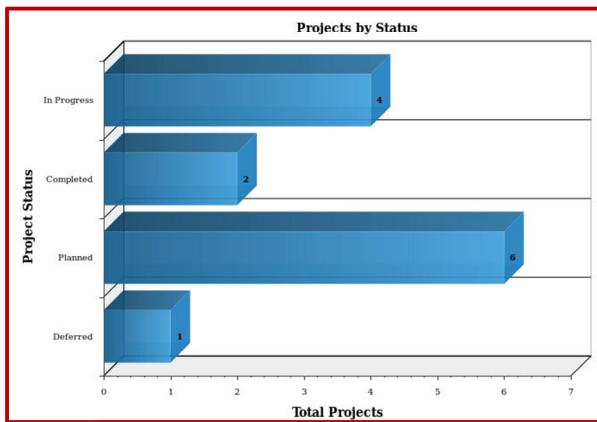
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Building Charts

3D Column Chart



3D Bar Chart



These two charts are based on the same query.



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Oracle Application Express includes built-in wizards for generating two types of charts: HTML5 and Flash charts.

Flash charts are based on the AnyChart Flash Chart component. AnyChart is a flexible Macromedia Flash-based solution that enables developers to create animated, compact, and interactive Flash charts. Flash charts are rendered by a browser and require Flash Player 9 or later. For more information about AnyChart, go to <http://www.anychart.com>.

HTML5 charts use a JavaScript chart engine, rendering the chart in SVG format. Flash cannot be rendered on most of the modern mobile devices. However, you can now take advantage of the new HTML5 charting solution to incorporate charts in your mobile applications. HTML5 charts are compatible with popular browsers. The example in the slide shows two Flash charts, 3D bar and 3D column, which are based on the same query and it shows the number of projects under each project status.

Creating SQL Queries for Charts

```
SELECT link, label, value  
FROM ...
```

Example:

```
select null link, STATUS_NAME label,  
COUNT(PROJECT_STATUS) value1from  
"PTS"."PROJECT_STATUS_VIEW" group by STATUS_NAME
```



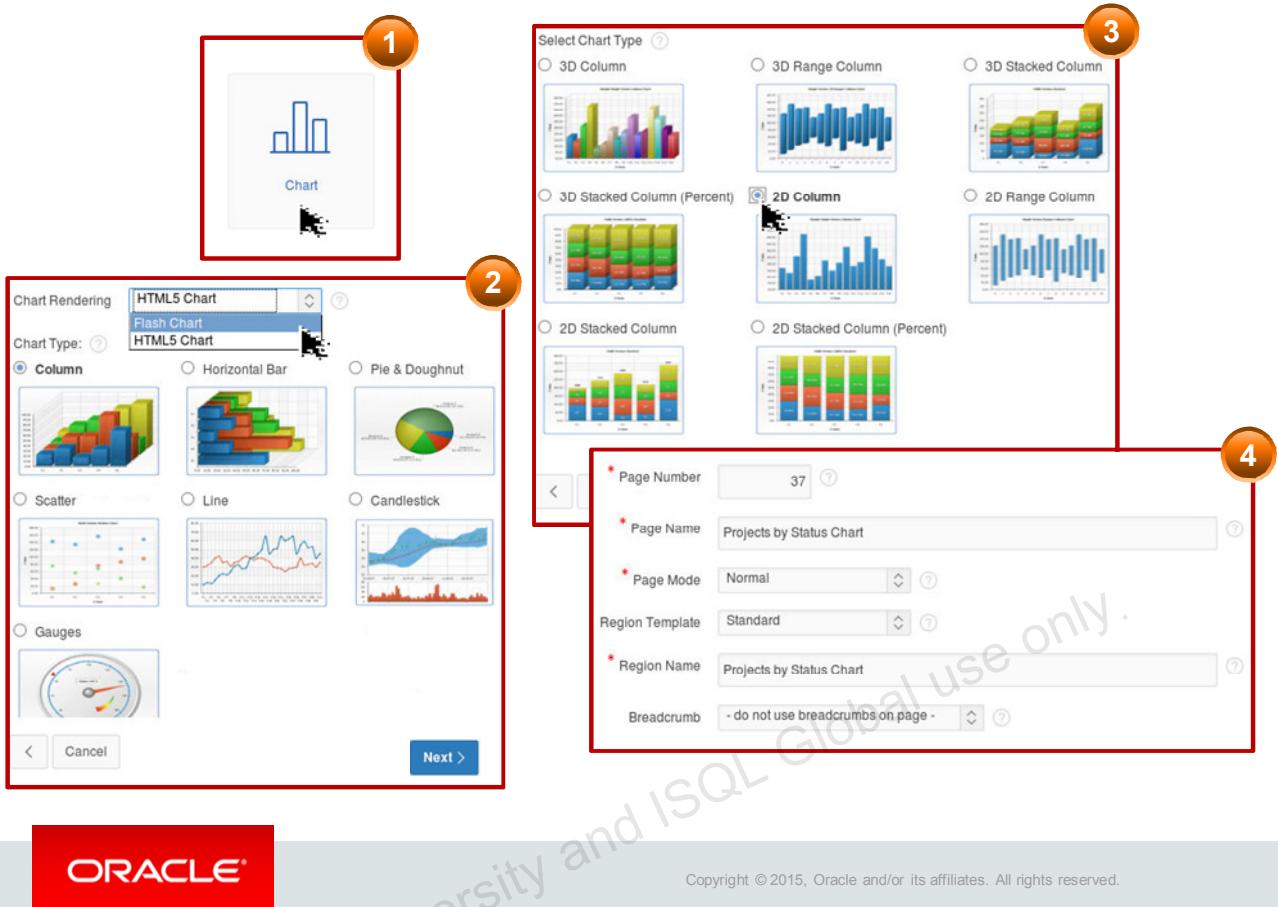
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You define a chart in Application Builder using a wizard. For most chart wizards, you select a chart type and provide a SQL query by using the syntax shown in the slide. Here `link` is a URL, `label` is the text that displays in the bar, and `value` is the numeric column that defines the bar size.

The example in the slide shows the SQL query using the syntax.

Jack wants to create a chart that shows the number of projects for each possible status in Project Tracking System. He generates the SQL query shown in the slide to build the chart.

Creating a Flash Chart



To create a Flash chart, navigate to your application home page and click Create Page. Perform the following steps:

1. Select Chart and click Next.
2. Select Flash Chart for Chart Rendering. Select the type of chart that you want to create. Click Next.
Note: Numerous Flash charts are available.
3. Depending on what you selected from the previous list, you may receive a set of more detailed charts to select from. Select the chart that you want and click Next.
4. Accept the defaults and click Next.

Creating a Flash Chart

Step 5: Navigation Preference

Step 6: Build Query

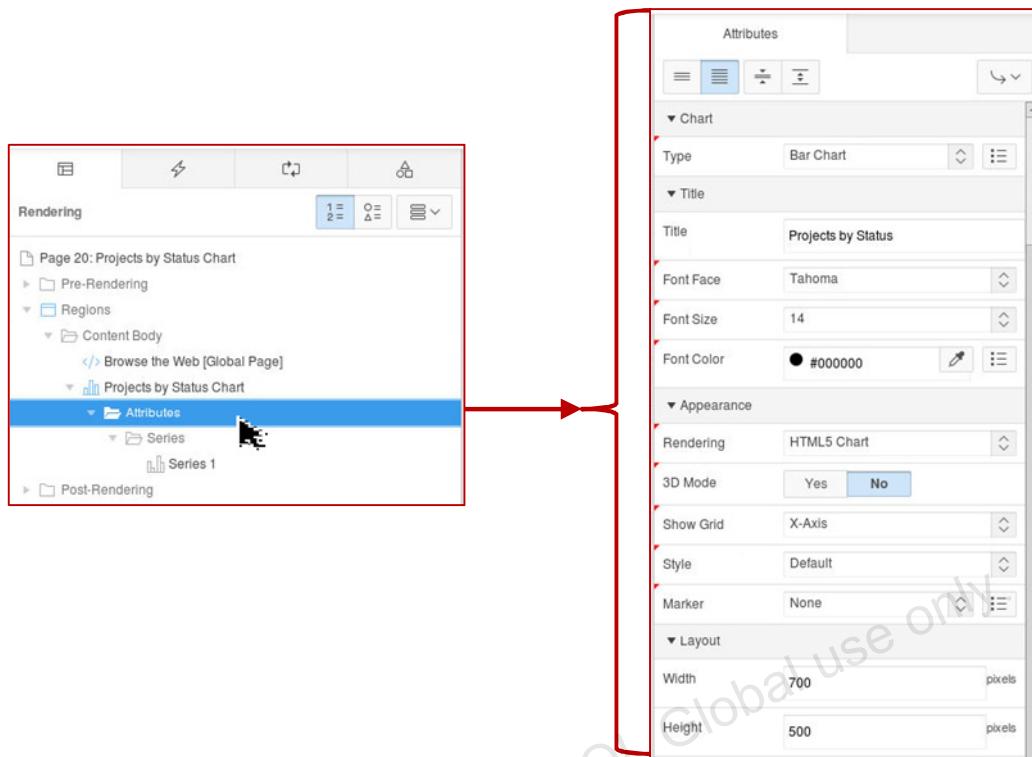
Step 7: Chart Attributes

Step 8: Confirmation Dialog

Application	2
Page	37
Page Name	Projects by Status Chart
Region Title	Projects by Status Chart
Region Template	Standard
Chart Type	2D Column

5. Provide details to create a new Navigation Menu entry and click Next.
6. Enter a Chart Title and specify any of the parameters in this window. In the example in the slide, a different Color Scheme is selected and X-Axis and Y-Axis titles are specified. Click Next.
7. Enter a SQL query that this chart will be based on. If you want to see a sample of a SQL query, you can click the Chart Query Example link at the bottom of the window. The query can differ depending on the type of chart that you are creating. Click Next.
8. Click Create.

Viewing and Editing Chart Attributes



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After you create a chart, you can edit the attributes of the chart region. To view and edit the attributes:

1. Click the Page icon on the application home page.
 2. In Page Designer View, click the Chart Attributes under Page Rendering to see its properties in the Property Editor on the right.
 3. Edit the properties to change the rendering, content, and the look and feel of the chart.
- The attribute categories may be slightly different depending on the chart type.

Practice17-1 Overview: Creating and Editing Charts

This practice covers the following topics:

- Creating a Flash chart page that includes a Horizontal Bar – 3D Bar Chart
- Modifying the chart and changing it to a 3D Column Chart with Series Color Scheme set to Look 7

Creating an HTML5 Chart for Mobile Applications

1. Navigate to your application and create a new page.
2. Select **Chart**.
3. Select HTML5 Chart for chart rendering, and specify a chart type.
4. For page and region attributes, specify the page number, page name, region template, region name, and breadcrumb.
5. For Tab Options, specify whether to include tabs.
6. For Chart Attributes, specify the appropriate attributes.
7. For Query, specify a query by entering a SQL Query or by clicking the Build Query button.
8. Click Create.



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You can create an HTML5 chart for both desktop and mobile applications by specifying the type of user interface. The steps to create an HTML5 chart for a mobile application is shown in the slide.

Practice 17-2 Overview: Creating an HTML5 Chart for Mobile Applications

This workshop covers creating HTML5 Pie and Doughnut charts for mobile applications.

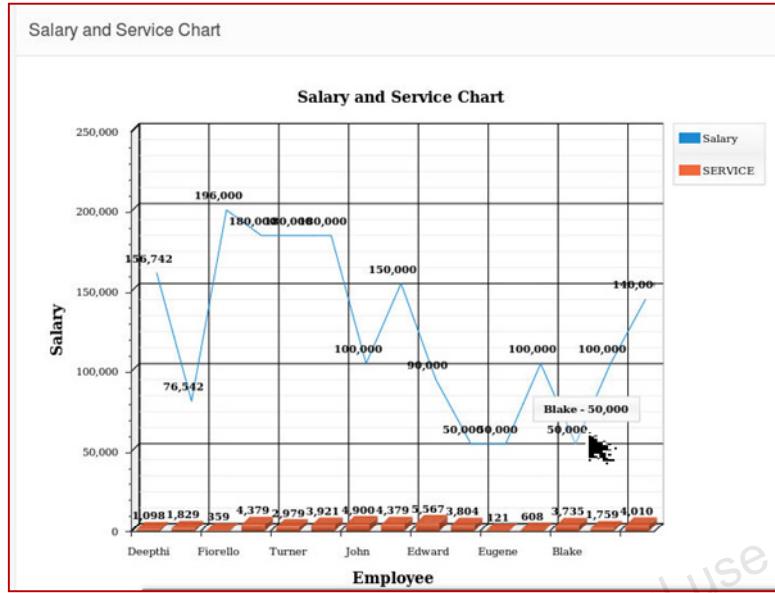
Lesson Agenda

- Creating and Using Charts
- Reviewing Additional Charting Examples
 - Creating a Combined Chart
 - Creating a Project Gantt
 - Creating a Circular Gauge Chart



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Creating a Combined Chart



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You can create a chart that is a combination of Line, Bar, and Marker chart types. If you want to show different chart types on the same chart, you simply create several data series of the different (but combinable) types. The example in the slide shows a combined chart. Salary series data is displayed as a Line chart and Service data is displayed as a Bar chart.

In this example, you first create a chart page of 3D Column type. Then you edit the chart attributes and select Line for Series Type. The Salary series of the chart now appears as a Line, and the Service series appears as a Bar.

Creating a Combined Chart

The screenshot illustrates the process of creating a combined chart in Oracle Application Express. It shows the following steps:

- Chart Configuration:** A configuration screen for a "3D Column" chart. It includes fields for "Chart Title" (Salary and Service Chart), "Background Type" (Transparent), "Background Color 1" (#eeeeee), "Background Color 2" (#eeeeee), "Color Scheme" (Look 6), "X Axis Title" (Employee), and "Y Axis Title" (Salary).
- SQL Query:** An SQL query editor showing the following SQL code:


```
SELECT NULL LINK,
         LAST_NAME LABEL,
         SALARY "Salary",
         (SYSDATE - HIRE_DATE) "SERVICE"
    FROM EMPLOYEES
   ORDER BY SERVICE
```
- Confirmation Dialog:** A modal dialog asking for confirmation to create a Flash chart page with the specified attributes. The attributes listed are:

Application	2
Page	21
Page Name	Salary and Service Chart
Region Title	Salary and Service Chart
Region Template	Standard
Chart Type	3D Column
- Page Designer:** The Oracle Application Express page designer interface. It shows the "Regions" section with "Content Body" expanded, revealing "Pre-Rendering", "Regions", "Content Body", "Browse the Web [Global Page]", "Salary and Service Chart", "Attributes", and "Series". The "Series" section contains "Series 1". The "Identification" properties for "Series 1" are shown in a Property Editor, with the "Type" dropdown set to "Line". A callout arrow points to this section with the text "Editing attributes in page designer".
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To create a combined chart, perform the following steps:

1. Create a 3D Column chart. Specify Employee for X-Axis Title and Salary for Y-Axis Title. Select the X-Axis option for Show Scrollbar. For Show Legend, select the Right option. Use the following SQL query:

```
SELECT NULL LINK,
       LAST_NAME LABEL,
       SALARY "Salary",
       (SYSDATE - HIRE_DATE) "SERVICE"
  FROM EMPLOYEES
 ORDER BY SERVICE
```

2. Edit the chart. Under chart region in page designer, click Series 1 to open its properties in the Property Editor on the right.
3. Under Identification, select Line for Series Type. Click the “Save and Run” icon.

When creating a combined chart, the Series Type selected is associated with a single series. If your query contains multiple series, the setting of “Line” Series Type is only applied to the first series of that multiseries query.

The Series Type of the second series will automatically pick up the default Series Type for the chart. In this example, the query contains multiple series. Therefore, the setting of “Line” Series Type is applied only to the first series of the query. The Series Type of the second series will automatically pick up “Bar” because the chart type is 3D Column Chart.

4. Run the page. You can now see a combination of salary as Line and commission as Bar charts.

Note: For a multiseries query, the setting of Series Type is applied *only* to the first series of your query. But, if you want to separate your multiseries into two separate queries and create two separate series on the chart, you can set a different series type on each.

Quiz



Your chart query syntax looks like the following:

```
SELECT link, label, value  
FROM ...
```

In the syntax, value refers to the:

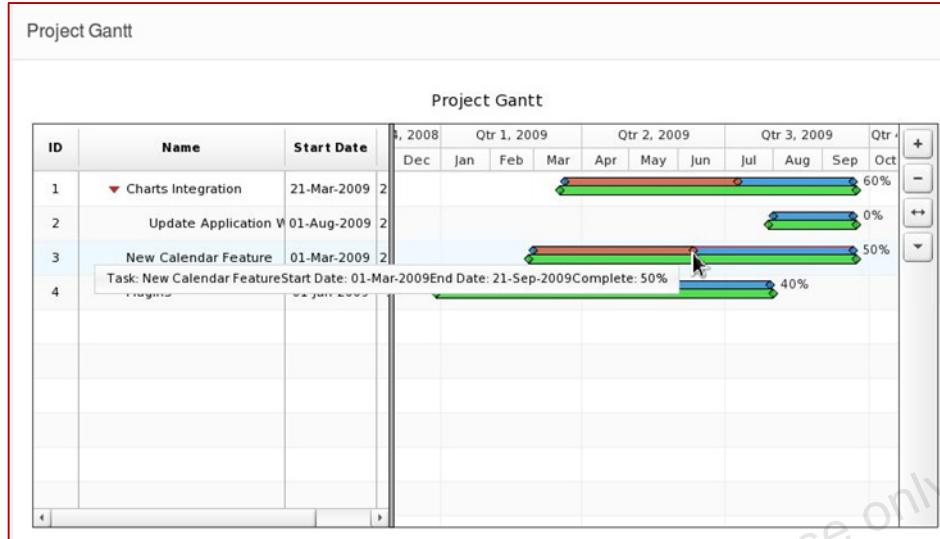
- a. Text that is displayed in the bar
- b. Column that defines the bar size
- c. Starting point
- d. URL

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Answer: b

Creating a Project Gantt



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Application Builder includes built-in wizards for generating Project Gantt and Resource Gantt charts. How you create a Gantt chart depends on whether you are adding it to an existing page, or adding it on a new page. Gantt chart support in Oracle Application Express is based on the AnyChart-AnyGantt Component. AnyGantt is a flexible Macromedia Flash-based data-visualization solution that enables developers to create complex and informative Gantt charts.

You use a Project Gantt chart to show the progress of completion of a group of tasks. The chart considers planned time periods and actual time periods of the tasks. You can also use a Project Gantt chart for complex projects that involve hierarchies.

The slide example shows a parent/child hierarchy between Charts Integration and Update Application tasks. The Project Gantt chart in the slide consists of the following elements:

- A data grid that displays the task number, name, start time, and end time
- A timeline that displays the task progress bar in red, the actual progress bar in blue, and the planned timeline bar in green
- A navigation panel that enables you to modify your chart's visual appearance

The task tooltip uses the %dd.%MMM.%yyyy date format that you specify on the Gantt Settings tab.

Creating a Project Gantt

To create a Project Gantt chart, create a Flash chart and provide a SQL query by using one of the following syntaxes:

```
SELECT LINK,  
       TASK_NAME,  
       TASK_ID,  
       PARENT_ID,  
       ACTUAL_START_DATE,  
       ACTUAL_END_DATE,  
       PROGRESS  
  FROM TASKS1
```

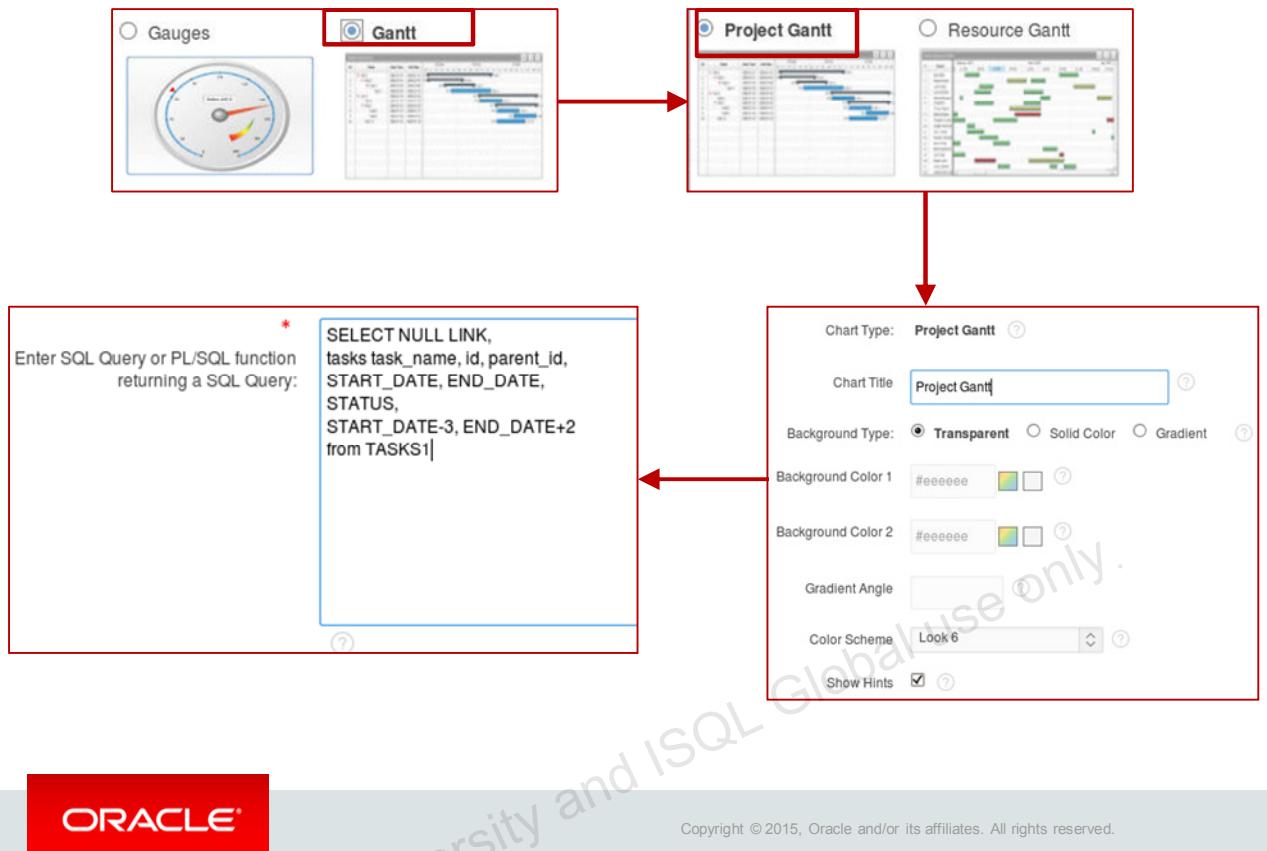
```
SELECT LINK,  
       TASK_NAME,  
       TASK_ID,  
       PARENT_ID,  
       ACTUAL_START_DATE,  
       ACTUAL_END_DATE,  
       PROGRESS,  
       PLANNED_START,  
       PLANNED_END  
  FROM TASKS1
```



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Project Gantt charts require a task name, task ID, parent task ID, actual start date, actual end date, and progress value for each task. Two optional values for planned start date and planned end date can also be used.

Creating a Project Gantt



To create a Project Gantt chart, perform the following steps:

1. In your application, click Create Page. Select Chart page type and click Next.
2. Select Flash Chart and select Gantt and click Next. Then select Project Gantt and click Next.
3. Specify the page attributes and click Next. Accept the default tab option and click Next.
4. Specify the chart attributes. In the example in the slide, enter Project Gantt for Chart Title. Click Next.
5. Enter the following SQL and click Next:

```
SELECT null link,  
       tasks task_name, id, parent_id,  
       START_DATE, END_DATE,  
       STATUS,  
       START_DATE-3, END_DATE+2  
  from TASKS1
```

6. On the Confirmation page, click Create.

Quiz



You can use a Project Gantt chart for complex projects that involve hierarchies.

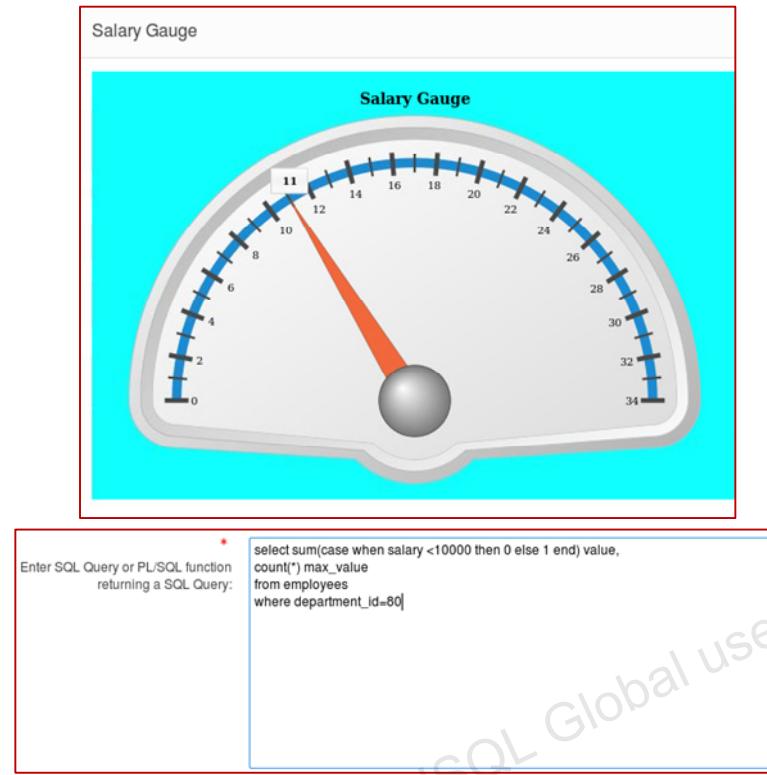
- a. True
- b. False

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Answer: a

Creating a Circular Gauge Chart



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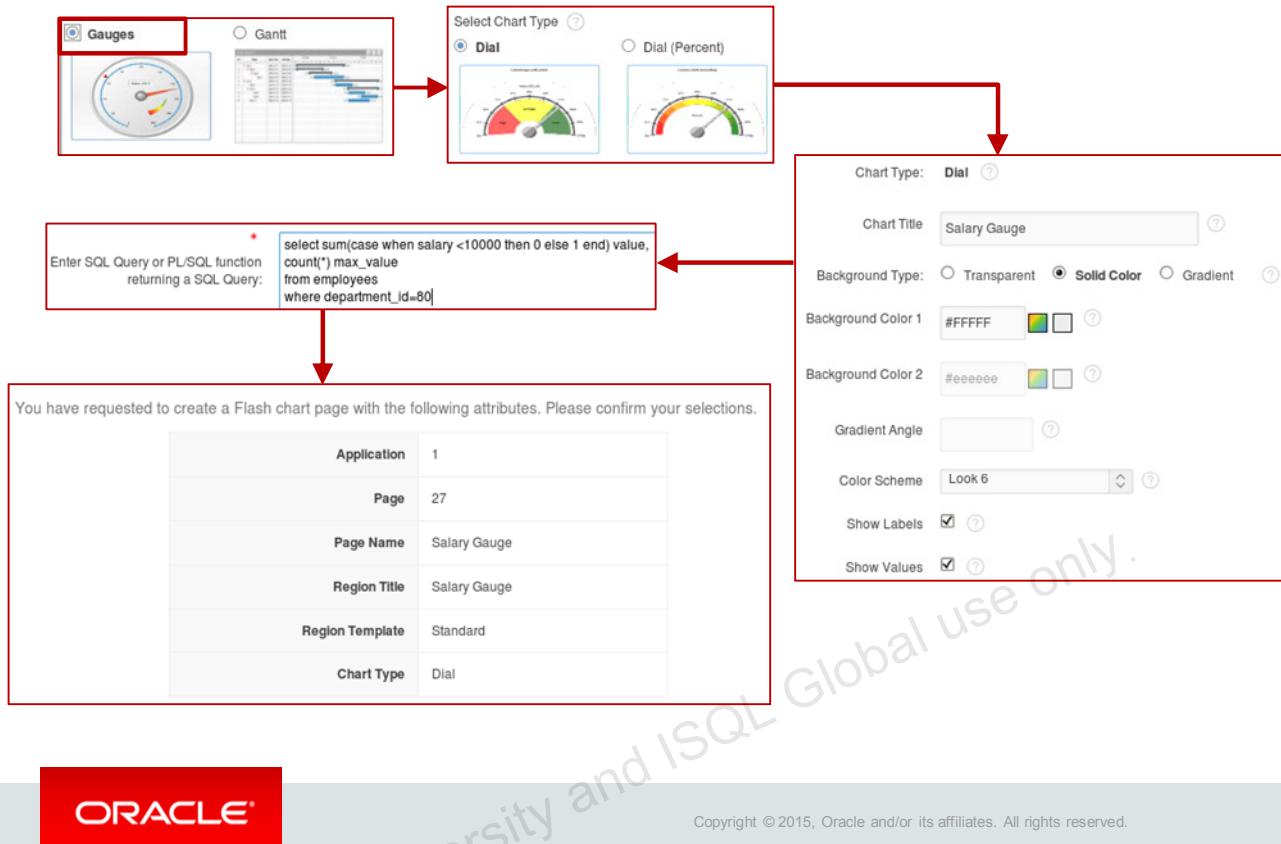
The example in the slide shows a Gauge chart with the label outside the gauge and a needle pointer.

To create a Gauge chart, you provide a SQL query by using the following syntax:

```
SELECT value , maximum_value [ ,low_value [ ,high_value] ]
FROM ...
```

Total number of employees in department 80 is 34. The example in the slide shows that the salary of 11 employees in department 80 is greater than or equal to 10000.

Creating a Circular Gauge Chart



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To create a Gauge chart, perform the following steps:

1. In your application, click Create Page. Select Chart page type and click Next.
 2. Select Flash Chart and select Gauges. Click Next. Then select Dial and click Next.
 3. Specify the page attributes and click Next. Accept the default tab option and click Next.
 4. Specify the chart attributes. In the example in the slide, enter Salary Gauge for Chart Title, select Solid Color for Background Type, and enter #FFFFFF for Background Color. Click Next.
 5. Enter the following SQL and click Next.
- ```
select sum(case when salary <10000 then 0 else 1 end) value, count(*)
max_value from oechr_employees where department_id=80
```
6. On the confirmation page, click Create.
  7. By default, the label alignment is Inside. To display the label outside the Gauge, edit the page. Select Attributes under Page Rendering and select Outside for Label Alignment in its Property Editor. Click the “Save and Run” icon. Now, run the page.

## Practice17-3 Overview: Enhanced Charting Examples

This practice covers the following topics:

- Building a Combined chart
- Creating a Project Gantt chart
- Creating a Salary Gauge chart

## Summary

In this lesson, you should have learned how to:

- Create and use Flash charts
- Create an HTML5 chart for mobile applications
- Create a Project Gantt chart
- Create a Gauge chart



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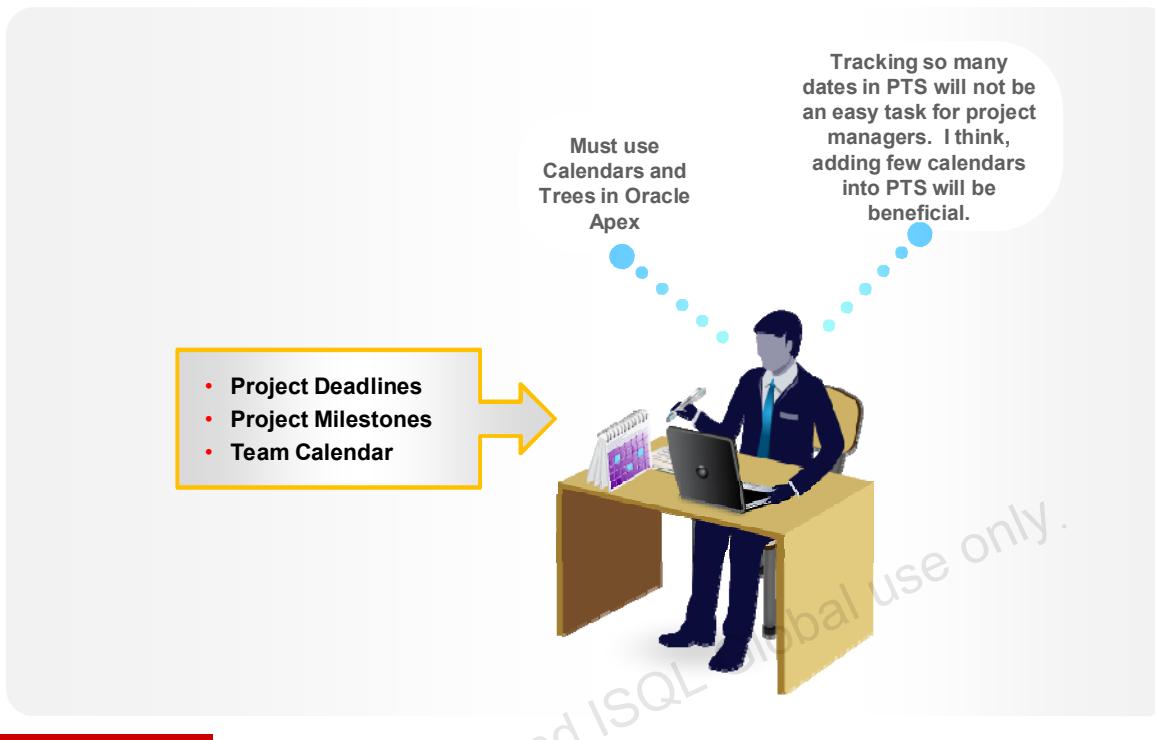
In this lesson, you should have learned about the various enhanced charting examples for both desktop and mobile applications.

# Adding Calendars and Trees

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## Explores Tools to Organize Project Activities



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By now, Jack has a good version of PTS application that can be used for real-time project management. While working with PTS with some real-time project-related data, Jack observes that there are many dates to be dealt with in PTS and having clarity on dates will definitely help in identifying lagging tasks, meeting deadlines, and planning things well in advance. Therefore, Jack decides to implement the calendars feature provided by Oracle Apex into PTS.

## Objectives

After completing this lesson, you should be able to create and manipulate:

- Calendars
- Trees

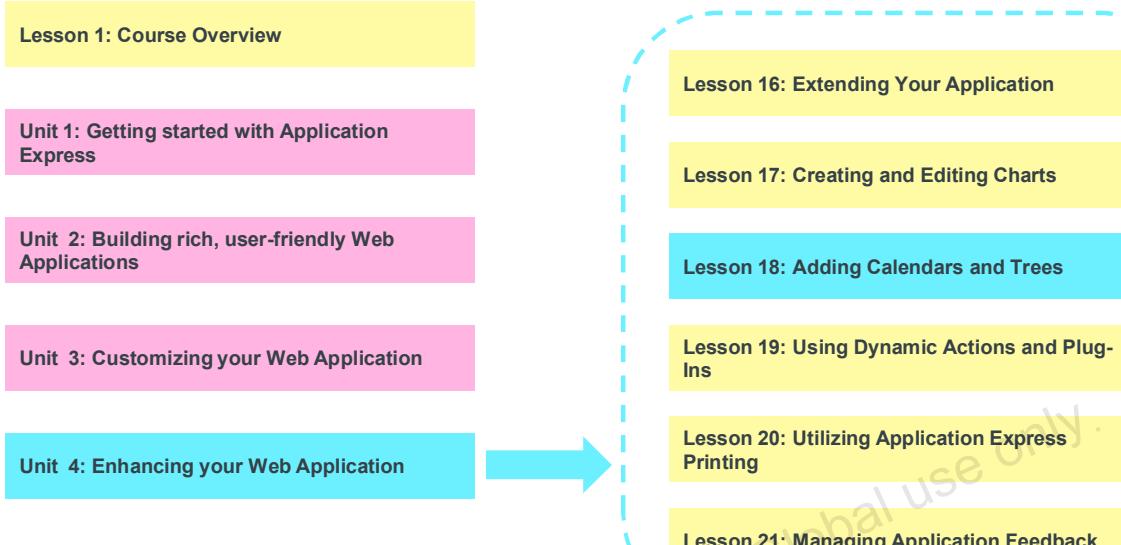


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In this lesson, you learn how to create calendars and trees in your application.

# You Are Here in This Course



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In Unit 3, you include navigation in your application with the help of shared components. This unit also explains how to implement page-level authorization to make your application highly secure.

## Lesson Agenda

- Using Calendars
  - Creating a Calendar
  - Editing Calendar Attributes
  - Dragging and Dropping Calendar Entries
  - Linking to the Calendar from a Button
  - Calendars for Mobile Applications
- Using Trees



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# Creating a Calendar

The screenshot shows a monthly calendar for June 2015. The days of the week are labeled at the top: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday. The dates are numbered from 31 down to 1. Two specific dates are highlighted with blue boxes: June 15th and June 19th. The date 15th is associated with the text "Supera Banking Solutions" and the date 19th is associated with the text "MFG Petrol Industry". The calendar is set against a light gray background with a red border around the main content area.



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Oracle Application Express supports two types of calendars:

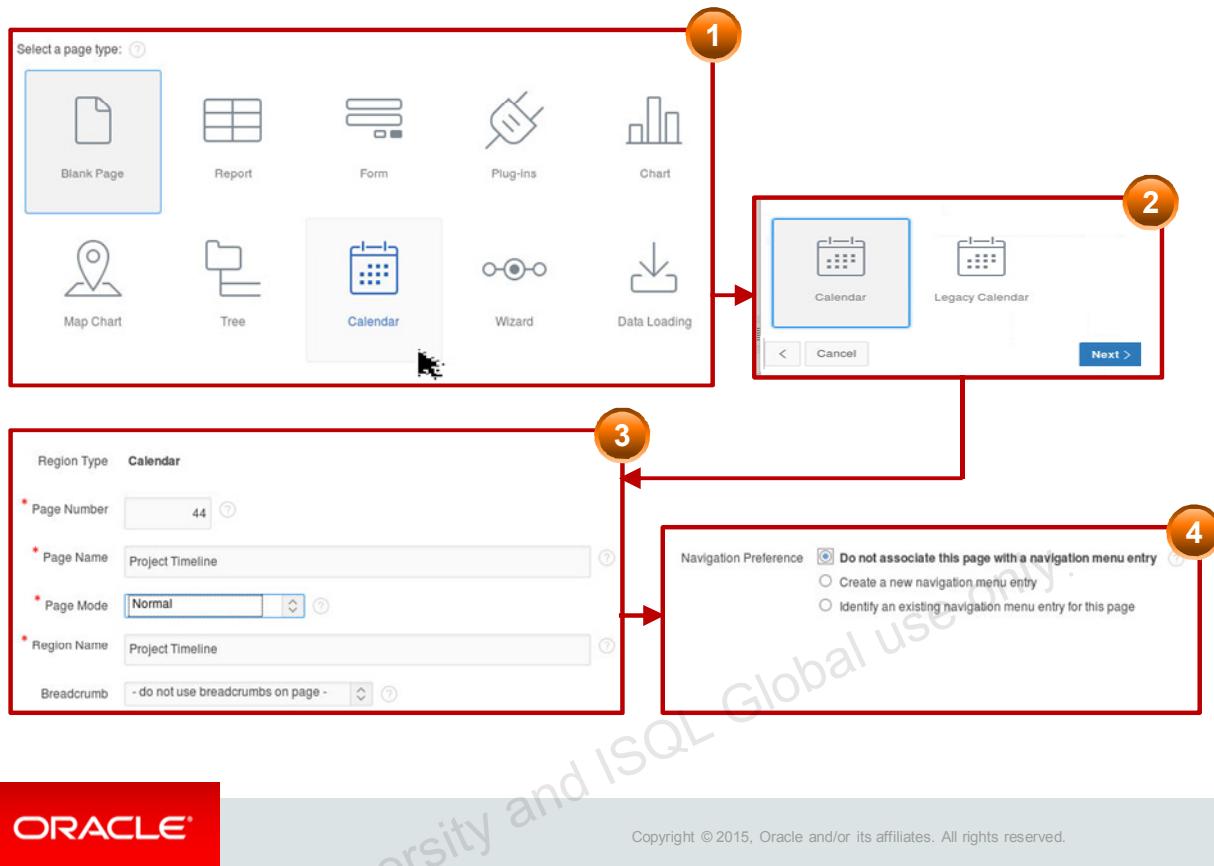
- **Calendar:** This type of calendar is based on the FullCalendar jQuery library and can be customized only through CSS.
- **Legacy Calendar:** This is a template-based calendar and may be deprecated in further releases of Oracle APEX. This is the same as “Easy Calendar,” which was created using a wizard in previous releases of Oracle APEX.

Irrespective of the type of calendar, you need to provide the following basic information while creating a calendar:

- Table or SQL query (depending on whether you are using wizard with query builder or pasting SQL query directly)
- Date Column: The date column determines which days on the calendar will contain entries.
- Display Column: The display column defines a specific row that will display a calendar date.

The calendar can be viewed in multiple modes: monthly, weekly, and daily or list.

# Creating a Calendar



To create a calendar on a new page, navigate to your application home page and click Create Page. Perform the following steps:

1. Select Calendar and click Next.
2. Select the type of calendar required and click Next.
3. Specify a name and click Next.
4. Specify the tab option that you want and click Next.

# Creating a Calendar

The screenshot shows the Oracle Application Express interface for creating a new page. Red numbers 5 through 9 are overlaid on the interface to indicate the sequence of steps:

- Step 5:** The "Source Type" is set to "Table" (radio button selected), and the "Table / View Owner" is "PTS". The "Table / View Name" is "PROJECTS (table)".
- Step 6:** The "Display Column" is "PROJECT\_ID", "Start Date Column" is "PROJECT\_PLANNED\_START\_DATE", and "End Date Column" is "PROJECT\_PLANNED\_END\_DATE". "Show Time" is set to "No". Under "Generate Drag&Drop Code", "Yes" is selected for both "Add Create Page" and "Add Edit Page".
- Step 7:** The "Table Owner" is "PTS" and the "Table Name" is "PROJECTS". Under "Primary Key Type", "Select Primary Key Column(s)" is selected, and the "Primary Key Column 1" is "PROJECT\_ID (Number)".
- Step 8:** A confirmation dialog box is shown with the following details:
 

|              |                  |
|--------------|------------------|
| Application  | 2                |
| Page         | 44               |
| Page Name    | Project Timeline |
| Region Title | Project Timeline |

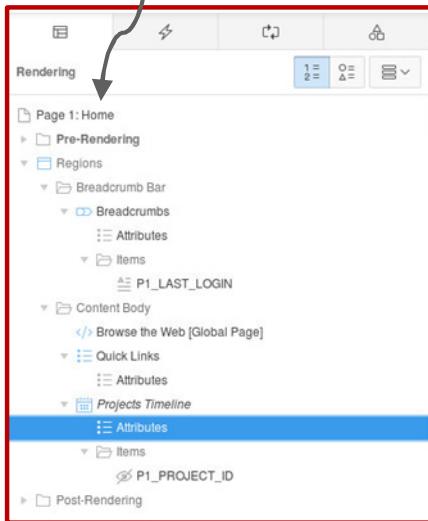
 The text in the dialog box reads: "You have requested to create a page with the following attributes. Please confirm your selections."
- Step 9:** The "Source Type" for the primary key is set to "Existing trigger" (radio button selected). Other options include "Custom PL/SQL function" and "Existing sequence".

5. Select the table, which has a date column, and click Next.
6. Specify the date column, the column to display, and the primary key column. Also, specify whether you want to show a custom date range and allow drag and drop in the calendar. You can also specify if you want additional form pages created for adding new events or editing existing events in the calendar. In this example, you are creating a calendar based on `PROJECTS` table. Because you already have a form page to create / edit Projects, you select "No" for these two options. Click Next.
7. Specify the Table and Primary Key for generating a "Drag and Drop" query and click Next.
8. Specify the method by which Primary Key is populated in case of "Drag and Drop" and click Next.
9. Confirm the details and click Create.

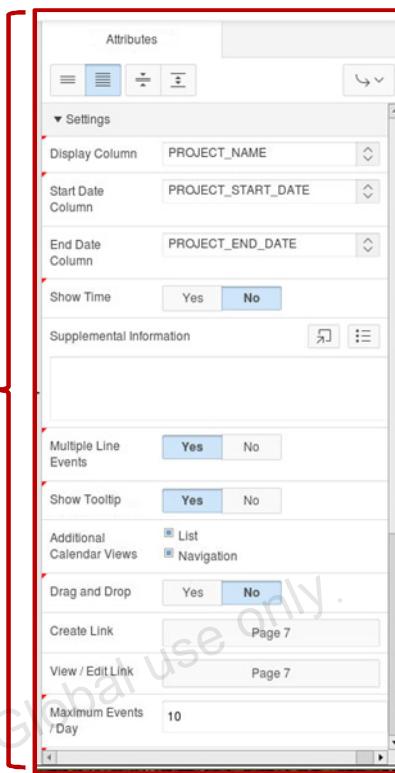
For the PTS application, Jack wants to create a "Projects Timeline" calendar that displays all the projects as an event between planned start date and planned end date. He also plans to create a new project from this calendar (new entry on calendar) or edit any project from the calendar itself.

# Editing Calendar Attributes

In this screenshot, a calendar region is created in Home Page.



A calendar can be created as a new page or as a new region on an existing page.



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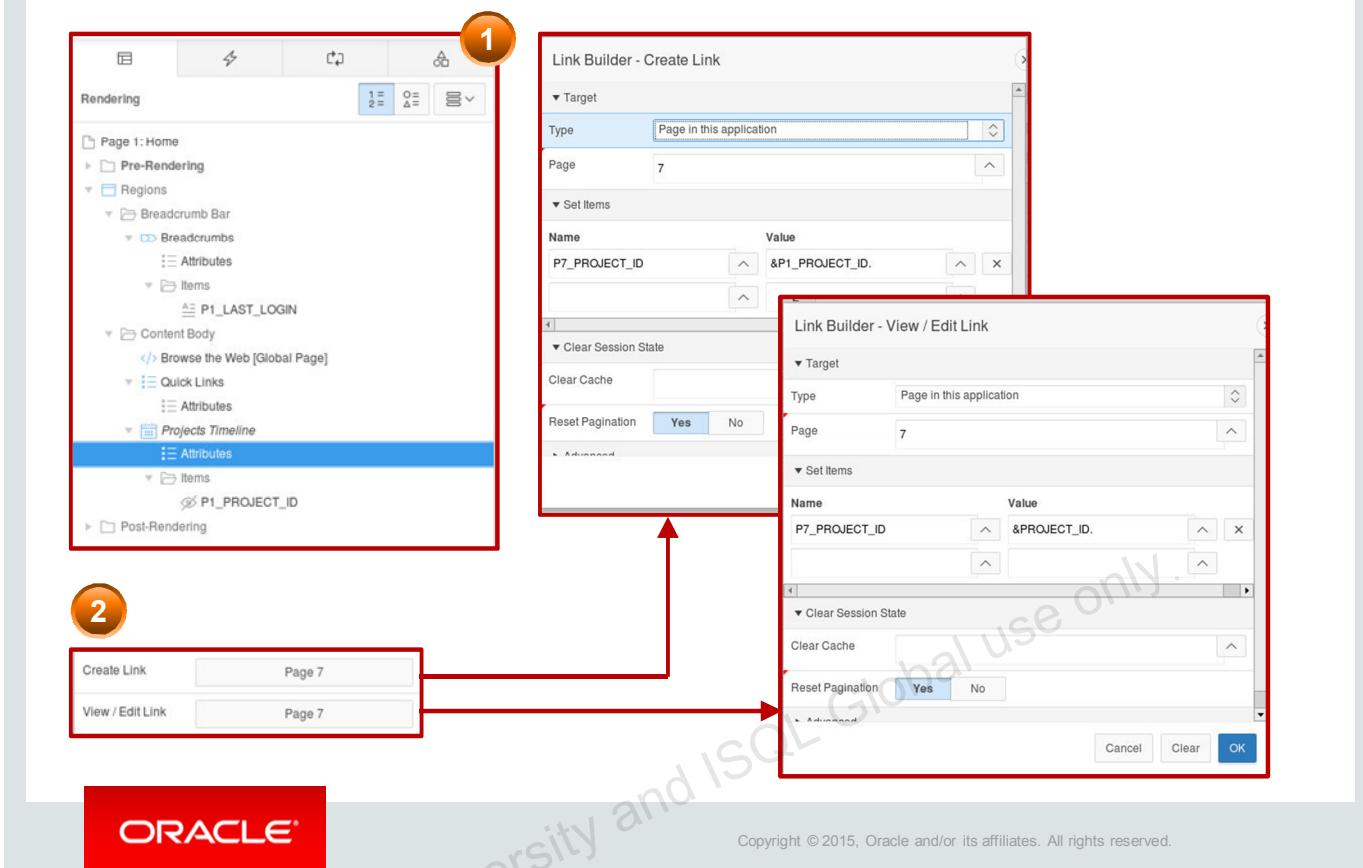
Use the Calendar attributes' property editor on the calendar page (opened in the page designer view) to specify a template, date columns, and general calendar formatting. In addition, you can define the interval in which the calendar is displayed, as well as define the links to be placed on a day or a column in the calendar.

To modify calendar attributes, perform the following steps:

1. Navigate to the page definition where your calendar was created.
2. Open the calendar page in page designer view.
3. Under Rendering, locate "Attributes" under the calendar region and click it.
4. You can see its properties opened in the property editor on the right side.
5. Update the required properties and "save and run" the page to notice the changes in the application.

**Warning** (on the use of Start Time/End Time): If the date column specified does not have a time component (or if individual records have no time), by default, the time is 0:00 hours and will not be displayed if the start time is set to a later time (for example, 8:00 AM).

## Editing Calendar Attributes

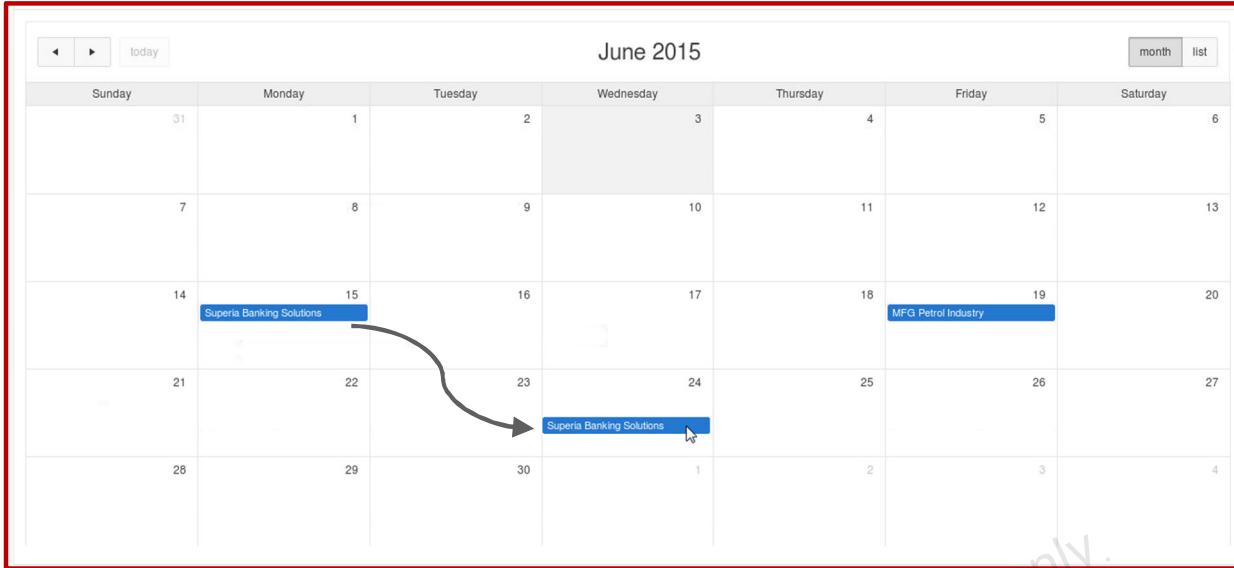


You can also define the links to be placed on a day or a column in the calendar. In the example in the slide, you can modify an existing project by clicking it in the calendar. If you want to create a new project, click Day in the calendar. This navigates to the same page, but will clear the page so that you can create a new project.

For Projects Timeline calendar, Jack provided Page 7: Manage Projects in the Link column for both “Create Link” and “View/Edit Link” options so that clicking an entry or a day in the calendar takes the user to this page where he/she can create a new project or modify the selected project.

Because of the authorization enabled on Page 7 already, all the project members will be able to just view the project details by clicking any project entry on the calendar. All the project managers will be able to edit the project details by clicking an entry in the calendar.

## Dragging and Dropping Calendar Entries



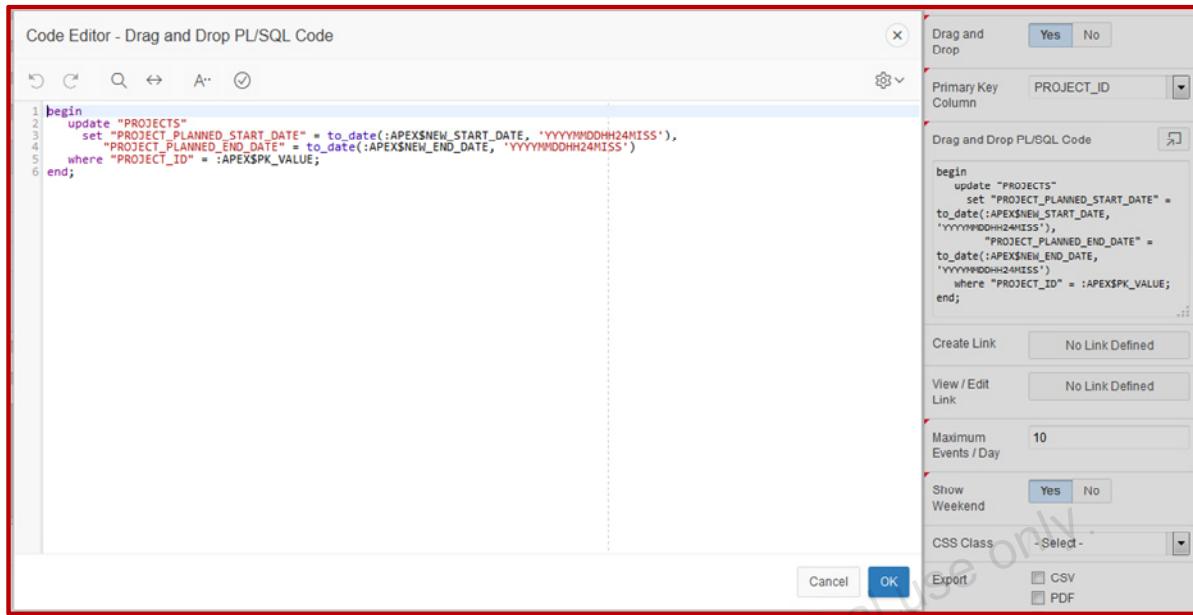
Moving Planned Start Date of  
Superia Banking Solutions from June  
15<sup>th</sup> to June 24<sup>th</sup>

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By enabling drag-and-drop of calendar entries, you can move a project from one day to another from the calendar itself.

## Dragging and Dropping Calendar Entries

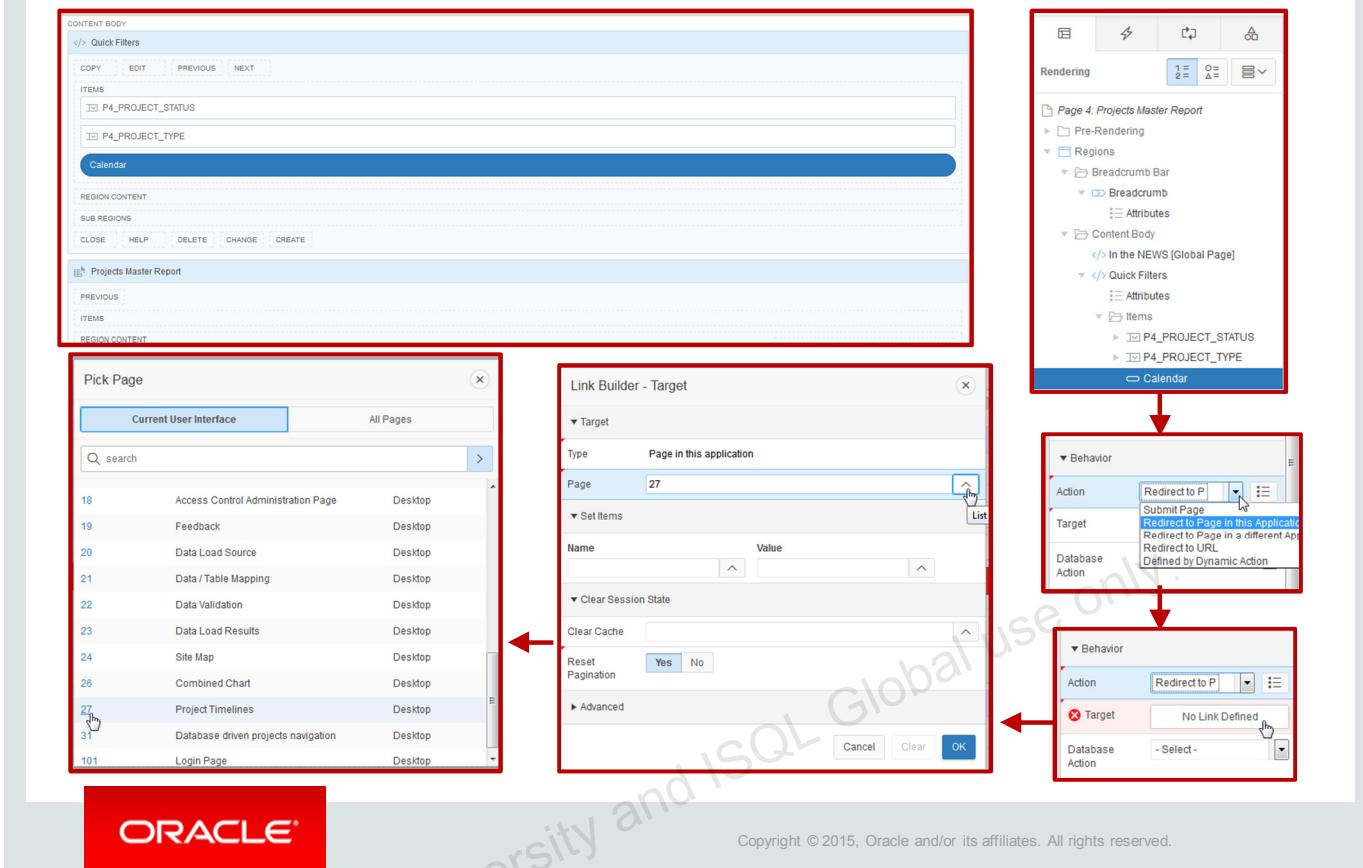


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When you enable the drag-and-drop feature in a calendar, a PL/SQL code will get created that will update the date of the project in the database.

# Linking to the Calendar from a Button



You may want to link to a calendar from a button on another page. In the example in the slide, you create a button on the Projects Master Report page that links to the calendar page. Perform the following steps:

1. Navigate to the Projects Master Report page and open it in the page designer view.
2. Drag a button from Buttons Gallery to the Report region in Grid Layout.
3. Update button properties such as name and label in the property editor.
4. Change Action to "Redirect to Page in this Application" and select the Calendar page for "Target" and click the "Save and Run" icon.

## Linking to the Calendar from a Button

The screenshot shows a report page for projects. At the top, there are 'Quick Filters' for 'Project status' and 'Project type'. Below the filters is a 'Calendar View' button, which is highlighted with a red box and a mouse cursor. To the right of the button is a search bar and an 'Actions' dropdown menu. The main area displays a table of project data:

| Project | Project Name              | Project Type | Project Description                                   | Project Status | Project Planned Start Date | Project Start Date | Project Planned End Date | Project End Date | Project Upgrade Yn | Project Created By | Project Created On | Project Last Updated By | Project Last Updated On      |
|---------|---------------------------|--------------|-------------------------------------------------------|----------------|----------------------------|--------------------|--------------------------|------------------|--------------------|--------------------|--------------------|-------------------------|------------------------------|
| 604     | MFG Sugar Industry        | 304          | Engineering Design Capabilities in the Sugar Industry | 104            | 19-JAN-2015                | 01-FEB-2015        | 23-MAR-2015              | 26-MAR-2015      | N                  | 504                | 01-FEB-2015        | 504                     | 20-APR-15 12:00:00.000000 AM |
| 607     | APEXL2 Course Development | 303          | Developing Course Lessons for                         | 104            | 15-DEC-2014                | 20-DEC-2014        | 01-APR-2015              | 24-MAR-2015      | N                  | 504                | 20-DEC-2014        | 504                     | 23-MAR-15                    |
| 601     | BOFA_Customer_Care        |              |                                                       |                |                            |                    |                          |                  |                    |                    |                    |                         |                              |
| 602     | AMEX Cobrand              |              |                                                       |                |                            |                    |                          |                  |                    |                    |                    |                         |                              |
| 603     | Order Management          |              |                                                       |                |                            |                    |                          |                  |                    |                    |                    |                         |                              |
| 605     | Super Insurance Solutions |              |                                                       |                |                            |                    |                          |                  |                    |                    |                    |                         |                              |

An arrow points from the 'Calendar View' button to a calendar overlay for June 2015. The calendar shows days from Sunday to Saturday. Specific dates are highlighted with blue boxes: June 15 (Superior Banking Solutions) and June 19 (MFG Petrol Industry). The calendar is also labeled with 'month' and 'list' buttons at the top right.

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In the report, when you click Calendar View, the Calendar page is displayed.

## Practice 18-1 Overview: Creating a Calendar

This practice covers creating a calendar for a desktop application.

## Calendars for Mobile Applications

The screenshot displays a mobile calendar interface for June 2015. The calendar grid shows dates from June 1st to June 30th. A blue dot is placed on June 3rd, indicating it is the current date. The days of the week are labeled as S, M, T, W, T, F, S. The month header "June 2015" and a "Today" button are at the top. Below the calendar, a list view provides details for June 3rd:

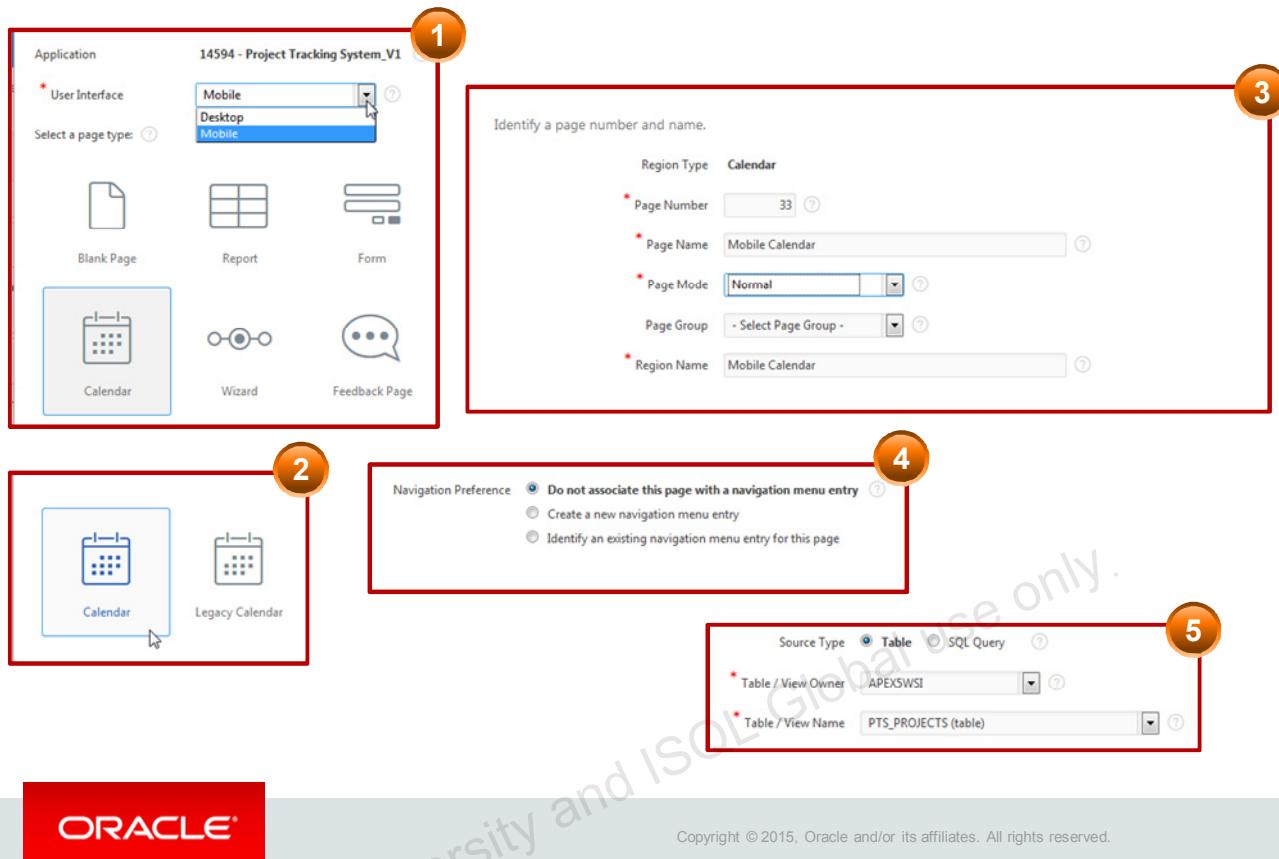
- Wednesday, June 3, 2015**
- 04/10/2015 **SPRINT P2K**
- 06/15/2015
- 04/10/2015 **XYZ Store CRM**
- 07/15/2015

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When a calendar for mobile application is created, the calendar is displayed using the jQuery Mobile implementation. A dot on the calendar indicates that a project has an end date on that day. When the day is clicked, a List View is displayed below the calendar with a list of the entries on that day. When you click the project from the List View, the jQuery Mobile form page is displayed where you can modify the project.

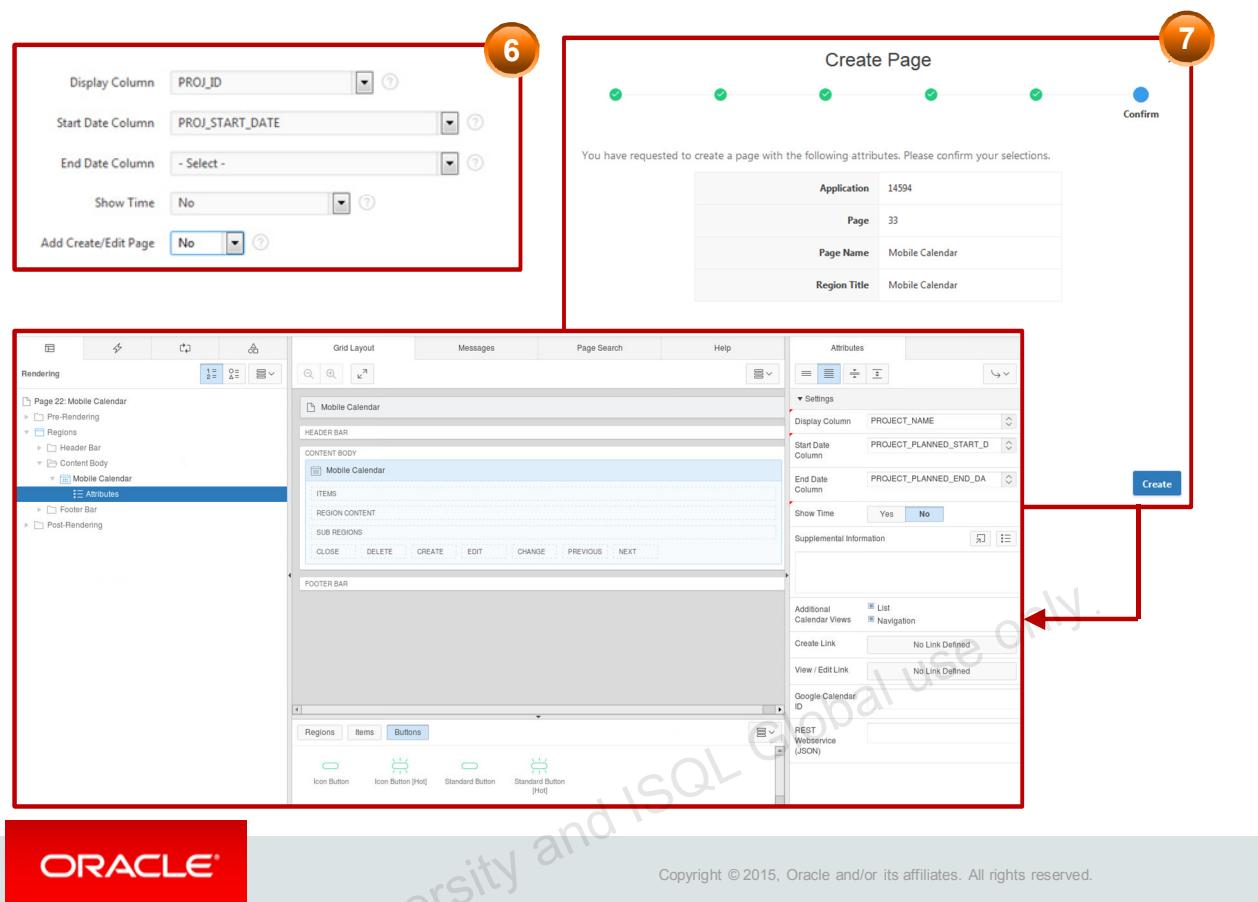
# Creating a Calendar for Mobile Applications



To create a calendar on a new page, navigate to your application home page and click Create Page. Perform the following steps:

1. Select the Mobile User Interface option. Select Calendar and click Next.
2. Select the type of calendar required and click Next. In this case, select Calendar.
3. Specify a name and click Next.
4. Select Navigation Preference and click Next.
5. Select the table name using which you want to create calendar query. Note that it must contain the `display_name` column and the date field to base the entry on, in this case, `project_planned_start_date`. Then click Next.

# Creating a Calendar for Mobile Applications



6. Specify the date column, the column to display, and the primary key column. Also, specify whether you want to “add a create/edit page”. Then click Next. In the example shown in the slide, “No” is selected.
7. Review the page details and click Create.

## Practice18-2 Overview: Adding a Calendar to a Mobile Application

This practice covers creating a calendar for a mobile application.

## Lesson Agenda

- Using Calendars
- Using Trees
  - What Is a Tree?
  - Creating a Tree
  - Manipulating a Tree



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# What Is a Tree?

Employees Hierarchy

Adapala  
LaGuardia  
Mary  
Bren  
Rao  
Roger  
Smith  
Taylor  
Thomas  
O'Hare  
Dulles  
Emanuel  
Hartfield  
Johnson  
Logan  
Williams  
Thomas  
Bradley  
Henry  
James  
Joesph  
John  
Kiran  
Lambert  
Roberts

A tree is a type of region that is suited for representing hierarchical data such as an organizational chart.

```
1 select case when connect_by_isleaf = 1 then 0
2 when level = 1 then 1
3 else
4 end as status,
5 level,
6 "LAST_NAME" as title,
7 null as icon,
8 "EMPLOYEE_ID" as value,
9 null as tooltip,
10 null as link
11 from "#OWNER#"."EMPLOYEES"
12 start with "MANAGER_ID" is null
13 connect by prior "EMPLOYEE_ID" = "MANAGER_ID"
14 order siblings by "LAST_NAME"
```

SQL query used for creating this Tree

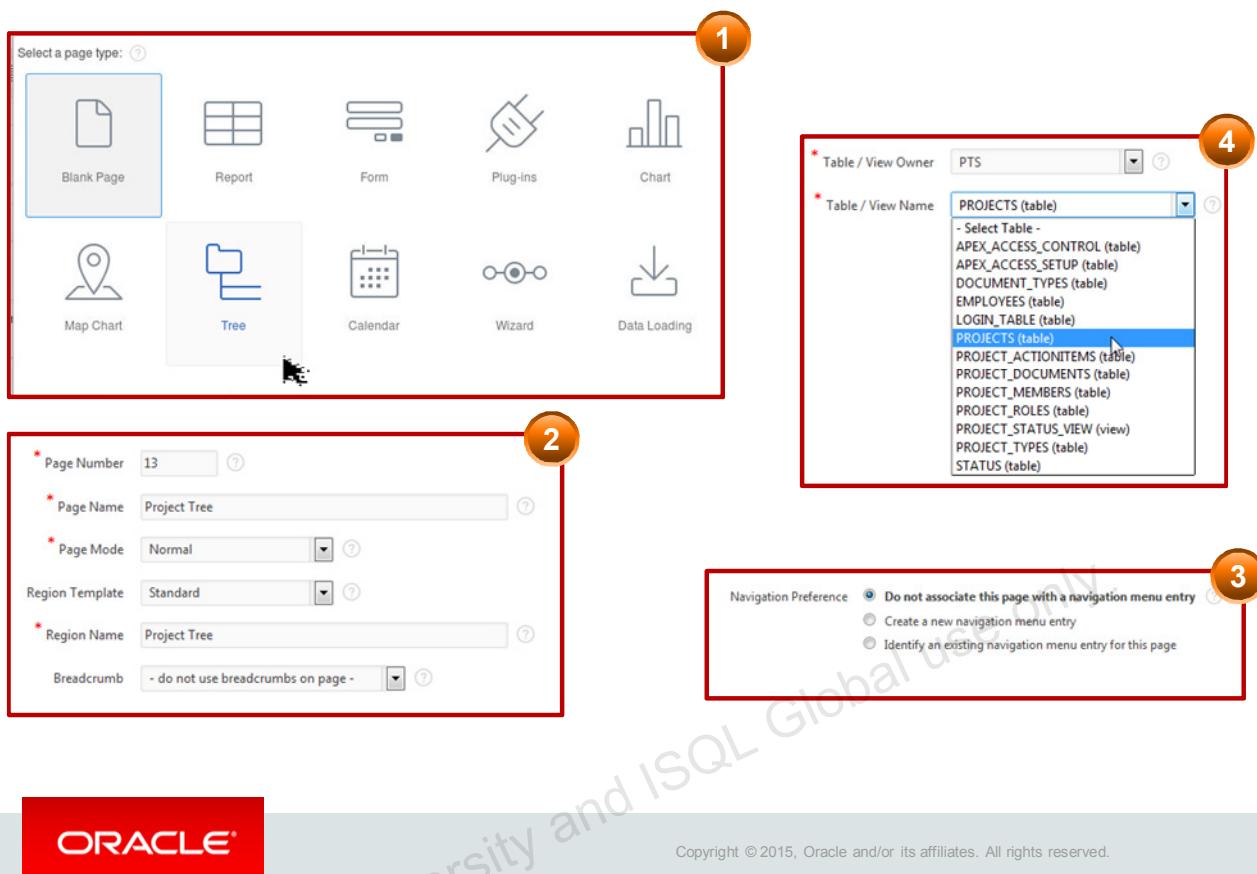


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A tree is based on a table or view that contains a hierarchical relationship. You can create a tree in your application to communicate hierarchical or multiple-level data. You can create a tree from a query by identifying an ID and a parent ID in a table or a view. A tree definition contains a starting point and is displayed in a region on a page. The tree can also be referenced by multiple regions.

The example in the slide shows a tree created from the SQL specified on the right. The tree displays a list of managers and the employees who work for them.

## Creating a Tree



When you create a tree, it can be included on a new page or added to an existing page. To create a tree on a new page, navigate to the application home page and select Create Page. Perform the following steps:

1. Select Tree and click Next.
2. Enter a Page Number, Page Name, and Region Name, and click Next.
3. Accept the default Navigation Preference option, and click Next.
4. Select the table on which you want to create the Tree and click Next.

## Creating a Tree

5. Identify an optional where clause and order siblings by column for your query.

Where Clause (for example ename = 'JONES')

Order Siblings By (for example ENAME) LAST\_NAME (Varchar2)

**Current Query**

```
select case when connect_by_isleaf = 1 then 0
 when level = 1 then 1
 else -1
 end as status,
 level,
 "LAST_NAME" as title,
```

< Cancel Next >

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5. For Query, select the columns for the following to include in the tree and click Next:
  - **ID:** Select the column to base the tree on; in this case, EMPLOYEE\_ID.
  - **Parent ID:** Select the column to use as the parent ID; in this case, MANAGER\_ID.
  - **Node Text:** Select the text to appear on the tree nodes; in this case, LAST\_NAME.
  - **Start With:** Select the column to be used to specify the root of the hierarchical tree query.
  - **Start Tree:** Choose how to start your query; in this case, null.
6. You can specify a Where and an Order By clause and click Next. In addition, you can see the query that was generated by clicking the expand icon for Current Query.  
Note that connect\_by\_isleaf is a pseudocolumn, and connect by prior specifies a condition that identifies the relationship between parent rows and child rows in the hierarchy. The START WITH clause identifies the row or rows to be considered for the starting point of the hierarchy.

## Creating a Tree

The screenshot shows the Oracle Application Express Page Designer interface. A red box highlights the configuration panel on the left, which includes settings for 'Include Buttons' (checkboxes for 'Collapse All' and 'Expand All'), 'Selected Node Page Item' (P1\_PROJECT\_ID), 'Tooltip' (Database Column), 'Tooltip Column' (PROJECT\_ID (Number)), 'Link Option' (radio buttons for 'Nothing' and 'Existing Application Item' selected), 'Link Page' (7 Manage Projects), and 'Link Item' (Page: 7: P7\_PROJECT\_ID). A red circle labeled '7' points to the 'Link Item' field. Another red box highlights the page properties table in the center, showing 'Application' (2), 'Page' (13), 'Page Name' (Project Tree), 'Region Title' (Project Tree), and 'Region Template' (Standard). A red circle labeled '8' points to the 'Page Name' row. A third red box highlights the 'Project Tree' item in the 'Regions' section of the page structure. A red circle labeled '9' points to the 'Source' tab where a SQL query is defined:

```

select case when connect_by_isleaf = 1
then 0
when level
= 1
then 1
else
-1
end as status,
level,
"PARENT NAME"
;

```

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7. Specify whether you want to include buttons for Collapse All and Expand All, whether you want to link to an existing item or define a tool tip for the nodes of the tree, and whether the tree state should be saved via the Selected Page Node Item. Then click Next.
8. Click Create.

# Manipulating a Tree

The screenshot shows two windows of the 'PROJECT TRACKING SYSTEM'. The left window displays a 'Project Tree' with nodes like AMEX Cobrand, APEX4.2 Course Development, MFG Petrol Industry, etc. One node, 'Super Insurance Solutions', is highlighted with a red box and has a red arrow pointing to the right window. The right window is titled 'Manage Projects' and contains various input fields for managing projects, such as Project Name (Super Insurance Solutions), Project Type (305), Project Description (Application development for Sup), and Project Status (102). Other fields include Project Planned Start Date (01-MAR-15), Project Start Date (15-MAR-15), Project Planned End Date (15-APR-15), Project End Date, Project Upgrade Yn (No), Project Upgrade Of, Project Created By (518), Project Created On (15-MAR-15), Project Last Updated By (518), and Project Last Updated On (23-APR-15). Buttons for 'Cancel' and 'Apply Changes' are at the bottom.

The tree displays the projects hierarchy. In the example in the slide, you see that the parent project for Super Insurance Solutions is Order Management project. When you click Super Insurance Solutions, the Manage Projects form is displayed.

# Manipulating a Tree

The screenshot illustrates a process for upgrading a project. On the left, a 'Manage Projects' form is displayed within a 'PROJECT TRACKING SYSTEM' interface. The form includes fields for Project Name ('Super Insurance Solutions'), Project Type ('305'), Project Description ('Application development for Sup'), Project Status ('102'), Project Planned Start Date ('01-MAR-15'), Project Start Date ('15-MAR-15'), Project Planned End Date ('15-APR-15'), Project End Date, Project Upgrade Yn ('Yes'), Project Upgrade Of (with value '602' highlighted), Project Created By ('518'), Project Created On ('15-MAR-15'), Project Last Updated By ('518'), and Project Last Updated On ('23-APR-15'). A red box highlights the 'Project Upgrade Of' field. On the right, a 'Project Tree' window shows a hierarchical list of projects. A red box highlights the 'Super Insurance Solutions' node under the 'AMEX Cobrand' node. A handwritten note above the tree states: 'Super Insurance Solutions became upgrade of Project ID 602'. A red arrow points from the 'Project Upgrade Of' field in the form to the 'Super Insurance Solutions' node in the tree. The tree also lists other nodes like 'APEX4.2 Course Development', 'APEX5.0 Course Development', 'MFG Petrol Industry', etc. Buttons for 'Collapse All' and 'Expand All' are visible at the bottom of the tree window.

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## Practice18-3 Overview: Creating a Tree Whose Nodes Link to a Different Page

This practice covers the following topics:

- Creating a new page with a tree region and linking it to another page
- Adding a button on a page and navigating back to the tree page using the button

## Summary

In this lesson, you should have learned how to create and manipulate:

- A calendar
- A tree



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The lesson showed you how to use dynamic queries to display information in a calendar or tree.

# Using Dynamic Actions and Plug-Ins

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## Jack Uses Dynamic Actions and Plug-ins



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Jack is continuously looking to improvise the user experience of the PTS application. He comes across the APEX built-in Dynamic Actions and Plug-ins feature which helps in improving the user experience.

He decides to explore Dynamic Actions and Plug-ins. After he is familiar with it, he plans to incorporate some of these features in the PTS application.

# You Are Here in This Course

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19: Using Dynamic Actions and Plug-Ins

Lesson 20: Utilizing Application Express Printing

Lesson 21: Managing Application Feedback

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This slide shows a graphical representation of the entire course highlighting the lesson which is dealt with in these slides.

# Objectives

After completing this lesson, you should be able to:

- Create and use dynamic actions
- Import and use plug-ins



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This lesson discusses dynamic actions and plug-ins. You learn what they are, how to create a dynamic action and use it in your application, and how to import a plug-in and use it in your application.

## Lesson Agenda

- Using Dynamic Actions
  - What Are Dynamic Actions?
  - Creating a Dynamic Action
  - Dynamic Action Examples
- Using Plug-Ins



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# What Is a Dynamic Action?

Example of a dynamic action for enable and disable:

**Left Screenshot (Milestone Yn = Yes):**

Milestone Date is enabled when action item is a milestone (Milestone Yn = 'Yes')

**Right Screenshot (Milestone Yn = No):**

Milestone Date is disabled when action item is not a milestone (Milestone Yn = 'No')

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Dynamic actions provide developers a way to define client-side behavior declaratively without the need to know JavaScript. You can create a dynamic action from 'Dynamic Actions' tab in page designer. From its property editor, you can specify an action that is performed when a defined set of conditions occur. You can also specify which elements are affected by the action, and when and how they are affected.

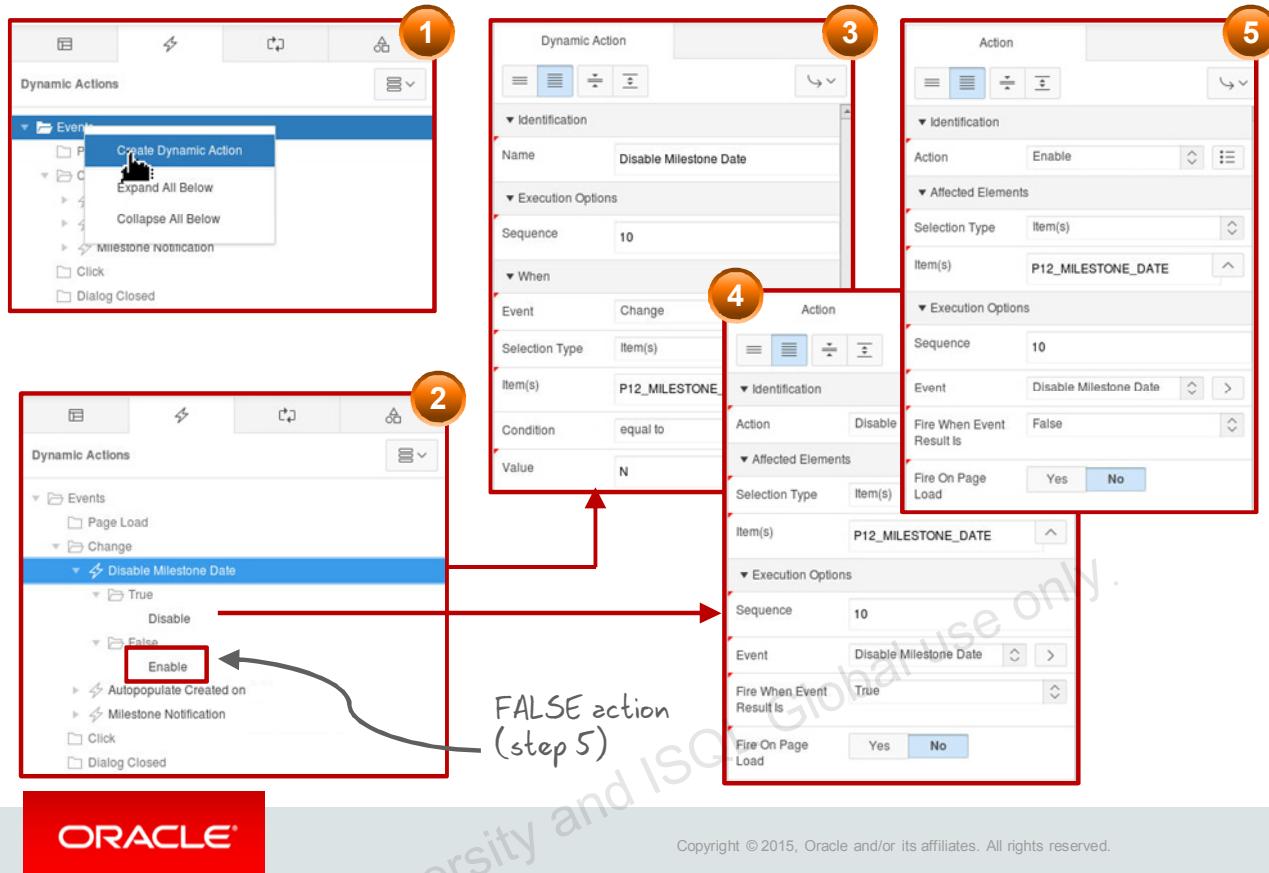
The process of implementing a dynamic action involves the following:

- Edit or create an item, button, region, DOM object, or jQuery selector on a page. This component is referenced within the dynamic action, which is defined when it fires.
- Create a dynamic action from the application page that invokes the action.
- Run your application to test the dynamic action.

In the example in the slide, in the screenshot on the left, the value for Milestone Yn is YES and the Milestone Date item is enabled. In the screenshot on the right, the value for Milestone Yn is NO and the Milestone Date item is disabled. The way in which the items work is controlled by the dynamic action created.

Many dynamic actions are available in Application Express. In this course, you examine a few of them. To learn more, review the Application Express User's Guide. In addition, an OBE tutorial is available in the Oracle Learning Library. This topic is also discussed in more detail in the *Advanced APEX Workshop* course.

# General Steps to Create a Dynamic Action



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There are two ways to create a dynamic action:

- From a specific item
- From the Dynamic Actions tab on page designer. If you create it from the Dynamic Actions tab, you can identify multiple triggering items in the “When” section of the dynamic action’s property editor.

Jack wants to improvise his application by creating dynamic actions to perform a few actions automatically which will ensure that correct, meaningful data enters into PTS application. In this slide, you can see Jack creating a dynamic action, which ensures that the MILESTONE\_DATE is disabled, if the action item is not a milestone.

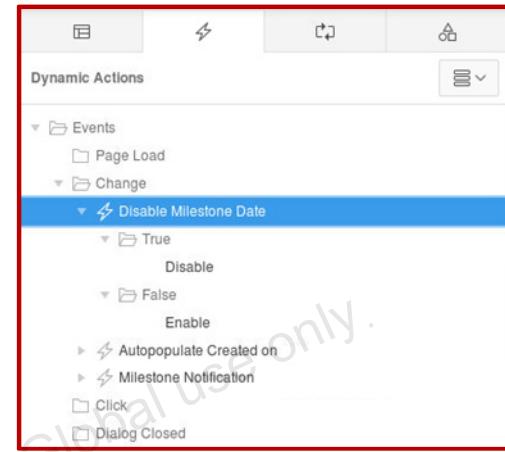
An example of a dynamic action is to enable and disable an item based on the value of the item. To create this type of dynamic action, navigate to the page that contains the item for which you want to create a dynamic action. In the page designer's Dynamic Actions tab, perform the following steps:

1. **Create Dynamic Action:** Right-click Event and select Create Dynamic Action. A new dynamic action is created. Enter the relevant values such as Name, Event, Item on which dynamic action is defined, Condition (if any) and value for the condition. In the example in the slide, Event is "Change", Selection Item is `P<n>_MILESTONE_YN`, Condition is "Equal To" and Value is "N".
2. **Defining TRUE action:** In the next step, define the item which is affected by the dynamic action. That is, define what action should be triggered in case the above defined event and condition takes place. To do this, click "True" in the dynamic actions tree under the new dynamic action created in the above step. In this example, you choose Action as "Disable", Item as `P<n>_ MILESTONE_DATE`. You can also define whether this dynamic action should be triggered immediately on the page load. In this example, we set it to "No".
3. **Creating FALSE action:** Creating a FALSE action is equally important so that the effect of the dynamic action is reset when the dynamic action triggering event is taken back by the user. For example, in this scenario, when the user selects "No" for milestone, the milestone date gets disabled because of the dynamic action. If the user selects "Yes" for the milestone immediately again, the milestone does not get enabled if a FALSE event is not created.
4. **Save and Run the page.**

## Enabling and Disabling an Item: Overview

In this example, you create a dynamic action called Disable Milestone Date and specify the following in the dynamic action properties:

|                   |                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------|
| When              | Event: Change<br>Selection Type: Item(s)<br>Item(s): P<n>_MILESTONE_YN<br>Condition: equal to<br>Value: N |
| Action(s)         | True: Disable<br>False: Enable                                                                            |
| Affected Elements | Selection Type: Item(s)<br>Item(s):<br>P<n>_MILESTONE_DATE                                                |



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The table in the slide indicates what is entered to enable the commission when the value of MILESTONE\_YN is set to N. In addition, you see the dynamic action in the tree view after creation.

## Creating and Using Dynamic Actions: Examples

This lesson covers the following examples of creating and using dynamic actions in Application Express:

- Setting the value of an item when another item changes
- Clearing the values of all items when a button is clicked
- Disabling the button and Submitting the page when a button is clicked
- Refreshing the data in a report using custom filters



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In this lesson, you examine the examples listed in the slide.

## Setting the Value of an Item When Another Item Changes

The figure consists of two side-by-side screenshots of a web application form titled "Manage Action Items". Both screenshots show the following fields:

- Project: 612
- Actionitem Created By: 504
- Actionitem Assigned To: 508
- Actionitem Name:
- Actionitem Description:
- Actionitem Status:
- Milestone Yn:  No  Yes
- Milestone Date:
- Actionitem Created On:

In the left screenshot, the "Actionitem Created On" field is highlighted with a red box and an arrow points from the "Actionitem Name" field below it. The text below the left screenshot states: "Actionitem Created On" is blank when the cursor is still in the "Actionitem Name" field.

In the right screenshot, the "Actionitem Created On" field now contains the value "05-JUN-15" and is also highlighted with a red box. An arrow points from the "Actionitem Name" field above it. The text below the right screenshot states: "Actionitem Created On" populated as soon as value is entered into "Actionitem Name"

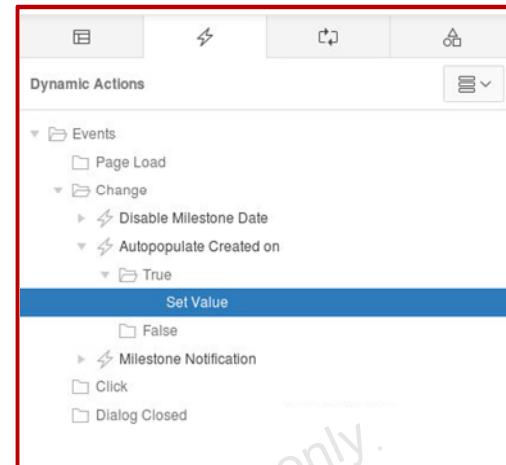
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The example in the slide has a dynamic action that fires when the value of the page item P<n>\_DEPARTMENT\_ID changes. The dynamic action uses a SQL statement to select the City for the department and populates the Location page item.

# Setting the Value of an Item When Another Item Changes

|                   |                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------|
| When              | Event: Change<br>Selection Type: Item(s)<br>Item(s):<br>P<n>_ACTIONITEM_NAME<br>Condition: none   |
| Action(s)         | True: Set Value                                                                                   |
| Settings          | Set Type: SQL Statement<br>SQL Statement: SELECT SYSDATE FROM DUAL;<br>Page Items to Submit: None |
| Affected Elements | Selection Type: Item(s)<br>Item(s):<br>P<n>_ACTIONITEM_CREATED_ON                                 |



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To create the dynamic action explained in the previous slide, perform the following steps:

1. On the page that contains the item, in page rendering, right-click the item and select Create Dynamic Action. In this example, dynamic action is created on P<n>\_ACTIONITEM\_NAME.
2. Enter relevant values such as Name, Event , Condition (if any) and value for the condition. In this case, because you created dynamic action from item directly, you can see that Item is prepopulated.
3. Define the item that is affected by the dynamic action. That is, define what action should be triggered in case the above defined event and condition takes place. To do this, click "True" in the dynamic actions tree under the new dynamic action and update its properties in the property editor.
4. Create a FALSE action and define its properties.
5. **Save and Run** the page.

# Clearing All Items When a Button Is Clicked

All the fields have values populated before the Reset Values button is clicked.

The screenshot shows the 'Manage Projects' form with various input fields filled with data. The fields include Project Name (MFG Petrol Industry), Project Type (304), Project Description (Engineering Design Capabilities), Project Status (101), Project Planned Start Date (19-JUN-15), Project Start Date (19-JUN-15), Project Planned End Date (01-JUL-15), Project End Date, Project Upgrade Yn (No), Project Created By (504), Project Created On (02-MAY-15), Project Last Updated By (504), and Project Last Updated On (02-MAY-15). A 'Reset Values' button is visible at the top right of the form.

All the fields are cleared upon clicking the Reset Values button.

The screenshot shows the same 'Manage Projects' form, but all the previously populated fields are now empty. The 'Reset Values' button is highlighted with a red box and an arrow points from it to the cleared fields. The rest of the interface remains the same, including the header and footer.



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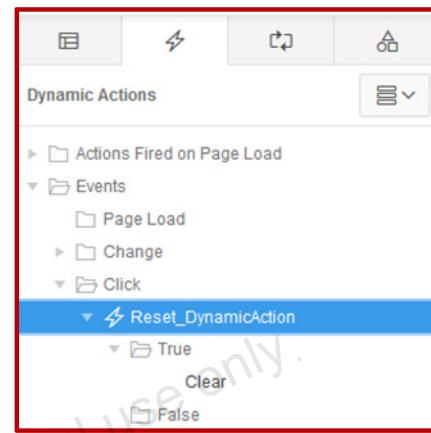
The example in the slide uses a dynamic action that fires whenever the user clicks the “Reset Values” button on the form. As soon as the button is clicked, the dynamic action fires and clears the values from all the fields on the form.

The “Highlight Project Description” dynamic action created in the PTS application’s “Manage Projects” form includes the Add Class and Remove Class actions.

## Clearing All Items When a Button Is Clicked

To create this dynamic action, specify the following in the wizard:

|                   |                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| When              | Event: Click<br>Selection Type: Button<br>Button: Reset                                                                                                                                                                                                                                                                                                                        |
| Action(s)         | True: Clear<br>No False action                                                                                                                                                                                                                                                                                                                                                 |
| Affected Elements | Selection Type: Item(s)<br>Item(s):<br>P7_PROJECT_NAME, P7_PROJECT_TYPE, P7_PROJECT_DESCRIPTION, P7_PROJECT_STATUS, P7_PROJECT_PLANNED_START_DATE, P7_PROJECT_START_DATE, P7_PROJECT_PLANNED_END_DATE, P7_PROJECT_END_DATE, P7_PROJECT_UPGRADE_YN, P7_PROJECT_CREATED_BY, P7_PROJECT_UPGRADE_OF, P7_PROJECT_CREATED_ON, P7_PROJECT_LAST_UPDATED_BY, P7_PROJECT_LAST_UPDATED_ON |



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To create this type of dynamic action, perform the following steps:

1. On the page that contains the button, in the page rendering, right-click the button and select Create Dynamic Action. In this example, dynamic action is created on the `Reset` button.
2. Enter the relevant values such as Name, Event , Condition (if any) and value for the condition. In this case, because you created dynamic action from a button directly, you can see that selection type is prepopulated with “Button” and the button name is prepopulated with “Reset”.
3. Define the items which are affected by the dynamic action. That is, define what action should be triggered in case the above defined event and condition takes place. To do this, click “True” in the dynamic actions tree under the new dynamic action and update its properties in the property editor.
4. Create a FALSE action and define its properties. In this example, the FALSE action is not needed and this step is not needed.
5. **Save and Run** the page.

**Note:** All event types show the Selection Type field except Page Load, Page Unload, Resize, and Before Submit.

## Disabling the Button and Submitting the Page When Button Is Clicked

The figure consists of two side-by-side screenshots of a web form. Both screenshots show a similar set of fields for a project, including Project Name, Project Type, Project Description, Project Status, various dates, and upgrade information. In the first screenshot, the 'Apply Changes' button at the bottom right is highlighted with a red box and has a cursor icon pointing to it. In the second screenshot, the same button is shown but is now grayed out and disabled, also highlighted with a red box. Arrows from the descriptive text below each screenshot point to the corresponding button in each image.

Project Name \* MFG Sugar Industry  
Project Type \* 304  
Project Description \* Engineering Design Capabilities ii  
Project Status \* 104  
Project Planned Start Date \* 19-JAN-2015  
Project Start Date \* 01-FEB-2015  
Project Planned End Date \* 23-MAR-2015  
Project End Date 26-MAR-2015  
Project Upgrade Yn \* No  
Project Upgrade Of  
Project Created By \* 504  
Project Created On 01-FEB-2015  
Project Last Updated By \* 504  
Project Last Updated On 20-APR-2015

Cancel Apply Changes

Project Name \* MFG Sugar Industry  
Project Type \* 304  
Project Description \* Engineering Design Capabilities ii  
Project Status \* 104  
Project Planned Start Date \* 19-JAN-2015  
Project Start Date \* 01-FEB-2015  
Project Planned End Date \* 23-MAR-2015  
Project End Date 26-MAR-2015  
Project Upgrade Yn \* No  
Project Upgrade Of  
Project Created By \* 504  
Project Created On 01-FEB-2015  
Project Last Updated By \* 504  
Project Last Updated On 20-APR-2015

Cancel Apply Changes

Button before clicking it.

Button disabled after clicking it and page submitted.



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You can create a dynamic action to be fired when a button is clicked. Consider a situation when you are submitting a page by clicking a Save, Apply Changes, or Create button. It takes a few seconds for the page processing to complete and the resulted page to be displayed. Within these few seconds it is possible for the user to click the button again or make some other changes. This can lead to data integrity issues and also increase the response time if the button is clicked again and again. To avoid this situation, you can create a dynamic action to be fired when a button is clicked, which will disable the button clicked (in this example, Apply Changes button) so that the user cannot click another time before the page is completely processed. The example in the slide shows a form for Update. A dynamic action is defined to fire when the Save button is clicked. It displays a disabled button. After the page processing is complete, the resultant page is displayed.

# Disabling a Button When Clicked: Overview

|                   |                                                            |
|-------------------|------------------------------------------------------------|
| When              | Event: Click<br>Selection Type: Button<br>Button: SAVE     |
| Actions(s)        | Behavior Action: Submit Page<br>True Event Action: Disable |
| Settings          | Request/Button Name: SAVE                                  |
| Affected Elements | Selection Type: Button(s)<br>Button(s): SAVE               |

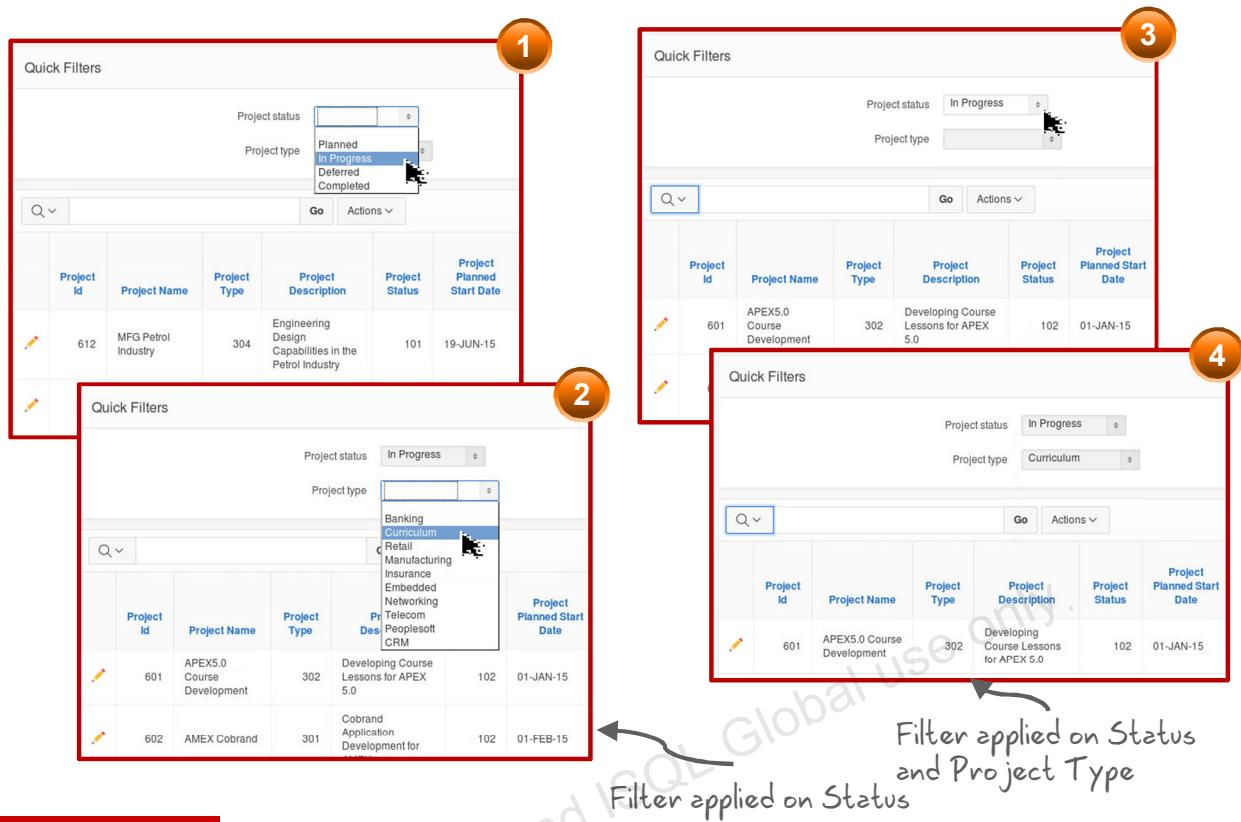


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To create a dynamic action on a button, perform the following steps:

1. Navigate to the page that contains the button for which you want to create a dynamic action. In the tree view under page rendering, right-click the button and select Create Dynamic Action.
2. Update the properties of dynamic action in its property editor:
  - a. Name: Disable Page
  - b. Event: Click (prepopulated)
  - c. Selection Type: Button (prepopulated)
  - d. Button: SAVE (prepopulated)
3. Define the properties for the “TRUE” event:
  - a. Action: Disable
  - b. Request/Button Name: SAVE
  - c. Fire On Page Load: No
4. Ensure Behavior > Action is selected as “Submit Page” for the SAVE button.
5. Click the “Save and Run” icon.

# Refreshing the Data in a Report Using Custom Filters



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Dynamic actions can handle AJAX-based filtering of report data. The approach is slightly different depending on whether your report is a classic or an interactive report.

The example in the slide demonstrates how custom filters can be added to reports, very easily with dynamic actions. When either a Department or Job is selected, the report is refreshed by AJAX to show the newly scoped employees. To achieve this, the report contains one dynamic action that refreshes the report after either a different Department or a Job has been selected. This makes use of the Refresh action.

The example in the slide uses an interactive report. For interactive reports, perform the following steps to create AJAX-based filtering:

1. Create a page with a report region, ensuring the page item filters are referenced in the SQL.
2. Create the page items for filtering.
3. Create the dynamic action so that it fires whenever the value of any of the page item filters changes in order to refresh the interactive report region.
4. Define the interactive report region to save these items' values in session state after the region is refreshed.
5. Make sure #REGION\_STATIC\_ID# is set in the Region Template.

## Refreshing the Data in a Report Using Custom Filters: Overview

1. Create a page called Projects Master Report with an interactive report region.
2. Create another region called Quick Filters on the same page.
3. Add two select list items called `P<n>_PROJECT_STATUS` and `P<n>_PROJECT_TYPE` to the new region.
4. Populate the select lists with the status and project type IDs by entering the appropriate SQL query under List of Values.
5. Create a dynamic action and specify its properties in the property editor such that on the event of any change in select lists, the main report region is refreshed.
6. Define the interactive report region to save these items' values in session state after the region is refreshed.
7. Update the report source SQL such that the records returned after refresh are as per the selected filters.



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The slide provides the steps necessary to produce a report that refreshes the data based on custom filters.

Please note that in case you are not using Universal Theme and your application uses any legacy theme, you must ensure that the Region Template is set to some template that contains the `#REGION_STATIC_ID#` substitution string. This is because, dynamic actions need this ID to be able to perform the refresh. Most of the new themes in Application Express default to an appropriate template when creating new interactive report regions. However, if you are using an old theme, then you may need to select an appropriate template. For example, you can use the Region without the Buttons and Titles templates.

## Refreshing the Data in a Report Using Custom Filters

The screenshot shows the Oracle Application Express workspace. On the left, the 'Rendering' tab is selected, displaying the structure of 'Page 4: Projects Master Report'. It includes sections for Pre-Rendering, Regions (Breadcrumb Bar, Content Body), and Post-Rendering. In the Content Body region, there is a 'Quick Filters' section containing two items: 'P4\_PROJECT\_STATUS' and 'P4\_PROJECT\_TYPE'. Each item has a 'Quick Filter Refresh' option. Red boxes highlight these two items. To the right of the report structure, two separate 'List of Values' definitions are shown, each with an 'SQL Query' type. The first query, associated with 'P4\_PROJECT\_STATUS', retrieves project status names and IDs from the STATUS table. The second query, associated with 'P4\_PROJECT\_TYPE', retrieves project type names and IDs from the PROJECT\_TYPES table.

```
select STATUS.STATUS_NAME as d, STATUS.STATUS_ID as r from STATUS STATUS
```

```
select PROJECT_TYPES.PROJECT_TYPE_NAME as D, PROJECT_TYPES.PROJECT_TYPE_ID as R from PROJECT_TYPES PROJECT_TYPES
```

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As shown in the previous slide, you create a Quick Filters region in this example. In this region, you create two filter items `P<n>_PROJECT_STATUS` and `P<n>_PROJECT_TYPE` to filter the Projects Master report by Project Status and Project Type. The slide shows the List of Values definition for the items `P<n>_PROJECT_STATUS` and `P<n>_PROJECT_TYPE`.

# Refreshing the Data in a Report Using Custom Filters: Overview

|                   |                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------|
| When              | Event: Change<br>Selection Type: Item(s)<br>Item(s):<br>P<n>_PROJECT_STATUS,<br>P<n>_PROJECT_TYPE<br>Condition: none |
| Action(s)         | True: Refresh                                                                                                        |
| Affected Elements | Selection Type: Region<br>Region: <report region name>                                                               |

When

Event: Change

Selection Type: Item(s)

Item(s): P4\_PROJECT\_STATUS, P4\_PROJECT\_TYPE

Condition: - Select -

Affected Elements

Selection Type: Region

Region: Projects Master Report

Execution Options

Sequence: 10

Event: Quick Filter Refresh

Fire When Event Result Is: True

Fire On Page Load: Yes



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To create the dynamic action, perform the following steps:

1. Open the page in the page designer mode and click the Dynamic Actions tab in tree view.
2. Right-click Events under the Dynamic Actions tab and select Create Dynamic Action.
3. Update the following values in its property editor. Select Change for Event and p<n>\_PROJECT\_STATUS, P<n>\_PROJECT\_TYPE for Item(s). These selections define that the dynamic action will fire whenever the value in the Status or Project Type list changes.
4. For TRUE action, select Refresh in its property editor. The Refresh action currently supports interactive report regions, classic reports, and all item types with cascading LOV support. It also supports item or region plug-ins, depending on whether the plug-in author has coded the plug-in accordingly. Ensure that the Fire On Page Load check box is deselected. Click Next.
5. In the same property editor (for TRUE action), select Region for selection type and Projects Master Report for the Region.
6. Click the “Save and Run” icon.
7. The Projects Master Report loads. Select a value for Project Status and see that the report region is refreshed.

Even though the dynamic action fired and the report is refreshed, it is not being scoped by the filter selection. The problem is that the values for the filter page items are not being saved to session state and are, therefore, not set when the report's SQL is executed.

Perform the following steps to define the interactive report region to save these items' values in session state after the region is refreshed:

1. Select report region under page rendering and select `P<n>_PROJECT_STATUS`, `P<n>_PROJECT_TYPE` for Page Items to Submit.
2. Modify the SQL query under Source to mention `PROJECT_STATUS` and `PROJECT_TYPE` in the `where` clause.

Now if you run the page, you see that the filters are fully functional. Select different status IDs and project types and see the refreshed report, which shows projects scoped by your selections.

## Quiz



Which of the following would be implemented as a dynamic action?

- a. Showing and hiding an item based on the changing of another item's value
- b. Setting an item's value when another element is clicked
- c. Refreshing a report based on the changing of an item's value
- d. Enabling an item based on the changing of another item's value
- e. All of the above

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**Answer: e**

## Quiz



In the Create Dynamic Action Wizard, if you select Change for event type, the dynamic action would fire when:

- a. The pointing device button is clicked over the triggering element
- b. The triggering element loses focus by tabbing out of the element
- c. The user selects some text in a text field
- d. A control loses the input focus and its value has been modified since gaining focus

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**Answer: d**

## Practice 19-1 Overview: Creating and Using Dynamic Actions

This practice covers creating and using the following dynamic actions:

- Hide and show an item based on the value of another item
- Changing the class when an item is null
- Refreshing the data in a report using custom filters

## Lesson Agenda

- Using Dynamic Actions
- Using Plug-Ins
  - What Is a Plug-In?
  - Importing and Installing a Plug-In
  - Reviewing the Plug-in Definition
  - Using an Item Plug-in on Your Page
  - Plug-in Examples



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# What Is a Plug-In?

## Item plug-in example: Masked Field Item

The Mobile Number field accepts input in the required format.

PROJECT TRACKING SYSTEM

Create Employees

First Name \* Ronald

Last Name \* Roger

Email \* rr@oracle.com

Phone Number \* 8904566754

Mobile number (0) 123-4567

Address

Hire Date \* [date picker]

Designation \*

Salary \*

Manager Id Frank OHare, Turner Thomas

Note Only new employees can be created from this page.  
To modify existing employee details, please open 'Manage Employees' form.

Get Manager Reportees

Cancel Create

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Plug-ins enable developers to declaratively extend the built-in types available with Application Express and share and reuse them.

Application Express supports a set group of item, region, dynamic action, and process types. Plug-ins offer a means of augmenting these built-in types by declaratively creating and using new types in your application. Because plug-ins are designed for reuse, developers can export them from and import them into other applications in the same or other workspaces and also share them with the Application Express Plug-in community by using the Plug-in Repository.

The process of implementing a plug-in involves the following:

- Creating a plug-in in your application workspace or importing a plug-in into it
- Editing or creating an item, region, process, or dynamic action type to use the plug-in
- Running your application to test the plug-in

The example in the slide shows a Masked Field plug-in item.

There are a number of plug-ins available in the plug-in repository (accessed from the Plug-in window). To find out more about plug-ins, see the *Application Express User's Guide*.

## Steps to Use a Plug-in in Your Application

1. Create or import a plug-in for your application (under Shared Components).
2. Review and/or optimize the plug-in definition.
3. Edit or create an item, region, process, or dynamic action type to use the plug-in.
4. Run your application to test the plug-in functionality.



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The slide shows the steps involved in using a plug-in in your application. In this lesson, you import different plug-ins (shown in upcoming slides) provided in the Plug-in Repository, review the plug-in definition, and make some changes to optimize the use of the plug-ins. You will create appropriate objects on your page that will use the plug-ins and run the page to view the results.

# Accessing the Plug-in Repository

The diagram illustrates the connection between the Oracle Application Express interface and the APEX Development Team Plug-Ins page. It consists of two main parts:

- Top Part:** Shows the Oracle Application Express interface with a red box highlighting the "Plug-ins" tab under "Shared Components". An arrow points from this interface to the "Other Components" section on the left side of the APEX Development Team Plug-Ins page.
- Bottom Part:** Shows the "Other Components" section on the left side of the APEX Development Team Plug-Ins page. This section contains links for "List of Values", "Plug-ins" (which is highlighted with a blue background), and "Shortcuts". An arrow points from this section to the "Item Type Plug-Ins" section on the right side of the page.

**APEX Development Team Plug-Ins**

Below is a list of Plug-Ins that can be used with Oracle Application Express 4.0 and above. These provide usable examples of what you can create and show plug-in developers how to create such plug-ins. You can also learn how to build your own plug-ins using this OBE, [Extending Your Application Using Plug-ins](#).

**Note:** Before downloading, please read the [Installation Instructions](#) and [Terms of Use](#) at the bottom of the page.

- Item Type Plug-Ins
- Region Type Plug-Ins
- Process Type Plug-Ins
- Dynamic Action Type Plug-Ins
- Installation Instructions
- Terms of Use

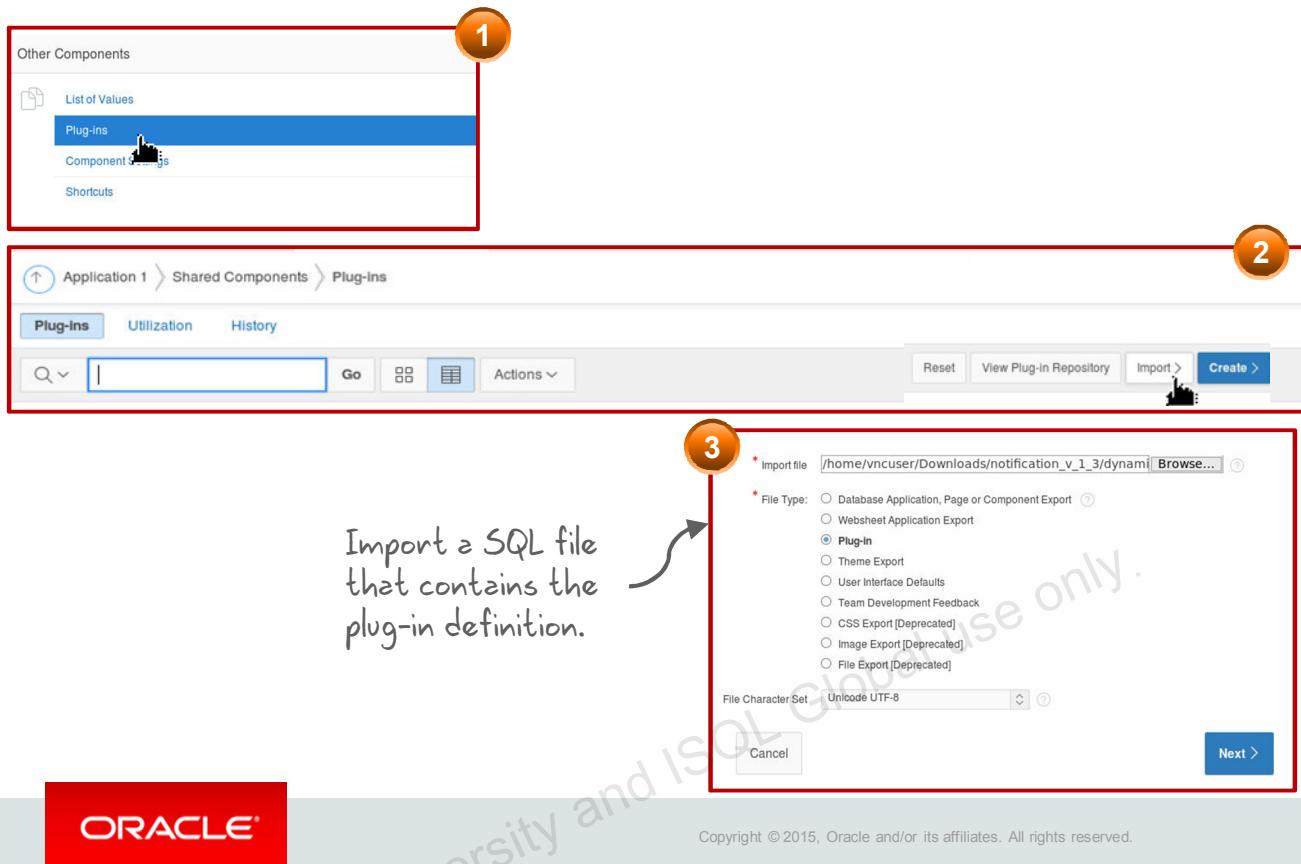
**Item Type Plug-Ins**

- **Facebook Like Button**  
The Like button lets a user share content with friends on Facebook. When the user clicks the Like button on your site, a story appears in the user's friends' News Feed with a link back to your website.  
Minimum Release: 4.0  
Version: 1.1  
Released on: 7-Dec-2010  
Links: [Demonstration](#)  
[Download: facebook\\_like\\_button\\_v\\_1\\_1.zip](#)  
[Comments & Details](#)

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The Plug-in Repository provides a series of available plug-ins developed by Oracle that can be used by customers to perform various tasks. This repository continues to be updated with additional plug-ins for use by the Oracle Application Express user community.

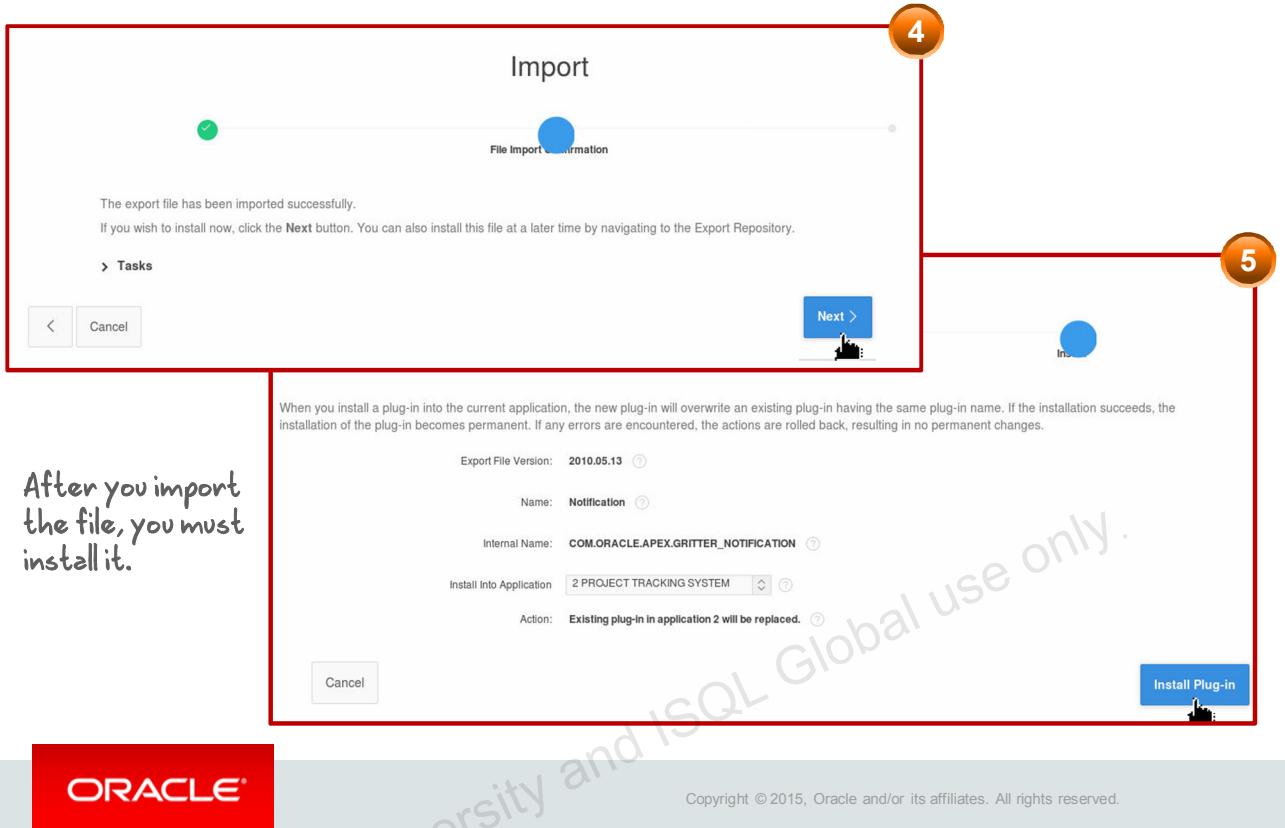
## Importing a Plug-In



To use a plug-in in your application, you import or create it under Shared Components. To import a plug-in, perform the following steps:

1. Navigate to your application's Shared Components page. Under Other Components, select Plug-ins.
2. Click Import.
3. Select your plug-in import file and click Next.

## Installing a Plug-In



4. After the file is imported, click Next to install it.
5. Select the application that you want to install the plug-in into, and click Install Plug-in.

# Reviewing a Plug-in Definition

**Plug-in: Notification**

**Name**

- Name: Notification
- Internal Name: COM.ORACLE.APEX.GRITTER\_NOTIFICATION
- Type: Dynamic Action
- Category: Notification

**Subscription**

Reference Master Plug-in From:

**Source**

PL/SQL Code:

```

1 function render_gritter_notification (
2 p_dynamic_action in apex_plugin.t_dynamic_act
3 ,p_plugin in apex_plugin.t_plugin)
4 return apex_plugin.t_dynamic_action_render_re
5 is
6 l_title varchar2(4000) := p_dynamic_
7 l_text varchar2(4000) := p_dynamic_
8 l_image_url varchar2(4000) := p_dynamic_
9 l_is_sticky varchar2(1) := nvl(p_dyna
10 l_hide_after_sec number := to_number(
11 l_result apex_plugin.t_dynamic_action
12

```

**Standard Attributes**

| Attributes:                                                    |                                                        |                                                    |
|----------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------|
| <input type="checkbox"/> For Item(s)                           | <input type="checkbox"/> For Button                    | <input type="checkbox"/> For Region                |
| <input type="checkbox"/> For jQuery Selector                   | <input type="checkbox"/> For JavaScript Expression     | <input type="checkbox"/> For Triggering Element    |
| <input type="checkbox"/> For Event Source                      | <input type="checkbox"/> Affected Element Required     | <input type="checkbox"/> Check "Fire on page load" |
| <input type="checkbox"/> Has Stop Execution on Error Attribute | <input type="checkbox"/> Has Wait For Result Attribute |                                                    |

**Custom Attributes**

| Substitute Attribute Values: Yes |           |           |
|----------------------------------|-----------|-----------|
| Label                            | Scope     | Attribute |
| Title                            | Component | 1         |
| Text                             | Component | 2         |
| Image URL                        | Component | 3         |
| Sticky                           | Component | 4         |
| Hide After x Seconds             | Component | 5         |

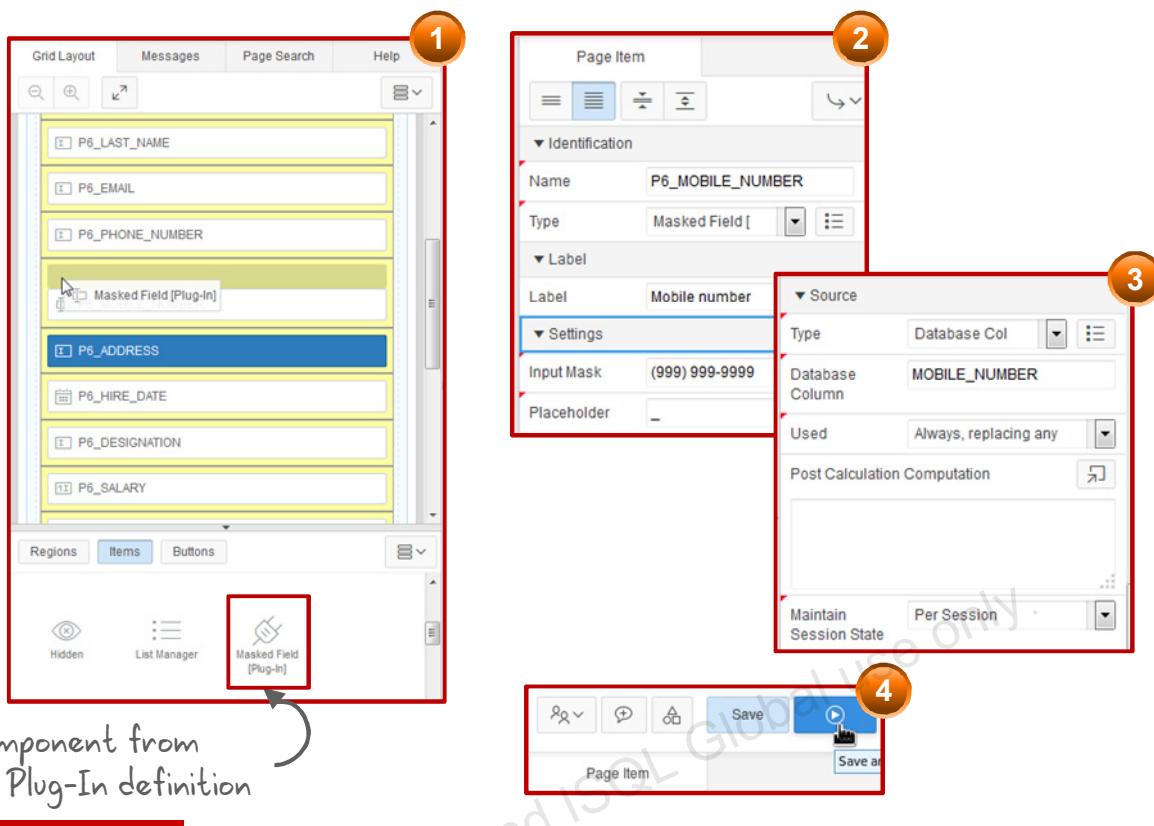
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To review the contents of a plug-in, from Shared Components > Plug-ins for your application, click the plug-in icon. Some of the sections that appear in the definition include:

- Name:** Provides a name for the plug-in, an internal name, and type of plug-in it represents. In this case, the Notification plug-in is a Dynamic Action type plug-in.
- Source:** Provides the PL/SQL code that is needed to run so that the plug-in will function properly
- Callbacks:** Provides the name of the functions specified in the Source section that should be executed to render and validate the plug-in. In addition, you can call an AJAX function that behaves the same way as an on-demand process and can access the generic `apex_application.g_x01 - g_x10` global variables to transfer data from the browser to the back end. It can also read and set session state as an On-Demand process does.
- Standard Attributes:** Contains a list of attributes that apply to this plug-in

- **Custom Attributes:** Are used to prompt the developer for additional data in the Builder when the plug-in is used. In the Star Rating example, you want a wizard window to appear and prompt the user for the number of stars that the user wants to appear when the page is displayed.
- **Files:** Displays the images, style sheet, and JavaScript files needed for this plug-in to run successfully

## Using an Item Plug-in on a Page



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After the plug-in is made available to the application, you can use it. Perform the following steps to create an item plug-in:

1. Open the page in page designer mode and locate the “Masked Field [plug-in]” item in the items gallery.
2. Drag it to page content on the grid layout.
3. Update its properties such as Name, Settings (Input Mask), and source in the property editor.
4. If the source type is “Database Column,” you have to mention the database column value.
5. Click save and run icon on the page.
6. You can see that the Masked Field item is displayed on the page.

## Quiz



Which of the following can be implemented by using a plug-in?

- a. Showing an item that has a particular format
- b. Changing the value of an item based on another item value
- c. Fading in and out an item
- d. Enabling or disabling an item

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**Answer: a, c**

b and d are dynamic actions.

## Additional Plug-in Examples

- Adding a Simple Checkbox Item
- Displaying Notification Message When an Item Is Clicked
- Changing and Highlighting an Item When Another Item Changes
- Setting the Value of an Item When Other Item(s) Change



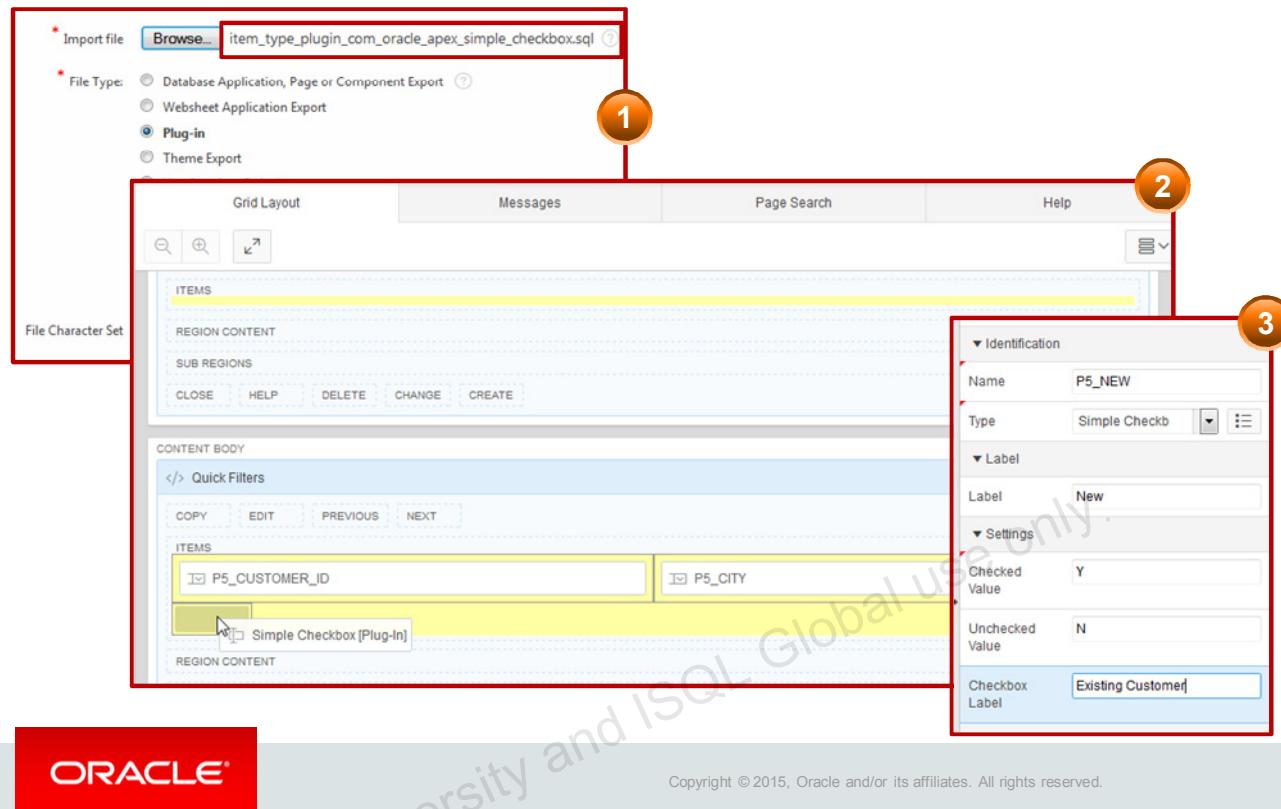
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There are several plug-ins in the plug-in repository (accessed from the Plug-in window). You examine some additional examples provided in the slide.

To find out more about plug-ins, see the *Application Express User's Guide*.

# Adding a Simple Checkbox Item

## Simple Checkbox item plug-In

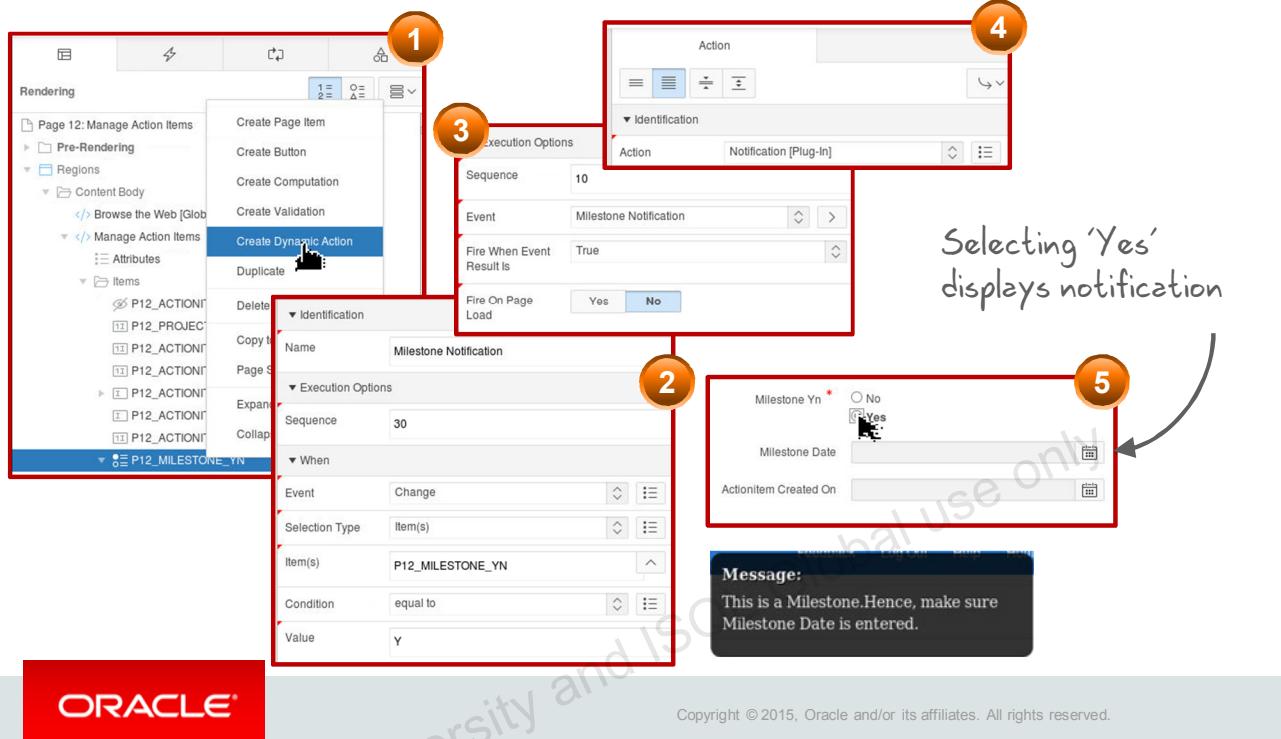


With Oracle APEX 5.0, a checkbox item comes along with all other basic item types in the item gallery. But if you want to add a check box to the page, which allows you to select an option and deselect another option at the same time, you can import a “Simple Checkbox” item plug-in from the plug-in repository. After the plug-in is imported, you can use it on your page.

After adding the Simple Checkbox item plug-in to the content body of the page, you need to specify the properties that are specific to the plug-in, in this case, the checked and unchecked values and a check box label if so desired.

# Displaying a Notification Message When an Item is Clicked

## Notification Dynamic Action plug-in



The Notification Dynamic Action plug-in is invoked when the dynamic action fires. In the example in the slide, you create a dynamic action that uses the notification plug-in. In this case, the user selects “Yes” for the Milestone\_Yn field while creating an action item in the project and a notification is displayed asking the user to enter the milestone date without fail.

Perform the following steps:

1. Right-click the milestone\_yn item and select Create Dynamic Action.
2. Update the properties such as Name, Event, Selection Type, Item(s), TRUE action, and affected elements in the property editor of the dynamic action.
3. Ensure that the action for the dynamic action’s TRUE event is selected as “Notification [Plug – in]”.
4. Click the Save and Run icon.

# Changing and Highlighting an Item When Another Item Changes

## Highlight Dynamic Action plug-in

Project End Date is highlighted when status changes to complete (104)

|                                                               |                                |
|---------------------------------------------------------------|--------------------------------|
| Project Name * AMEX Cobrand                                   | Project Type * 301             |
| Project Description * Cobrand Application Development for AME | Project Status * 102           |
| Project Planned Start Date * 01-FEB-15                        | Project Start Date * 10-FEB-15 |
| Project Planned End Date * 05-MAY-15                          | Project End Date               |
| Project Upgrade Yn * No                                       | Project Upgrade Of             |
| Project Created By * 518                                      | Project Created On 10-FEB-15   |

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The Highlight Dynamic Action plug-in is invoked when the dynamic action fires. In the example in the slide, you create a dynamic action that highlights the Project End Date item when the value of Status changes to 104, which means "Completed".

# Changing and Highlighting an Item When Another Item Changes: Overview

In this example, perform the following steps:

1. Import the Highlight Plug-In into an application's shared components.
2. Create a dynamic action and specify the following in the wizard:

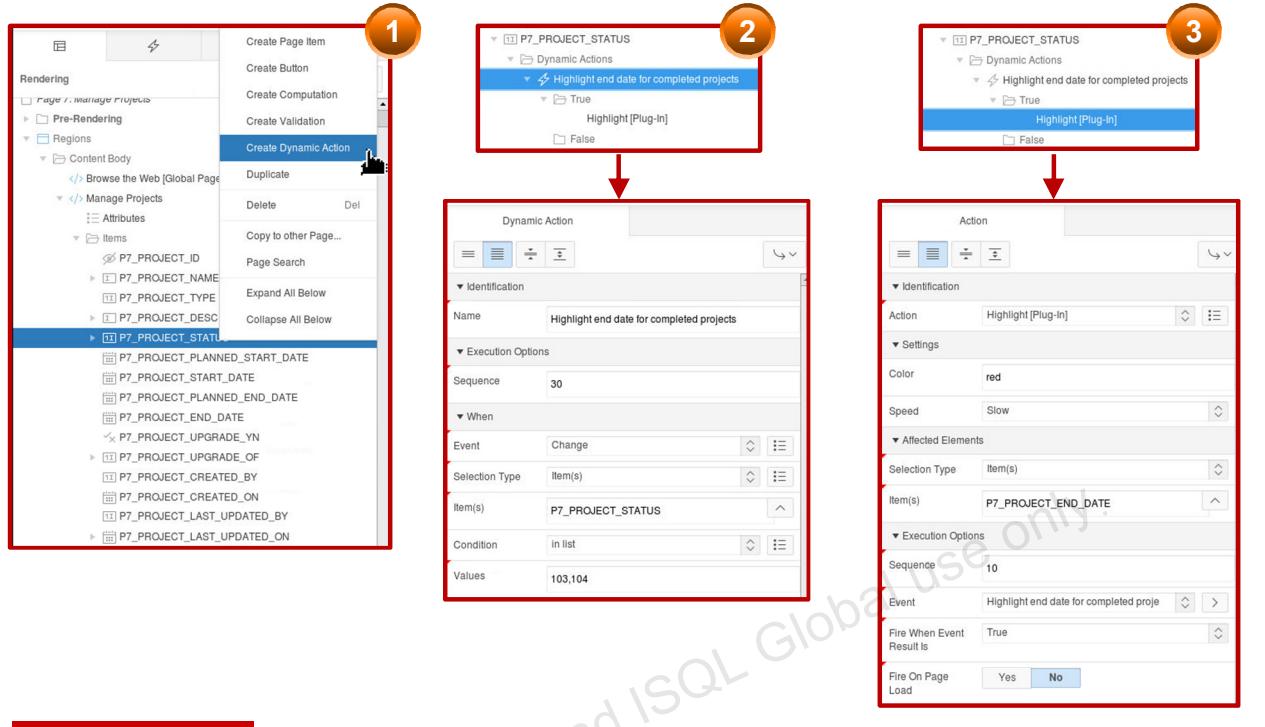
|                   |                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------|
| When              | Event: Change<br>Selection Type: Item(s)<br>Item(s): P<n>_PROJECT_STATUS                                         |
| Actions(s)        | Action: Highlight [Plug-in]                                                                                      |
| Affected Elements | Selection Type: Item(s)<br>Items(s): P<n>_PROJECT_END_DATE<br>Color: Red<br>Speed: Slow<br>Fire On Page Load: No |



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This example uses the Highlight plug-in action. To perform this type of example, you must first import the Highlight Plug-in into an application's shared components. Then you create a dynamic action, which highlights Project End Date after the Project Status item is changed to 103 or 104 (deferred or completed).

# Creating a Dynamic Action that Uses the Highlight Plug-In



To create the dynamic action, perform the following steps:

1. In the example in the slide, because you want the dynamic action to be fired when the Project Status field is changed to 103 or 104, right-click `P<n>_PROJECT_STATUS` and select Create Dynamic Action.
2. Update the properties such as Name, Event, Selection Type, and Condition in the property editor of the new dynamic action. In the example shown in the slide, the selection type is Item(s) and the Item is `P<n>_PROJECT_END_DATE`. Condition is set to "in list" and the Values are 103,104.
3. Update the TRUE Event for this dynamic action in its property editor to specify the Action, Affected Elements. In this example, select Highlight [Plug-in] from the Action drop-down list. Depending on your application configuration, you may also have additional plug-in dynamic actions available here. Ensure that No is selected for Fire On Page Load.
4. Under Settings, enter the color code and select the Speed type. In this example, enter red for Color and select Slow for Speed. When the Project Status field is changed to 103 or 104, Project End Date is highlighted with this color to indicate that it has to be populated.

## Setting the Value of an Item When Other Item(s) Change

from Project End Date is highlighted and populated with System Date when status changes to 104

The figure consists of two side-by-side screenshots of a web-based form. Both screenshots show the same set of fields: Project Name (AMEX Cobrand), Project Type (301), Project Description (Cobrand Application Development for AME), Project Status (initially 102, later 104), Project Planned Start Date (01-FEB-15), Project Start Date (10-FEB-15), Project Planned End Date (05-MAY-15), Project End Date (highlighted in red), Project Upgrade Yn (No), Project Upgrade Of, Project Created By (518), and Project Created On (10-FEB-15). A handwritten note above the second screenshot states: "from Project End Date is highlighted and populated with System Date when status changes to 104". A curved arrow points from this note to the highlighted Project End Date field in the second screenshot. The second screenshot also shows the Project End Date field populated with the value 10-JUN-15.



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The example in the slide demonstrates a similar example using a Set Value dynamic action event with a SQL Statement as Set Type. This is created as an additional TRUE event to the existing dynamic action on P<n>\_PROJECT\_STATUS created in earlier slides to highlight the project end date when status changes to 103 or 104.

So, when the dynamic action condition is met, the project end date field is highlighted in red color and at the same time populated with a value equal to the current system date.

This example uses the Highlight plug-in action. The Highlight plug-in should already be imported into your application.

# Setting the Value of an Item When Another Item Changes: Overview

Create a new TRUE event on the existing dynamic action and select SQL Statement for Set Type.

The screenshot illustrates the process of creating a new dynamic action. It consists of three main parts:

- Step 1:** The left panel shows the 'P7\_PROJECT\_STATUS' page item with its 'Dynamic Actions' section expanded. A red box highlights the 'True' event under 'Highlight end date for completed projects'. An orange circle labeled '1' is positioned above this box.
- Step 2:** The middle panel shows the 'Action' configuration screen. The 'Action' dropdown is set to 'Set Value'. The 'Set Type' dropdown is set to 'SQL Statement'. The 'SQL Statement' field contains the code 'select sysdate from dual;'. An orange circle labeled '2' is positioned above the 'Action' screen.
- Step 3:** The right panel shows the 'Affected Elements' configuration screen. The 'Selection Type' is set to 'Item(s)' and the 'Item(s)' field contains 'P7\_PROJECT\_END\_DATE'. An orange circle labeled '3' is positioned above this screen.

**Action:**  
Action: Set Value  
Set Type: SQL Statement  
SQL Statement:  
Select SYSDATE from DUAL;

**Affected Elements:**  
Selection Type: Item(s)  
Item(s):  
P<n>\_PROJECT\_END\_DATE

The slide shows creating a new “TRUE” event on the existing dynamic action and setting its properties.

## Practice19-2 Overview: Importing and Using Plug-Ins

This practice covers importing and using the following plug-ins on your page:

- Adding a rating column to the CUSTOMERS table
- Importing the Star Rating Item Plug-In and the Notification Dynamic action Plug-in files
- Adding the Star Rating Item Plug-in to your Customer Details page
- Adding the Notification Dynamic Action Plug-in to your Master Detail page



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## Summary

In this lesson, you should have learned how to:

- Create and use dynamic actions
- Import and use plug-ins



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In this lesson, you should have learned how to create and use dynamic actions and plug-ins in your application.

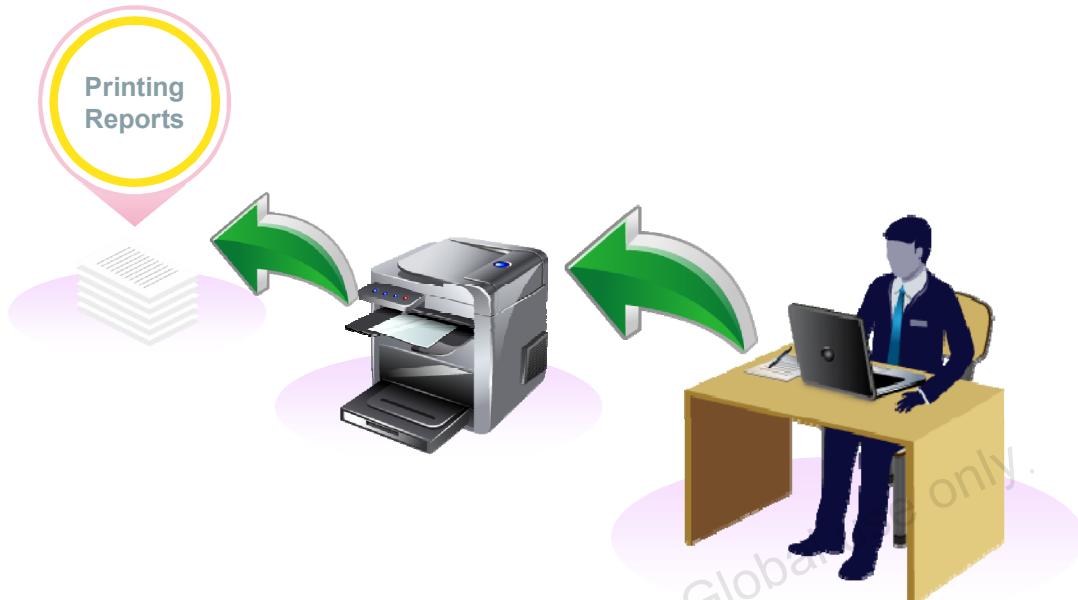
20

# Utilizing Application Express Printing

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## Jack Uses Application Express Printing Features



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Jill invites Jack for a meeting to discuss the PTS application. She is really happy with the application and congratulates Jack for learning APEX so quickly. On discussing about the PTS application in detail, Jill realizes that the application currently lacks the report printing feature.

Jack now starts exploring the print feature available in APEX.

# You Are Here in This Course

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19: Using Dynamic Actions and Plug-Ins

Lesson 20: Utilizing Application Express Printing

Lesson 21: Managing Application Feedback

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This slide shows a graphical representation of the entire course highlighting the lesson which is dealt with in these slides.

## Objectives

After completing this lesson, you should be able to:

- Describe the Application Express printing architecture
- Customize and print a standard report
- Create a customized report



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In this lesson, you examine the various ways to create and print reports by using Oracle Application Express.

## Lesson Agenda

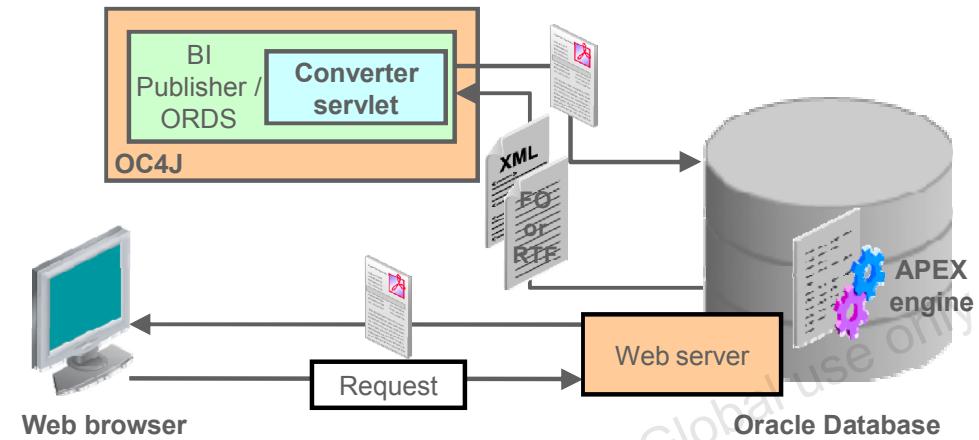
- Understanding Application Express printing architecture
- Customizing and Printing a Standard Report
- Creating a Customized Report



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# Report-Printing Configuration Options

- Standard Support: Inherent reporting within Oracle APEX
- Advanced Support: RTF-based report layouts defined in BI Publisher



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Oracle Application Express provides three report printing configuration options:

- **Oracle REST Data Services:** Select this option if you are using the Oracle REST Data Services (formerly called Application Express Listener) release 2.0 or later. This option enables you to use the basic printing functionality, which includes creating report queries and printing report regions using the default templates provided in Application Express and using your own customized XSL-FO templates.
- **External (Apache FOP):** Select this option if you are using Apache FOP on an external J2EE server. This option enables you to use the basic printing functionality, which includes creating report queries and printing report regions using the default templates provided in Application Express and using your own customized XSL-FO templates.
- **Oracle BI Publisher:** This option requires a valid license of Oracle BI Publisher (also known as Oracle XML Publisher). This option enables you to take report query results and convert them from XML to RTF format using Oracle BI Publisher. Select this option to upload your own customized RTF or XSL-FO templates for printing reports within Application Express.

In the classroom machine, the Oracle Rest Data Services is set up.

# Producing Reports in Oracle Application Express

Oracle APEX enables you to:

- Export reports to PDF, RTF, XLS, and XML formats
- View and print reports that use a prepackaged query and layout
- Create and use customized report queries and layouts

The image shows two reports side-by-side, both titled "Top Tier Salary". The left report has a red box around it, and the right report also has a red box around it. Both reports show a table with columns: Last Name, Email, and Salary. The left report's salary column has an upward arrow icon. The right report's salary column has a downward arrow icon. The data in both tables is identical.

| Last Name | Email    | Salary ↑ |
|-----------|----------|----------|
| Mourgos   | KMOURGOS | 5800     |
| Ernst     | BERNST   | 6000     |
| Fay       | PFAY     | 6000     |
| Kumar     | SKUMAR   | 6100     |
| Banda     | ABANDA   | 6200     |
| Johnson   | CJOHNSON | 6200     |
| Ande      | SANDE    | 6400     |
| Mavris    | SMAVRIS  | 6500     |
| Vollman   | SVOLLMAN | 6500     |

| Last Name | Email    | Salary ↓ |
|-----------|----------|----------|
| Mourgos   | KMOURGOS | 5800     |
| Ernst     | BERNST   | 6000     |
| Fay       | PFAY     | 6000     |
| Kumar     | SKUMAR   | 6100     |
| Banda     | ABANDA   | 6200     |
| Johnson   | CJOHNSON | 6200     |
| Ande      | SANDE    | 6400     |
| Mavris    | SMAVRIS  | 6500     |
| Vollman   | SVOLLMAN | 6500     |
| Lee       | DLEE     | 6800     |
| Popp      | LPOPP    | 6900     |
| Grant     | KGRANT   | 7000     |
| Sewall    | SSEWALL  | 7000     |
| Tuvault   | OTUVault | 7000     |



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You can configure a report region to print by exporting it to several different formats. Oracle BI Publisher supports Adobe Portable Document Format (PDF), Microsoft Word Rich Text Format (RTF), Microsoft Excel format (XLS), and Extensible Markup Language (XML). Oracle Rest Data Services also supports PDF and XML. If you choose to use other third-party rendering engines, other output formats can also be configured.

By taking advantage of region report printing, your application users can view and print reports that have a predefined orientation, page size, column headings, and page header and footer.

To print a report to PDF, the data must be transformed using a report server defined at the instance level. From an end user's perspective, one just clicks a print link. However, from a developer's perspective, you must then declaratively create regions to support PDF printing.

## Lesson Agenda

- Understanding Application Express printing architecture
- Customizing and Printing a Standard Report
- Creating a Customized Report



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## Standard Report, Print Enabled

- In the Rendering pane, select the Attributes node under the Report.
- In the Property Editor, select Yes for Printing Enabled.
- Select the default print format (PDF, Word, Excel, HTML, XML).
- Create the report header and footer.
- Determine the columns to show and format.

```
--<DOCUMENT>
-<DATE>11-JUN-2015</DATE>
-<USER_NAME>APEX</USER_NAME>
-<APP_ID>1</APP_ID>
-<APP_NAME>GlobalMart Management Tool</APP_NAME>
-<PAGE_ID>3</PAGE_ID>
-<TITLE>Top Tier Salary</TITLE>
-<P3_REPORT_SEARCH>
-<P3_OUTPUT_FORMAT>XML</P3_OUTPUT_FORMAT>
-<P3_ROWS>15</P3_ROWS>
-<REGION ID="22344187117741237">
-<ROWSET>
-<ROW>
 <LAST_NAME>Mourgos</LAST_NAME>
 <EMAIL>KMOURGOS</EMAIL>
 <SALARY>5800</SALARY>
-</ROW>
-<ROW>
 <LAST_NAME>Ernst</LAST_NAME>
 <EMAIL>BERNST</EMAIL>
 <SALARY>6000</SALARY>
-</ROW>
-<ROW>
 <LAST_NAME>Fay</LAST_NAME>
 <EMAIL>PFAY</EMAIL>
 <SALARY>6000</SALARY>
-</ROW>
-<ROW>
 <LAST_NAME>Kumar</LAST_NAME>
 <EMAIL>SKUMAR</EMAIL>
 <SALARY>6100</SALARY>
-</ROW>
```



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This type of report is the most basic of all the types and very easy to produce. You can produce this report in different formats (PDF, Word, Excel, HTML, XML) and you can create a header and footer and determine which columns show and their format (color, spacing, and so on) on the report. When the Print Enabled option is set to Yes, a Print link appears at the bottom of your report. When selected, the report is produced in the default format selected.

## Standard Report, with Derived Output

1. Create an item to produce a select list of formats.
2. Select Derived From Output for Output Format and specify the item.
3. Create a button and branch to print.

| Last Name | Email    | Salary |
|-----------|----------|--------|
| Mourgos   | KMOURGOS | 5800   |
| Ernst     | BERNST   | 6000   |
| Fay       | PFAY     | 6000   |
| Kumar     | SKUMAR   | 6100   |
| Banda     | ABANDA   | 6200   |
| Johnson   | CJOHNSON | 6200   |
| Ande      | SANDE    | 6400   |
| Mavris    | SMAVRIS  | 6500   |
| Vollman   | SVOLLMAN | 6500   |
| Lee       | DLEE     | 6800   |
| Popp      | LPOPP    | 6900   |



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This type of report allows the output format to be changed at run time.

To produce this type of report, perform the following steps:

1. Create a select list item to store the valid formats the user can select from.
2. Click the Print Attributes tab for the report region. Select Derived From Output for Output Format and select the item you created for Item.

When the page is run, the user can select the desired format, and then click the Print link at the bottom of the report.

You can also create a button to produce the report based on the output format rather than clicking the Print link at the bottom of the report. When you create the button, select the Download Printable Report Query action so that it creates a branch. Then specify that the report query must execute from the branch when the button is clicked.

## Quiz



With standard report, you can create a header and footer and determine which columns show and their format on the report.

- a.** True
- b.** False

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**Answer: a**

## Practice 20-1 Overview: Printing a Standard Report with Derived Output

This practice covers the following topics:

- Enabling printing of a custom report
- Creating an output format item
- Deriving the printing of the report based on the item

## Lesson Agenda

- Understanding Application Express printing architecture
- Customizing and Printing a Standard Report
- Creating a Customized Report

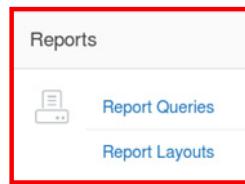


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# Report Queries

## Characteristics:

- SQL statements (one or more) are used to create a report.
- Report queries can be associated with report layouts. If no report layout is specified, a generic layout is used.
- Report queries can be integrated in different parts of your application (such as button, list item, branch, or other components that allow URLs as targets).



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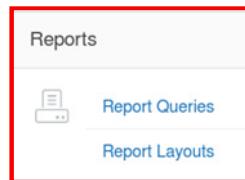
You can print a report region by defining a report query as a shared component. Unlike SQL statements contained in regions, report queries are not validated to ensure that they are formatted correctly and the objects they reference exist. With report queries, the query is used to generate the file that you create to build a template. Note that report queries must be SQL statements, not functions returning SQL statements.

You can associate a report query with a report layout and download it as a formatted document. If no report layout is selected, a generic layout is used. The generic layout is intended to be used to test and verify a report query. When using the generic layout option and multiple source queries are defined, only the first result set is included in the print document. The reports can include the session state of the current application.

To make these reports available to end users, you integrate them with an application. For example, you can associate a report query with a button, list item, branch, or other navigational components that allow you to use URLs as targets. Selecting that item initiates the printing process.

# Report Layouts

- Using report layouts, you can customize the look of the report.
- Options:
  - Default XSL-FO layout
  - Customize default XSL-FO layout
  - RTF or XSL-FO report layouts



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To format either a classic report region or report query, you associate it with a report layout. Using report layouts renders the data in a printer-friendly format. If you do not select a report layout, a default XSL-FO layout is used. The default XSL-FO layout is always used for rendering Interactive Report regions.

When creating and using report layouts, you can:

- Use a default layout for report regions and generic layouts for report queries
- Use the built-in XSL-FO-based layouts for report regions by copying and customizing the code. You can edit a number of attributes for report regions that control page size, fonts, colors, and so on.
- Create RTF or XSL-FO report layouts to customize the look and feel of the report. To use RTF report layouts, your Oracle Application Express service administrator must select the Advanced setting for your site.
- Create a new report layout based on one of these options:
  - **Generic columns:** A generic report layout works with most query result sets. With this layout, the number of columns is automatically adjusted when generating the printable document.

A number of report layout attributes can be defined declaratively for report regions by using the built-in XSL-FO default layout. This step allows for creating customizable copies of the built-in default XSL-FO layout, if additional control over the report layout is needed.

- **Named columns:** A named column report layout is a query-specific report layout designed to work with a defined list of columns in the query result set. This type of layout is used for custom-designed layouts when precise control of the positioning of page items and query columns is required.

Note that the availability of the report layout options depends on how your site administrator configured the report printing settings at your site. All options described in these steps may not be available to you.

# Creating a Report for Download

To create a report for download:

1. Create a report query.
2. Create an RTF template.
3. Create the report layout.
4. Link the report to your application.

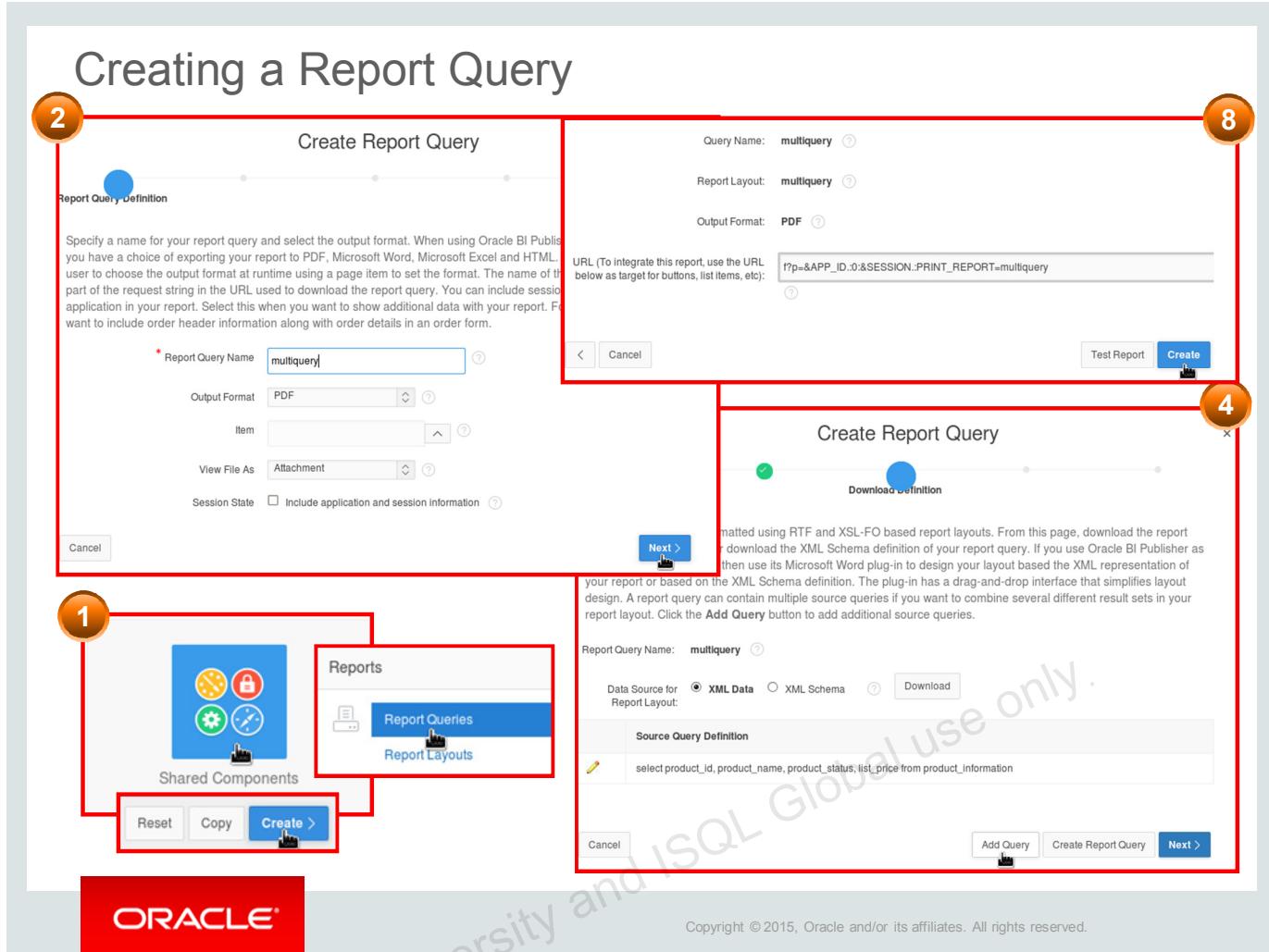
| Product Id | Product Name        | Product Status    | List Price |
|------------|---------------------|-------------------|------------|
| 1797       | Inkjet C/8/HQ       | orderable         | 349        |
| 2459       | LaserPro 1200/8/BW  | under development | 699        |
| 3127       | LaserPro 600/6/BW   | orderable         | 498        |
| 2254       | HD 10GB /I          | obsolete          | 453        |
| 3353       | HD 10GB /R          | obsolete          | 489        |
| 3069       | HD 10GB /S          | obsolete          | 436        |
| 2253       | HD 10GB @5400 /SE   | obsolete          | 399        |
| 3354       | HD 12GB /I          | orderable         | 543        |
| 3072       | HD 12GB /N          | orderable         | 567        |
| 3334       | HD 12GB /R          | orderable         | 612        |
| 3071       | HD 12GB /S          | orderable         | 633        |
| 2255       | HD 12GB @7200 /SE   | orderable         | 775        |
| 1743       | HD 18.2GB @10000 /E | planned           | 800        |



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The report query identifies the data to be extracted from the application. The report layout identifies where and how it should be displayed. To create a customized report, you can create both a report query and a report layout. The steps are as follows:

1. Create a report query.
2. Create an RTF template.
3. Create a report layout.
4. Link the report to your application page.



To create a report query, perform the following steps:

1. From Shared Components for your application, under Reports, select Report Queries. Click Create.
2. Enter a name for your report query and select:
  - The output format this report query requires
  - Whether you want the file to be viewed as an attachment or inline (in the browser)
  - Whether you want to include the session state information
 Click Next.
3. Enter the SQL statement that will be executed when the report is run and click Next.
4. You can add multiple source query definitions. To add a query, click Add Query.
5. If you plan to create a customized report layout, you can download the data source by clicking Download and saving the file that is used to create the RTF template.
6. If you have already created the report layout, click Next. Select the existing report layout and click Next.
7. On the last page, you view the URL that is invoked to run the report. Click Test Report.
8. Click Create.

# Creating the Report Layout

After completing your report layout, you need to save it as an RTF or XSL-FO file. Then upload the file back into Application Express using the **Browse** button on this page. The file is stored as a report layout among the shared components of your application.

Report Layout Source: Create file based report layout

Layout Name: multiquery

Report Layout File: /home/oracle/labs/labs/multiquery.rtf [Browse...](#)

< Cancel Next >

A report query can be downloaded as a PDF document, a Word document (RTF based), an Excel Spreadsheet (HTML based) or as a HTML file. To integrate the document with your application, you can select the report query as the target for buttons or list items or integrate it in other places using the download URL as the target.

Query Name: multiquery

Report Layout: multiquery

Output Format: PDF

URL (To integrate this report, use the URL below as target for buttons, list items, etc): `?p=&APP_ID.0&SESSION.PRINT_REPORT=multiquery`

< Cancel Test Report Create

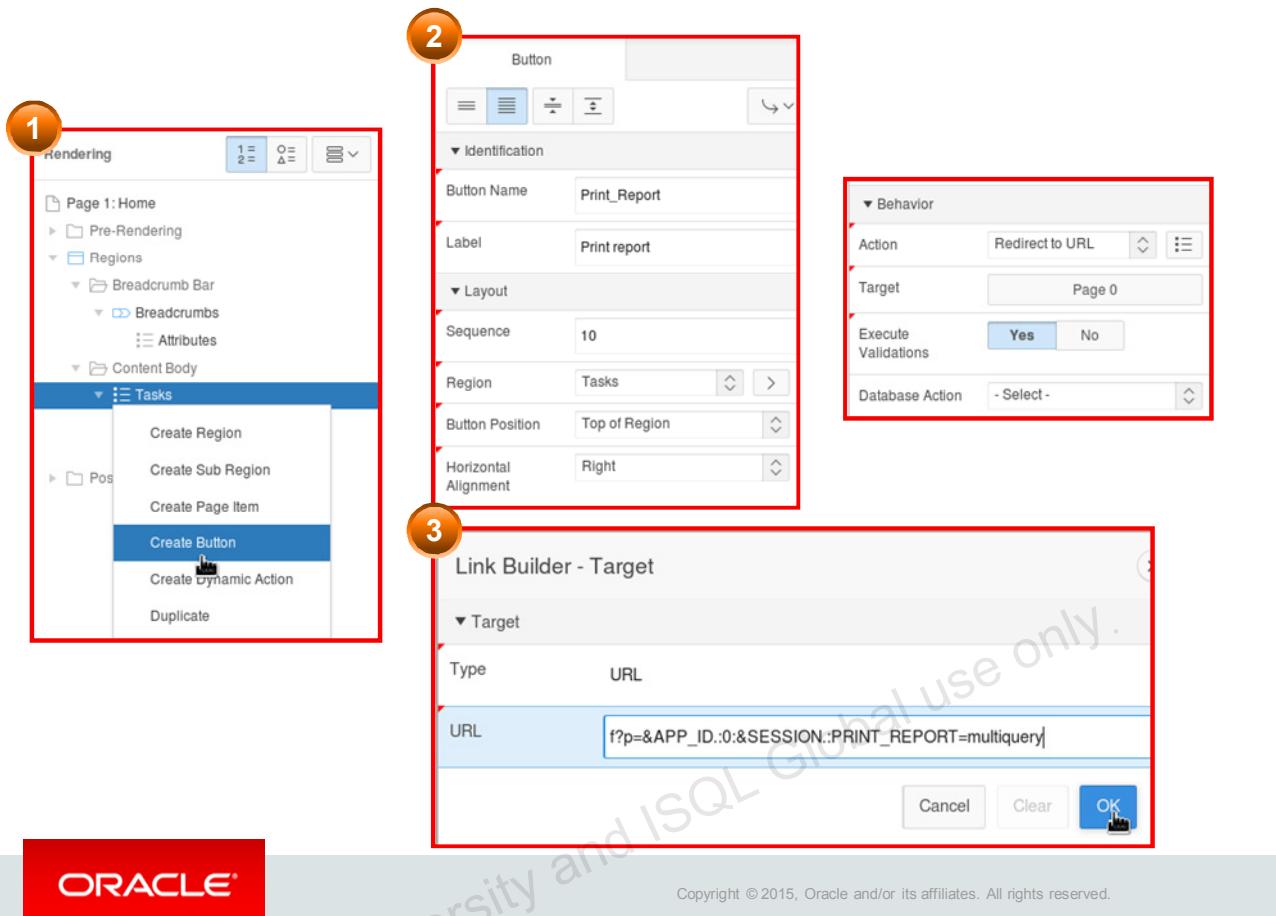


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You can upload the RTF to create your report layout and change the report query to use this layout. Perform the following steps:

1. From Shared Components for your application, under Reports, select Report Layouts.
  2. Click Create.
  3. Select Named Columns (RTF) and click Next.
  4. Enter a name for the report layout, select the RTF file to upload, and click Create Layout.
  5. Select the Shared Components breadcrumb.
  6. Under Reports, select Report Query.
  7. Select the report query that you created in step 1.
  8. For Report Layout, select the report layout you just created and click Apply Changes.
- To test the report, perform the following steps:
1. Select the report query again.
  2. In the Attributes section, click Test Report.

## Linking the Report to Your Application



To create a button to invoke the report query and report layout, perform the following steps:

1. On the Page Definition page, select the region where you want the button and click Create Button.
2. In the Property Editor, enter details of the button.
3. For Action, select Redirect to URL and for Target, enter the Report URL. Save the page.

**Note:** Because the report layout is assigned to the report query, Application Express knows what layout to use.

## Practice 20-2 Overview: Creating a PDF Report with Multiple Queries

This practice covers the following topics:

- Creating a report query that contains two queries
- Creating a report that uses the report query you created
- Invoking the report from a button

## Summary

In this lesson, you should have learned how to:

- Describe the Application Express printing architecture
- Customize and print a standard report
- Create a customized report



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In this lesson, you should have learned how to print a standard report and a report derived from an item, create a report query and report layout, and use print APIs.

# Managing Application Feedback

The Oracle logo, consisting of the word "ORACLE" in white capital letters on a red rectangular background.

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## Introducing Visual Aids for Representing Data



Hello Jack.

Hi Jill, good morning.

I used PTS for a few projects in the last 2 weeks and it's really amazing! Great Job, Jack!!

Thank you, Jill.

The only thing that comes to my mind was that it's good to have a feedback option in PTS so that all its users can share their suggestions or comments. What do you say, Jack?

That's a great thought, Jill. Let me check on this.

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Jack successfully created a holistic project management tool called PTS leveraging all the features provided by Oracle Apex making PTS very user-friendly and an effective tool for project managers. Jill congratulates Jack on this great achievement and asks Jack to add a feedback form into PTS so that all its users can provide their appreciation or comments (if any) directly into PTS. Jack finds this thought really useful and begins working on it.

# Objectives

After completing this lesson, you should be able to:

- Describe what Team Development is
- Manage feedback



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This lesson explains how to use the Team Development component of Oracle Application Express. You learn to track features, milestones, bugs, and to dos. You also learn to manage the feedback received.

# You Are Here in This Course



Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19: Using Dynamic Actions and Plug-Ins

Lesson 20: Utilizing Application Express Printing

Lesson 21: Managing Application Feedback

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In Unit 3, you included navigation in your application with the help of shared components. This unit also explains how to implement page-level authorization to make your application highly secure.

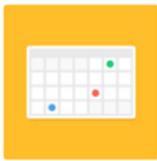
## Lesson Agenda

- Understanding Team Development
  - Creating and Updating Features
  - Creating and Updating Milestones
  - Creating Bugs
  - Creating and Updating To Dos
- Reviewing the Progress of Your Milestones and Features



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# What Is Team Development?



Milestones



Features



To Dos



Bugs



Feedback

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Team Development is a built-in development management tool that enables you to manage the development process by tracking new features, non-feature-related tasks (or to dos), bugs, and milestones. Users can provide real-time feedback, which can then be categorized into to dos, bugs, or features.

The Workspace Administrator will have the privilege to access Team Development by default. When creating a developer or a user, you have an option to set the Team Development module access to Yes or No.

## Tracking the Progress of Your Application Development Project

- Create and update features.
- Create and update milestones.
- Create bugs.
- Create and update to dos.
- Review the progress of your milestones and features (dashboards).



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The slide lists the tasks that you perform to track the progress of your application. The tasks need not be performed in the order in which they are listed in the slide. However, the order used in the slide is the logical flow of when to do the tasks.

# Creating Features

The screenshot shows the Oracle Application Express Features page. At the top left is a small icon of a monitor with a progress bar. Below it is a red box containing the word "Features" and a small factory icon. A handwritten note says "Click the Feature Name to see details." A curved arrow points from this note to the "Features" icon. To the right is a larger dashboard view with several circular badges: one blue badge with "1" labeled "Features Features for Release 0"; another blue badge with "100%" labeled "Features 80% Complete or More"; and a white badge with "0%" labeled "Features Past Due Date". Below these are two more badges: a blue one with "100%" labeled "Features with Due Dates" and a white one with "0%" labeled "Features Past Due Date". On the far right is a "Create Feature" button with a handwritten note "Create Feature button" pointing to it. At the bottom is a report view showing a single row of data:

| Feature                                          | Number | Updated      | Due/Completed | Release | Milestone | Owner | Status Percent | Progress Entries | To Dos | Parent | Copy |
|--------------------------------------------------|--------|--------------|---------------|---------|-----------|-------|----------------|------------------|--------|--------|------|
| Date format needs to be changed on Master Detail | 1      | 29 hours ago | 07/03/2015    | 3.0     |           | bob   | 80             | 0                | 0      |        |      |

A handwritten note "Reset" is next to the "Reset" button in the report header. The bottom right corner of the page has the Oracle logo and the text "Copyright © 2015, Oracle and/or its affiliates. All rights reserved. Application Express 5.0.0.00.31".

Use the Features page to track the features from initial concept through implementation. You can organize features by release, assignee, tags, or associated milestones. Click the Features icon to view the features created. You can see various badges with the count of features based on various categorizations such as:

- Feature Count
- Functionally Complete Features
- Past Due Features
- Features with Due Dates
- Features by Status (Open, Completed)
- Feature Owners
- Without Owners

To show details of the features, click any of the badges displayed. In this view, you see additional information about each feature that you have created and its progress. There are several tabs that you can select for additional information, such as calendar, which will show you a calendar and the date on which the task is due.

To create a feature, click the Create Feature button and fill out the feature details. Then click Create Feature.

# Creating Milestones

The screenshot shows the Oracle Application Express Milesstones module. At the top, there's a 'Milestones' icon with a red border. Below it is the 'Milestones dashboard' showing a calendar view for July and August 2015, with a 'Beta 6.0' milestone listed for July. A large red box highlights the 'Report' tab of the navigation bar. To the right, a 'Create Milestone' form is displayed, also with a red border. The form includes fields for Milestone name (Early Adopter 6.0), Date (08/03/2015), Type (Adopter), Owner (John), Days Out, Features (checkbox), To Dos (checkbox), Bugs (checkbox), Tags (checkbox), and a Description text area. A dropdown menu for Release shows options: '1.0' and '3.0', with '3.0' selected. Handwritten annotations include 'Milestones dashboard' pointing to the dashboard icon, 'Create Milestone form' pointing to the report tab, and arrows indicating the flow from the dashboard to the form and the specific release selection in the form.

Use the Milestones page to manage important milestones. Milestones track events. You can associate milestones with features, bugs, and to dos. In the example in the slide, you see milestones for the phases of the development life cycle: Beta, Early Adopter, and Production. You can track how many features, to dos, and bugs are associated with each milestone. Other tabs provide additional information, such as features by milestone, which displays the features that have been assigned to a milestone. It is a good practice to organize milestones by release.

## Creating Bugs

The screenshot displays two main views of the Oracle Application Express Bugs application. The top view is the 'Bugs' dashboard, which includes a summary of bug counts (1 All Bugs, 1 Open Bugs, 0% Closed Bugs) and a progress bar for assigned bugs (100% assigned to 'john'). The bottom view is the 'Bug' creation form, where a new bug titled 'Form loading with incorrect date' is being created. The form includes fields for Bug Title, Status (Entered), Severity (Moderate Impact), Priority (As soon as possible), Resolution (Assigned To bob), Fix By Release (3.0), and various dates. A red box highlights the 'Create Bug' button at the top right of the dashboard.

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Bugs track software defects. Bugs can be assigned, associated with milestones, and tracked by due date, status, and other attributes. Tabs provide additional information, such as viewing all the bugs assigned to a particular developer or bugs opened and closed on a particular day.

# Creating To Dos

The screenshot shows the Oracle Application Express interface for creating a To Do item. At the top, there is a navigation bar with tabs: Dashboard, Report, Calendar, and Progress Log. Below the navigation bar, there are filters for Show (All To Dos), Release (- All -), Assignee (- All -), and Application (- All -). A progress log section displays developer percent complete for assignee 'bob' (1 Open, 0 Closed, Count 1, % Complete 0, Updated 43 hours ago). The main area is divided into two sections: 'To Dos Report' and 'Create To Do Form'. The 'To Dos Report' section shows a table with one row: 'Add label help text on projects page' assigned to 'bob'. The 'Create To Do Form' section shows a detailed form with fields: To Do Action (Review the label help text for all pages), Assigned To (larry), Contributor (peter), Parent To Do (Add label help text on projects page), Status (Work Progressing - 10%), Start Date (06/03/2015), Due Date (06/12/2015), Date Completed (blank), Category (Documentation), and Release (- Select Release -). Handwritten annotations include 'To Dos Report' pointing to the report table and 'Create To Do Form' pointing to the detailed form.

To dos are action items that can be assigned, prioritized, tagged, and tracked. To dos can also have related parent tasks. To dos may or may not be associated with a feature or milestone. Tabs provide you additional information, such as a view of a to do progress log.

Clicking a assignee name will give a report of all the To Dos assigned to him/her. To view the “to dos” assigned to yourself, you can click the My To Dos button on the report.

## Quiz



Which Team Development component would you create to add feedback to application?

- a. Feature
- b. To do
- c. Milestone
- d. Bug

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**Answer: b**

## Quiz



Which Team Development component would you create to allow an employee to enter status report information?

- a. Feature
- b. To do
- c. Milestone
- d. Bug

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**Answer: a**

## Quiz



Which Team Development component would you create to correct the packing list report error when using IE?

- a. Feature
- b. To do
- c. Milestone
- d. Bug

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**Answer: d**

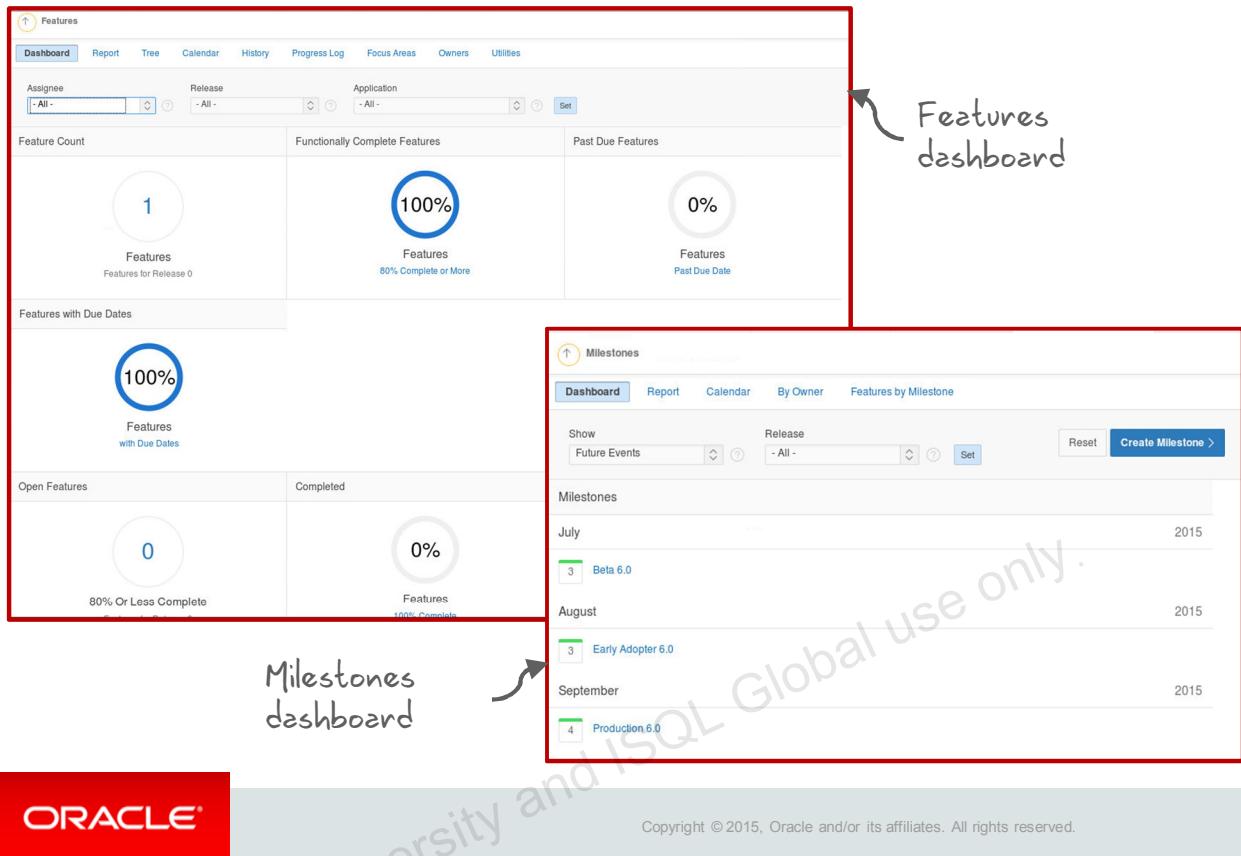
## Lesson Agenda

- Understanding Team Development
- Reviewing the Progress of Your Milestones and Features



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# Review the Progress of Your Milestones and Features



There is a dashboard for every Team Development component. In the example in the slide, the milestone dashboard and features dashboard are displayed. Milestones dashboard provides useful information, such as a summary of the upcoming milestones and the number of days that are left before the due date. Features dashboard provides information of all the features categorized under various badges such as feature count, functional completeness, past due features, open features, completed features, and features by owners.

## Enabling Feedback for an Application

1. Enable feedback in application properties.
2. Create a feedback page.
3. Submit feedback.
4. Access the submitted feedback in Team Development.



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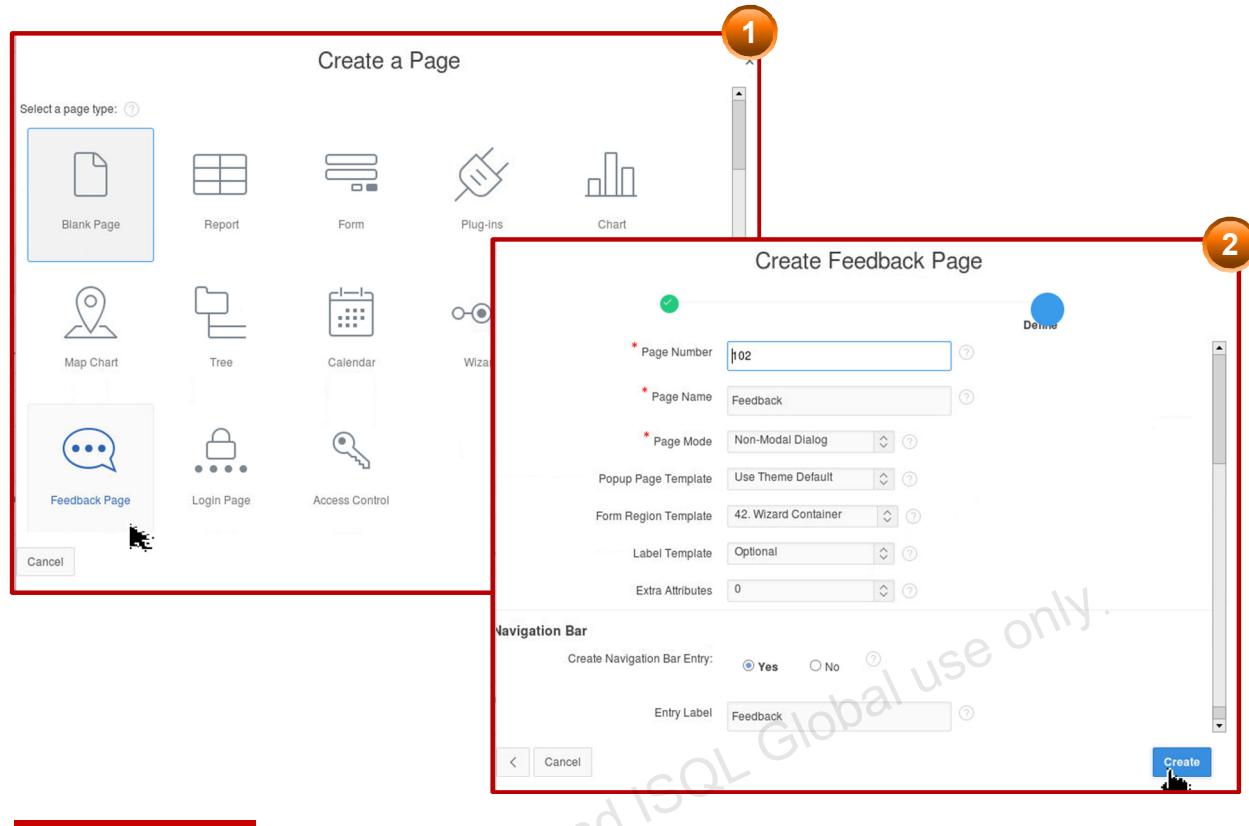
Feedback is the process of gathering real-time comments, enhancement requests, and bugs from your application users. To add a feedback page to an application, you perform the steps listed in the slide. Details about these steps are provided in the following slides.

## Step 1: Enabling Feedback in Application Properties

The screenshot shows the Oracle Application Express interface. At the top, there are tabs for Application Express, Application Builder, SQL Workshop, Team Development, and Packaged Apps. Below the tabs, the application name "Application 2 - PROJECT TRACKING SYSTEM" is displayed. On the right side of the header, there are several icons and a link labeled "Edit Application Properties". The main content area shows five icons: "Run Application", "Supporting Objects", "Shared Components", "Utilities", and "Export / Import". A red box highlights the "Edit Application Properties" link. Below this, a modal window titled "Properties" is open, showing configuration options. The "Allow Feedback" dropdown is set to "Yes", with a handwritten note "Set to Yes" and an arrow pointing to it. Other options include "Logging" (Yes), "Debugging" (No), "Compatibility Mode" (Yes), "Application Email From Address" (empty), and "Proxy Server" (empty). The Oracle logo is at the bottom left, and copyright information is at the bottom right.

The first step to enable feedback in your application is to set the Allow Feedback option in Application Properties to Yes.

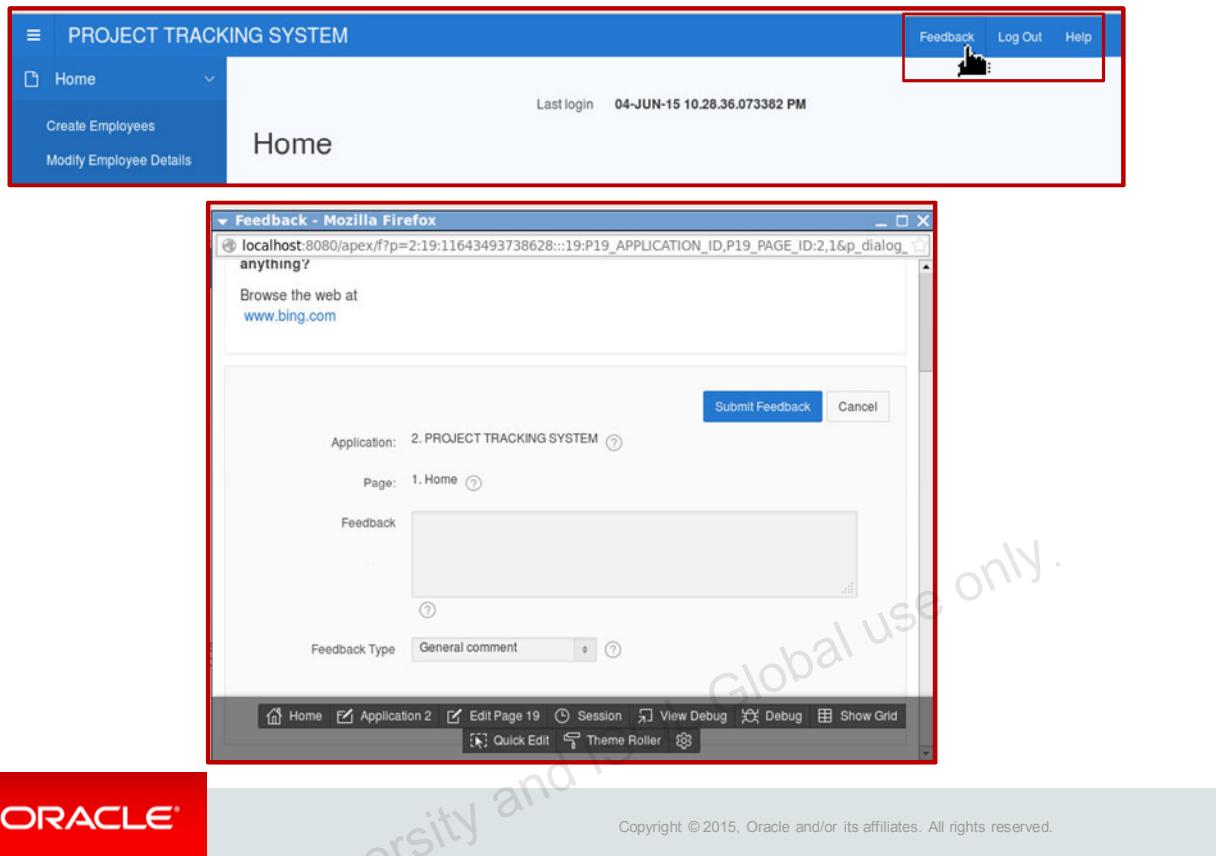
## Step 2: Creating a Feedback Page



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The next step is to create a feedback page that will be displayed when a user clicks the Feedback link in your navigation bar. The Extra Attributes setting allows you to define additional items to be displayed and then captured, giving you the ability to ask the user other questions (such as category of feedback, severity of issue faced, and so on). Make sure that Create Navigation Bar Entry is set to Yes.

## Step 3: Submitting Feedback



Click the Feedback link in your navigation bar to view the feedback page. Enter your feedback in the Feedback text area and click Submit Feedback.

## Step 4: Accessing Submitted Feedback in Team Development

The screenshot shows the Oracle Team Development interface. At the top, there are five icons: Milestones (calendar), Features (gauge), To Dos (checklist), Bugs (bug), and Feedback (speech bubbles). Below these are navigation tabs: Dashboard (selected), Report, Calendar, and By Filing User. The main area is the 'Feedback' dashboard, which includes a progress bar for 'Open Feedback' at 0%, a count of 1 user, and 3 feedback entries. It also displays breakdowns by status (No status, Acknowledged, Additional information requested, Open, processing feedback, Closed) and application (PROJECT TRACKING SYSTEM, mgr1). A red box highlights the 'Feedback' section, and a callout arrow points to it from the text 'Feedback dashboard'.

Feedback dashboard

Dashboard Report Calendar By Filing User

Open Feedback 0% Feedback Users 1 Users

Feedback Entries 3

By Status

| Status                           | Count |
|----------------------------------|-------|
| No status                        | 0     |
| Acknowledged                     | 0     |
| Additional information requested | 0     |
| Open, processing feedback        | 0     |
| Closed                           | 3     |

By Application

| Application             | Count |
|-------------------------|-------|
| PROJECT TRACKING SYSTEM | 3     |
| mgr1                    | 3     |

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When your feedback has been submitted, you access it by using Team Development. Select Feedback and you see the feedback listed. You can edit the feedback and change the type to a bug, to do, or feature, and assign it to someone.

## Quiz



Feedback is enabled for an application automatically.

- a. True
- b. False

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**Answer: b**

## Summary

In this lesson, you should have learned how to:

- Track Team Development components
- Add feedback capabilities to your application



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In this lesson, you learned how to track Team Development components.

# Practice 21 Overview: Adding and Monitoring Feedback in Your Application

This practice covers the following topics:

- Creating a Feedback form
- Reviewing and editing the feedback

# IV

## Unit IV: Enhancing Your Web Application

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# Unit IV Road Map

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19: Using Dynamic Actions and Plug-Ins

Lesson 20: Utilizing Application Express Printing

Lesson 21: Managing Application Feedback



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In Unit 4, you completed six topics.

V

# Unit V: Oracle Cloud

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# Oracle Application Express on Oracle Cloud

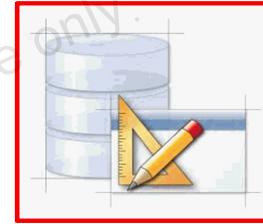
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# Objectives

After completing this lesson, you should be able to:

- Using Oracle Application Express from Oracle Exadata Express Cloud Service
  - Salient features of Oracle Cloud
  - Various offerings of Oracle Cloud for Data Management
  - Features of Oracle Database Exadata Express Cloud Service
  - Oracle Application Express from Oracle Exadata Express Cloud Service



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This lesson introduces you to Oracle Cloud, and how to access Oracle Application Express from Oracle Exadata Express Cloud Service.

## Introduction to Oracle Cloud

- Any business can now use the enterprise cloud provided by Oracle.
- You can access the Oracle Cloud from [cloud.oracle.com](http://cloud.oracle.com).



The Oracle Cloud is an enterprise cloud for business. Oracle Cloud services are built on Oracle Exalogic Elastic Cloud and Oracle Exadata Database Machine, together offering a platform that delivers extreme performance and scalability.

The top two benefits of cloud computing are speed and cost.

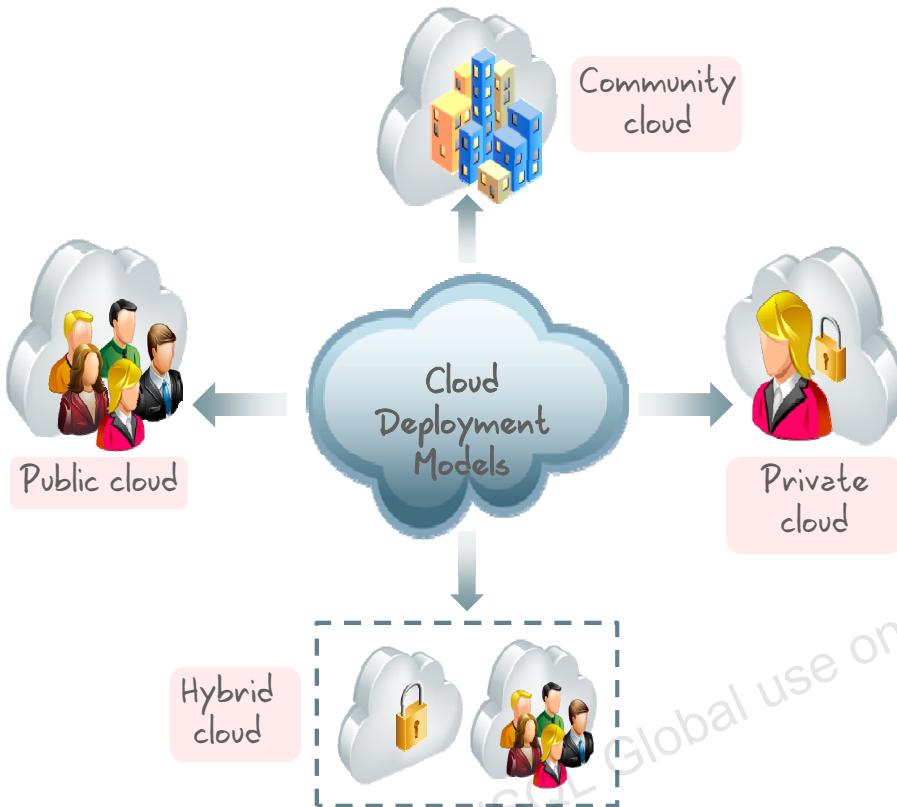
As a result, the applications and databases deployed in the Oracle Cloud are portable and you can easily move them to or from a private cloud or on-premise environment.

- You can request and get the cloud services provisioned through a self-service interface.
- You can either use an integrated development and deployment platform to rapidly extend and create new services.

Using Oracle Cloud services, you can benefit from the following five essential characteristics:

- **On-demand self-service:** You can provision, monitor, and manage cloud on your own.
- **Resource pooling:** You can share resources and maintain a level of abstraction between consumers and services.
- **Rapid elasticity:** You can quickly scale up or down as needed.
- **Measured service:** You pay for what you use with either internal chargeback (private cloud) or external billing (public cloud).
- **Broad network access:** You can access the cloud services through a browser on any networked device.

# Cloud Deployment Models



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- **Private cloud:** A single organization uses a private cloud, which it typically controls, manages, and hosts in private data centers. However, the organization can also outsource hosting and operation to a third-party service provider. Amazon's Virtual Private Cloud is an example of a private cloud in an external provider setting.
- **Public cloud:** Multiple organizations (tenants) use a private cloud on a shared basis. This private cloud is hosted and managed by a third-party service provider. For example: Amazon's Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, and Google AppEngine
- **Community cloud:** A group of related organizations, who want to make use of a common cloud computing environment, uses the community cloud. It is managed by the participating organizations or by a third-party managed service provider. It is hosted internally or externally. For example, a community might consist of the different branches of the military, all the universities in a given region, or all the suppliers to a large manufacturer.
- **Hybrid cloud:** A single organization that wants to adopt both private and public clouds for a single application uses the hybrid cloud. A third model, the hybrid cloud, is maintained by both internal and external providers. For example, an organization might use a public cloud service, such as Amazon Simple Storage Service (Amazon S3), for archived data but continue to maintain in-house (private cloud) storage for operational customer data.

# Oracle Cloud Services

Oracle Cloud provides three types of services:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)



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**SaaS** generally refers to applications that are delivered to end users over the Internet. Oracle CRM On Demand is an example of a SaaS offering that provides both multitenant as well as single-tenant options, depending on the customer's preferences.

**PaaS** generally refers to an application development and deployment platform that is delivered as a service to developers, enabling them to quickly build and deploy a SaaS application to end users. The platform typically includes databases, middleware, and development tools, all delivered as a service via the Internet.

**IaaS** refers to computing hardware (servers, storage, and network) delivered as a service. This service typically includes the associated software as well as operating systems, virtualization, clustering, and so on. Examples of IaaS in the public cloud include Amazon's Elastic Compute Cloud (EC2) and Simple Storage Service (S3).

The Oracle Cloud Database is built as a PaaS model. It provides on-demand access to database services in a self-service, scalable, and metered manner. You can deploy a database within a virtual machine in an IaaS platform.

You can rapidly deploy Oracle Cloud Database on Oracle Exadata, which is a pre-integrated and optimized hardware platform that supports both online transaction processing (OLTP) and Data Warehouse workloads.

# Oracle Cloud Services for Data Management

## Oracle Database Cloud Service

- Provides you the ability to create full, running deployments of Oracle Database quickly and easily.

## Oracle Database Backup Cloud Service

- Provides you the ability to store Oracle Database backups in the cloud.

## Oracle Database Cloud - Database Schema Service

- Provides a multi-tenant cloud environment for using the Oracle Database.

## Oracle Exadata Cloud Service

- Provides full Oracle Databases hosted on Oracle Exadata Database Machine inside the Oracle Cloud.

## Oracle Database Exadata Express Cloud Service

- Provides Oracle Database 12c Release 2 Enterprise Edition, running on Oracle Exadata engineered systems.

## Oracle MySQL Cloud Service

- Provides MySQL in the Cloud.

## Oracle Big Data Cloud Service

- Provides Hadoop clusters in the cloud.

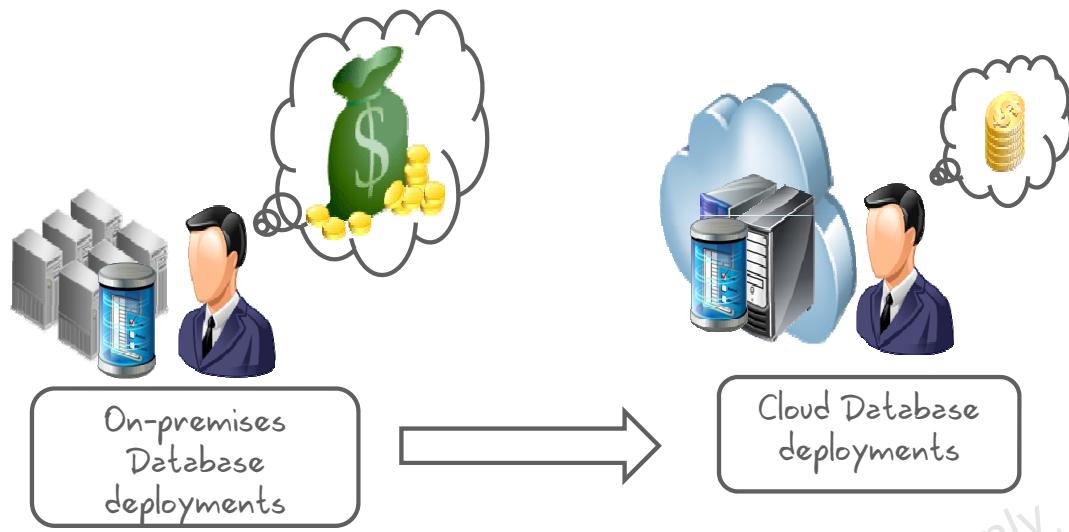


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Oracle Cloud provides several Oracle Cloud service deployment choices for Data Management as PaaS (Platform as a Service) offerings. They provide many options as single schemas, dedicated pluggable databases, virtualized databases, databases running on world class engineered infrastructure like Exadata.

The information shown on the slide gives a complete list of Oracle Database Cloud Service offerings. This information might change in the course of time, as and when Oracle Cloud introduces many more new offerings.

## Evolving from On-premises to Exadata Express Cloud Service



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Cloud deployments provide end users and enterprises with different capabilities to store and process data. They enable users to have high performance and huge computing resources at a lower price as compared to traditional on-premises deployments.

Exadata Express is a powerful database machine, extended as a cloud service. End users can use it for Oracle 12c database deployments. It delivers a complete database experience for developers and enterprises.

Exadata Express being a cloud deployment provides high scalability, performance and availability to its users.

It is fully managed database, therefore you need not worry about patching, upgrading or other DBA tasks.

## What is in Exadata Express Cloud Service?

- A fully managed database service
- Provides powerful yet elastic database cloud service for developers
- Provides on-demand access to a shared pool of database resources
- Comes with built-in tools for rapid application development
  - Oracle Application Express for web application development
  - Compatibility with external clients such as SQL Developer, SQLcl



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Exadata Express is a fully managed database service where end users need not worry about upgrades to the database and other components of the service. All enhancements are automatically managed by the cloud service.

Being a cloud deployment, Exadata Express, allows end users to scale their data virtually to unlimited size.

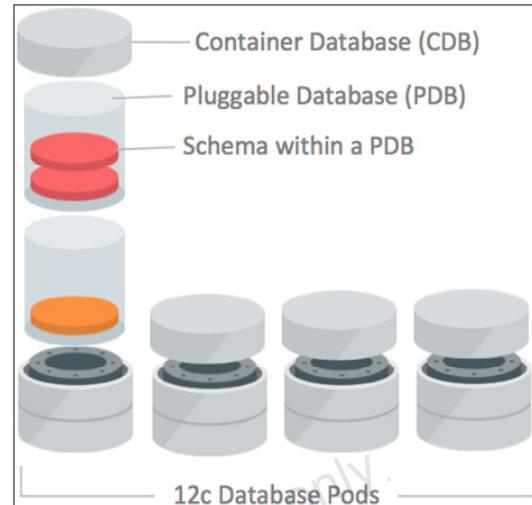
Dynamic provisioning of resources allows users to access huge amount of compute and storage resources in no time.

For developers, it provides built-in application development tool – Oracle Application Express, which is a rapid web application development tool for Oracle database. Developers with minimal development experience can develop and deploy professional applications through web browser using Oracle APEX.

Oracle makes a variety of database client drivers and tools available for use with Oracle Database Exadata Express Cloud Service. You can use Exadata Express with Oracle SQL Developer, an IDE used for SQL, PL/SQL development and Oracle SQLcl, an enhanced command line interface.

# Exadata Express Cloud Service for Users

- Oracle manages the service as multiple Container databases(CDBs), also known as database pods
- Each CDB can accommodate up to 1000 Pluggable databases(PDBs).
- Each user is provisioned with a PDB on subscribing to the service, where the user can create several schemas.



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# Exadata Express Cloud Service for Developers

- Developers can connect with a wide range of data sources for their applications
    - JSON Document Storage
    - Document Style data access
    - Oracle Rest Data Services



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- **JSON Document Storage:** Oracle Database in Exadata Express provides direct storage, access and management of JSON documents. See JSON Support in Oracle Database New Features Guide 12c Release 2 (12.2).
  - **Document-Style Data Access:** Oracle Database in Exadata Express gives you the ability to store and access data as schema-less documents and collections using the Simple Oracle Document Access (SODA) API. See Working with JSON and Other Data Using SODA in Using Oracle Database Exadata Express Cloud Service.
  - **Oracle REST Data Services 3:** Exadata Express includes the newest Oracle REST Data Services (ORDS). With ORDS 3, it's easy to develop modern RESTful interfaces for relational data and now JSON documents stored in Oracle Database.

# Getting Started with Exadata Express Cloud Service

1. Purchase a subscription.
2. Activate and verify the service.
3. Verify activation.
4. Learn about users and roles.
5. Create accounts for your users and assign them appropriate privileges and roles.
6. Set the password for the database user authorized to perform administrative tasks for your service (PDB\_ADMIN).

Note: You can refer to [Using Oracle Database Exadata Express Cloud Service](#) for details on the subscription process.

Demonstration [link](#).



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The steps in the slide provide you a brief overview of how to get started with Exadata Express. In the following slides, you will learn to perform these steps.

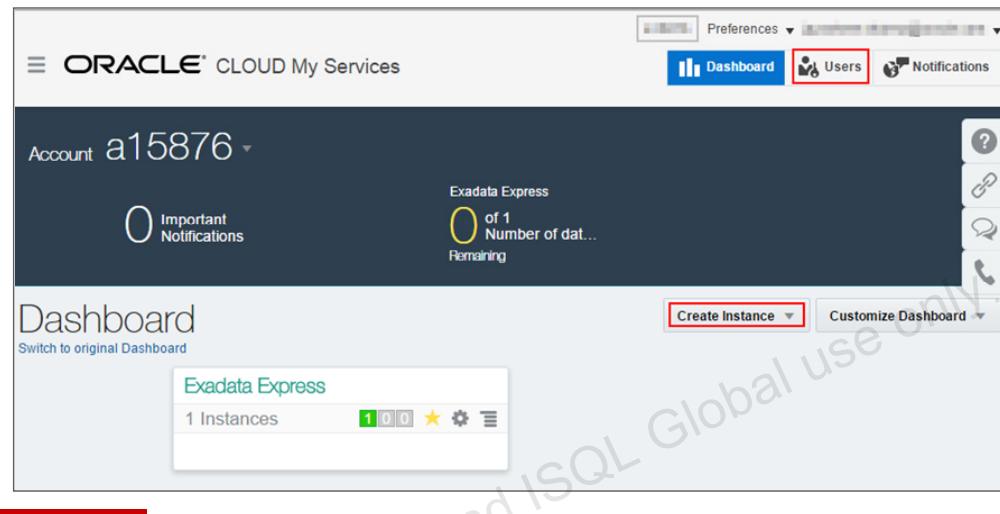
You can view the demonstration of these steps, along with a tour of Exadata Express Cloud Service by opening this link:

<http://oukc.oracle.com/public/redir.html?type=player&offid=1984113094>

**Note:** This link is accessible from within the classroom with audio disabled. If you wish to view this video along with the audio, you can request the instructor to play it for you.

# Getting Started with Exadata Express Cloud Service

- On signing into the service, you get access to the dashboard.
- Dashboard allows you to create database instances and users.
- The number of instances you create is limited by the amount of resources you have access to.



After successful subscription to the service, you can log in to your account and access the dashboard. Based on the type of subscription you can create instances.

The instances would appear on the dashboard. In the image on the slide, you can see an instance created in the image . To manage the instance, click on the instance.

# Managing Exadata Express Cloud Service

The screenshot shows the Oracle Cloud Service Instances dashboard. On the left, there's a list of service instances. One instance, named 'exa4', is selected. A red box highlights the 'Open Service Console' button, which has a downward arrow pointing to the service console interface. The service console interface is titled 'Service Console: exa4' and contains several sections: 'Web Access', 'Client Access', and 'Administration'. Each section has associated icons, descriptions, and 'Learn More' or 'Watch Video' links.

**Service Instances**

**exa4**

Service Type: Exadata Express  
Instance Id: 500033811  
Status: Active  
Size: BASIC  
Service SFTP User Name: us148271  
Service SFTP Host & Port: den00rc.us.oracle.com

Administrator: dbcloud-alm\_ww@oracle.com  
Requested By: dbcloud-alm\_ww@oracle.com  
Service Instance URL: <http://exa4-a1587...>

**Open Service Console**

**Service Console: exa4**

| Category       | Action                                      | Description                                                                                      |
|----------------|---------------------------------------------|--------------------------------------------------------------------------------------------------|
| Web Access     | <a href="#">Go to SQL Workshop</a>          | Run SQL commands, execute SQL scripts and browse database objects                                |
|                | <a href="#">Define REST Data Services</a>   | Create and manage RESTful web service interfaces to your database                                |
| Client Access  | <a href="#">Install Productivity Apps</a>   | Browse and install productivity apps                                                             |
|                | <a href="#">Download Client Credentials</a> | Download a zip file containing your security credentials and network configuration files         |
| Administration | <a href="#">Disable Client Access</a>       | Disable SQL*Net access and invalidate all existing client credential files                       |
|                | <a href="#">Create Database Schema</a>      | Create a new schema for database objects                                                         |
|                | <a href="#">Set Administrator Password</a>  | Set or reset your database's privileged user (FQDB_ADMIN) account password                       |
|                | <a href="#">Download Drivers</a>            | Get database drivers for Java, .NET, Node.js, Python, PHP, Ruby, C, C++, Instant Client and more |
|                | <a href="#">Download Tools</a>              | Get SQL*Plus command-line and developer tools including SQL Developer and JDeveloper             |
|                | <a href="#">Create Document Store</a>       | Enable or disable a schema-less document-style interface, with JSON storage and access           |
|                | <a href="#">Manage Application Express</a>  | Use Application Express (APEX) administrative options                                            |

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On clicking the instance on the dashboard, you see various details about the dashboard. You can access the services by clicking on 'Open Service Console'.

The service console provides you access to tools for Web Access, Client Access and Administration.

# Service Console

- Service Console is the interface to use and manage the Exadata Express Cloud Service
- It provides three different perspectives of the instance
  - Web Access
  - Client Access
  - Administration

The screenshot shows the Service Console interface for an instance named 'exa4'. It is divided into three main sections:

- Web Access:** Develop database and web apps using Oracle Application Express (APEX). Includes links to 'Learn More' and 'Watch Video'.
- Client Access:** Enable database client access, then connect using drivers and tools. Includes links to 'Learn More' and 'Watch Video'.
- Administration:** Manage your cloud database. Includes links to 'Learn More' and 'Watch Video'.

Each section also contains additional links and descriptions for specific tasks like 'Go to SQL Workshop', 'Define REST Data Services', 'Download Client Credentials', etc.

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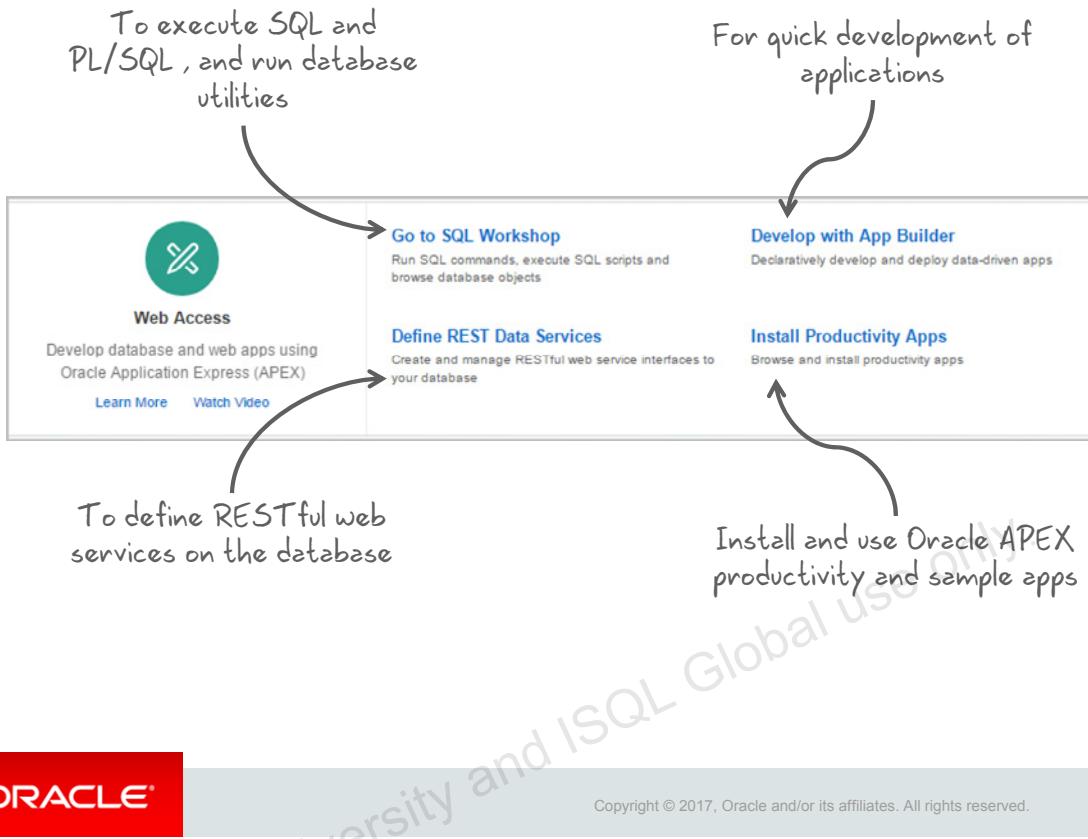
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Web access provides utilities which enable you to develop database and web applications using Oracle Application Express(APEX).

Database clients can connect to Exadata Express Cloud Service using SQL \*Net Access. Some examples of supported database clients are SQLcl, SQL Developer, SQL \*Plus, JDBC Thin client, ODP.NET, OCI and Instant Client. Client Access in the Service Console allows you to access the database on Exadata Express Cloud Service, from the client you choose.

Administration section in the Service Console provides you options for performing administration tasks such as create new database schemas for database objects, set or reset administration password, create a schema-less documents and collections interface, and use administrative options to manage Oracle Application Express.

# Web Access through Service Console



| Option                    | Description                                                                                                                                                                                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Go to SQL Workshop        | Allows you to go directly to browser-based SQL Workshop, where you can run SQL statements, execute scripts and explore database objects.                                                                                                                                          |
| Develop with App Builder  | Quickly, declaratively develop database and websheet applications. You can import files such as database applications and plug-ins. There is a dashboard showing metrics about your applications and workspace utilities to manage defaults, themes, metadata, exports, and more. |
| Define REST Data Services | Directly access the page to define and manage RESTful web services that enable third-party developers to view and manipulate data objects within your database.                                                                                                                   |
| Install Productivity Apps | Install productivity apps or sample apps from a gallery of pre-built Oracle Application Express apps.                                                                                                                                                                             |

# Client Access Configuration through Service Console

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**Client Access**

Enable database client access, then connect using drivers and tools

[Learn More](#) [Watch Video](#)

**Enable Client Access**

Enable client SQL\*Net access to your database. You must first enable before seeing other options

**Client Access**

Enable database client access, then connect using drivers and tools

[Learn More](#) [Watch Video](#)

**Download Client Credentials**

Download a zip file containing your security credentials and network configuration files

**Disable Client Access**

Disable SQL\*Net access and invalidate all existing client credential files

**Download Drivers**

Get database drivers for Java, .NET, Node.js, Python, PHP, Ruby, C, C++, Instant Client and more

**Download Tools**

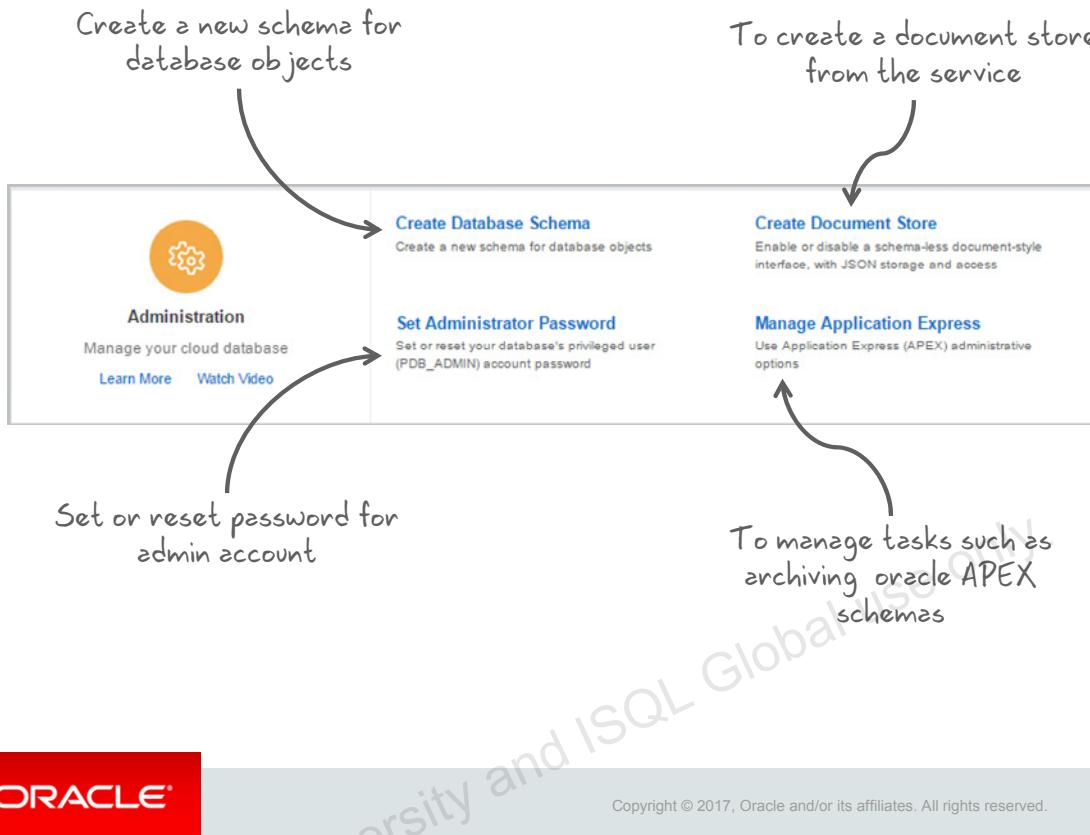
Get SQL\*Plus command-line and developer tools including SQL Developer and JDeveloper



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| Option                      | Description                                                                                                                                                                                                                   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Download Client Credentials | Download client credentials needed for clients to access your service.                                                                                                                                                        |
| Download Drivers            | Go directly to the Oracle Technology Network page to download and install database drivers including for Java, Instant Client, C, C++, Microsoft .NET, Node.js, Python, PHP, Ruby, and more.                                  |
| Disable Client Access       | Use this option to disallow SQL*Net access to your service. This option is only available when client access has been enabled.                                                                                                |
| Download tools              | Go directly to the Oracle Technology Network page to download and install tools such as SQL*Plus, SQLcl, command-line and integrated development environments such as Oracle SQL Developer, JDeveloper, Oracle JET, and more. |

# Database Administration through Service Console



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| Option                     | Description                                                                                                                                                                                                                                                                                                        |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Create Database Schema     | Create a new schema for database objects. Schema is the set of database objects, such as tables and views that belong to that user account.                                                                                                                                                                        |
| Create Document Store      | This option enables you to create a document store, using either an existing schema or new schema, and to enable SODA for REST, which enables REST-based operations on the schema using Oracle's SODA for REST API. It also enables SODA for Java, which is Oracle's SODA for Java API for use with Java programs. |
| Set Administrator Password | Use this option to set the password for the PDB_ADMIN database user that is authorized to perform administrative tasks.                                                                                                                                                                                            |
| Manage Application Express | Options here allow you to enable application archiving to archive your Oracle Application Express applications to database tables, manage the association between schemas and Oracle Application Express, and manage messages and set preferences for the workspace.                                               |

## Develop with App Builder

1

Web Access  
Develop database and web apps using Oracle Application Express (APEX)  
[Learn More](#) [Watch Video](#)

Go to SQL Workshop  
Run SQL commands, execute SQL scripts and browse database objects

Define REST Data Services  
Create and manage RESTful web service interfaces to your database

Develop with App Builder  
Declaratively develop and deploy data-driven apps

Install Productivity Apps  
Browse and install productivity apps

2

ORACLE Application Express Application Builder SQL Workshop Team Development Packaged Apps

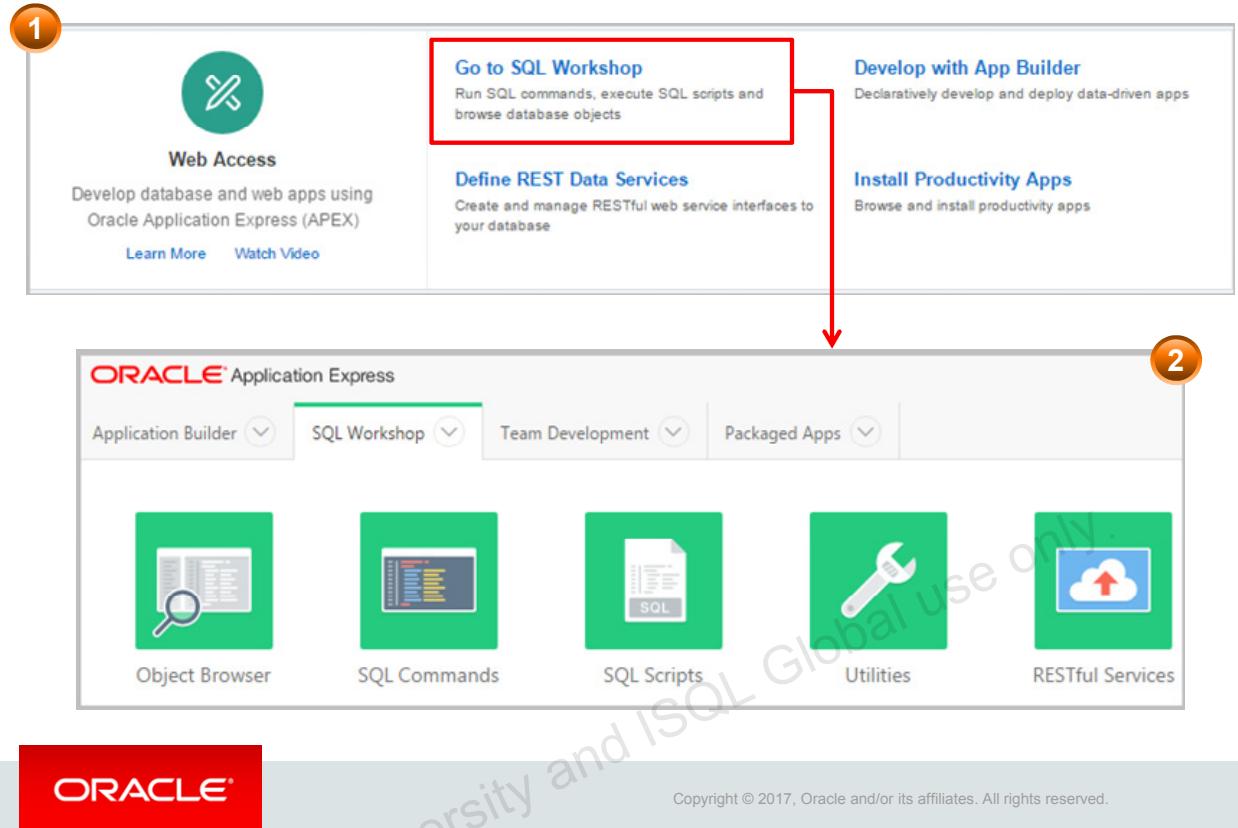
Create Import Dashboard Workspace Utilities

Sample Database Application 61400200000

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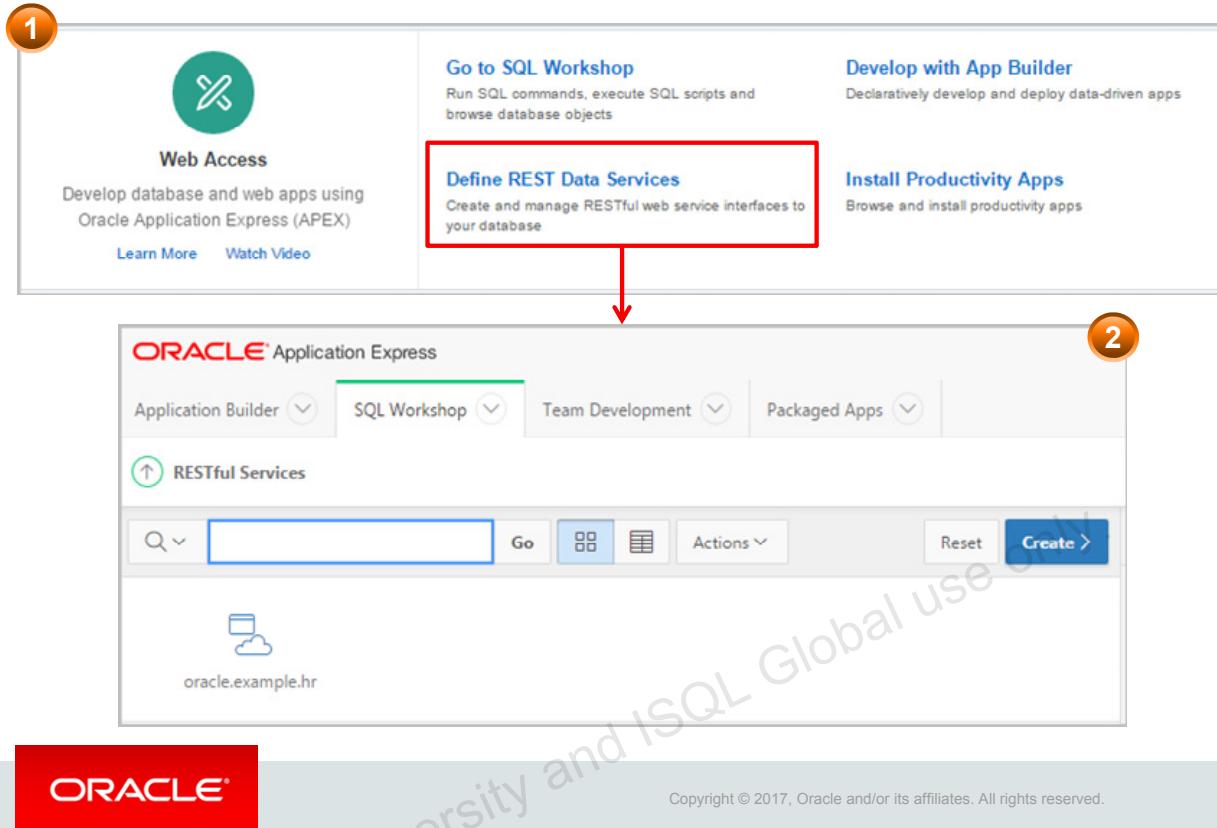
From the Oracle Exadata Express service console, clicking **Develop with App Builder** in the Web Access section, launches the Application Builder component of Oracle Application Express. This component provides you with options and tools to create, develop, and manage web applications.

# Go to SQL Workshop



From the Oracle Exadata Express service console, clicking **Go to SQL Workshop** in the Web Access section, launches the Application Builder component of Oracle Application Express. This component provides you with options and tools to execute SQL commands, SQL and PL/SQL scripts, load and unload data, and other database utilities.

# Define REST Data Services



From the Oracle Exadata Express service console, clicking **Define REST Data Services** in the Web Access section, launches the RESTful Services page in Oracle Application Express. You can create RESTful web services from this console with the help of organized wizards.

# Install Productivity Apps

The screenshot shows two parts of the Oracle Exadata Express service console. Part 1 (top) shows the main dashboard with sections for Web Access, Go to SQL Workshop, Define REST Data Services, and Develop with App Builder. A red box highlights the 'Install Productivity Apps' link under the Develop with App Builder section. Part 2 (bottom) shows the Oracle Application Express App Gallery. A red arrow points from the highlighted link in Part 1 to the 'Productivity Apps' tab in Part 2. The App Gallery displays various productivity and sample apps, each with a thumbnail, name, and brief description. The Oracle logo is at the bottom left, and copyright information is at the bottom right.

1

Web Access

Develop database and web apps using Oracle Application Express (APEX)

Learn More Watch Video

Go to SQL Workshop

Run SQL commands, execute SQL scripts and browse database objects

Define REST Data Services

Create and manage RESTful web service interfaces to your database

Develop with App Builder

Declaratively develop and deploy data-driven apps

Install Productivity Apps

Browse and install productivity apps

2

ORACLE Application Express

Application Builder SQL Workshop Team Development Packaged Apps

App Gallery

Search Productivity Apps Sample Apps

| Icon                          | Name                          | Description                             |
|-------------------------------|-------------------------------|-----------------------------------------|
| APEX Application Archive      | APEX Application Archive      | Software Development                    |
| Checklist Manager             | Checklist Manager             | Tracking, Team Productivity             |
| Data Reporter                 | Data Reporter                 | Knowledge Management, Tracking, Project |
| Feedback                      | Feedback                      | Software Development                    |
| Application Standards Tracker | Application Standards Tracker | Tracking, Knowledge Management          |
| Community Requests            | Community Requests            | Software Development, Community         |
| Decision Manager              | Decision Manager              | Team Productivity, Tracking             |
| Go Live Checklist             | Go Live Checklist             | Project Management                      |
| Bug Tracking                  | Bug Tracking                  | Software Development, Tracking          |
| Customer Tracker              | Customer Tracker              | Tracking, Marketing                     |
| Expertise Tracker             | Expertise Tracker             | Tracking, Knowledge Management          |
| Group Calendar                | Group Calendar                | Team Productivity                       |

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From the Oracle Exadata Express service console, clicking **Install Productivity Apps** in the Web Access section, launches the App Gallery where you can view the various productivity and sample apps provided by Oracle Application Express which are ready to be installed and used.

## Additional Resources

For additional information about Oracle Cloud, refer to the following:

- Oracle Cloud portal:
  - <https://cloud.oracle.com/>
- Cloud documentation on Oracle Help Center:
  - <https://docs.oracle.com/>
- Oracle Exadata Express Cloud Service Using Guide on Oracle Help Center:
  - <http://docs.oracle.com/cloud/latest/exadataexpress-cloud/CSDBP/>



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## Summary

In this lesson, you should have learned how to:

- Access Oracle Application Express from Oracle Exadata Express Cloud Service.



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A

# Additional Resources

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## Additional Resources

- APEX home page on OTN
- Documentation and Tutorials
- Oracle Learning Library
- Blogs
- Forum
- Hosted Online Help Center
- Oracle University courses
- Oracle Application Express Developer Certified Expert examination



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# Application Express Page on OTN

Oracle Application Express (APEX)

Build applications using only your web browser.

Application Express enables you to design, develop and deploy beautiful, responsive, database-driven applications using only your web browser. See how you can take advantage of this fully-supported, no-cost feature of the Oracle Database.

APEX on Oracle Cloud Try apex.oracle.com Download Now

**ORACLE®**

Fully Supported. Enterprise Ready. No Additional Cost.

If you have the Oracle Database, you already have Application Express. Since 2004, Application Express has been a fully supported and no-cost feature of the Oracle Database. Using Application Express as a platform, thousands of customers have created applications that range from small opportunistic solutions to enterprise-wide mission critical systems.

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The Oracle Application Express product page on OTN is a very useful place to gather information. It contains the following sections:

- **Overview:** Get an overview of APEX and links to news, events, presentations, and books. The overview page also includes the following:
  - **APEX on Oracle Cloud:** Takes you to the Oracle cloud page of Application Express which provides useful information about the various offerings on cloud
  - **Try apex.oracle.com:** Provides you an option to request for a free workspace and try out Oracle Application Express
  - **Download Now:** Link to the Download page
- **Downloads:** Enables you to download the latest software
- **Documentation:** Provides access to the documentation and a host of How-to tutorials
- **Community:** Provides access to APEX Discussion forum, Community How-Tos, and a list of blogs. The Application Express Discussion forum is one of the most active on OTN. The forum has a knowledge base of hints and tips, and issues that users have encountered and their resolutions.
- **Learn More:** Provides access to education and how-tos, technical information, and white papers

# Documentation and Tutorials

The screenshot shows a web page titled "Documentation" under the "Documentation" tab of a navigation bar. The page features a logo of a pencil and a wrench, followed by the text "Oracle Application Express Documentation". Below this, a paragraph explains that Application Express is a supported feature of the Oracle Database since 2004, used by thousands of customers to create applications ranging from small to mission-critical systems. A sidebar on the left lists various documentation resources, each preceded by a grey circular icon with a white arrow:

- Full Library
- Release Notes
- Installation Guide
- Application Builder User's Guide
- Migration Guide
- SQL Workshop Guide
- API Reference
- Administration Guide
- End User's Guide
- Third Party Books
- Documentation Archives

At the bottom of the page is a red footer bar with the "ORACLE" logo and a copyright notice: "Copyright © 2015, Oracle and/or its affiliates. All rights reserved."

OTN has documentation to help answer your questions. You can access the documentation page from OTN at the following URL:

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

# Oracle Learning Library

The screenshot shows the Oracle Learning Library interface for Oracle Application Express. At the top, there's a navigation bar with links for Home, Products (which is selected), Search, My Library, and a user icon for 'nobody'. Below the navigation is a banner for the 'Oracle Application Express Learning Library...'. A search bar is present. The main content area features three course cards: 'Oracle Application Express: Workshop I' (5 day course), 'Oracle Application Express: Workshop II' (3 day course), and 'Oracle Application Express: Administration' (2 day course). Below these are tabs for Welcome, Overview, Latest Additions, Getting Started, Learn by Action, and Additional Resources. A sidebar on the right contains 'Useful Links' to Oracle Technology Network, Product Documentation, OTN Discussion Forum, and apex.oracle.com. It also includes a section for 'My Oracle Support' with the Oracle logo and a globe icon.

The Oracle Learning Library (Learning Library) is an application built by using Oracle Application Express. The Learning Library enables you to search for free online training content (OBEs, demos, and tutorials).

Use the following URL to access the Oracle Application Express landing page in Oracle Learning Library:

<https://apexapps.oracle.com/pls/apex/f?p=44785:141:::NO::>

# Blogs

**APEX Community & Partners**

Logout | Consulting Companies | Hosting Companies | **Blogs** | Administration

Want to keep up to date with all the Oracle APEX Blogs then download this [OPML file](#) and import into your favorite feed reader, such as [Google Reader](#). Alternatively you can simply bookmark the [APEX BLOG Aggregator](#) from [APEX Evangelists](#) which also includes some very useful search capabilities, etc.

| Blogger                                    | URL                                                                                                 | Blog Name                                                                                                                                                                                                                                                  | Language |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| APEX.dbe.pl                                | <a href="http://apex.dbe.pl">http://apex.dbe.pl</a>                                                 | APEX.dbe.pl - Blog o Oracle Application Express                                                                                                                                                                                                            | Polish   |
| APEXtras                                   | <a href="http://blog.apextras.com/">http://blog.apextras.com/</a>                                   | APEXtras                                                                                                                                                                                                                                                   | English  |
| Absodia.com                                | <a href="http://www.absodia.com/">http://www.absodia.com/</a>                                       | Absodia.com                                                                                                                                                                                                                                                | French   |
| Andy Tulley                                | <a href="http://andrew.tulley.co.uk/">http://andrew.tulley.co.uk/</a>                               | andrew.tulley.co.uk - SELECT * FROM RANDOM.stuff WHERE subject IN ('Application Express','Oracle','PL/SQL','SQL','Javascript')                                                                                                                             | English  |
| Anthony Rayner                             | <a href="http://anthonyrayner.blogspot.com/">http://anthonyrayner.blogspot.com/</a>                 | Let's talk about APEX, with Anthony Rayner                                                                                                                                                                                                                 | English  |
| Anton Nielsen                              | <a href="http://c2anton.blogspot.com/">http://c2anton.blogspot.com/</a>                             | Anton Nielsen - Mostly Random experience with Oracle technologies. It is mostly specific solutions to isolated problems.                                                                                                                                   | English  |
| Austrian Competence Center for Oracle APEX | <a href="http://blog.oracleapex.at/">http://blog.oracleapex.at/</a>                                 | Der Oracle Experten Blog                                                                                                                                                                                                                                   | German   |
| Ben Burrell                                | <a href="http://munkvben.wordpress.com/">http://munkvben.wordpress.com/</a>                         | Munk's Blog - Yet more APEX musings                                                                                                                                                                                                                        | English  |
| Bernard Fischer-Wasels                     | <a href="http://htmldb-de.blogspot.com/">http://htmldb-de.blogspot.com/</a>                         | Rund um Oracle APEX - erstes BLOG in DEUTSCH mit Hauptfokus Oracle Application Express (vormals HTML DB) Entwicklung von Bernhard Fischer-Wasels                                                                                                           | German   |
| BlueTIC                                    | <a href="http://www.oracleapex.es/">http://www.oracleapex.es/</a>                                   | El blog de Oracle Apex                                                                                                                                                                                                                                     | Spanish  |
| Bradley Brown                              | <a href="http://www.tuscsoftware.com/brown">http://www.tuscsoftware.com/brown</a>                   | Bradley D. Brown - CTO co-founder of TUSC, a provider of Oracle management and technical consulting. Best-selling author of multiple web-development books. Recently accepted as 1 of 9 U.S. Elite Oracle Fusion Middleware Regional Directors. Oracle ACE | English  |
| Carl Backstrom                             | <a href="http://carlback.blogspot.com/">http://carlback.blogspot.com/</a>                           | Carl Backstrom's Blog - Where spellcheck is just another word.                                                                                                                                                                                             | English  |
| Carsten Cerny                              | <a href="http://cc13.com/">http://cc13.com/</a>                                                     | Oracle Application Express in der Praxis                                                                                                                                                                                                                   | German   |
| Carston Czarski                            | <a href="http://sql-plsql-de.blogspot.com/">http://sql-plsql-de.blogspot.com/</a>                   | Oracle SQL and PL/SQL - TIPPS, TRICKS, "BEST PRACTICE"                                                                                                                                                                                                     | German   |
| Chaitanya Koratamaddi                      | <a href="http://chaitanyain.blogspot.com/">http://chaitanyain.blogspot.com/</a>                     | Chaitanya's APEX Blog                                                                                                                                                                                                                                      | English  |
| Christopher Beck                           | <a href="http://christopherbeck.wordpress.com/">http://christopherbeck.wordpress.com/</a>           | Christopher Beck's Blog - Yet another tech blog on Oracle, ApEx and PL/SQL development (and other rants, just to keep it interesting)                                                                                                                      | English  |
| Craig A.                                   | <a href="http://www.oracleapplicationexpress.com/">http://www.oracleapplicationexpress.com/</a>     | Oracle Application Express                                                                                                                                                                                                                                 | English  |
| Dan McGhan                                 | <a href="http://www.danielmcghan.us/">http://www.danielmcghan.us/</a>                               | Dan McGhan's Oracle Blog - To share some of the things I've learned over the last few years using Oracle and Application Express (APEX)                                                                                                                    | English  |
| David Njoku                                | <a href="http://dancingwithapex.blogspot.com/">http://dancingwithapex.blogspot.com/</a>             | Dancing and Wrestling with Oracle APEX - An Oracle Forms developer's journey into the "exciting new world" of Oracle Application Express                                                                                                                   | English  |
| David Peake                                | <a href="http://dpeake.blogspot.com/">http://dpeake.blogspot.com/</a>                               | David Peake on Oracle APEX - Product Manager for Oracle Application Express (APEX), formerly HTML-DB                                                                                                                                                       | English  |
| Denes Kubicek                              | <a href="http://deneskubicek.blogspot.com/">http://deneskubicek.blogspot.com/</a>                   | Denes Kubicek APEX Blog                                                                                                                                                                                                                                    | English  |
| Dietmar Aust                               | <a href="http://daust.blogspot.com/">http://daust.blogspot.com/</a>                                 | Oracle XE / APEX                                                                                                                                                                                                                                           | English  |
| Dimitri Gielis                             | <a href="http://dgeliis.blogspot.com/">http://dgeliis.blogspot.com/</a>                             | Dimitri Gielis Blog                                                                                                                                                                                                                                        | English  |
| Douwe Pieter Van den Bos                   | <a href="http://www.ome-b.nl/">http://www.ome-b.nl/</a>                                             | Ome-B.nl - APEX Specialists                                                                                                                                                                                                                                | Dutch    |
| Duncan Mein                                | <a href="http://dimein.blogspot.com/">http://dimein.blogspot.com/</a>                               | Duncan Mein's Blog                                                                                                                                                                                                                                         | English  |
| E-DBA                                      | <a href="http://application-express-blog.e-dba.com/">http://application-express-blog.e-dba.com/</a> | APEX Development - Increasing Development Productivity through ExtJS Integration!                                                                                                                                                                          | English  |



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Oracle Application Express Blog is a website where users can communicate and interact on various topics. Users can post questions, images, events, and so on. The slide above contains a list of APEX blogs. You can access the Blogs page at the following URL:

<http://apex.oracle.com/pls/otn/f?p=24793:12:0>

# Forum: Application Express

The screenshot shows the Oracle Application Express (APEX) forum page on the Oracle Community Network. At the top, there's a navigation bar with links for Oracle Community Directory and Oracle Community FAQ. The main title is "Oracle Application Express (APEX)". Below the title, there are tabs for Overview, Content, People, and Subspaces. A yellow banner at the top says "ANNOUNCEMENT: Welcome to the Oracle Application Express Discussion Forum! Show Details". Below this, a message encourages users to "Log in to follow, share, and participate in this community." The left sidebar features a "WELCOME" section with a profile picture of Joel Kallman and a brief bio. The "FEATURED CONTENT" section lists several posts: "APEX 5.0.1 Patchset Now Available!" (5 days ago), "Finding Inspiration in Tech Projects | Anton Nielson [VIDEO]" (2 months ago), "Working with JSON and APEX | Dimitri Gielis [VIDEO]" (2 months ago), "APEX 5 Known Issues" (3 months ago), "APEX 5 Now Available for Download!!!" (1 week ago), and "Using the Declarative Features in Oracle APEX | Joel Kallman [VIDEO]" (1 week ago). The right sidebar includes sections for "DEVELOPER CHOICE AWARDS" (with a call to nominate by Aug 15th) and "INDIVIDUAL LEADERS" (listing 1st place with 45,600 points, 2nd place with 36,120 points, 3rd place with 24,805 points, and 4th place with 9,320 points). The bottom of the page has an "ASK IT" button and a copyright notice: "Copyright © 2015, Oracle and/or its affiliates. All rights reserved."

The Application Express Discussion forum is one of the most active on OTN. In this forum, users can have conversations through posted messages. The forum has a knowledge base of hints and tips, and issues that users have encountered and their resolutions.

You can access the APEX Forum page at the following URL:

[https://community.oracle.com/community/database/developer-tools/application\\_express](https://community.oracle.com/community/database/developer-tools/application_express)

# Hosted Online Help Center

The screenshot shows the Oracle Application Express Documentation page for Release 5.0. The left sidebar has a 'Database' category with links for Overview, Tasks, Install and Upgrade, Build Applications, Tutorials, Videos, Collateral, and Training. The 'Overview' link is selected. The main content area features a large red title 'Oracle Application Express Documentation Release 5.0'. Below it is a section titled 'Overview' and another titled 'Welcome'. The 'Welcome' section contains text about Oracle Application Express being Oracle's primary tool for developing Web applications with SQL and PL/SQL, mentioning web browser support for desktops and mobile devices. To the right, there is a sidebar titled 'Oracle Application Express Documentation' containing links to various documentation resources, each with an info icon and a plus sign icon.

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In Oracle Application Express, you can get help on any topic, such as get context-sensitive help for the page or field where you are at any given point and search for a particular topic. You can access the APEX Help Center page at the following URL:

[https://docs.oracle.com/cd/E59726\\_01/index.htm](https://docs.oracle.com/cd/E59726_01/index.htm)

## Learn More

The screenshot shows a web browser window with the Oracle Application Express 'Learn More' tab selected in the top navigation bar. The main content area features a logo for Oracle Application Express (a pencil icon) and a large 'Learn More' button. Below this, a paragraph of text states: 'Application Express has more than ten years of real-world usage and community activity. On this page you will find collateral, success stories, news articles, and a whole lot more.' A vertical list of links follows: 'Datasheet', 'Technical Overview', and 'Statement of Direction'. A horizontal line separates this from a 'Topics' section. The 'Topics' section contains two columns of links: 'Getting Started', 'New Features in Release 5.0', 'Collateral', 'Deployment', 'Books', 'News' on the left; and 'Success Stories', 'Customer Quotes', 'Videos and Podcasts', 'Education and Certification', 'Plug-Ins', and 'Packaged Applications' on the right. At the bottom of the page is a red footer bar with the 'ORACLE' logo and a copyright notice: 'Copyright © 2015, Oracle and/or its affiliates. All rights reserved.'

On the workspace home page, click the Learn More tab. A Learn More page appears that provides an overview of Oracle Application Express as shown in the slide.

# Oracle Application Express Developer Certified Expert Examination

The screenshot shows the Oracle University website with the following details:

- Header:** Welcome Ashwin (Sign Out | Account), Request Information, United States ▾, Cart ▾, Help ▾, 1.800.529.0165.
- Breadcrumbs:** Home > Training > Database > Database Application Development > Oracle Application Express (Oracle APEX)
- Title:** Oracle Application Express (Oracle APEX)
- Description:** Help your business develop & deploy professional applications securely & rapidly.
- Navigation:** Training Courses, Certification, Learning Paths.
- Certification Section:** Oracle Application Express (Oracle APEX) Certification. Subtext: Click on the boxes below to learn detailed requirements for achieving each certification. ⓘ
- Certifications:** Certified Expert, Oracle Application Express Developer Certified Expert.
- Text:** The Oracle Certified Expert certification program grants credentials that recognize competency in specific technologies, architectures or domains not currently covered in the path-based Oracle Certifications.
- Footer:** ORACLE logo, Copyright © 2015, Oracle and/or its affiliates. All rights reserved.

You can access information about the *Oracle Application Express Developer Certified Expert* credential from the Certification > Database > Database Application Development section at the following URL:

<http://education.oracle.com>

On the Oracle Application Express Developer Certified Expert page, click the links in the diagrams to view the *Oracle Application Express 4: Developing Web Applications* exam requirements in detail.

- **Exam number:** 1Z0-450
- **Associated certifications:** *Oracle Application Express Developer Certified Expert*

The recommended training and preparation for the Oracle Application Express Developer Certified Expert examination is the *Oracle Application Express: Workshop I* course.



# More Information About Application Development

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## Lessons

The lessons covered in this appendix are:

- Create a Websheet Application
- Manipulate and Administer a Websheet Application



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This appendix explains how to use create, manipulate, and administer websheet applications.

## Create a Websheet Application

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## Objectives

After completing this lesson, you should be able to:

- Identify the different components of a websheet application
- Create a websheet application
- Create sections on a websheet page
- Annotate pages with files, notes, and tags
- Create and manipulate a data grid



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In this lesson, you learn how to create a websheet application, create sections on a websheet page, annotate pages with files, notes, and tags, and also learn how to create and manipulate a data grid.

## Lesson Agenda: Create a Websheet Application

- Overview
- Working with Pages and Sections
- Creating Data Grids
- Manipulating Data Grids

# What Is a Websheet?

Sample Websheet Application - AnyCo IT Department

Language Help anjani Sign out

View Create Edit Data Grid Administration

Search Websheet

Home Projects Systems

AnyCo IT Department

AnyCo Corp is a consulting firm founded to clients in the services industry. With a extend consulting services and solution. This websheet summarizes the four major the department. The various data grids, charts and reports. The following is a summary of the IT de

*Maintain the infrastructure such as*

Projects Breakdown

Below are the major projects the IT department are involved with. Also see project summaries within Project Review .

Search Report Search Add Row

| Project               | Task                                      | Start Date  | End Date    | Status | Assigned To   | Cost | Budget |
|-----------------------|-------------------------------------------|-------------|-------------|--------|---------------|------|--------|
| Timesheet Application | Determine business rules                  | 15-MAR-2010 | 15-NOV-2010 | Open   | Pam King      | 2500 | 4000   |
| Timesheet Application | Create prototype and trial testing        | 20-MAR-2010 | 30-NOV-2010 | Open   | James Cassidy | 6000 | 10000  |
| Order Management      | Develop application to streamline process | 01-AUG-2010 | 18-DEC-2010 | Open   | Mark Nile     | 6000 | 18000  |
| Customer Tracker      | Consolidate customer contacts             | 01-OCT-2010 | 15-DEC-2010 | Open   | Russ Sanders  | 300  | 12000  |

Control Panel

- New Section
- Edit Sections
- New Page
- New Page as a Copy
- Edit Page
- Page Directory
- New Data Grid

Files

No Files

Tags

- Tasks
- Resources
- Costs

Notes

No Notes

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Websheets provide a quick and easy way to post content on the web. Whether that content is text, images, reports, or charts, it can all be integrated into a websheet application. Most importantly, both the content and the structure are controlled by its users. If you have the data that you need in your database, expose it in a report or include that data on a page. If you need to manage your own data, use a data grid (which can then be referenced on a page).

Websheets provide the following functionality:

- Create and share content over the web.
- Organize webpages in a hierarchy and on cross-link pages.
- Create and manage tabular data by using an embedded feature called “data grids.”
- Create interactive reports by using SQL on existing data structures in your database.
- Expose data grid and report data within pages as a chart or a report.
- Annotate pages with files, tags, and notes. Associated images can be shown inline within page content.
- Search page content (using a search box in the upper-right corner of a page).
- Manage who can log in and, once logged in, who can read, write, and administer the application (authentication and authorization).

# Websheets Versus Database Applications

|                        | Websheet Applications                 | Database Applications         |
|------------------------|---------------------------------------|-------------------------------|
| Database Objects       | Automatically managed (APEX\$ tables) | Created by using SQL Workshop |
| Primary Key Management | Automatically managed                 | Triggers and sequences        |
| Validations            | Defined by using runtime UI           | Created by using wizards      |
| Report Layout          | Defined by using runtime UI           | Created by using SQL          |
| List of Values         | Defined by using runtime UI           | SQL or static                 |
| Page Flow              | Limited                               | Controlled by branches        |
| Form Layout            | Column groups                         | Items and regions             |
| Look and Feel          | Basic control                         | Themes and templates          |



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Building an APEX database application is very easy for an IT professional and for many “power users.” They typically understand database concepts. They are comfortable using wizards to create an application and then working within the declarative framework to maintain and enhance the application.

Websheet applications simplify the process of creating database objects and providing runtime UI capabilities to define features such as validations and LOVs.

However, websheet applications have limited capabilities (compared to database applications) for UI customization and page control. It is important to understand the differences between websheet applications and database applications, which are outlined in the slide.

# Default Websheet Interface

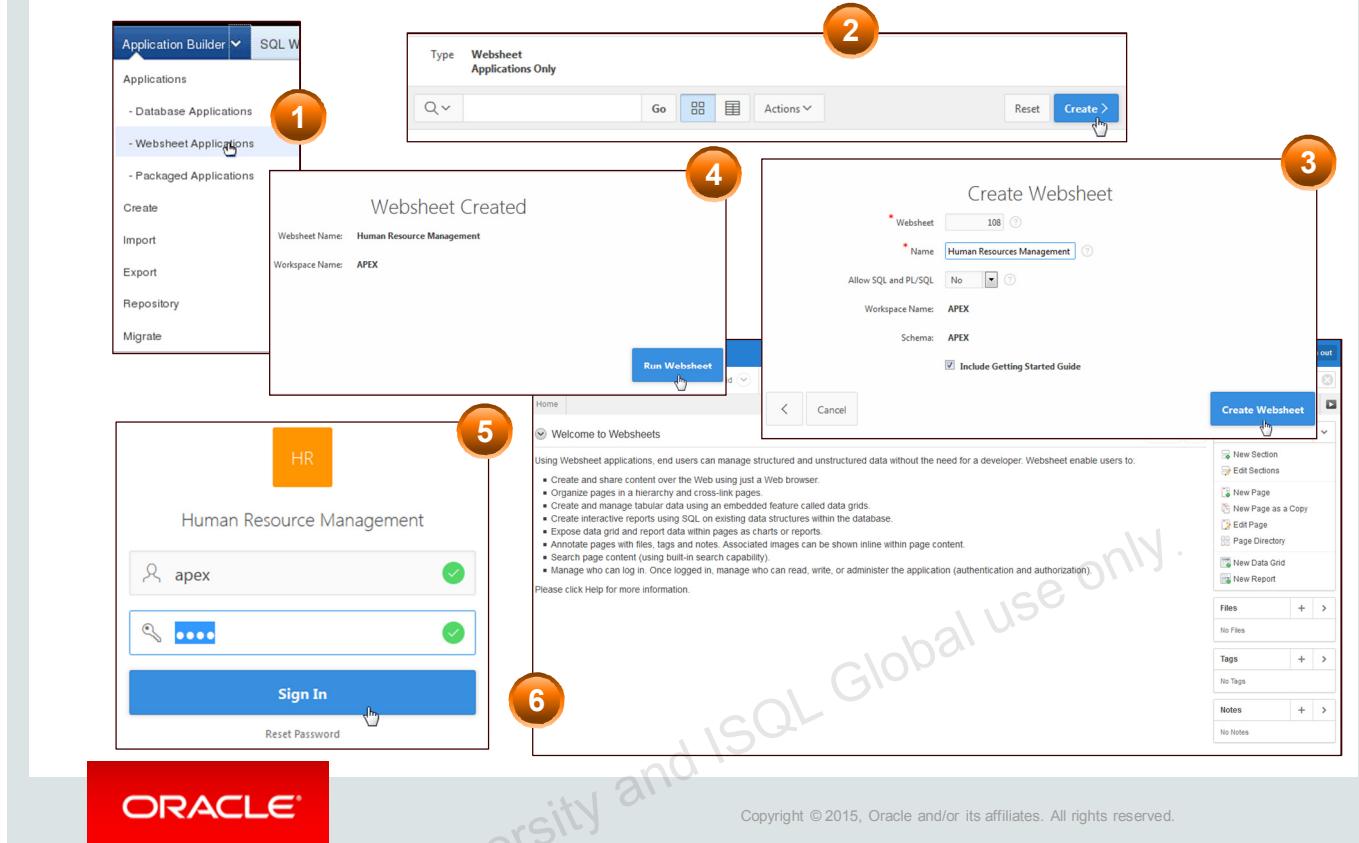
The screenshot shows the Oracle Websheet interface for a 'Human Resources Management' application. The top navigation bar includes links for View, Create, Edit, Data Grid, Report, Administration, Language, Help, and Sign out. A search bar labeled 'Search Websheet' is also present. The main content area displays a 'Welcome to Websheets' message and a list of features. On the right side, there is a 'Control Panel' with sections for New Section, Edit Sections, New Page, New Page as a Copy, Edit Page, Page Directory, New Data Grid, and New Report. Below the Control Panel are sections for Files, Tags, and Notes, each showing a list of items. The Oracle logo is visible at the bottom left, and a copyright notice is at the bottom right.

The slide shows the interface that gets created when you use the Create Application Wizard to create a websheet application. A default home page is created with new websheet application. The look and feel of all websheet applications will be the same. After you have created a websheet application, you can add content to your application by defining pages, sections, files, images, data from the database, and so on.

After a websheet application is created, the users of the application can perform the following actions:

- Create pages.
- Create different types of sections.
- Create links between pages.
- Annotate pages with notes, tags, and files.
- Create data grids.
- Create reports.

# Creating and Running a Websheet



To create a websheet, perform the following steps:

1. Click the down arrow next to the Application Builder tab and select Websheet Applications. (Alternatively, select Application Builder and click the Websheet Applications tab.)
2. Click Create.
3. Enter a name for the websheet and click Create Websheet.
4. Click Run Websheet to view the application.
5. Enter your websheet login credentials and click Sign In.
6. The websheet application is displayed.

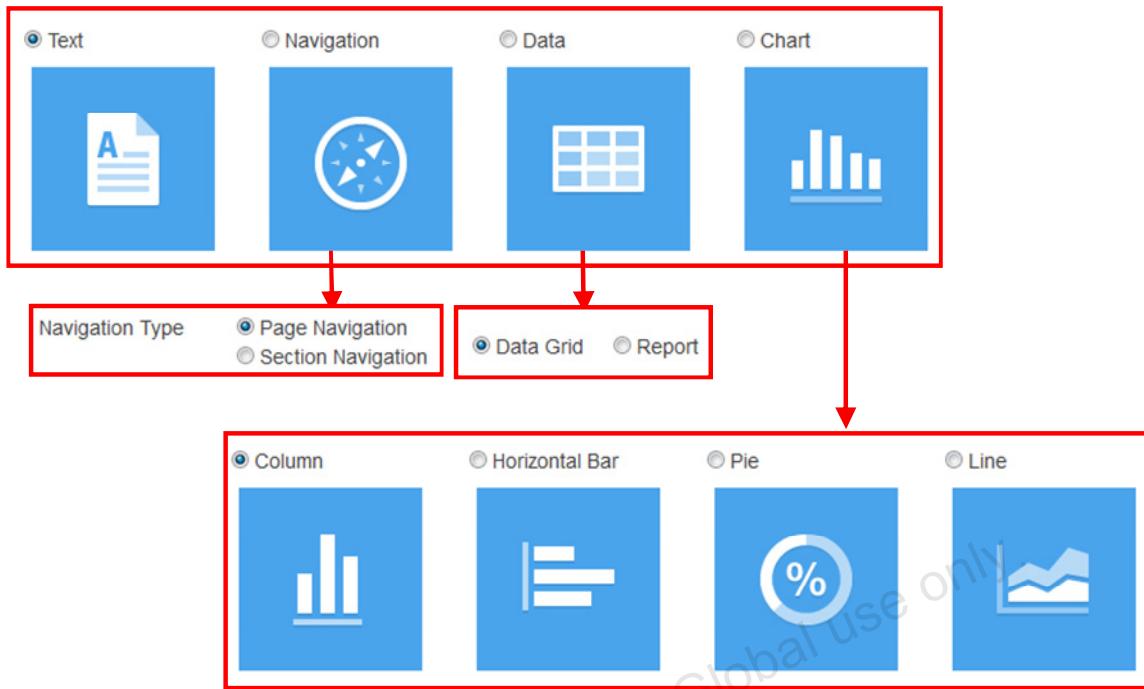
# Lesson Agenda: Create a Websheet Application

- Overview
- Working with Pages and Sections
  - Types of Sections
  - Creating a Text Section
  - Adding Annotations to a Page
  - Copying a Page
  - Editing Page Sections
  - Viewing the Page Directory
  - Displaying an Image
  - Using Markup Syntax
- Creating Data Grids
- Manipulating Data Grids



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## Types of Sections



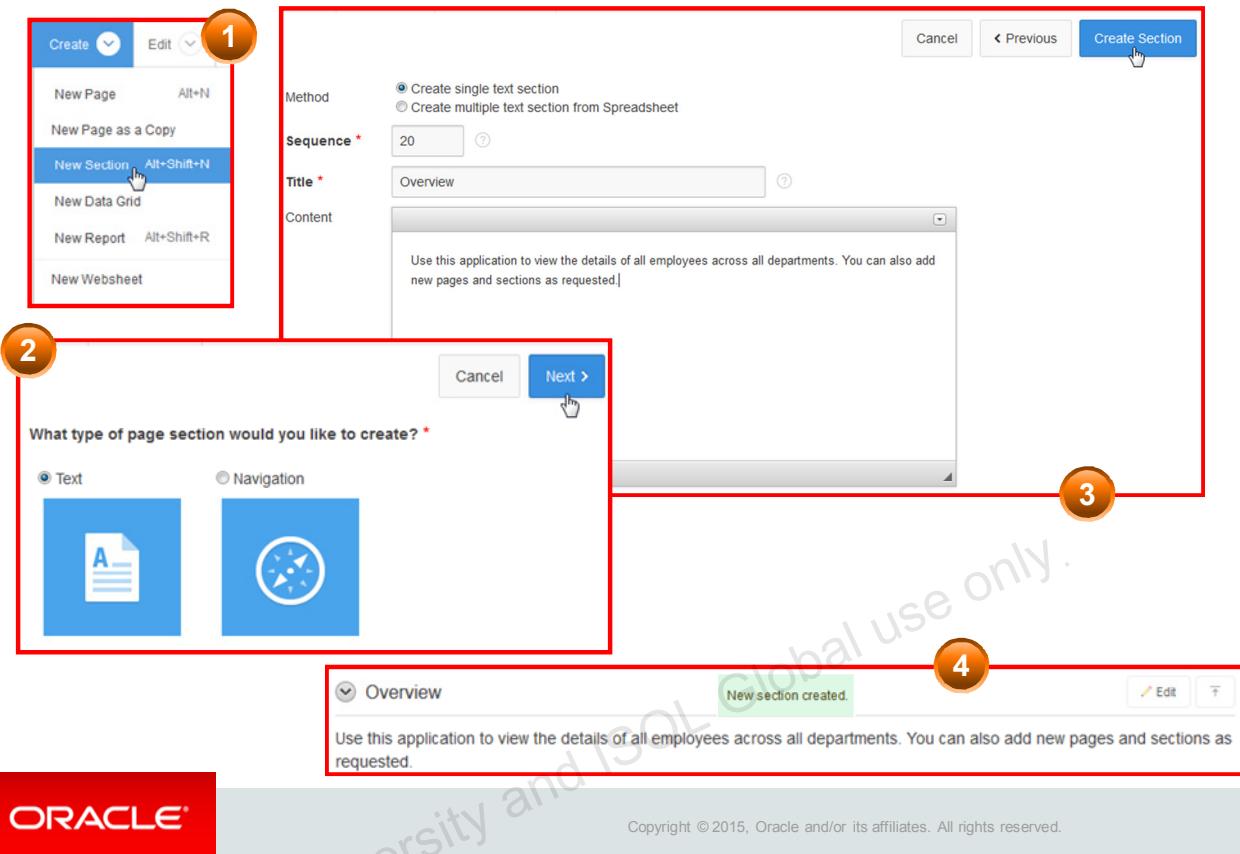
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The different types of sections that you can create are shown in the slide. The Text and Navigation options are available when the websheet is created. The Data and Chart options are available only when either a data grid or a report exists in the websheet.

These options are discussed in detail later in this appendix.

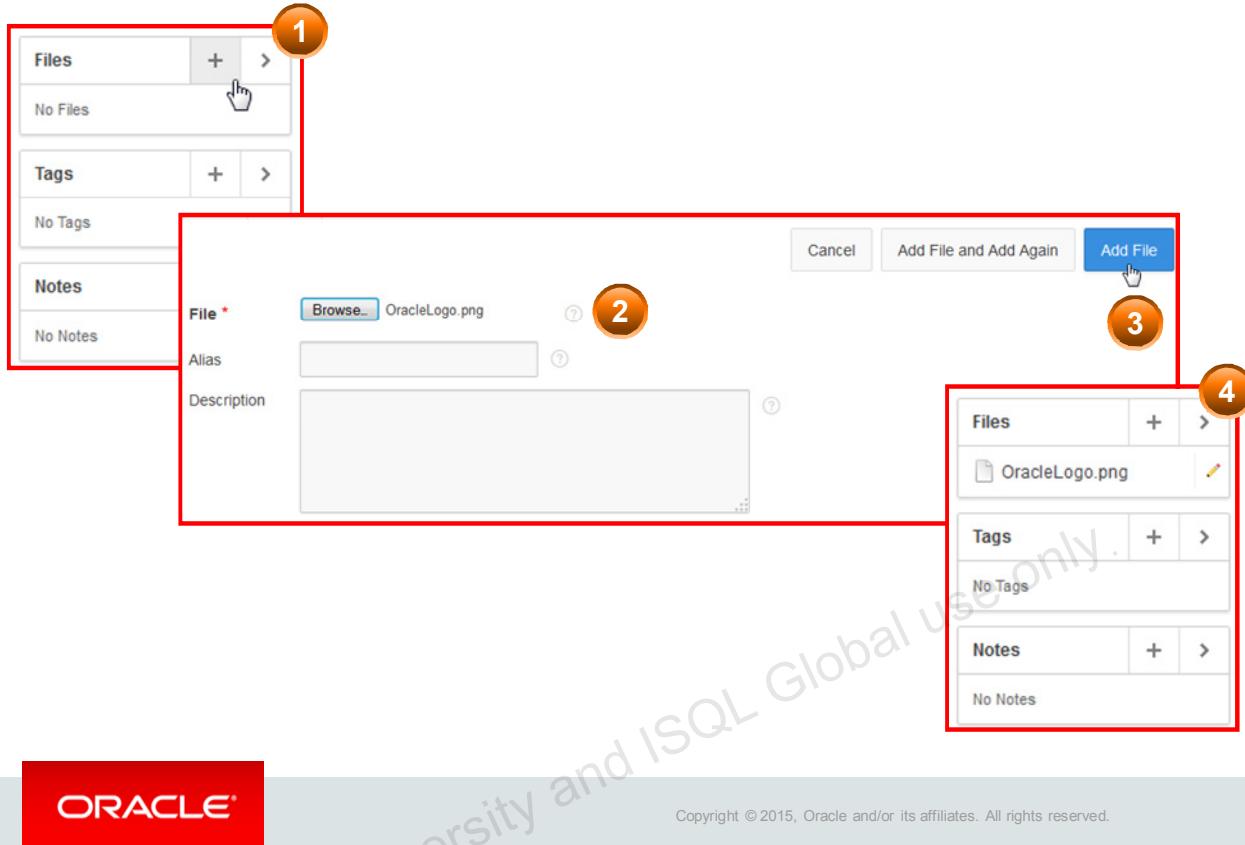
# Creating a Text Section



You can add textual content to your pages by creating a Text section. To create a Text section, perform the following steps:

1. Click Create and select New Section.
2. Ensure that Text is selected and click Next.
3. Enter a title for the section and enter the content for the section in the Content field. Click Create Section.
4. The Text section is created.

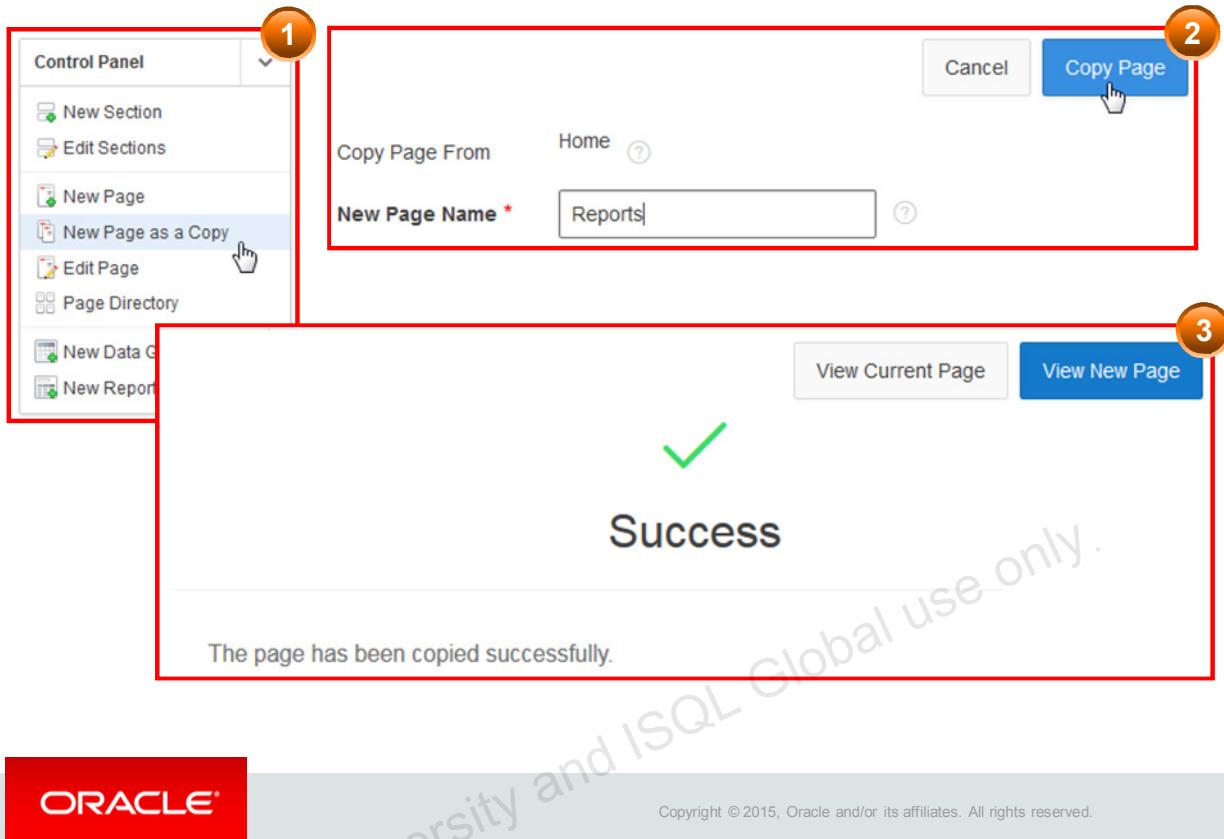
## Adding Annotations to a Page



You can add files, tags, and notes to the websheet pages. These are displayed on the bottom-right side of a page. You can click the plus icon (+) depending on what you want to add to the page. The slide shows an example of annotating a page with an image file. Perform the following steps:

1. Click the plus icon (+) in the Files section.
2. Click the Browse button and locate the file you want to add.
3. Click Add File.
4. The file that is added to the page is listed in the Files section.

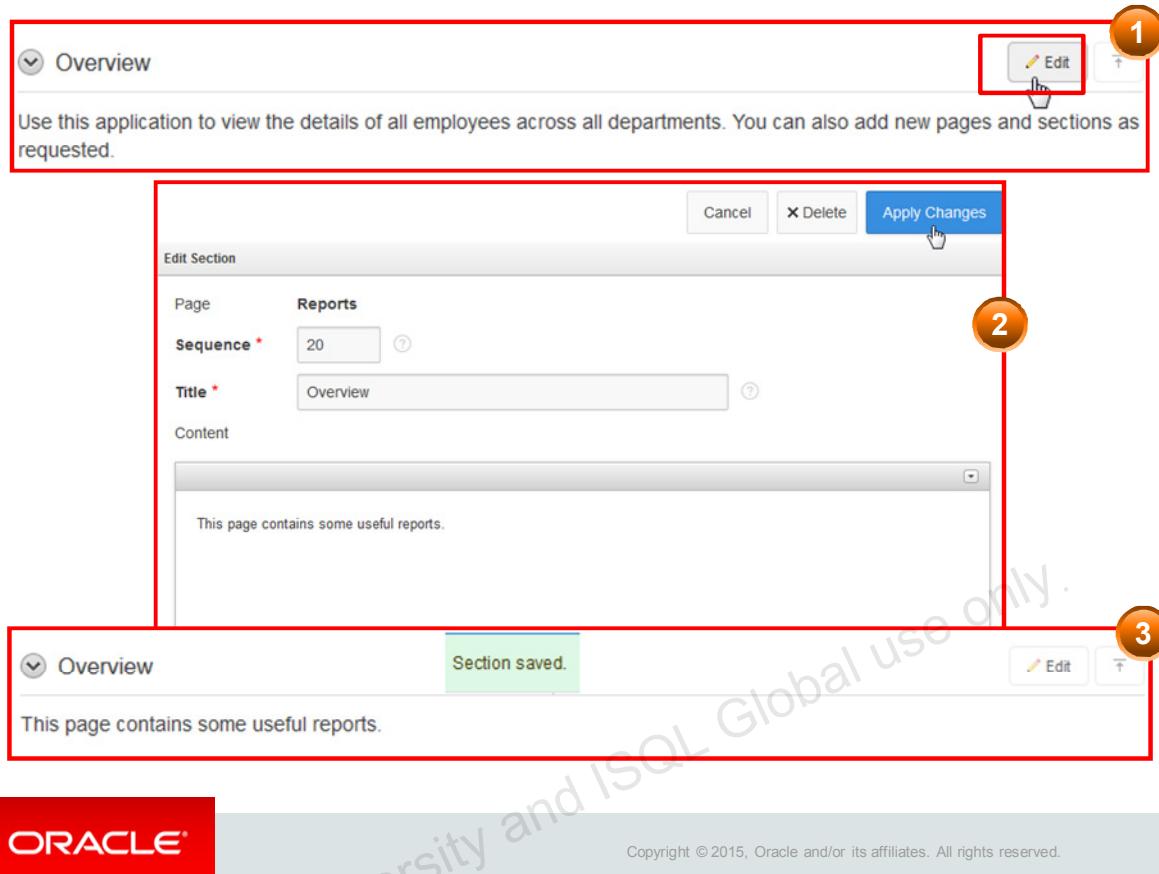
## Copying a Page



You can quickly copy a page to a new page as follows:

1. Ensure that you are viewing the page you want to copy. Then select “New Page as a Copy” in the Control Panel.
2. Enter a name for the new page and click Copy Page.
3. The page is copied. Now you can choose to view either the current page or the new copied page.

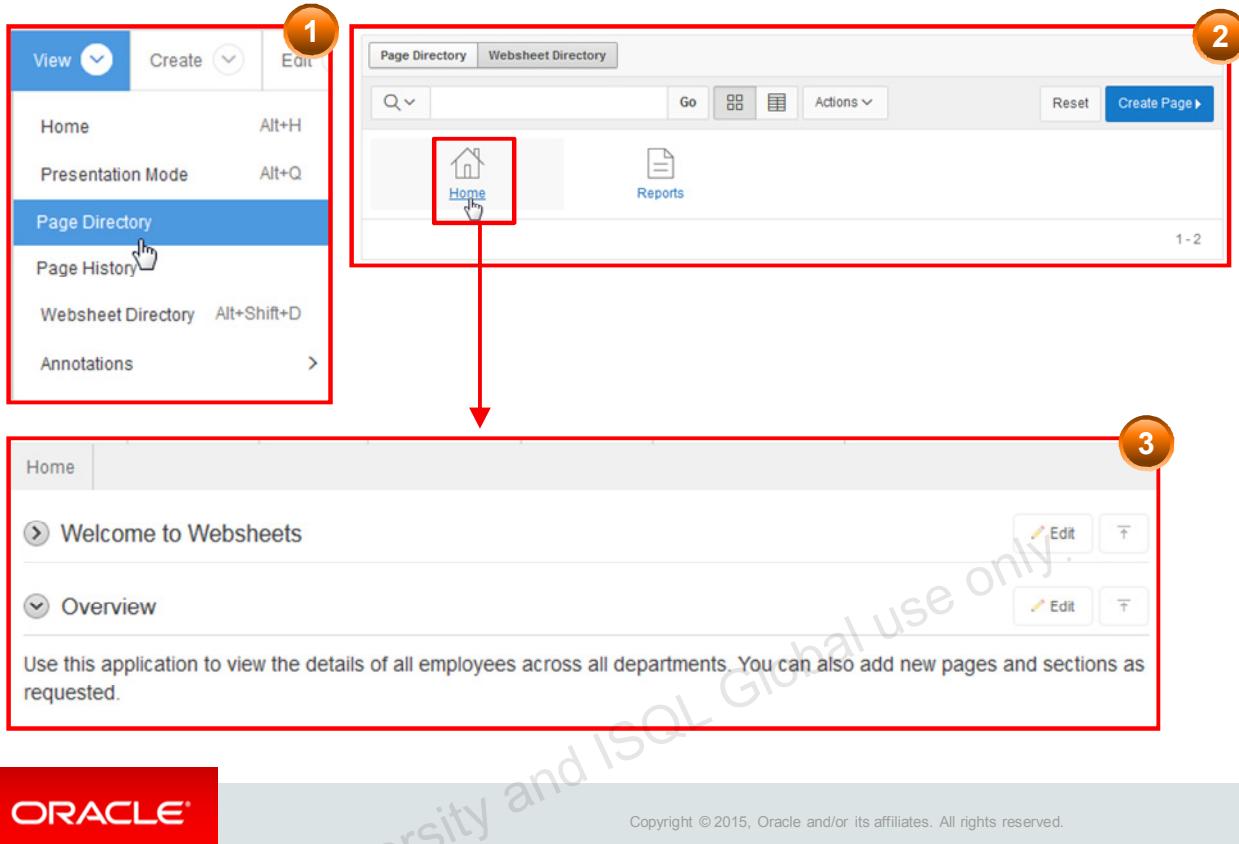
# Editing Page Sections



At any point, you can edit the sections on a page to change its title or contents. To edit a page section, perform the following steps:

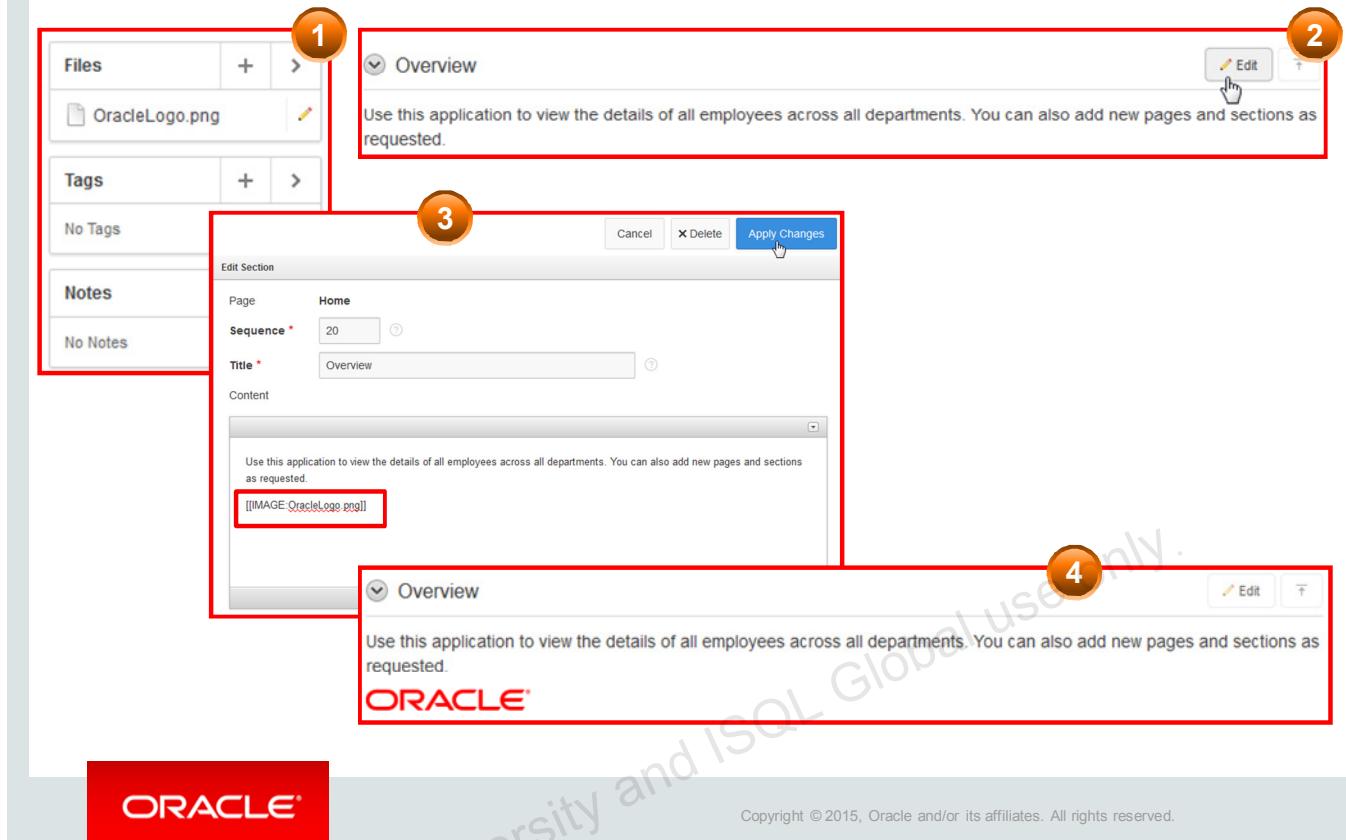
1. Click the Edit button for that section.
2. Make your changes and click the Apply Changes button.

## Viewing the Page Directory



You can view all the pages in a websheet by using the Page Directory. To access the Page Directory, click View and select Page Directory. All the pages in the websheet are displayed. You can view a particular page by clicking the page icon.

# Displaying an Image



You can display images on a page by using markup syntax. First, you need to annotate the page with the image. You can do this by clicking the plus icon for the Files region and uploading the image. After the image is added to the page, you can edit the section where you want to display the image. In the example in the slide, an Oracle logo is added to the page and displayed in the Overview section.

Note the markup syntax that is used to display the image:

```
[[IMAGE: <file name>]]
```

After entering the markup text, click the Apply Changes button. The image is displayed in the Overview section.

# Using Markup Syntax

Human Resource Management

Language Help

About Overview Access Control **Markup Syntax** Data Grid Application Content FAQ

Show All

Page Linking

To include links in page sections to other pages in a Websheet, use the syntax described below. Note that the use of the 'page:' identifier is optional. If the page exists, a link displays. If the page does not exist, a link to create the page displays.

**Syntax:**

```
[[page: <page alias> | <link name>]]
[[<page alias> | <link name>]]
```

**Syntax Examples:**

```
[[page: home]]
[[mypage | My Page]]
```

**In Context Example:**

One of the most colorful fish is the [[ clownfish | clown fish]].

Section Linking

To include links to a section of a page, use the syntax below. If the section exists, a link displays. If the section does not exist, a link to create the section displays. Note that if the section is not present on the current page, it is assumed the section is on the current page.

**Syntax:**

```
[[section: <page alias> . <page section> | <link name>]]
[[section: <page section> | <link name>]]
```

**Syntax Example Linking Within Current Page:**

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Similar to the markup syntax you saw in the previous slide, you can use other markup syntaxes. The online Help provides useful hints on how to use markup syntax to reference objects in your websheet. Click the Help link to see what markup syntaxes are available.

## Quiz



You can use markup text to reference a file or URL.

- a. True
- b. False

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**Answer: b**

## Lesson Agenda: Create a Websheet Application

- Overview
- Working with Pages and Sections
- Creating Data Grids
  - What are Data Grids?
  - Creating a Data Grid From the Beginning
  - Creating a Data Grid From a Spreadsheet
  - Creating a Data Section
  - Creating a Chart Section
- Manipulating Data Grids



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# What Are Data Grids?

Data grids are sets of tabular data displayed as an editable report and managed through APEX\$ tables.

| Project                     | Task                                           | Start Date  | End Date    | Status  | Assigned To   | Cost | Budget |
|-----------------------------|------------------------------------------------|-------------|-------------|---------|---------------|------|--------|
| Timesheet Application       | Determine business rules                       | 15-MAR-2010 | 15-NOV-2010 | Open    | Pam King      | 2500 | 4000   |
| Timesheet Application       | Create prototype and trial testing             | 20-MAR-2010 | 30-NOV-2010 | Open    | James Cassidy | 6000 | 10000  |
| Order Management            | Develop application to streamline process      | 01-AUG-2010 | 18-DEC-2010 | Open    | Mark Nile     | 6000 | 18000  |
| Customer Tracker            | Consolidate customer contacts and interactions | 01-OCT-2010 | 15-DEC-2010 | Open    | Russ Sanders  | 300  | 12000  |
| Customer Tracker            | Deliver single customer tracker application    | 16-OCT-2010 | 29-DEC-2010 | Pending | Al Bines      | 0    | 2500   |
| Timesheet Application       | Company rollout and training                   | 25-MAR-2010 | 05-DEC-2010 | Open    | Pam King      | 1000 | 1500   |
| Commercial Software Package | Install and customize parameters               | 07-APR-2010 | 07-APR-2010 | closed  | John Watson   | 1000 | 700    |
| Commercial Software Package | Train finance personnel                        | 10-APR-2010 | 05-OCT-2010 | Open    | John Watson   | 2000 | 1500   |
| Order Management            | Identify current processes                     | 10-JUL-2010 | 12-JUL-2010 | Closed  | Mark Nile     | 300  | 500    |
| Order Management            | Develop corporate policy                       | 12-JUL-2010 | 17-JUL-2010 | Closed  | James Cassidy | 500  | 500    |



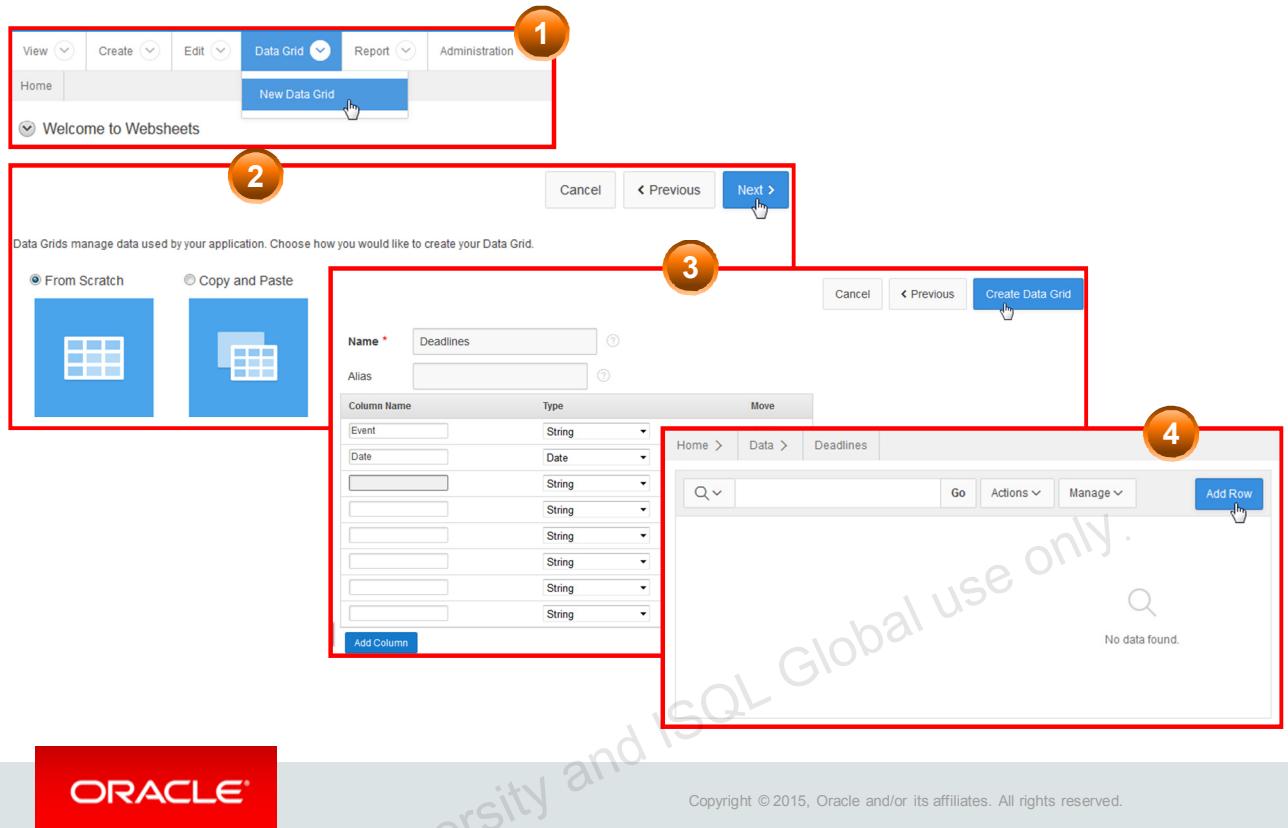
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Data grids are contributor-defined sets of tabular data—a web-based spreadsheet. You can define the structure of a data grid (column names, data types, and basic validations) or create a data grid by pasting in spreadsheet data. After it is created, the structure can be modified as needed over time. The data itself is managed by APEX\$ tables.

In addition to the defined columns, a set of standard columns is always included within each data grid. These include owner, created by, created on, updated by, updated on, row order, and annotation (files, notes, links, and tags).

Data grids are highly customizable. Users can alter the layout of report data by choosing the columns that they are interested in and applying filters, highlighting, and sorting. They can also define breaks, aggregations, group by, computations, and different charts. A subscription can also be set to email the data at a designated interval. Users can create multiple variations of a data grid and save them as named reports, for either public or private viewing. Apart from being available on the Data tab, data within a data grid can be included as a chart or report on any page.

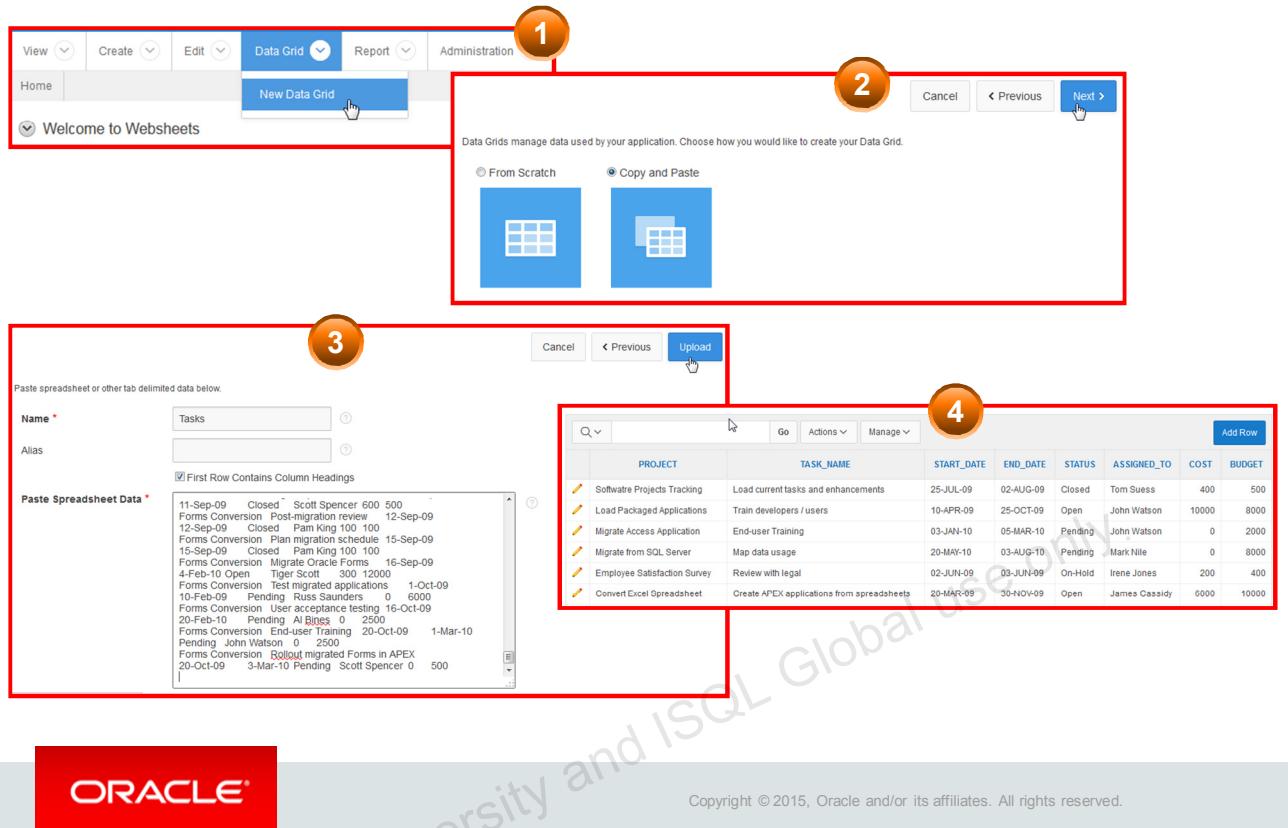
# Creating a Data Grid from the Beginning



To create a data grid from the beginning, perform the following steps:

1. Click Data Grid and select New Data Grid.
2. Ensure that From Scratch is selected and click Next.
3. Enter a name for the data grid and specify the column names and types. Use the Add Column button to add more columns to the data grid. After defining the data grid columns, click Create Data Grid.
4. The data grid is created. The data grid contains no data. You can add rows to the data grid by clicking the Add Row button.

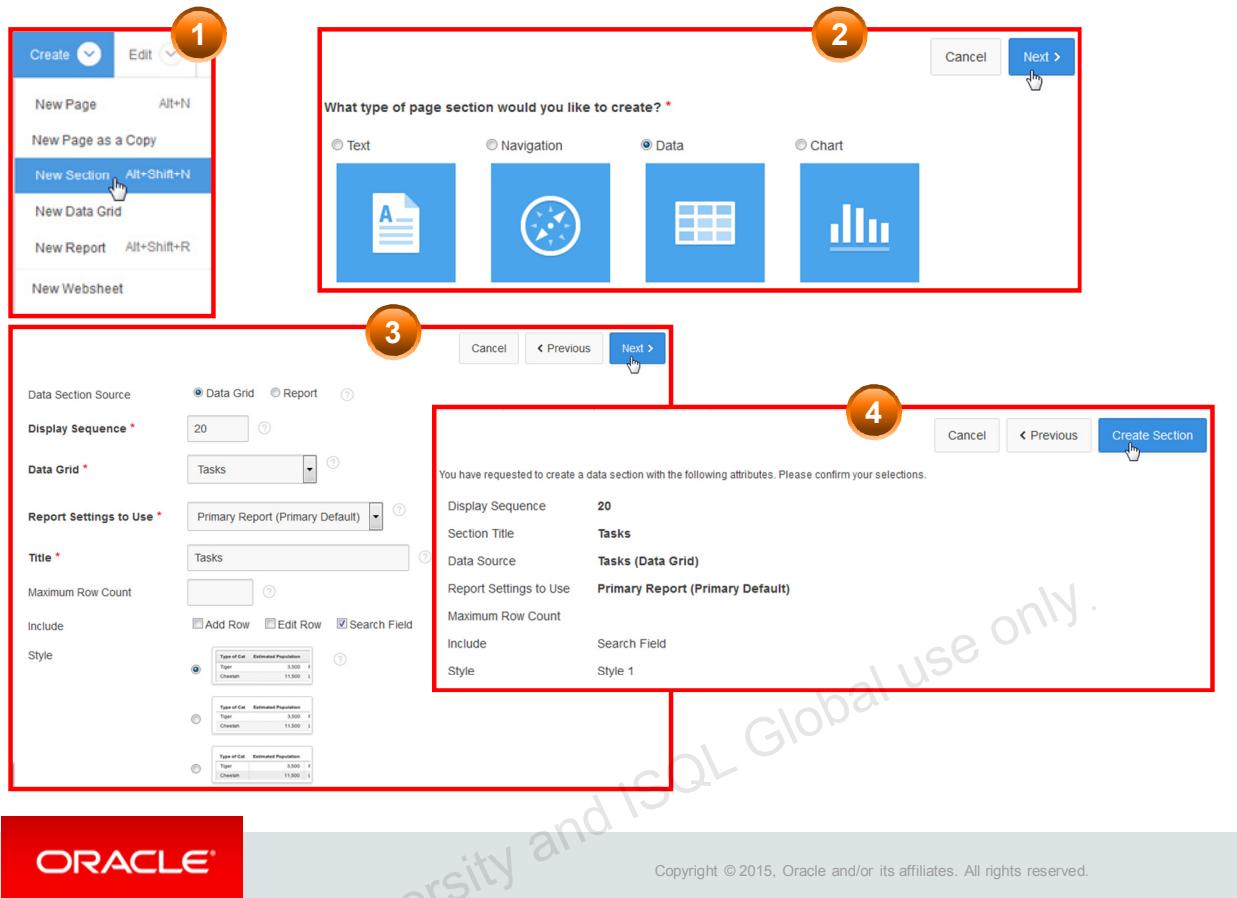
# Creating a Data Grid from a Spreadsheet



You can also create a data grid from a spreadsheet. Access the Data page and perform the following steps:

1. Click Data Grid and select New Data Grid.
2. Select Copy and Paste and click Next.
3. Enter a name for the data grid and, in the text area, copy and paste the data grid content from the spreadsheet. If the pasted content contains column names as the first row, select the First Row Contains Column Headings check box. Click Next.
4. The data grid is created.

## Creating a Data Section



The data grids that you created in the preceding slides are located as data components in the Data section of your websheet. To display data from these data grids on your websheet pages, you now need to create data sections.

To create a data section, perform the following steps:

1. Click Create and select New Section.
2. Select the Data option and click Next.
3. For Data Grid, select a data grid. Select a report setting and style. Also, specify the section title. Click Next.
4. Review the details and click Create Section.

## Creating a Data Section

| PROJECT                      | TASK_NAME                                  | START_DATE | END_DATE  | STATUS  | ASSIGNED_TO   | COST  | BUDGET |
|------------------------------|--------------------------------------------|------------|-----------|---------|---------------|-------|--------|
| Software Projects Tracking   | Load current tasks and enhancements        | 25-JUL-09  | 02-AUG-09 | Closed  | Tom Suess     | 400   | 500    |
| Load Packaged Applications   | Train developers / users                   | 10-APR-09  | 25-OCT-09 | Open    | John Watson   | 10000 | 8000   |
| Migrate Access Application   | End-user Training                          | 03-JAN-10  | 05-MAR-10 | Pending | John Watson   | 0     | 2000   |
| Migrate from SQL Server      | Map data usage                             | 20-MAY-10  | 03-AUG-10 | Pending | Mark Nile     | 0     | 8000   |
| Employee Satisfaction Survey | Review with legal                          | 02-JUN-09  | 03-JUN-09 | On-Hold | Irene Jones   | 200   | 400    |
| Convert Excel Spreadsheet    | Create APEX applications from spreadsheets | 20-MAR-09  | 30-NOV-09 | Open    | James Cassidy | 6000  | 10000  |
| Load Packaged Applications   | Identify point solutions required          | 03-APR-09  | 05-APR-09 | Closed  | John Watson   | 200   | 300    |



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This slide shows the data section that is created by performing the steps listed in the preceding slide. A search bar to enable you to search the entire report or specific columns is also created by default.

# Creating a Chart Section

The image shows a step-by-step wizard for creating a chart section in Oracle Application Express. It consists of four panels connected by numbered arrows:

- Panel 1:** "Select Chart Type". A red box highlights the "Pie" option. The "Next >" button is highlighted with a mouse cursor.
- Panel 2:** "Configure Chart Section". A red box highlights the "Data Grid" source and "Tasks" data grid. Other fields include "Display Sequence" (30), "Section Title" (Tasks Status), and "Report Settings to Use" (Primary Report (Primary Default)). The "Create Section" button is highlighted with a mouse cursor.
- Panel 3:** "Configure Chart Labels and Values". A red box highlights the "Chart Label" (STATUS) and "Axis Title for Label" (Project Status). Other fields include "Chart Value" (COST), "Axis Title for Value" (Project Cost), and "Function" (Default). The "Next >" button is highlighted with a mouse cursor.
- Panel 4:** "Review Settings". A red box highlights the summary of settings: Display Sequence (30), Section Title (Tasks Status), Chart Type (Pie), Enable 3D (unchecked), Chart Source (Tasks (Data Grid)), Report Settings to Use (Primary Report (Primary Default)), Chart Label (STATUS), Axis Title for Label (Project Status), Chart Value (COST), Axis Title for Value (Project Cost), Function (Default), and Sort (Default). The "Create Section" button is highlighted with a mouse cursor.

In the preceding slide, you learned how you can display data from data grids as reports. You can also display the data in the data grids as charts. For this, you need to create a chart section. Create a new section on a page and select the Chart option. Then perform the following steps:

1. Select the type of chart you want to create and click Next. In the example in the slide, the Pie option is selected.
2. Select the data grid you want to use and the report settings. Also specify a title for the chart section. Click Next.
3. Select the Chart Label and Chart Value columns and specify the axis values. Click Next.
4. Review the details you entered and click the Create Section button.

# Creating a Chart Section

>Welcome to Websheets

Overview

Tasks

Tasks Status

A horizontal bar chart titled "Project Status" on the Y-axis and "Project Cost" on the X-axis. The X-axis ranges from 0.00 to 12,000.00 with major ticks every 2,000.00. The Y-axis lists project statuses: Closed, Open, Pending, On-Hold, and closed. Each status has a corresponding colored bar: Closed (blue), Open (orange), Pending (green), On-Hold (yellow), and closed (dark green). The "Open" project status has the highest cost at approximately 10,000.00.

| Project Status | Project Cost |
|----------------|--------------|
| Closed         | ~8,000.00    |
| Open           | ~10,000.00   |
| Pending        | ~3,500.00    |
| On-Hold        | ~1,500.00    |
| closed         | ~5,000.00    |

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The slide shows the chart section that is created by performing the steps listed in the preceding slide.

## Quiz



Which section types enable you to reference a data grid or report? (Choose all that apply.)

- a. Text
- b. Navigation
- c. Data
- d. Chart

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**Answer: a, c, d**

## Lesson Agenda: Create a Websheet Application

- Overview
- Working with Pages and Sections
- Creating Data Grids
- Manipulating Data Grids
  - Overview
  - Adding a Column
  - Creating a List of Values
  - Editing Column Properties
  - Creating a Validation
  - Toggling Check Boxes
  - Setting Multiple Columns Values
  - Replacing Values
  - Adding Annotations



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# Overview

Click a text field to change the text.

The screenshot shows a data grid with a red border. At the top left is a search bar with a magnifying glass icon and the text 'Search Report', followed by a 'Search' button. At the top right is a blue 'Add Row' button. The data grid has columns: Project, Task, Start Date, End Date, Status, Assigned To, Cost, and Budget. The first column contains icons for edit (pencil) and delete (trash). The second column contains project names. The third column contains task descriptions. The fourth column contains start dates. The fifth column contains end dates. The sixth column contains status (e.g., Open, Pending, Closed). The seventh column contains assigned to (e.g., Pam King, James Cassidy, etc.). The eighth column contains cost. The ninth column contains budget. A red box highlights the 'Create prototype and trial testing' cell in the second row. A black arrow points from the text 'Click a text field to change the text.' to this highlighted cell. The entire data grid is also enclosed in a red box.

| Project                     | Task                                           | Start Date  | End Date    | Status  | Assigned To   | Cost | Budget |
|-----------------------------|------------------------------------------------|-------------|-------------|---------|---------------|------|--------|
| Timesheet Application       | Determine business rules                       | 15-MAR-2010 | 15-NOV-2010 | Open    | Pam King      | 2500 | 4000   |
| Timesheet Application       | Create prototype and trial testing             | 20-MAR-2010 | 30-NOV-2010 | Open    | James Cassidy | 6000 | 10000  |
| Order Management            | Develop application to streamline process      | 01-AUG-2010 | 18-DEC-2010 | Open    | Mark Nile     | 6000 | 18000  |
| Customer Tracker            | Consolidate customer contacts and interactions | 01-OCT-2010 | 15-DEC-2010 | Open    | Russ Sanders  | 300  | 12000  |
| Customer Tracker            | Deliver single customer tracker application    | 16-OCT-2010 | 29-DEC-2010 | Pending | Al Bines      | 0    | 2500   |
| Timesheet Application       | Company rollout and training                   | 25-MAR-2010 | 05-DEC-2010 | Open    | Pam King      | 1000 | 1500   |
| Commercial Software Package | Install and customize parameters               | 07-APR-2010 | 07-APR-2010 | Closed  | John Watson   | 1000 | 700    |
| Commercial Software Package | Train finance personnel                        | 10-APR-2010 | 05-OCT-2010 | Open    | John Watson   | 2000 | 1500   |
| Order Management            | Identify current processes                     | 10-JUL-2010 | 12-JUL-2010 | Closed  | Mark Nile     | 300  | 500    |
| Order Management            | Develop corporate policy                       | 12-JUL-2010 | 17-JUL-2010 | Closed  | James Cassidy | 500  | 500    |



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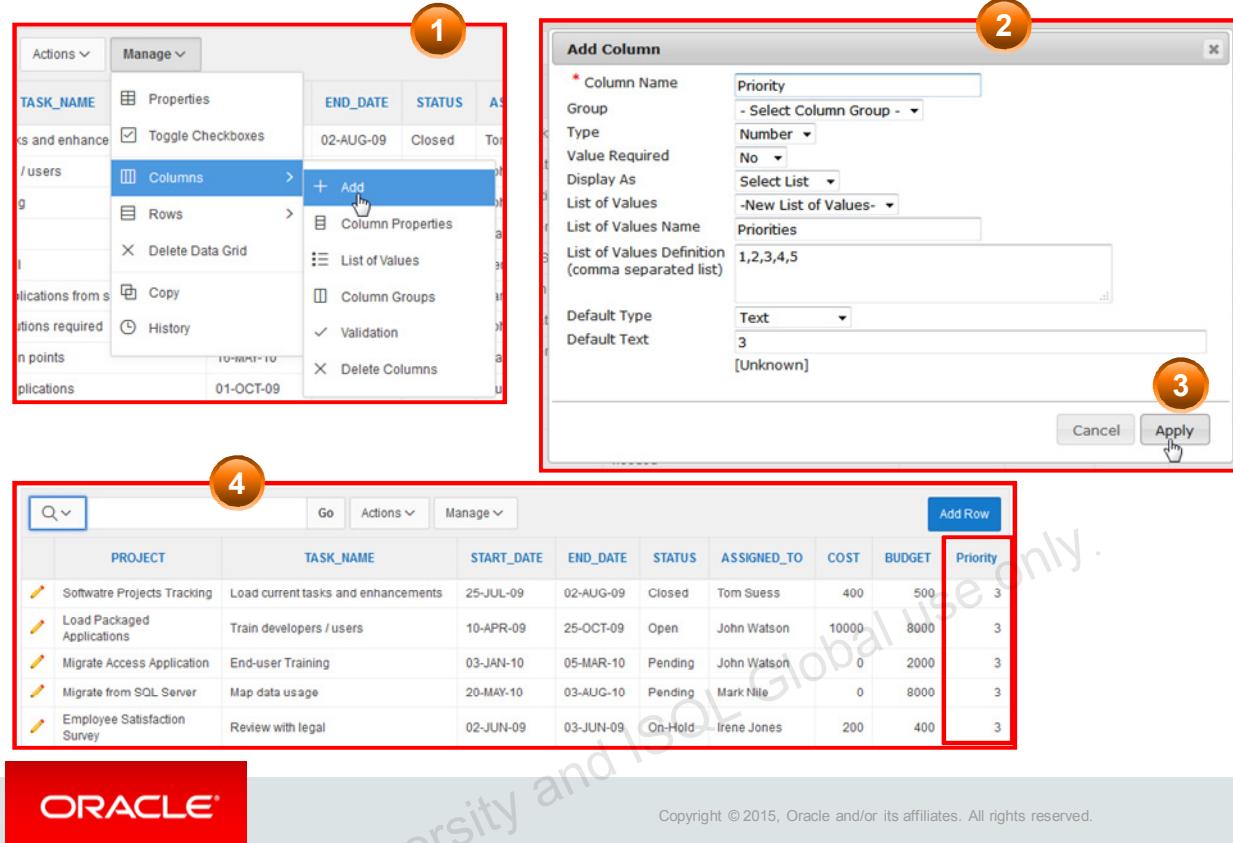
A data grid can be manipulated in many ways. There are two menus for data grids: Actions and Manage.

The Actions menu provides a way to change the way that the data grid is displayed. This menu is the same as the menu available for a basic interactive report in a database application. These options are discussed in detail in the lesson titled “Working with Reports for Desktop Applications.”

The Manage menu is specific to a data grid. You can manipulate the data in the data grid by using the options in this menu. Many of the tasks are covered in the next few slides.

You can click the pencil icon next to a row to edit that row. You can click the Add Row button to add a row to the data grid. You can also edit the text data in a data grid by clicking a cell (which changes the data into edit mode), making the change, and then changing focus to another field. This is the inline edit feature of a data grid.

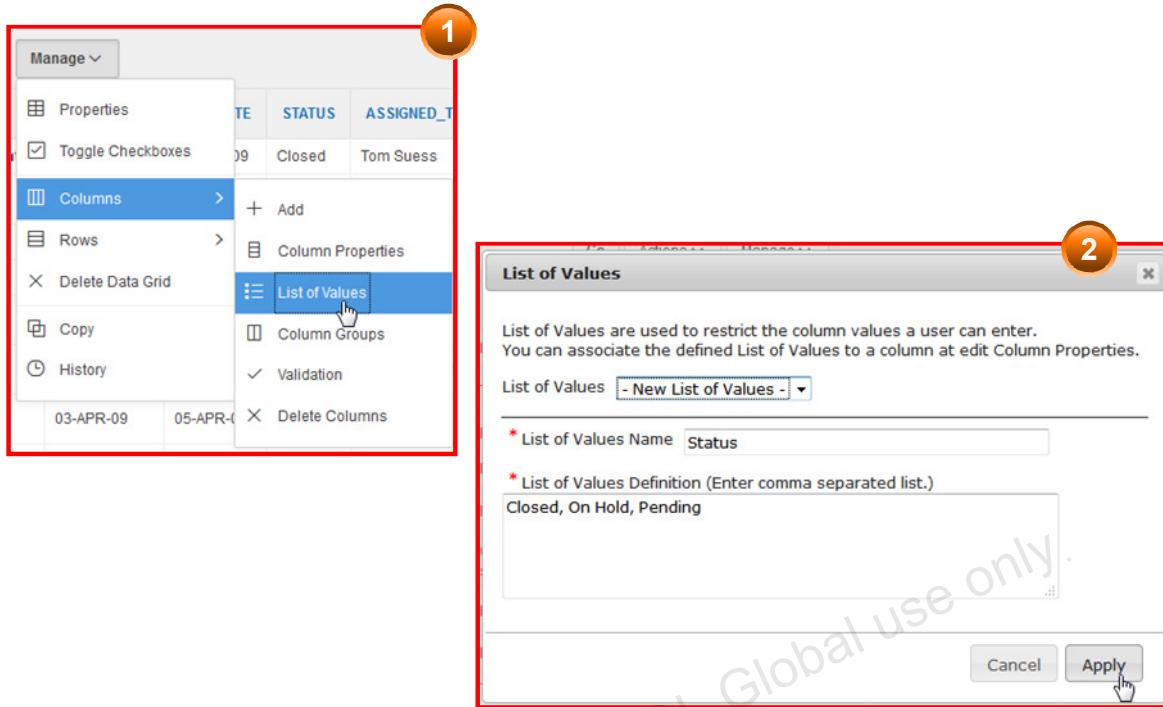
## Adding a Column



To add a column to a data grid, perform the following steps:

1. Select Manage > Columns > Add.
2. Enter the specifications for the new column. In the slide example, a new column for Priority is added. This column will be represented as a select list with the values 1 to 5, and the default value is 3.
3. Click Apply.
4. The new column is displayed in the data grid. The new column is also added to the Edit Row page when the user clicks the Edit icon for the row.

## Creating a List of Values



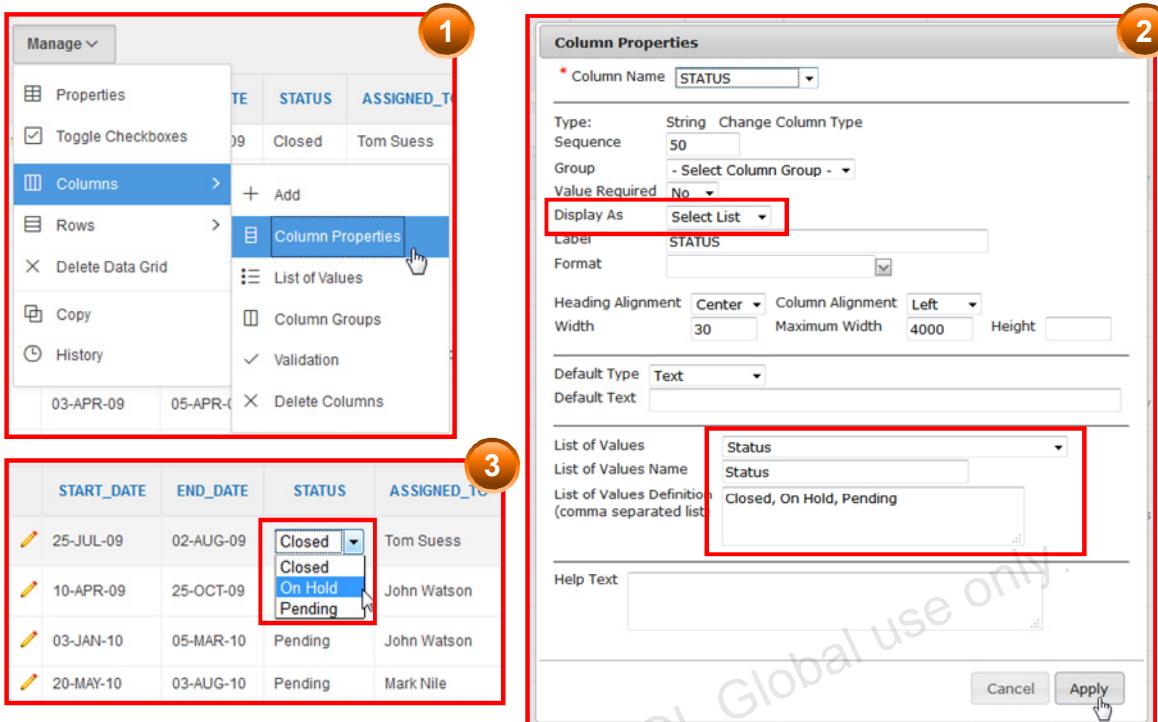
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You can create a list of values (LOV) to display column data in a data grid. To create an LOV, perform the following steps:

1. Select Manage > Column > List of Values.
2. Enter a name for the LOV and also enter the LOV values. Click Apply.

# Editing Column Properties

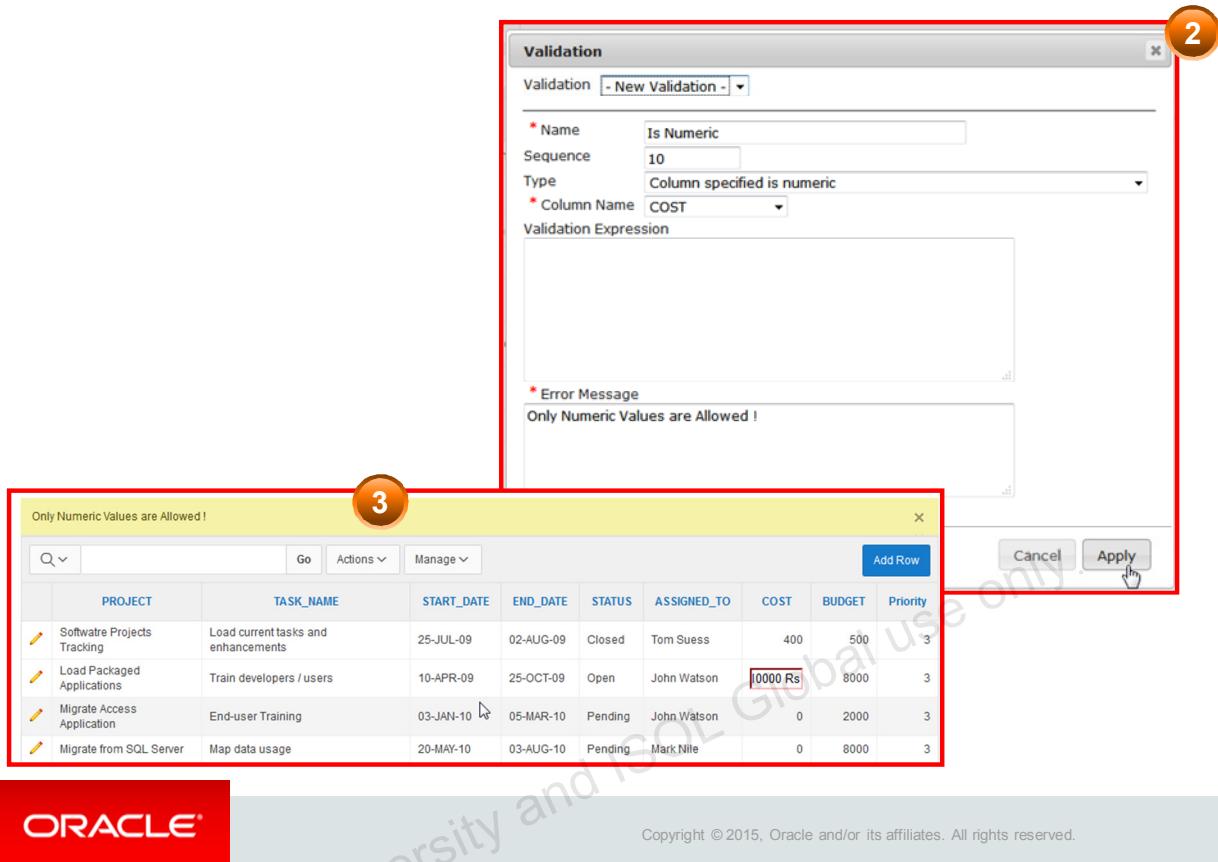


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You may want to control the values that your users enter. In this example, you change the text field to a drop-down list so that users can select only an existing value. Perform the following steps:

1. Select Manage > Columns > Column Properties.
2. In the Column Name drop-down list, select the name of the column that you want to change.
3. Specify the changes that you want to make. In the example in the slide, the Display As field is changed to Select List.
4. Select a list of values.
5. Click Apply.
6. Click one of the cells for the column that you changed. In the example in the slide, clicking a cell in the STATUS column opens a drop-down list (rather than a text field) with all the current values.

## Creating a Validation



You can create validations for columns in a data grid. Perform the following steps:

1. Select Manage > Columns > Validation (not shown in the slide).
2. Specify the validation and click Apply. In this example, a validation is created to ensure that only numeric values are entered in the Cost column.
3. Test the validation by entering a character in the Cost field.

## Toggling Check Boxes

The screenshot shows the Oracle Application Express interface. On the left, a sidebar menu titled 'Manage' is open, with the 'Properties' section selected. Within 'Properties', there is a checkbox labeled 'Toggle Checkboxes' which is checked. A hand cursor is pointing at this checkbox. An arrow points from this text to the data grid below:

Adding check boxes enables you to perform multirow or multicolumn tasks.

|                          | PROJECT                      | TASK_NAME                           | START_DATE | END_DATE  |
|--------------------------|------------------------------|-------------------------------------|------------|-----------|
| <input type="checkbox"/> | Software Projects Tracking   | Load current tasks and enhancements | 25-JUL-09  | 02-AUG-09 |
| <input type="checkbox"/> | Load Packaged Applications   | Train developers / users            | 10-APR-09  | 25-OCT-09 |
| <input type="checkbox"/> | Migrate Access Application   | End-user Training                   | 03-JAN-10  | 05-MAR-10 |
| <input type="checkbox"/> | Migrate from SQL Server      | Map data usage                      | 20-MAY-10  | 03-AUG-10 |
| <input type="checkbox"/> | Employee Satisfaction Survey | Review with legal                   | 02-JUN-09  | 03-JUN-09 |

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Certain tasks require that you select rows to which to apply the task. In such a case, you must toggle check boxes to turn them on to select the rows.

To toggle check boxes, select Manage > Toggle Checkboxes. Notice that there is a check box for each row. To turn the check boxes off, perform the action to toggle check boxes again. To select all rows, select the check box in the header area.

# Setting Multiple Column Values

**Step 1:** A screenshot of an Oracle Application Express page showing a data grid of tasks. A context menu is open over three selected rows: "Load Packaged Applications", "Migrate Access Application", and "Train developers / users". The menu path "Manage > Rows > Set Column Values" is highlighted. A red box highlights the selected rows in the grid.

**Step 2:** A screenshot of the "Set Column Values" dialog. The "Data Grid" is set to "Tasks" and the "Column" is set to "COST". The "New Column Value" field contains "450". The "Rows" section has a radio button selected for "Selected Rows". The "Apply" button is highlighted with a mouse cursor. A red box highlights the "Selected Rows" radio button and the "COST" column in the grid.

**Step 3:** A screenshot of the data grid after applying the changes. The "COST" column for the three selected rows has been updated to 450. A callout bubble points to the "COST" column of the selected rows with the text: "Only the rows that are selected are changed." A red box highlights the "COST" column for the selected rows.

You can change the values for a particular set of rows. Turn toggle check boxes on and select the columns for which you want to change values. Then perform the following steps:

1. Select Manage > Rows > Set Column Values.
2. Select the column that you want to change, enter the new value, and select the Selected Rows option. Then click Apply.
3. Only the rows that you selected are changed. Alternatively, you can select the value to be applied to all rows or just the rows that are null.

# Replacing Values

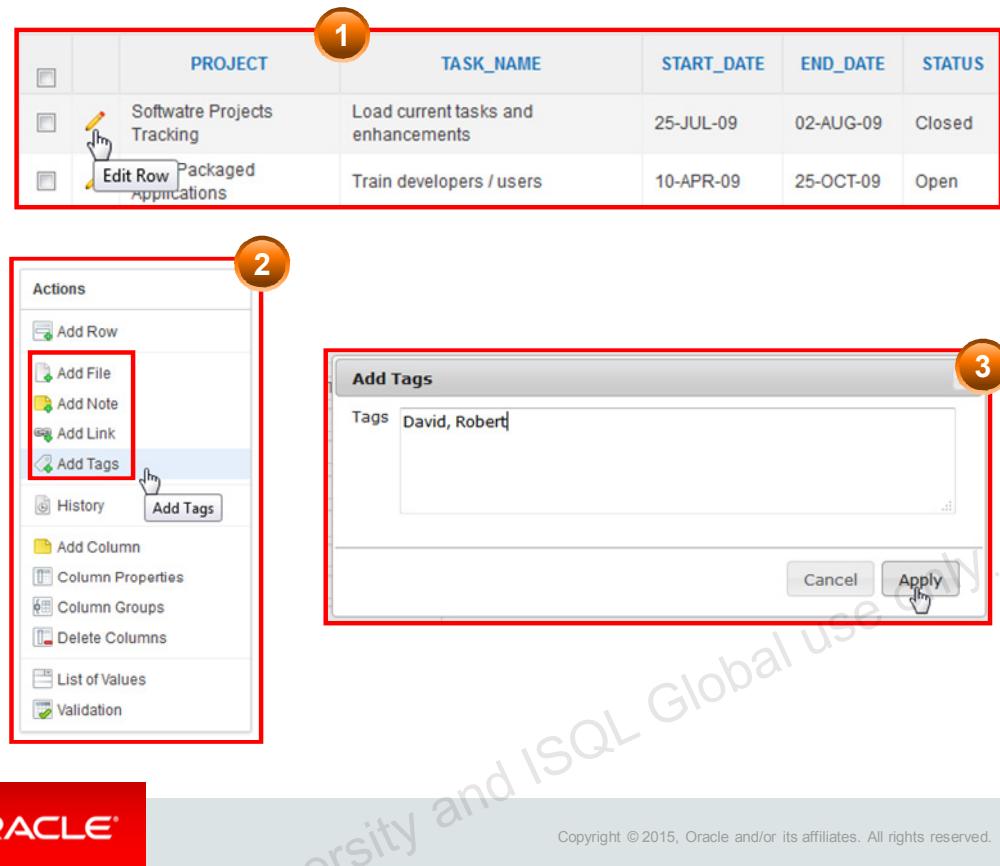
The screenshot shows the Oracle Application Express interface. On the left, a sidebar menu under 'Manage' has 'Rows' selected. A sub-menu for 'Rows' includes 'Replace', which is highlighted with a blue background and a red circle containing the number '1'. To the right is a 'Replace' dialog box for the 'Tasks' data grid. The 'Find What' field contains 'On-Hold' and the 'Replace With' field contains 'Pending'. The 'Replace' button at the bottom right of the dialog is also highlighted with a red circle containing a hand cursor icon. Below the dialog is a preview of the data grid showing five rows. The third row's 'STATUS' column value 'On-Hold' is highlighted with a red box and a hand cursor icon, indicating it is the target for replacement.

| PROJECT                      | TASK_NAME                           | START_DATE | END_DATE  | STATUS  | ASSIGNED_TO | COST | BUDGET | Priority |
|------------------------------|-------------------------------------|------------|-----------|---------|-------------|------|--------|----------|
| Software Projects Tracking   | Load current tasks and enhancements | 25-JUL-09  | 02-AUG-09 | Closed  | Tom Suess   | 400  | 500    | 3        |
| Load Packaged Applications   | Train developers / users            | 10-APR-09  | 25-OCT-09 | Open    | John Watson | 450  | 8000   | 3        |
| Migrate Access Application   | End-user Training                   | 03-JAN-10  | 05-MAR-10 | Pending | John Watson | 450  | 2000   | 3        |
| Migrate from SQL Server      | Map data usage                      | 20-MAY-10  | 03-AUG-10 | Pending | Mark Nile   | 0    | 8000   | 3        |
| Employee Satisfaction Survey | Review with legal                   | 02-JUN-09  | 03-JUN-09 | Pending | Irene Jones | 200  | 400    | 3        |

There may be situations where you want to change a set of values. In the example in the slide, the On-Hold STATUS value is changed to Pending. Perform the following steps:

1. Select Manage > Rows > Replace.
2. Select the column that you want. In this case, it is the STATUS column.
3. Enter the original value in the Find What area and the new value in the Replace With area. Then click Apply.
4. Note that all On-Hold values are replaced with Pending.

# Adding Annotations to a Data Grid



On pages or in rows of a data grid, you can include the following annotations:

- **Files:** Upload files for download or to display as an inline image within section text.
- **Notes:** Obvious and usually temporary notes that are specific to the content
- **Tags:** Tags to aid in searching
- **Links:** URLs to specific websites or files on the Internet or intranet

To add an annotation, perform the following steps:

1. Click the Edit icon for a row.
2. In the Actions area of the Add/Edit Row page, select the annotation type.
3. Complete the specific fields (they vary depending on the annotation type), and click Apply.

The annotation is displayed.

To add the annotation to the data grid display, you must add the column to the display by using Actions > Select Columns.

## Summary

In this lesson, you should have learned how to:

- Identify the different components of a websheet application
- Create a websheet application
- Create sections on a websheet page
- Annotate pages with files, notes, and tags
- Create and manipulate a data grid



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In this lesson, you should have learned about the various components of a websheet application. You should have learned how to create a websheet application, create sections on a websheet page, annotate pages with files, notes, and tags, and also create and manipulate a data grid.

## Manipulate and Administer a Websheet Application

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## Objectives

After completing this lesson, you should be able to:

- Enable a websheet to interact with a database
- Create SQL and report sections
- Create navigation sections
- Administer a websheet



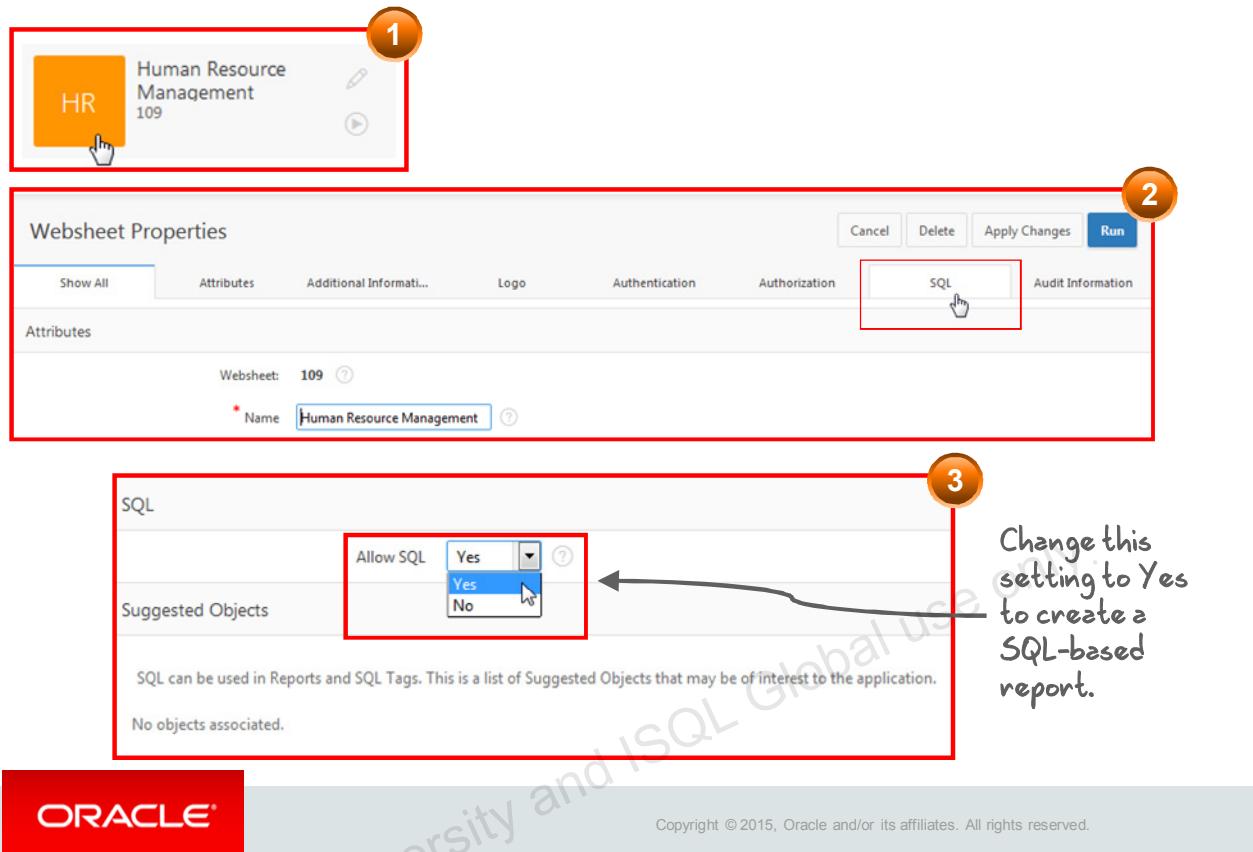
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In this lesson, you learn how to edit a websheet application's properties and manipulate a websheet. You also learn how to share a websheet across different users.

# Lesson Agenda: Manipulate and Administer a Websheet Application

- Interacting with the Database
  - Editing Websheet Properties
  - Creating a Report
  - Using SQL Markup
- Enhancing Websheet Applications
- Administering Websheet Applications

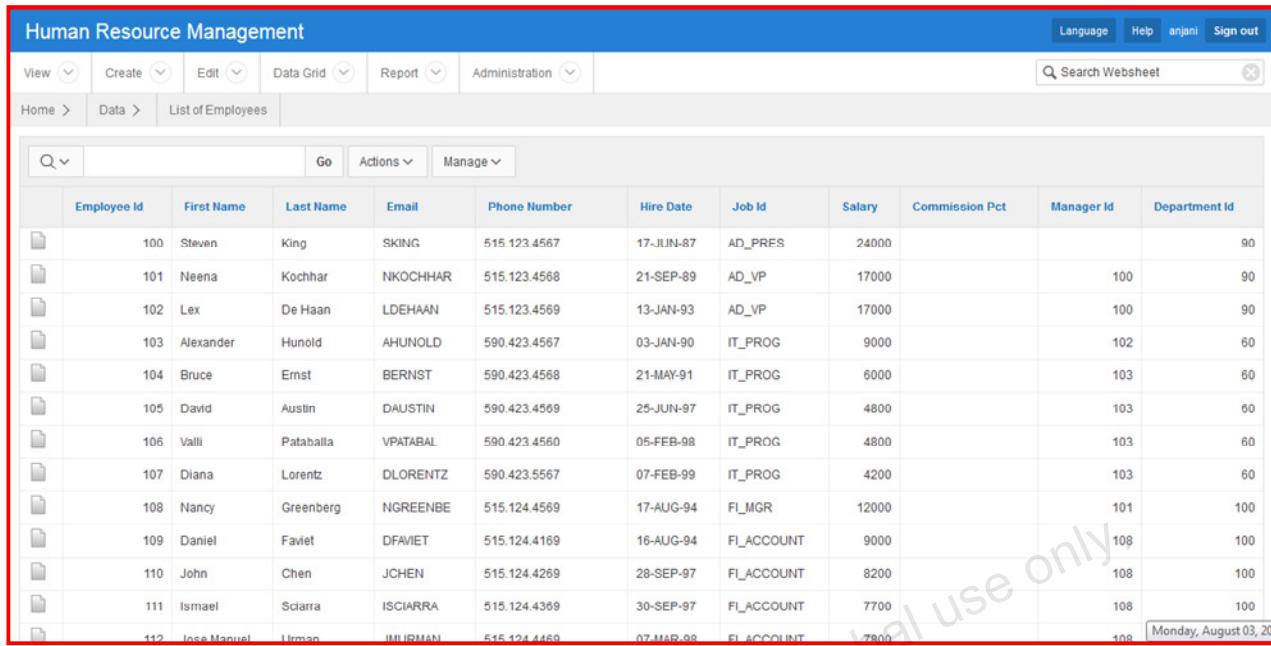
## Editing Websheet Properties



If you want to interact with database objects from a websheet, you must enable SQL and PL/SQL for the websheet. Perform the following steps:

1. On the Websheet applications home page, click the websheet icon.
2. Click the SQL subtab.
3. Select Yes for “Allow SQL”.
4. Click Apply Changes.

# Reports



The screenshot shows the Oracle Application Express Data Grid interface titled "Human Resource Management". The top navigation bar includes "View", "Create", "Edit", "Data Grid", "Report", "Administration", "Language", "Help", "arjani", and "Sign out". Below the navigation is a breadcrumb trail: Home > Data > List of Employees. The main area displays a grid of employee data with the following columns: Employee Id, First Name, Last Name, Email, Phone Number, Hire Date, Job Id, Salary, Commission Pct, Manager Id, and Department Id. The data grid contains 12 rows of employee information, with the last row showing a timestamp of "Monday, August 03, 2015".

|  | Employee Id | First Name  | Last Name | Email    | Phone Number | Hire Date | Job Id     | Salary | Commission Pct | Manager Id | Department Id |
|--|-------------|-------------|-----------|----------|--------------|-----------|------------|--------|----------------|------------|---------------|
|  | 100         | Steven      | King      | SKING    | 515.123.4567 | 17-JUN-87 | AD_PRES    | 24000  |                |            | 90            |
|  | 101         | Neena       | Kochhar   | NKOCHHAR | 515.123.4568 | 21-SEP-89 | AD_VP      | 17000  |                | 100        | 90            |
|  | 102         | Lex         | De Haan   | LDEHAAN  | 515.123.4569 | 13-JAN-93 | AD_VP      | 17000  |                | 100        | 90            |
|  | 103         | Alexander   | Hunold    | AHUNOLD  | 590.423.4567 | 03-JAN-90 | IT_PROG    | 9000   |                | 102        | 60            |
|  | 104         | Bruce       | Ernst     | BERNST   | 590.423.4568 | 21-MAY-91 | IT_PROG    | 6000   |                | 103        | 60            |
|  | 105         | David       | Austin    | DAUSTIN  | 590.423.4569 | 25-JUN-97 | IT_PROG    | 4800   |                | 103        | 60            |
|  | 106         | Valli       | Pataballa | VPATABAL | 590.423.4560 | 05-FEB-98 | IT_PROG    | 4800   |                | 103        | 60            |
|  | 107         | Diana       | Lorentz   | DLORENTZ | 590.423.5567 | 07-FEB-99 | IT_PROG    | 4200   |                | 103        | 60            |
|  | 108         | Nancy       | Greenberg | NGREENBE | 515.124.4569 | 17-AUG-94 | FI_MGR     | 12000  |                | 101        | 100           |
|  | 109         | Daniel      | Faviet    | DFAVIET  | 515.124.4169 | 16-AUG-94 | FI_ACCOUNT | 9000   |                | 108        | 100           |
|  | 110         | John        | Chen      | JCHEN    | 515.124.4269 | 28-SEP-97 | FI_ACCOUNT | 8200   |                | 108        | 100           |
|  | 111         | Ismael      | Sciarrra  | ISCIARRA | 515.124.4369 | 30-SEP-97 | FI_ACCOUNT | 7700   |                | 108        | 100           |
|  | 112         | Ines Manuel | Urmman    | IMURMAN  | 515.124.4469 | 07-MAR-98 | FI_ACCOUNT | 7800   |                | 108        | 100           |



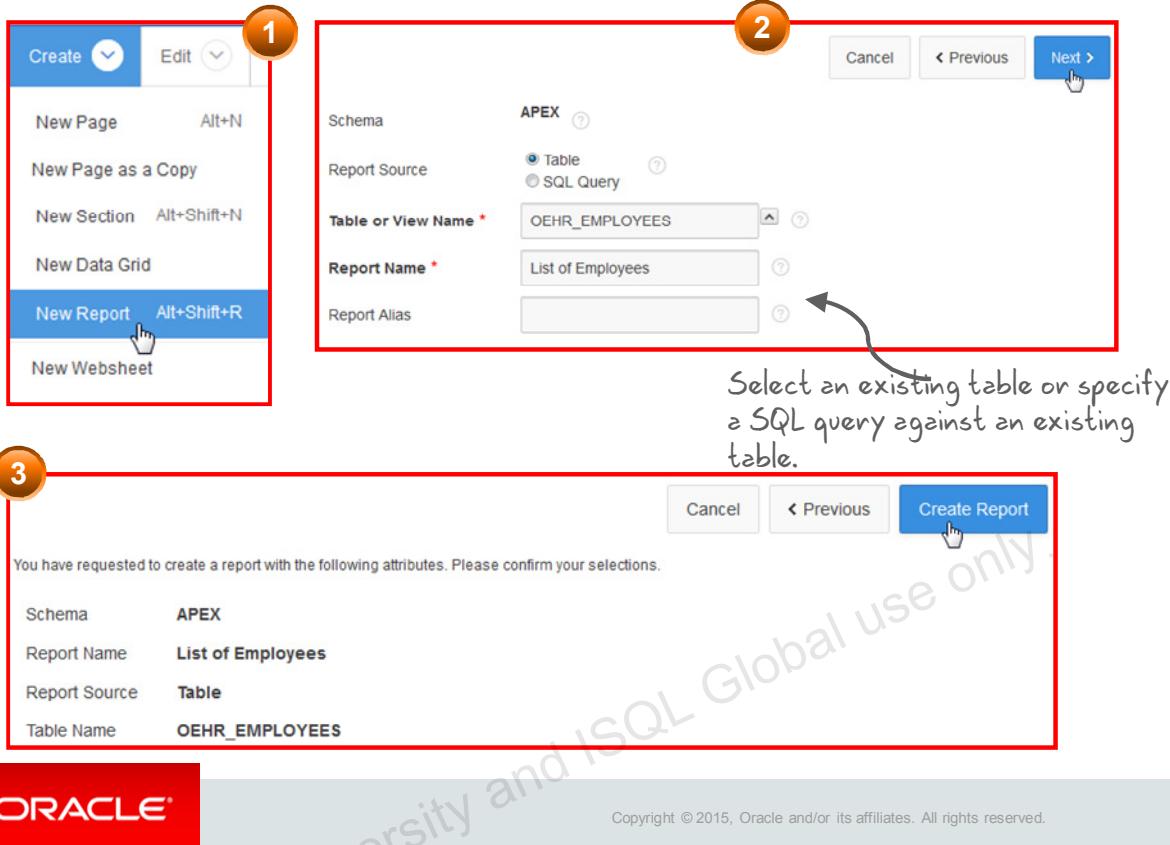
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Reports are queries against the database objects that you have access to. To define a report, you can either simply select a table or view within an available schema, or you can create something more complex by using industry-standard SQL.

Just as with data grids, reports are highly customizable. Users can alter the layout of report data by choosing the columns that they are interested in and applying filters, highlighting, and sorting. They can also define breaks, aggregations, group by, computations, and different charts. A subscription can also be set to email the report at a designated interval. Users can create multiple variations of a report and save them as named reports, for either public or private viewing.

In addition to being available on the Data tab, data within a report can be included as a chart or report on any page.

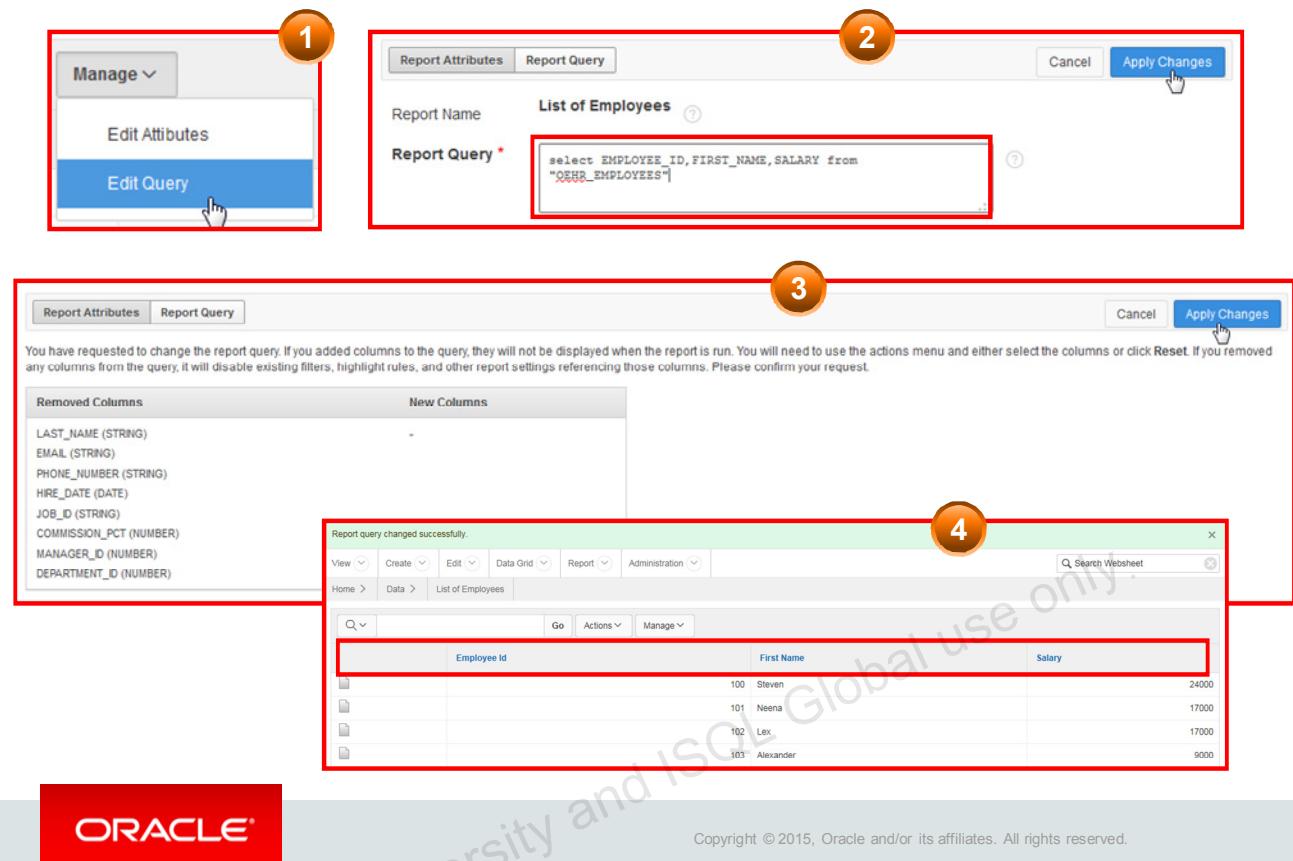
# Creating a Report



To create a report, perform the following steps:

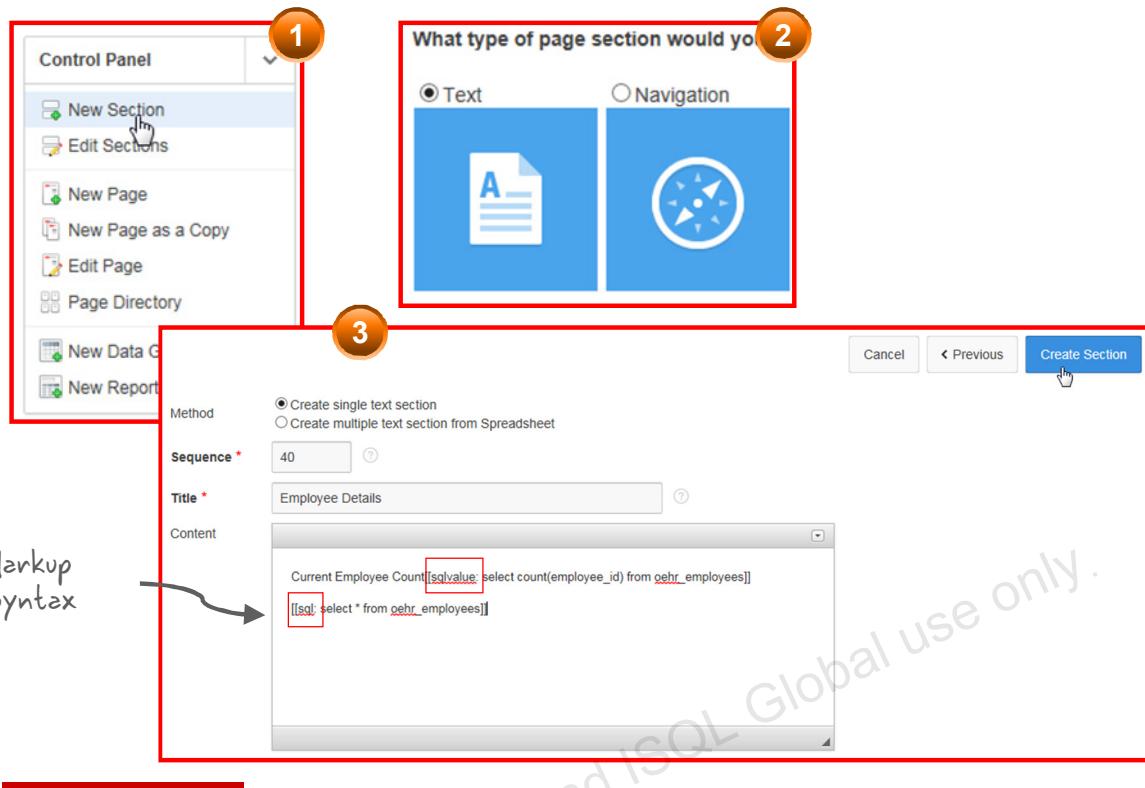
1. Click Create and select New Report.
2. Select Table or SQL Query for the report source, specify the rest of the fields depending on your report source, and click Next. In the example in the slide, Table is selected for the report source; so you select a table, specify a report name, and click Next.
3. Review the details and click Create Report.

## Editing the Report Query



You can change the query that the report is based on by selecting Manage > Edit Query. Alternatively, if you are viewing report attributes, click the Report Query tab. After you change the query, click Apply Changes. If columns were added or removed, a window is displayed confirming the changes. Click Apply Changes again to confirm the changes.

# Using SQL Markup



You can write SQL queries within your text sections. This is done by using the SQL markup syntax. In the slide example, note the use of the SQL and SQLVALUE markup syntax.

```
[[sqlvalue: <SQL query returning single value>]]
[[sql: <SQL query>]]
```

## Quiz



You can use markup text to reference a file or URL.

- a. True
- b. False

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**Answer: b**

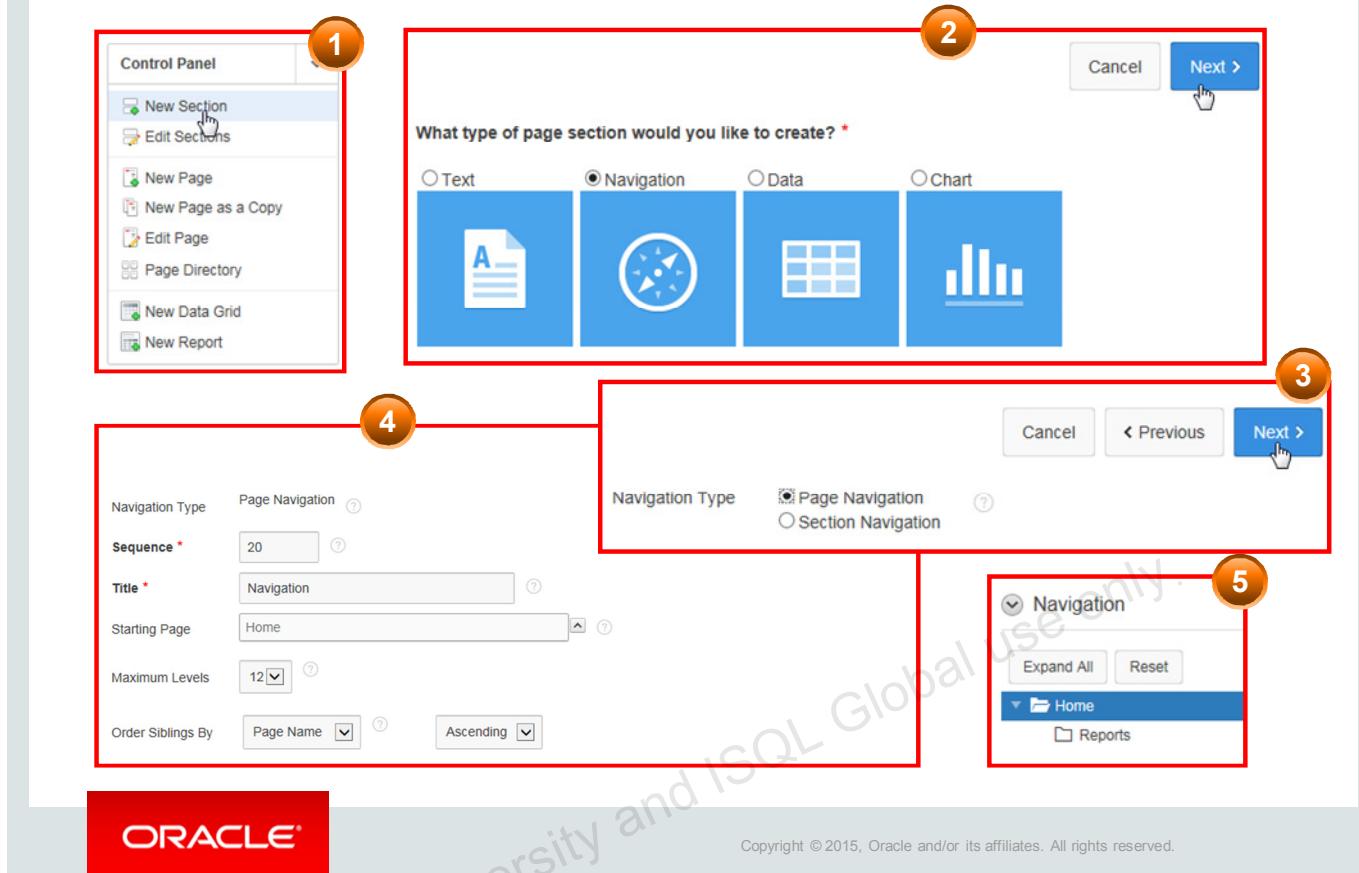
## Lesson Agenda: Manipulate and Administer a Websheet Application

- Interacting with the Database
- Enhancing Websheet Applications
  - Creating Navigation Sections
  - Linking Pages
  - Moving a Section to a Different Page
  - Viewing Page History
  - Viewing a Page in Presentation Mode
- Administering Websheet Applications



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# Creating Navigation Sections

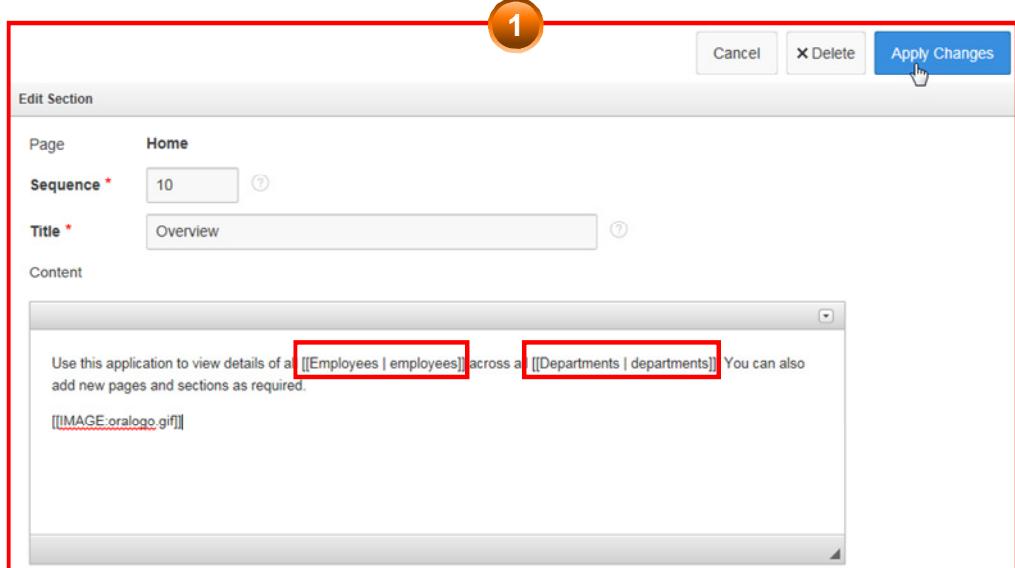


Two types of navigation sections are available: Page and Section. The Page Navigation section is displayed as a tree showing the hierarchy of pages with links to each page. The Section Navigation section displays a list of sections on a particular page. To create a navigation section, perform the following steps:

1. Click New Section in the Control Panel.
2. Select Navigation and click Next.
3. Select the navigation type and click Next.
4. Enter a name for the section, and specify the appropriate fields depending on the navigation type. Click Create Section.
5. The navigation section is created.

Notice that if you add a section to a page or add another page to the websheet after you create the navigation section, it is automatically added to the navigation section.

## Linking Pages



The screenshot shows the 'Overview' page. A red box labeled '2' highlights the top left corner where the 'Overview' link is located. The page content includes:

Overview  
Use this application to view the details of all **employees** across all **departments**. You can also add new pages and sections as requested.  
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You can create links in the text section to reference another page in the application. Note the use of the markup syntax in the example in the slide:

`[[ page name | link name ]]`

## Moving a Section to a Different Page

The screenshot illustrates the steps to move a section:

- Step 1:** The top part shows the "Employee Details" section of the application. A red box highlights the entire section area, and a red circle with the number "1" points to the "Edit" link in the top right corner.
- Step 2:** The middle part shows the "Sections" page. A red box highlights the "Employee Details" section in the list. A red circle with the number "2" points to the "Move Section To Another Page" button, which is highlighted with a blue background.
- Step 3:** The bottom part shows the "Move Section to Another Page" dialog box. A red box highlights the "New Page" dropdown, which is set to "Employees". A red circle with the number "3" points to the "Move Section" button at the top right of the dialog.

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You can move an existing section to another page or create a new page within the section. To move a section, perform the following steps:

1. Click the Edit link for the section.
2. Click the settings icon and select “Move Section to Another Page.”
3. Select the page to move to and click Move Section.

The section will appear on the new page.

## Viewing Page History

The screenshot illustrates the process of viewing page history in Oracle Application Express. It consists of two main parts:

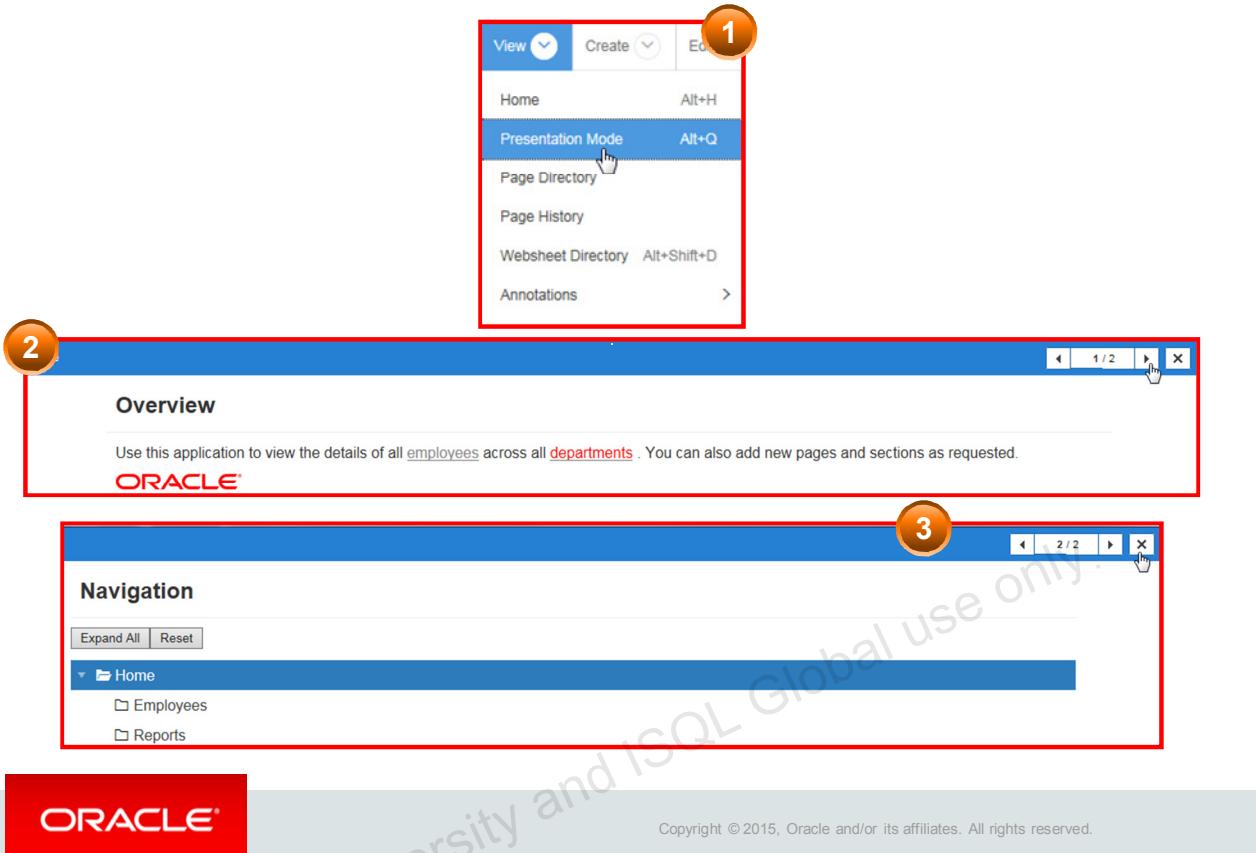
- Step 1:** A screenshot of the application's top navigation bar. The "View" menu is open, showing options like Home, Presentation Mode, Page Directory, and Page History. The "Page History" option is highlighted with a mouse cursor and has a red rectangular box around it. A small orange circle with the number "1" is positioned in the top right corner of this box.
- Step 2:** A screenshot of the "Page Section History" report page. This page lists changes made to specific pages and sections. The table includes columns for Page, Section, Old Content, New Content, Changed (with a downward arrow icon), User, and Page. Two rows are visible:

| Page      | Section          | Old Content | New Content     | Changed        | User   | Page             |
|-----------|------------------|-------------|-----------------|----------------|--------|------------------|
| Employees | -                | -           | Page created    | 3 minutes ago  | anjani | 9725726032959693 |
| Employees | Employee Details | -           | Section created | 25 minutes ago | anjani | 9725726032959693 |

A large red rectangular box surrounds the entire "Page Section History" section. A small orange circle with the number "2" is positioned in the top right corner of this box.

To view changes made to any pages or sections, select View > Page History.

## Viewing a Page in Presentation Mode



You can view a page in presentation mode. This will display one section at a time and also provide controls to move to the next section. To view a page in presentation mode, select View > Presentation Mode and perform the following steps:

1. Click the presentation icon at the top-right corner of the page.
2. The first section of the page is displayed. Click the next icon to move to the next section.
3. The next section on the page is displayed. Click the close icon to exit presentation mode.

## Lesson Agenda: Manipulate and Administer a Websheet Application

- Interacting with the Database
- Enhancing Websheet Applications
- Administering Websheet Applications
  - Sharing Websheet with Users



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## Sharing Websheets with Users

1. View the current websheet authentication method.
2. Create users in Application Express Administration.
3. Define an Access Control List (ACL) in the websheet.
4. Change websheet authorization to use a custom ACL.
5. Test user access to the websheet.



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To share the pages in your websheet with the user community, you must provide them with a username and password to log in. Depending on the username, you can authorize each user to have a particular level of access. The slide provides an overview of the steps required to set up an ACL, which determines who has access to your websheet and what privileges (if any) they have.

These steps are discussed in detail in the following slides.

## 1. View the Current Websheet Authentication Method

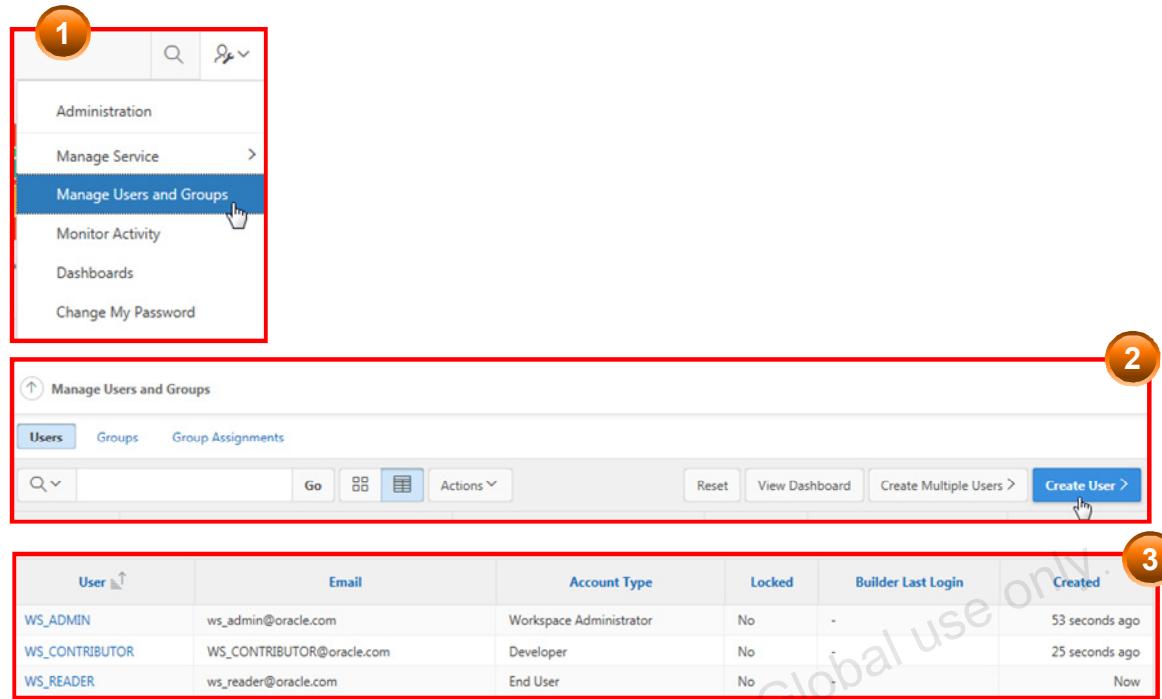
The screenshot shows the 'Websheet Properties' dialog box. At the top, there are tabs for 'Show All', 'Attributes', 'Additional Information', 'Logo', 'Authentication' (which is selected and highlighted in blue), 'Authorization', 'SQL', and 'Audit Information'. Below the tabs, the 'Authentication' section is expanded, containing the following fields:

- Authentication:** A radio button group where the first option, 'Application Express Account', is selected (indicated by a red box).
- Logout URL:** A text input field containing 'ws?p=109:home'.
- Cookie Name:** An empty text input field.
- Cookie Path:** An empty text input field.
- Cookie Domain:** An empty text input field.
- Secure:** A dropdown menu set to 'No'.

At the bottom right of the dialog are buttons for 'Cancel', 'Delete', 'Apply Changes', and a prominent blue 'Run' button. The entire 'Authentication' section is also enclosed in a large red box.

Before you set up an ACL, you should review the current authentication method that you are using. Select Administration > Websheet Properties and expand the Authentication region. In the example in the slide, the current authentication method is Application Express Account. This means that you must create all the users that you want to have access to this websheet in Application Express, and then you can assign them a particular privilege in the websheet when you create the ACL.

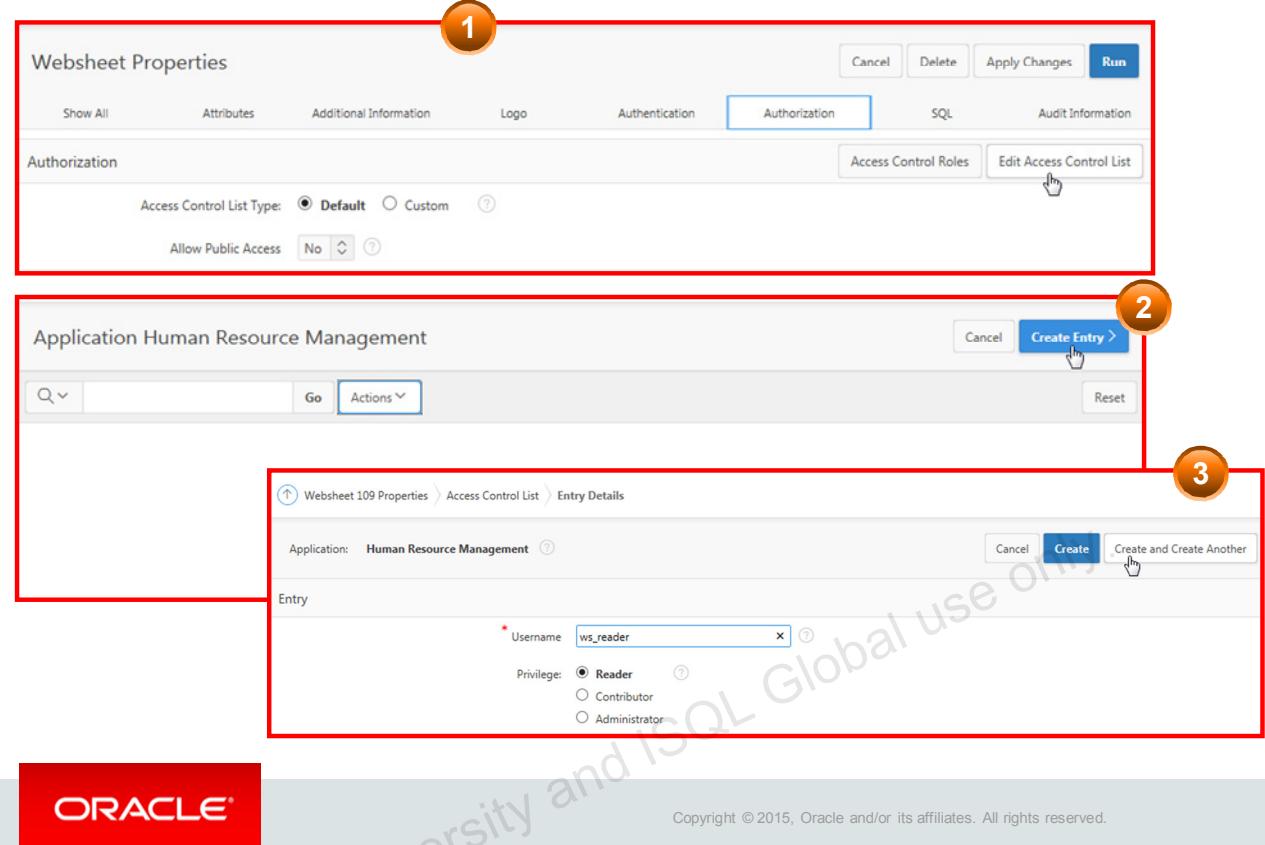
## 2. Create Users in Application Express Administration



To create a user in Application Express Administration, perform the following steps:

1. Log in to Application Express as “Administrator”.
2. Click Tools on the right side of the home page and select “Manage Users and Groups”.
3. Click Create User and create the required user.
4. The users for this example are listed.

### 3. Create an ACL in Your Websheet



After your APEX users are created, you can define an ACL in the websheet to allow the user to be authorized to access the websheet. You can assign the following three privileges to provide different levels of authorization for your websheet:

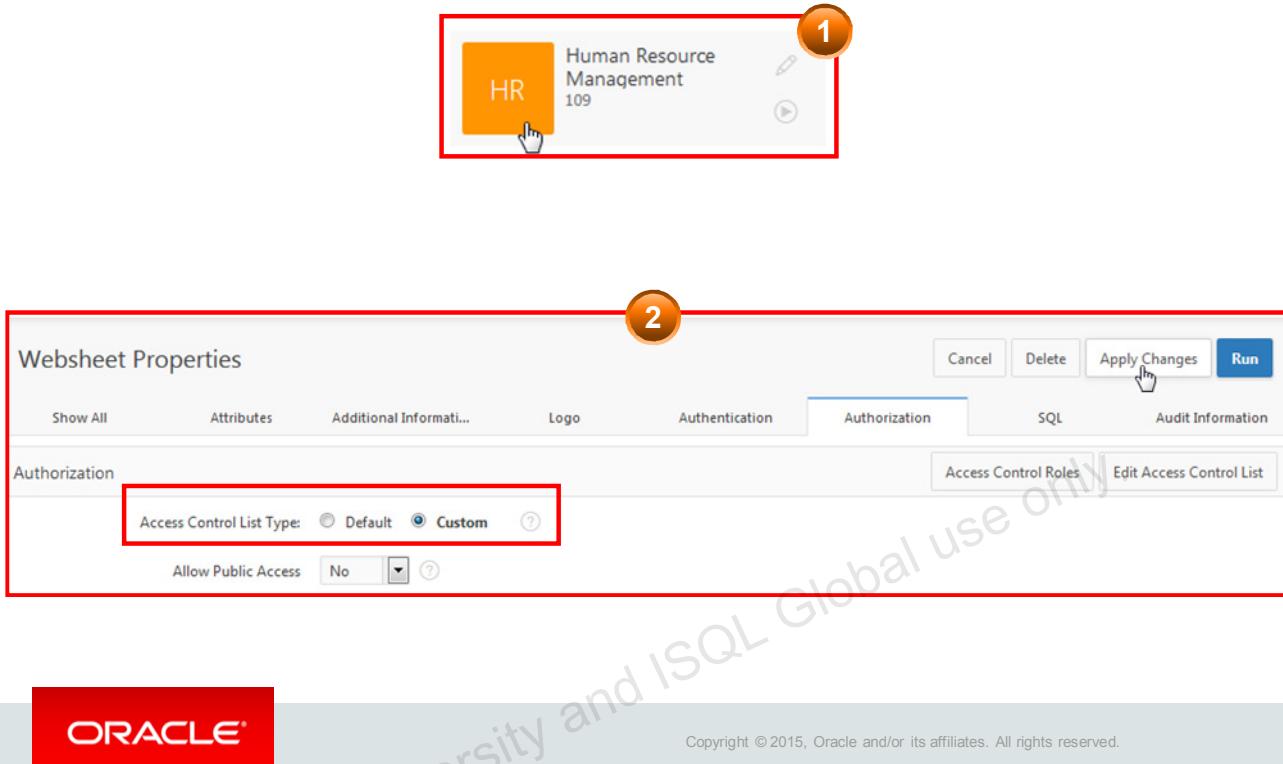
- **Reader:** Read access only; cannot make any changes
- **Contributor:** Can make changes to pages, sections, data grids, and reports, but cannot perform any administration tasks, such as define an ACL or change the authentication of the websheet
- **Administrator:** Can perform all functions allowed within a websheet

To create an ACL, log in to the Application Express as the user who created the websheet and perform the following steps:

1. On the Websheet applications home page, click the websheet icon.
2. Click the Authorization subtab.
3. Click Edit Access Control List.
4. Click Create Entry.
5. Enter the user ID and select appropriate access.
6. Click Create. Alternatively, click “Create and Create Another” to create another user.

**Note:** You must also add the creator of the websheet as an administrator so that the user can change the ACL type. If that user is not in the ACL, that person will not be able to enable the list (in the step in the next slide).

## 4. Change Websheet Authorization to Use a Custom ACL



To enable the ACL that you created in the previous step, perform the following steps:

1. On the Websheet applications home page, click the websheet icon.
2. Click the Authorization subtab.
3. Select Custom for Access Control List Type.
4. Click Apply Changes.

## 5. Test User Access to the Websheet



Depending on the privilege, the user is given different access to the websheet. In the example in the slide, note the following:

- The **WS\_READER** user cannot create any new objects or edit any existing ones. This user can only view the websheet objects.
- The **WS\_CONTRIBUTOR** user can create new websheet objects, but cannot administer the websheet.
- The **WS\_ADMIN** user has all privileges—the same privileges that the user who created the websheet has.

## Quiz



A user needs the ability to modify a section on a page but not change the properties of the websheet. Which websheet user privilege is needed?

- a. Administrator
- b. Reader
- c. Contributor
- d. Developer

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**Answer: c**

## Websheet Application Development: Additional References

- [Tutorial on Websheet Application Development in OLL](#)
- [http://www.oracle.com/technetwork/developer-tools/apex/overview/index.html](#)



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## Summary

In this lesson, you should have learned how to:

- Enable a websheet to interact with a database
- Create SQL and report sections
- Create navigation sections
- Administer a websheet



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In this lesson, you should have learned how to enable a websheet to interact with the database. You should have learned how to create SQL, PL/SQL, report sections, navigation sections, and administer a websheet application.

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# Converting Oracle Forms Application

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## Objectives

After completing this lesson, you should be able to convert an Oracle Forms application to an Oracle Application Express application.



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In this lesson, you learn how to convert an Oracle Forms application to an Oracle Application Express application.

# Why Migrate to Oracle Application Express?

An Oracle Forms application should be migrated to an Oracle Application Express application for the following reasons:

- Provides a robust, scalable, and secure application
- Takes full advantage of the Oracle Database
- Requires only a web browser and no client software
- Results in a hypertext mark-up language (HTML) webpage
- Provides many features, such as reports and charts
- Enables developers to rapidly deploy web application



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Often simple applications developed using Oracle Forms grow in size and complexity and become mission critical. Migrating to Oracle Application Express provides a robust, scalable, secure application development tool that takes full advantage of the Oracle Database. Oracle Application Express requires only a web browser and no other client software for development, or for run time. The resulting pages developed using Oracle Application Express is rendered in HTML format. Oracle Application Express provides many features, such as interactive reports, charts, calendars, and enables developers to rapidly deploy web application with high user interactivity. Therefore, it is a good idea to migrate from Oracle Forms to Oracle Application Express.

## Prerequisite for Converting Oracle Forms Applications

Before you begin the conversion process, you must:

- Install Oracle Application Express release 4.0 or later
- Install Oracle9i Oracle Developer Suite or later
- Convert Oracle Forms Metadata
- Associate Oracle Forms Schema with Oracle Application Express workspace



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Before you begin the conversion process, you must:

- Install Oracle Application Express release 4.0 or later.
- Install Oracle9i Oracle Developer Suite to convert Oracle Forms applications and Oracle Reports to XML format. You will specifically need Oracle Forms Builder and Oracle Reports Builder applications from this suite.
- Convert Oracle Forms Metadata to XML and PL/SQL library files to .PLD text files. This conversion process is explained in detail in the following slides.
- Associate Oracle Forms schema with the Oracle Application Express workspace.

## Forms Conversion: Overview

The conversion process consists of the following steps:

1. Converting Oracle Forms Metadata
2. Creating a workspace and adding Oracle Application Express users
3. Uploading database objects into the schema associated with your workspace
4. Creating a Conversion Project
5. Reviewing and editing the application metadata
6. Setting up application defaults
7. Generating an Oracle Application Express application

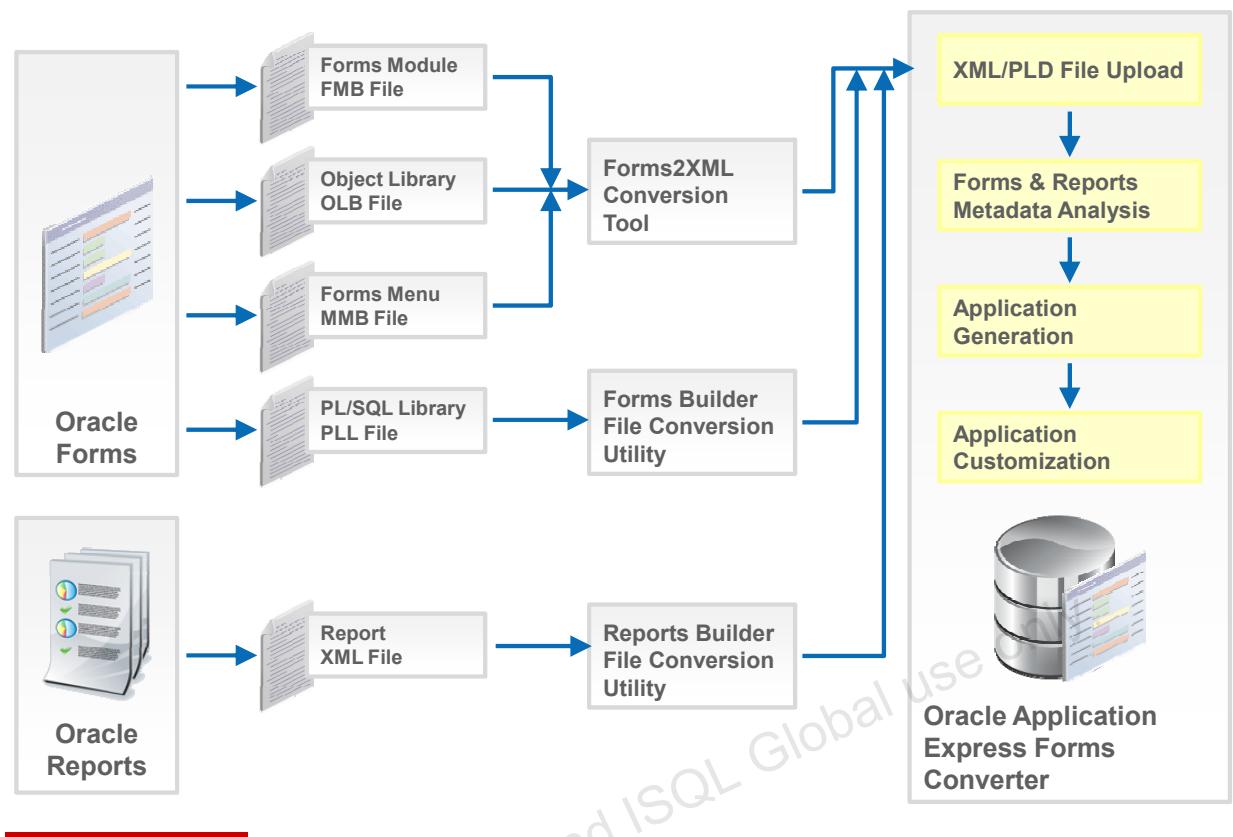


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The first three steps are the prerequisite for Oracle Forms Application conversion. The conversion process begins at step 4.

These steps are explained in detail in the following slides.

## Forms Conversion: Diagram



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The slide shows a diagrammatic view of the conversion process. Notice how the Oracle Forms and Reports go through a conversion process and the output is the Oracle Application Express application.

## 1. Converting Oracle Forms

To convert Oracle Forms to Oracle Application Express, you must first convert the following:

- Convert FormModules (.FMB), ObjectLibraries (.OLB), or MenuModules (.MMB) to XML
- Convert a PL/SQL Library (.PLL) to .PLD
- Convert an Oracle Report (.RDF, .REX, .JSP) to XML



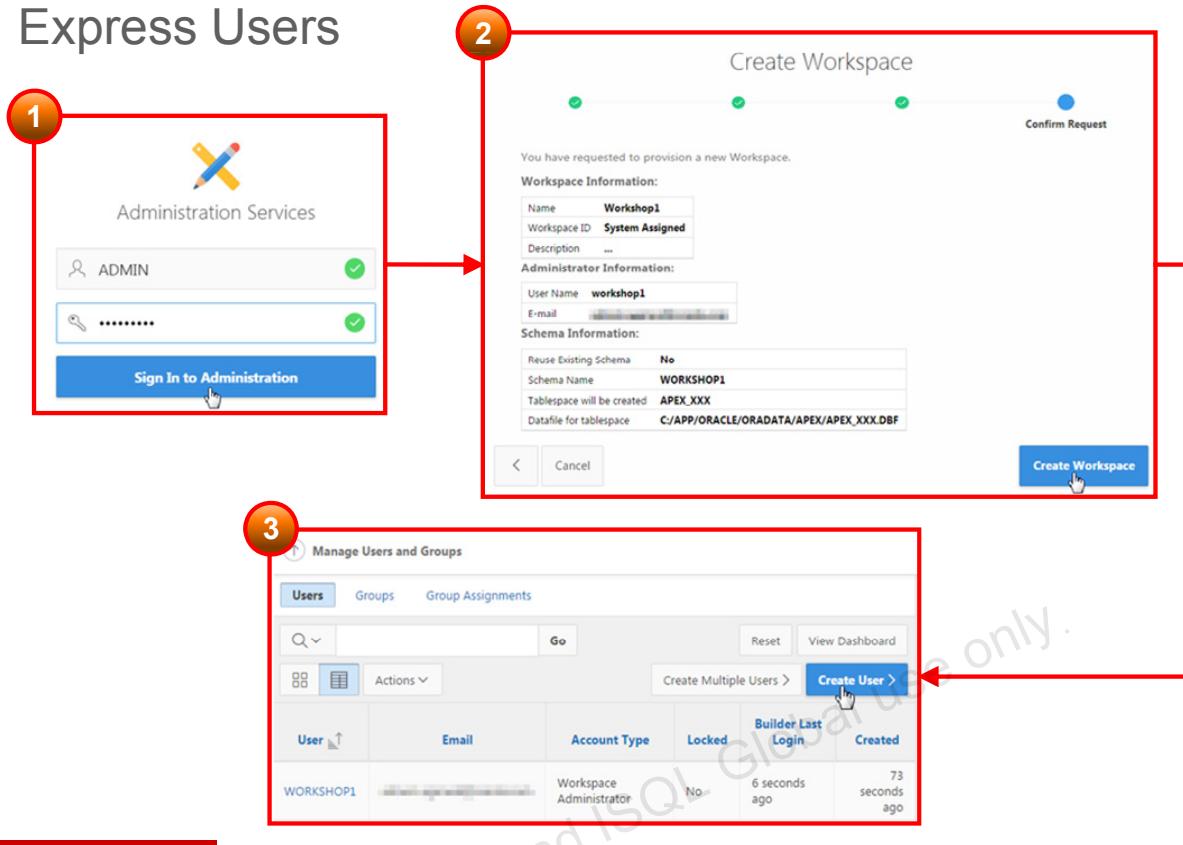
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To convert Oracle Forms to Oracle Application Express, you must first convert the Form modules to various formats that the Create Migration Project Wizard can consume.

- **Converting FormModules, ObjectLibraries, or MenuModules to XML:** You can convert Oracle Forms FormModule, MenuModule, and ObjectLibrary files to Extensible Markup Language (XML) using the Oracle Forms to XML conversion tool, Forms2XML.
- **Converting a PL/SQL Library:** Use the File > Convert option in Oracle Forms Builder to convert PL/SQL library .PLL files to .PLD text files. To learn more about Oracle Forms, see: <http://www.oracle.com/technetwork/developer-tools/forms/overview/index.html>
- **Converting an Oracle Report to XML:** To convert an Oracle Report, use the File Conversion option in Oracle Reports Builder to convert binary (.RDF), ASCII (.REX), and .JSP reports to XML format. To learn more about Oracle Reports, see: <http://www.oracle.com/technetwork/middleware/reports/overview/index.html>

A diagrammatic view of the conversion of Oracle Forms to XML is shown in the previous slide.

## 2. Creating a Workspace and Adding Oracle Application Express Users



Perform the following steps to create a workspace and add Oracle Application Express users:

1. Log in to the INTERNAL workspace as instance administrator.
2. Create the workspace and workspace administrator by using the Create Workspace Wizard. In the slide example, the WORKSHOP1 workspace and workspace administrator is created.
3. Log in to the workspace as workspace administrator and create more users.

### 3. Uploading Database Objects into the Schema Associated with Your Workspace

1

```
Rem create tablesRemRemCopyright (c) 2001, 2007, Oracle Corporation.
All rights reserved. RemREM
=====
REM Create the REGIONS table to hold region information for locationsREM
HR.LOCATIONS table has a foreign key to this table.REM
=====
CREATE TABLE regions (region_id NUMBER CONSTRAINT
region_id_nn NOT NULL, region_name VARCHAR2(25), CONSTRAINT
reg_id_pk PRIMARY KEY (region_id));REM
=====
REM Create the COUNTRIES table to hold country information for customersREM
and company locations. REM OE.CUSTOMERS table and HR.LOCATIONS have a foreign
key to this table.REM
=====
CREATE TABLE countries (country_id CHAR(2) CONSTRAINT
country_id_nn NOT NULL, country_name VARCHAR2(40), region_id
NUMBER, CONSTRAINT country_c_id_pk PRIMARY KEY
(country_id), CONSTRAINT country_reg_fk FOREIGN KEY
(region_id) REFERENCES regions(region_id)) ORGANIZATION
INDEX: RFM
```

2

| Actions                                       | Delete Checked           | Upload >                 | Create >                 |
|-----------------------------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/>                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> Edit      | Owner                    | Name                     | Created                  |
| <input checked="" type="checkbox"/> WORKSHOP1 | oehr_install_schema.sql  | 4 seconds ago            | Updated By               |
| <input checked="" type="checkbox"/> WORKSHOP1 | oehr_install_schema.sql  | 4 seconds ago            | Updated                  |
|                                               |                          | 440,780                  | Bytes                    |
|                                               |                          | 0                        | Results                  |
|                                               |                          |                          | Run                      |

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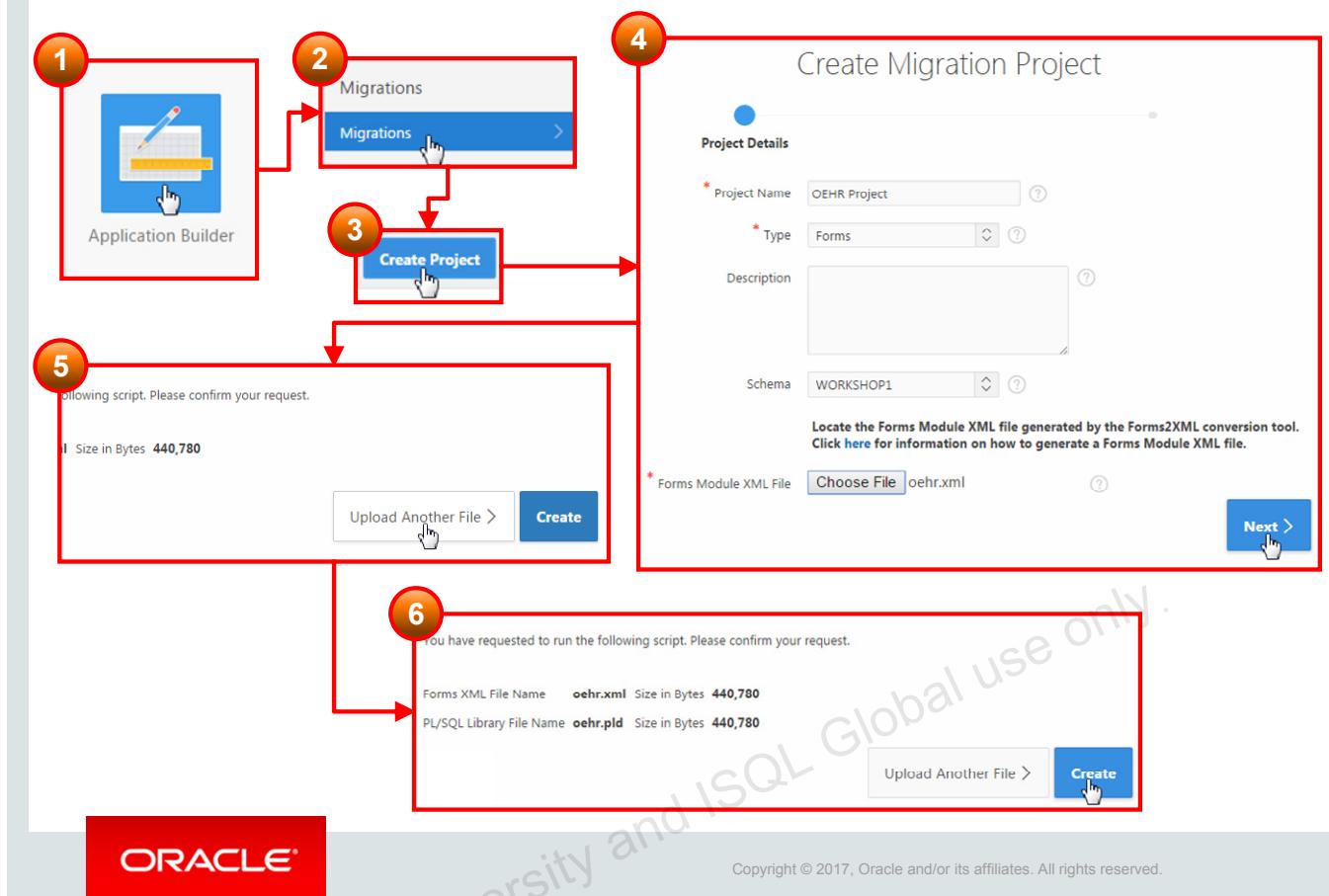
To start the conversion process, the database objects associated with your Oracle Forms application must reside in the same database as Oracle Application Express.

If the database objects associated with your Oracle Forms application do not reside in the same database as Oracle Application Express, you must upload them.

To upload database objects associated with your workspace:

1. Create a DDL script.
2. Upload it to the SQL Script Repository and run it.

## 4. Creating a Conversion Project



Next, you need to create a conversion project by running the Create Migration Project Wizard. To create a conversion project, access the workspace you created for your conversion project and perform the following steps:

1. Click the **Application Builder** icon.
2. Click **Migrations** on the right side of the page.
3. On the Application Migrations page, click **Create Project**. This opens the Create Migration Project Wizard.
4. Enter the project details such as Project Name, Type (select Forms), Description, Schema, and upload the Forms Module XML File. Then, click **Next**. In the slide example, the XML file is uploaded.
5. To add more files, click **Upload Another File** and upload the file. In the slide example, the .PLD file is uploaded. Add more files if required by repeating this step.
6. Review the project details, and click **Create**.

The Project page appears.

## 5. Reviewing and Editing the Application Metadata

Use the Project pages to review and edit form attributes and track the manual conversion process. Perform the following:

1. Review the Application Migrations Page.
2. Edit Project Details.
3. Review Forms Modules.
4. Review Oracle Reports.
5. Review PL/SQL Libraries.
6. Review Forms Menus.
7. Review Object Libraries.
8. Use Annotations to track the Conversion Process.



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Perform the following to review and edit form attributes and track the conversion process:

1. **Review the Application Migrations Page:** The Project page shows a high-level overview of your Oracle Forms conversion project.
2. **Edit Project Details:** The Project details can be edited by clicking the project name in the Application Migrations page.
3. **Review Forms Modules:** Browse and review the objects included in your uploaded Oracle FormModule XML file.
4. **Review Oracle Reports:** Browse and review the uploaded Oracle Report XML files.
5. **Review PL/SQL Libraries:** Browse and review uploaded PL/SQL libraries associated with your Oracle Forms application and update annotation.
6. **Review Forms Menus:** Browse and review the objects included in your uploaded MenuModule XML file and update annotations.
7. **Review Object Libraries:** Browse and review uploaded Object Libraries associated with your Oracle Forms application and update annotations.
8. **Use Annotations to Track the Conversion Process:** Use annotations to determine whether an object should be included in the conversion, assign a priority, track status, assign the object to specific individual, or create notes and tags.

## 6. Setting Up Application Defaults

To set up application defaults:

1. Click Set Application Defaults on the right side of the project page under Tasks.
2. Select the options you want to use as defaults.
3. Click Apply Changes.



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As a shortcut, you can also set some application defaults. These defaults are used whenever you create new applications.

To set up application defaults (optional):

1. On the right side of the project page under Tasks, click Set Application Defaults.
2. Select the options you want to use as defaults. To learn more about specific attribute, see field-level help.
3. Click Apply Changes.

The project page appears.

## 7. Generating an Oracle Application Express Application

To generate an application:

1. On Application Migrations page, click the project name.
2. Click Create Application.
3. Generate the application by following the instructions in the wizard and click Create.
4. Preview the application by clicking Run Application.
5. Sign in using your Oracle Application Express workspace credentials.
6. You can customize your application attributes by editing the application properties.



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You can generate an application based on valid forms and reports, or a maintenance application based on valid tables and views.

The steps are listed in the slide.

## Summary

In this lesson, you should have learned how to convert an Oracle Forms application to an Oracle Application Express application.



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In this lesson, you learned about converting an Oracle Forms Application to an Oracle Application Express application.