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Integrated Cloud Applications & Platform Services



Oracle Application Express Workshop I

Student Guide – Volume II

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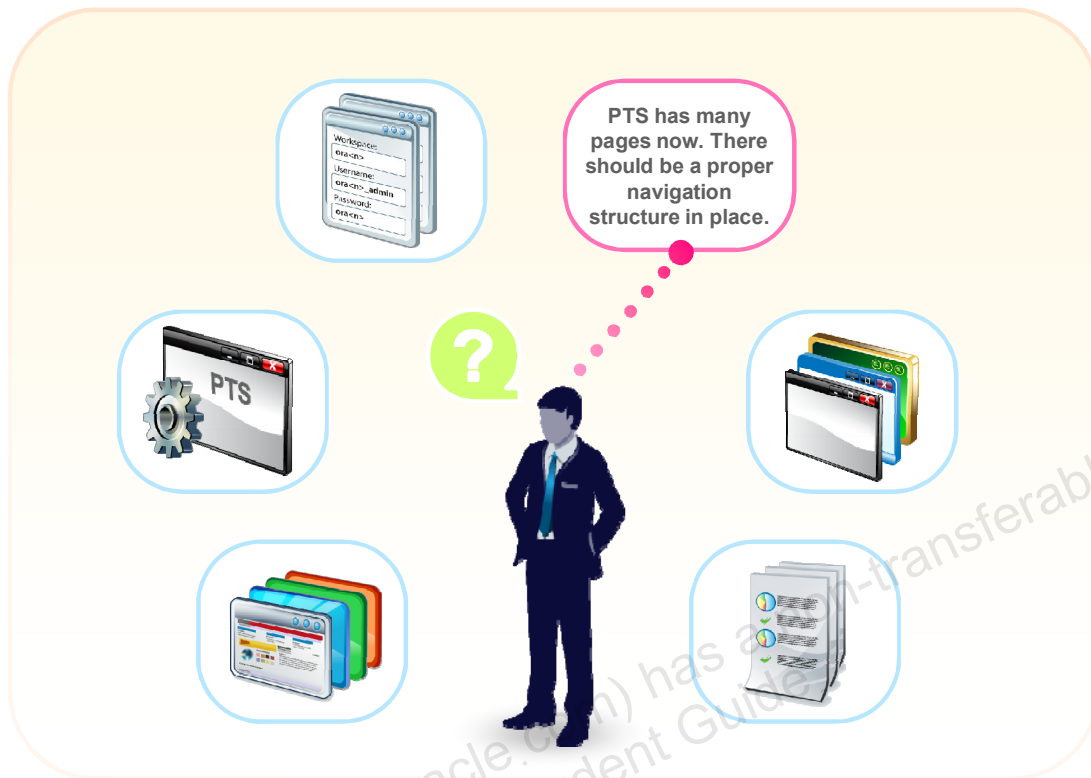
Unit III: Customizing Your Web Application

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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



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.

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Adding Shared Components That Aid Navigation

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Jack Builds a Navigation System into PTS

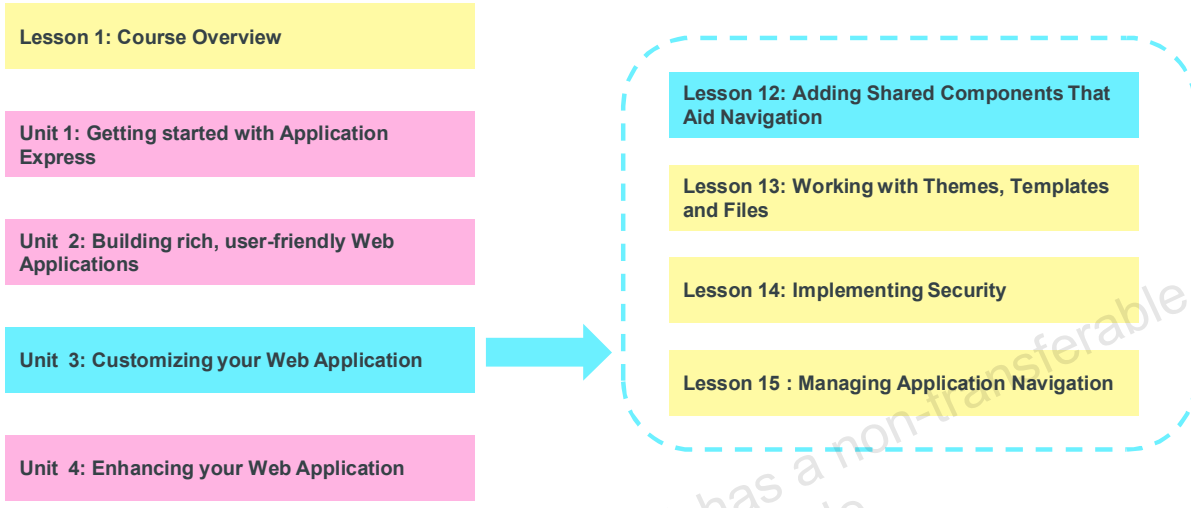


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Jack is very happy with the way PTS application has taken shape in recent days. But, he is finding it quite difficult to run the various pages that are built into PTS. Jack wants to make navigating through different pages more clear and user friendly.

You Are Here in This Course



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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.

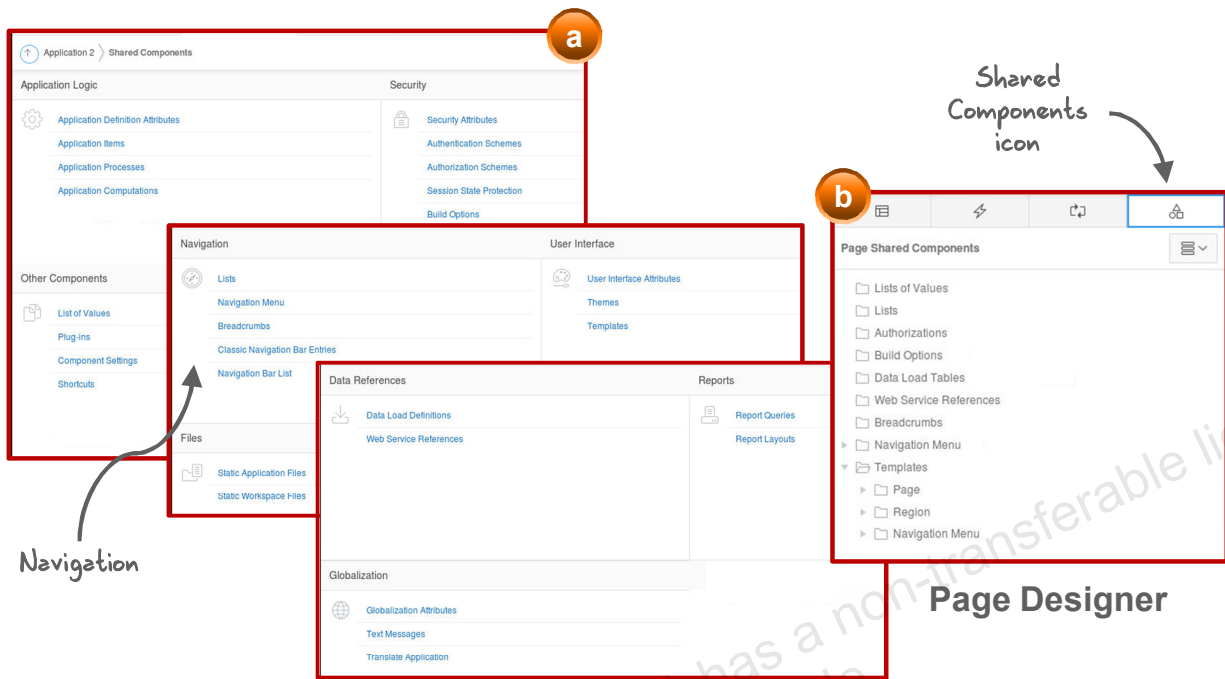
Lesson Agenda

- 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?



Shared Components page



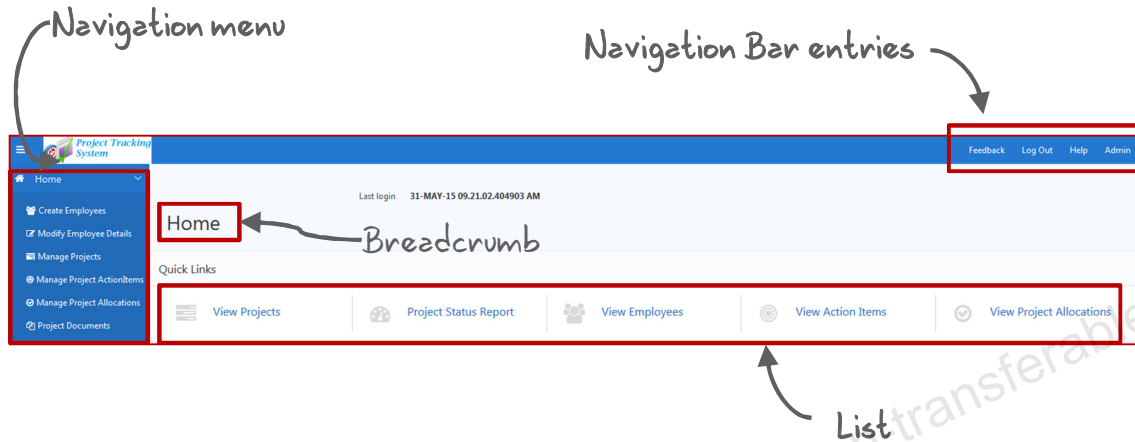
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Shared components are components that can be included on one or more pages of your application. The Shared Components Page screenshot in the slide shows the categories of shared components that you can include in your application.

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.

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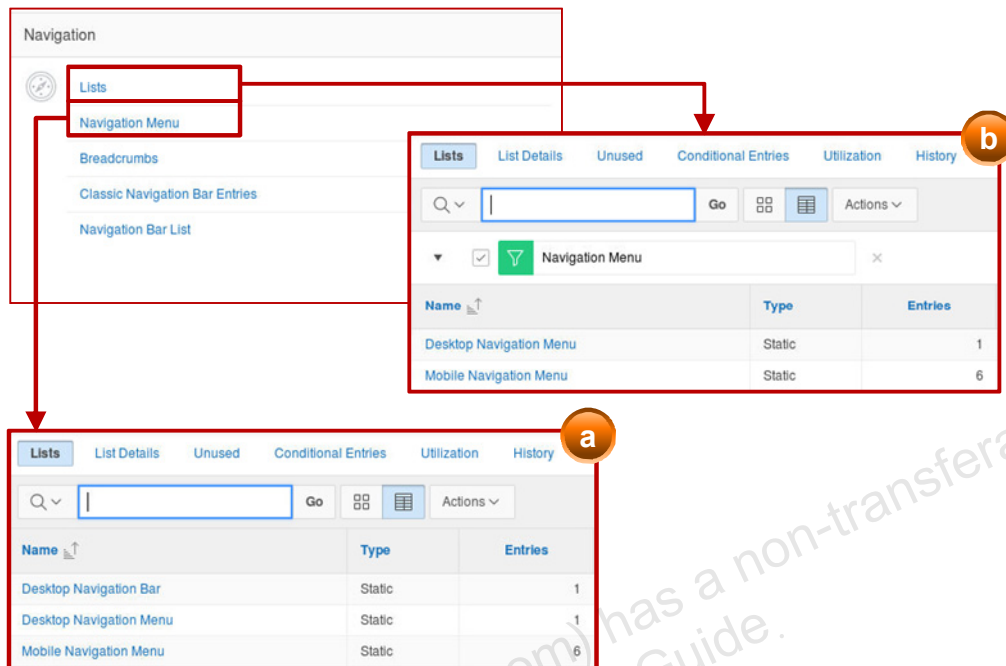
Lesson Agenda

- 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



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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

The screenshot illustrates the process of creating a navigation menu entry in Oracle APEX. It is divided into four numbered steps:

- Step 1:** The application home page is shown with a navigation menu containing 'Home' and 'Create Employees'. The 'Home' entry is highlighted.
- Step 2:** The 'Shared Components' icon is clicked, leading to the 'List Details' page for the 'Desktop Navigation Menu'. The 'Create List Entry' button is highlighted.
- Step 3:** The 'Create List Entry' form is shown, where details for the new entry are entered. The 'List' is set to 'Desktop Navigation Menu', the 'Parent List Entry' is 'Home', the 'Sequence' is 20, and the 'List Entry Label' is 'Create Employees'.
- Step 4:** The 'Desktop Navigation Menu' configuration page is shown, where the 'Create List Entry' button is clicked to save the new entry.

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.

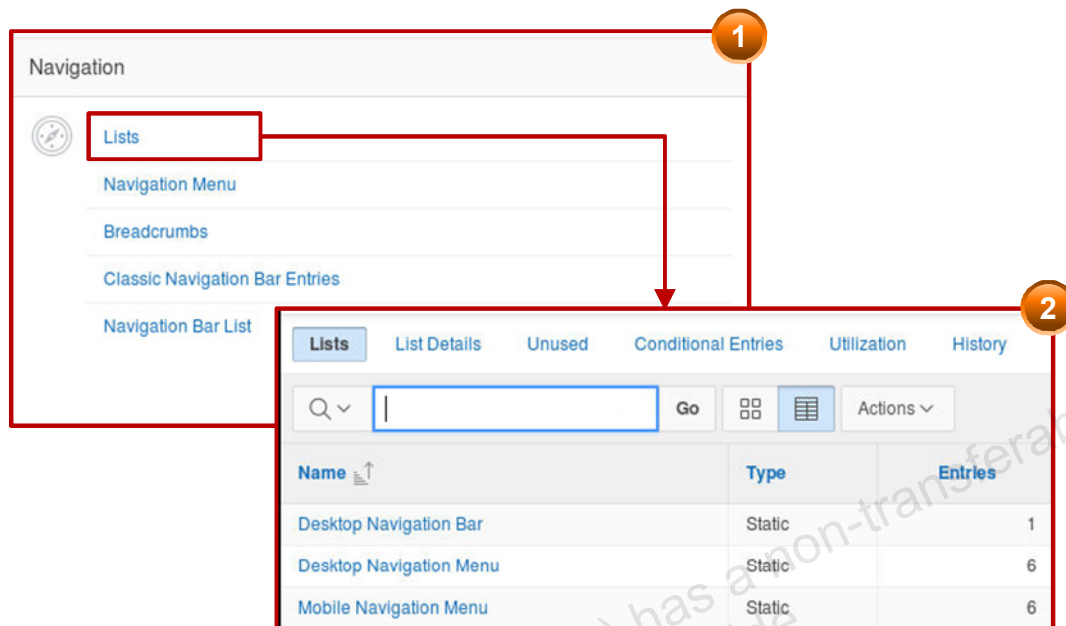
Lesson Agenda

- 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



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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

1

2

3

4

5

6

List created

| Name | Type | Entries | References |
|-------------------------|--------|---------|------------|
| Desktop Navigation Bar | Static | 1 | 0 |
| Desktop Navigation Menu | Static | 6 | - |
| Mobile Navigation Menu | Static | 6 | - |

Create List: From Scratch As a Copy of an Existing List

Type: Static Dynamic

Build Option: - No Build Option -

| List Entry Label | Target Page ID or |
|-------------------------|-------------------|
| 1 View Projects | 4 |
| 2 Project Status Report | 3 |
| 3 View Employees | 5 |
| 4 View Action Items | 11 |

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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

The screenshot shows the Oracle Lists page with the following components:

- Step 1:** The 'Lists' page with a search bar and a 'Create List Entry >' button.
- Step 2:** The 'List Details' page for the 'PTS Reports' list, showing a table of existing entries and a form for creating a new entry.
- Step 3:** The 'Target' tab of the form, showing fields for 'Parent List Entry', 'Sequence', 'Image/Class', 'Attributes', 'Alt Attribute', 'List Entry Label', 'Target type', and 'Page'.

| Sequence | Name |
|----------|---------------------------------------|
| 10 | View Projects |
| 20 | Project Status Report |
| 30 | View Employees |
| 40 | View Action Items |

Form fields for creating a new list entry:

- List: PTS Reports
- Parent List Entry: - No Parent List Item -
- Sequence: 50
- Image/Class: [Empty]
- Attributes: [Empty]
- Alt Attribute: [Empty]
- List Entry Label: [Empty]
- Target type: Page in this Application
- Page: [Empty]

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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

The screenshot illustrates the process of creating a dynamic list in Oracle APEX. It is divided into six numbered steps:

- Step 1:** The 'Lists' page is shown with the 'Create' button highlighted.
- Step 2:** The 'Lists' table is displayed, showing existing lists like 'Desktop Navigation Bar' and 'Mobile Navigation Menu'. The 'Create' button is highlighted.
- Step 3:** The 'Create List' dialog is shown with 'From Scratch' selected.
- Step 4:** The 'Dynamic List' configuration dialog is shown with the name 'Project Documents Quick Links' and 'Dynamic' type selected.
- Step 5:** The SQL Query editor is shown with the following query:

```
select null as level_value
, "DOCUMENT_NAME" as label_value
, "DOCUMENT_URL" as target_value
, null as is_current
, null as image_value
, null as image_attr_value
, null as image_alt_value
from "PROJECT_DOCUMENTS"
order by 1
```
- Step 6:** The final list region is shown, displaying a list of project documents with links for 'Project Plan', 'SQL scripts', 'Tracking Excel', and 'Schema Excel'.

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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

The image contains three screenshots illustrating the process of creating a list region:

- 1. Rendering:** A screenshot of the Oracle APEX page editor showing the 'Rendering' tab. The 'Regions' folder is expanded, and the 'Create Region' option is highlighted in a blue box.
- 2. Region Property Editor:** A screenshot of the 'Region' property editor. The 'Type' is set to 'List' and the 'List' dropdown is set to 'PTS Reports'. Both the 'List' type and the 'PTS Reports' selection are highlighted with red boxes.
- Property Editor:** A screenshot of the 'CONTENT BODY' showing the 'Quick Links' region. The region content is empty, and the 'List region as seen in Grid Layout' is indicated by a handwritten note and an arrow pointing to the region.

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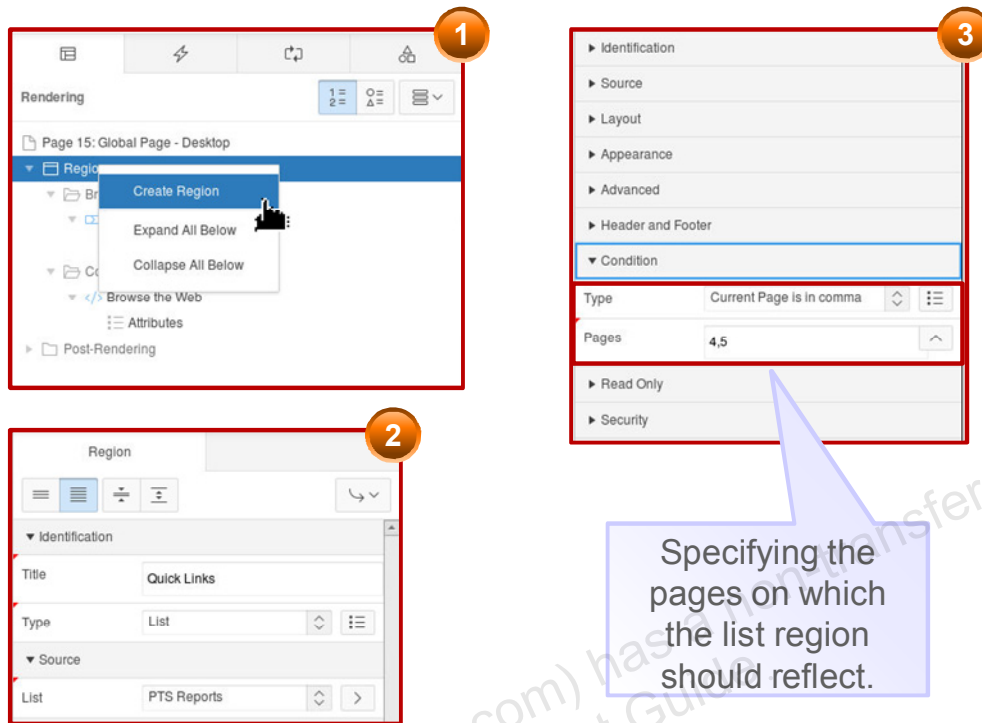
After you create a list and populate it with values, you can add the list to a page. To add the list to a page, navigate to the page's definition and perform the following steps:

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.

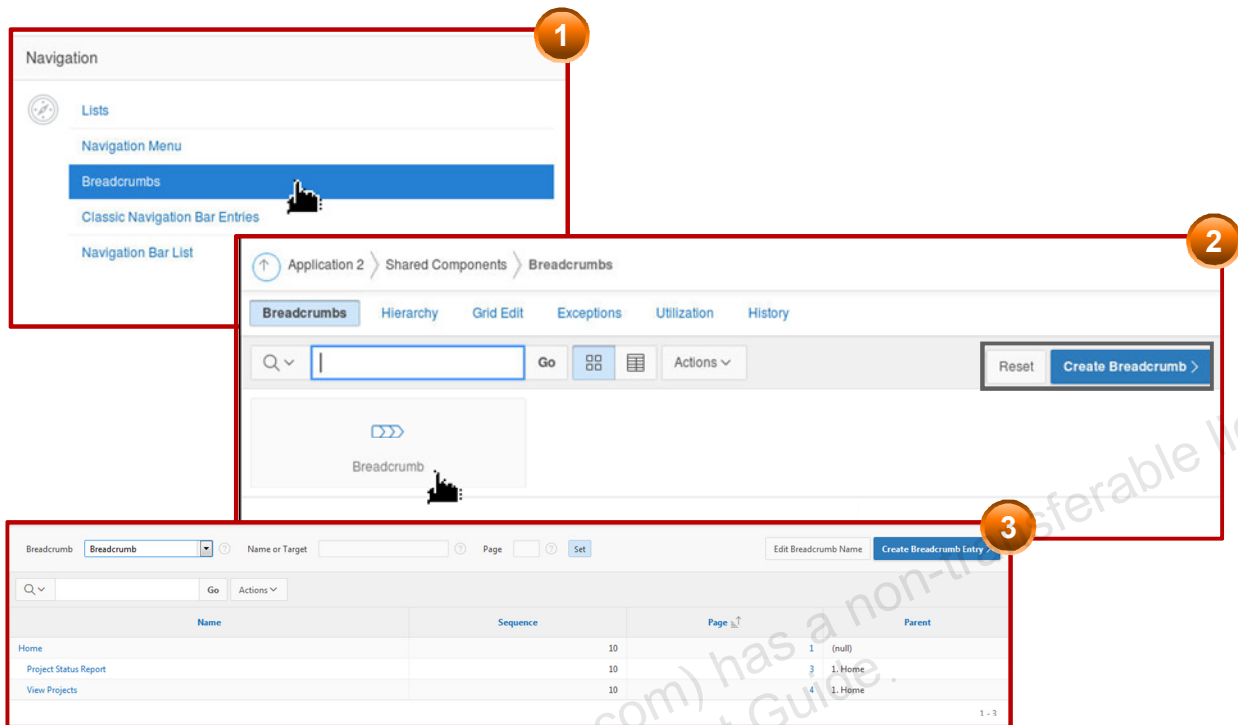
Lesson Agenda

- 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



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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 the creating the page using the Create Page Wizard itself.

Creating Breadcrumb Entries

The screenshot shows the 'Create Breadcrumb Entry' form with the following fields:

- Breadcrumb:** Breadcrumb (dropdown), Page 3 (input), [15] (input).
- Entry:** Sequence 10 (input), Parent Entry Home (Page 1) (dropdown), Short Name Project Status Report (input), Long Name (input).
- Target:** Target is a Page in this Application (dropdown), Page 3 (input).

A preview window shows the breadcrumb bar for 'Project Status Report' with the following structure:

- PAGE HEADER
- PAGE NAVIGATION
- BREADCRUMB BAR
 - Breadcrumb
 - COPY EDIT PREVIOUS NEXT
- REGION CONTENT
- ITEMS
- SUB REGIONS
- CLOSE HELP DELETE CHANGE CREATE

Handwritten notes include '1' in a red circle at the top right of the form, '2' in a red circle next to the preview window, and 'Breadcrumb region in page' with an arrow pointing to the breadcrumb bar in the preview.

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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

1

2

3

Project Status Report reparented from "Home"

| Breadcrumb Entries | |
|-------------------------------------|-----------------------|
| | Name |
| <input type="checkbox"/> | Home |
| <input checked="" type="checkbox"/> | Project Status Report |

| Breadcrumb Entries Re-parented | |
|-------------------------------------|-----------------------|
| Breadcrumb Entries | |
| | Name |
| <input type="checkbox"/> | Home |
| <input checked="" type="checkbox"/> | Project Status Report |

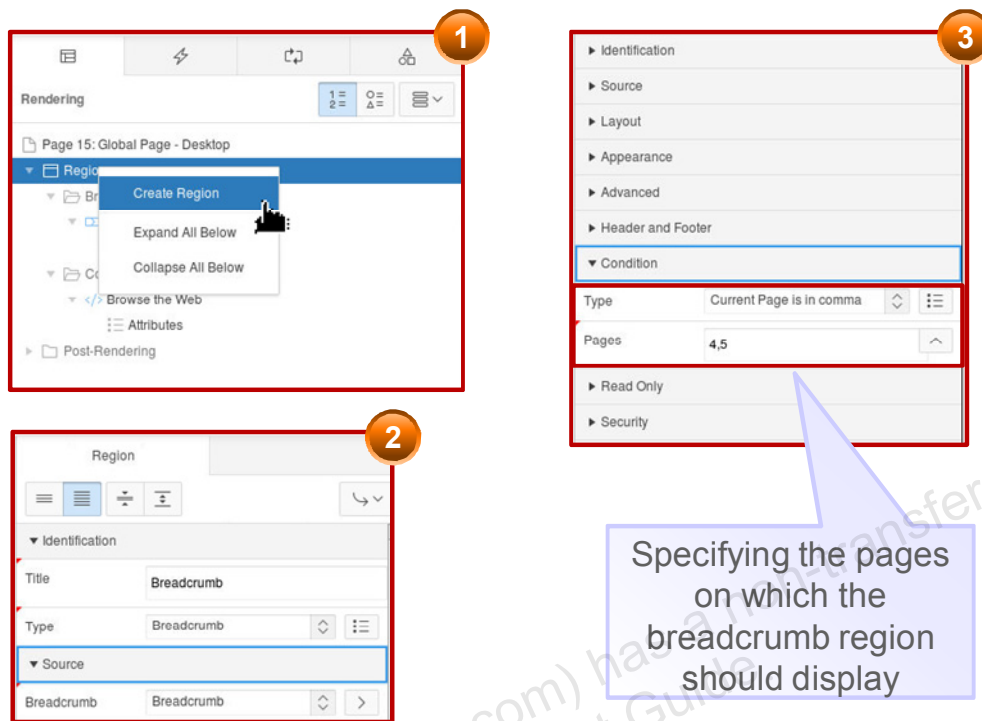
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You can change the parent entry for one or more breadcrumb entries. To reparent the breadcrumb entries, perform the following steps:

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 illustrates the process of accessing the Navigation Bar Entries page. It shows a 'Navigation' menu with several options: Lists, Navigation Menu, Breadcrumbs, Classic Navigation Bar Entries, and Navigation Bar List. The 'Navigation Bar List' option is highlighted in blue. A red arrow points from this option to the 'Navigation Bar List' entry in the 'Lists' table below.

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

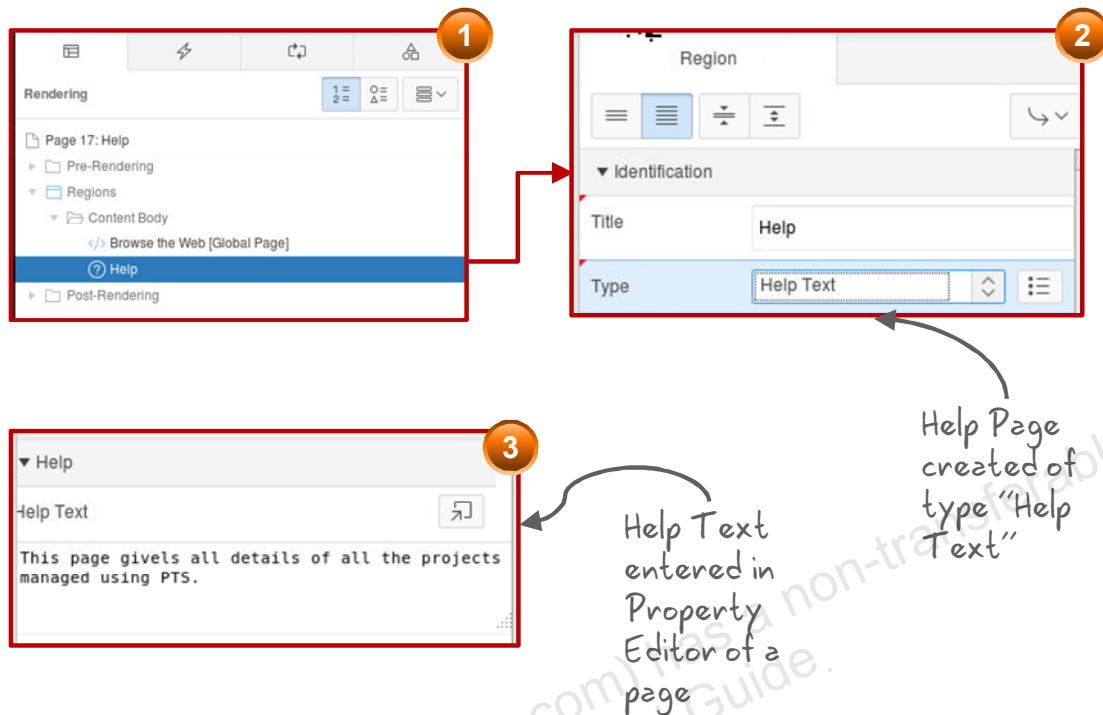
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Each application can have only one navigation bar. The items inside the navigation bar are called navigation bar entries. Some of the typical situations where you use navigation bars are accessing the home page and linking to a Help page. The location 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



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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

1

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

2

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

3

Navigation Bar entries

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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

Q

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

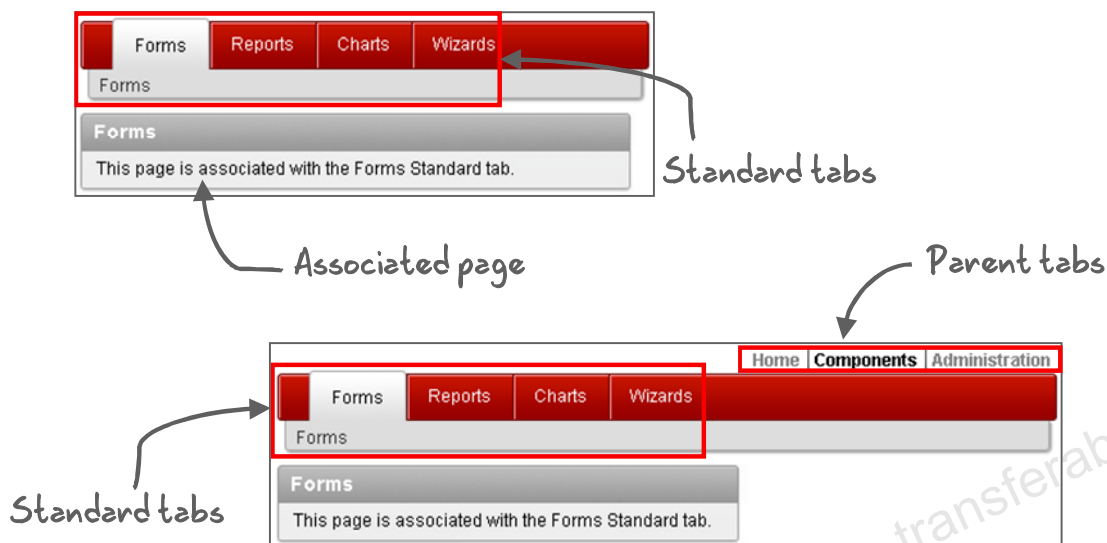
Lesson Agenda

- 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



Tabs are supported only in Tab-based Legacy themes of Oracle APEX.

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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

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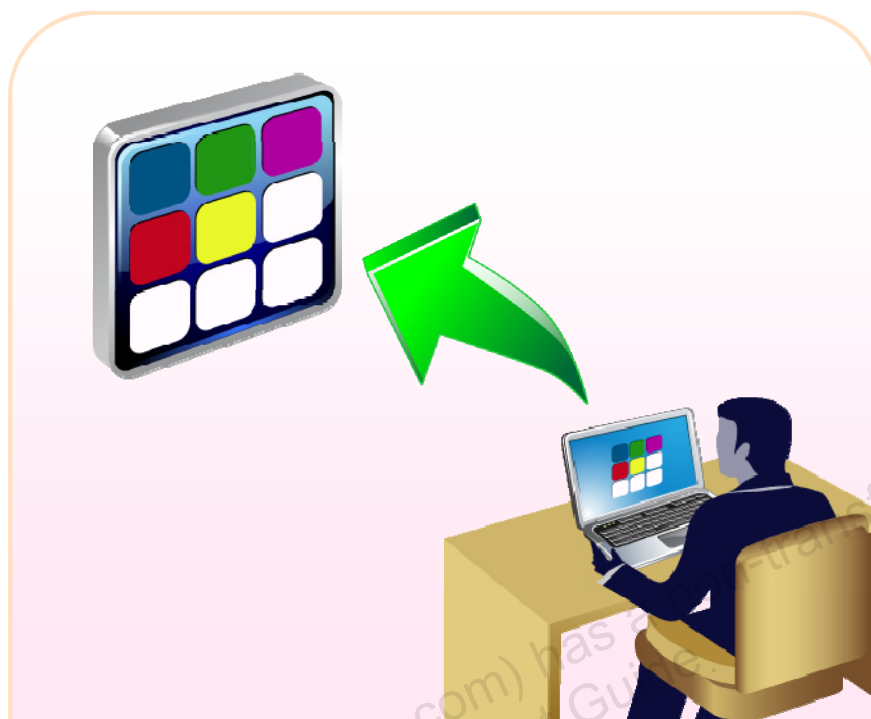
In this lesson, you learned how to create, edit, and use navigational shared components in your application.

Working with Themes, Templates, and Files



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Jack Works with Application User Interface

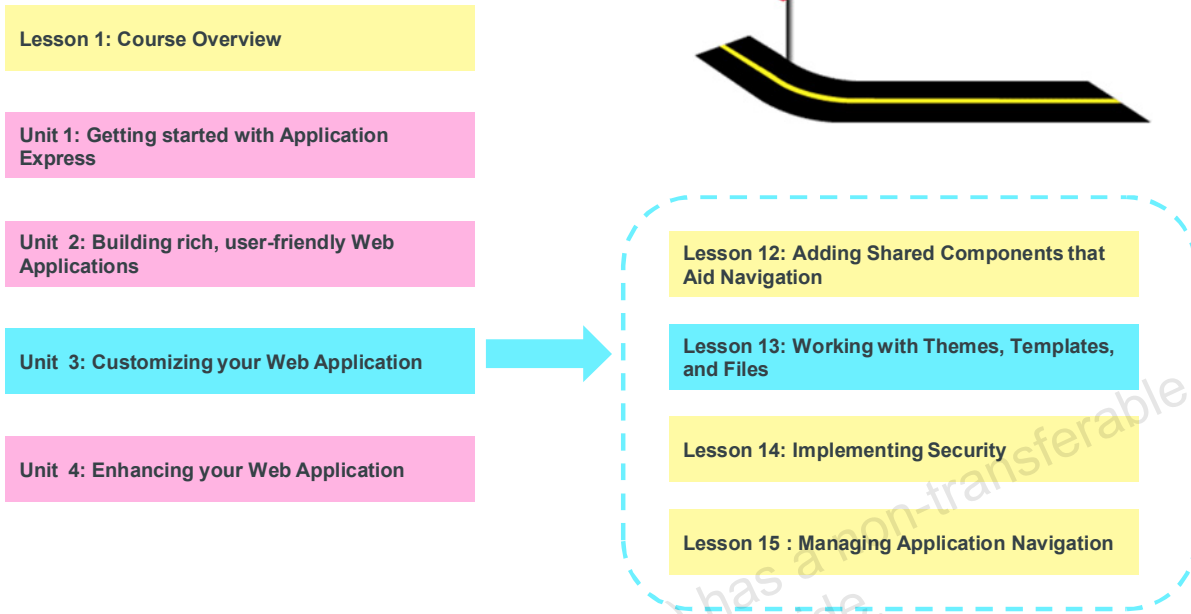


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Now that the functionality part of the PTS application is ready, Jack is looking to work on the look and the feel of the application. He explores the various themes available in APEX that he can use to enhance the user experience of the PTS application.

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.

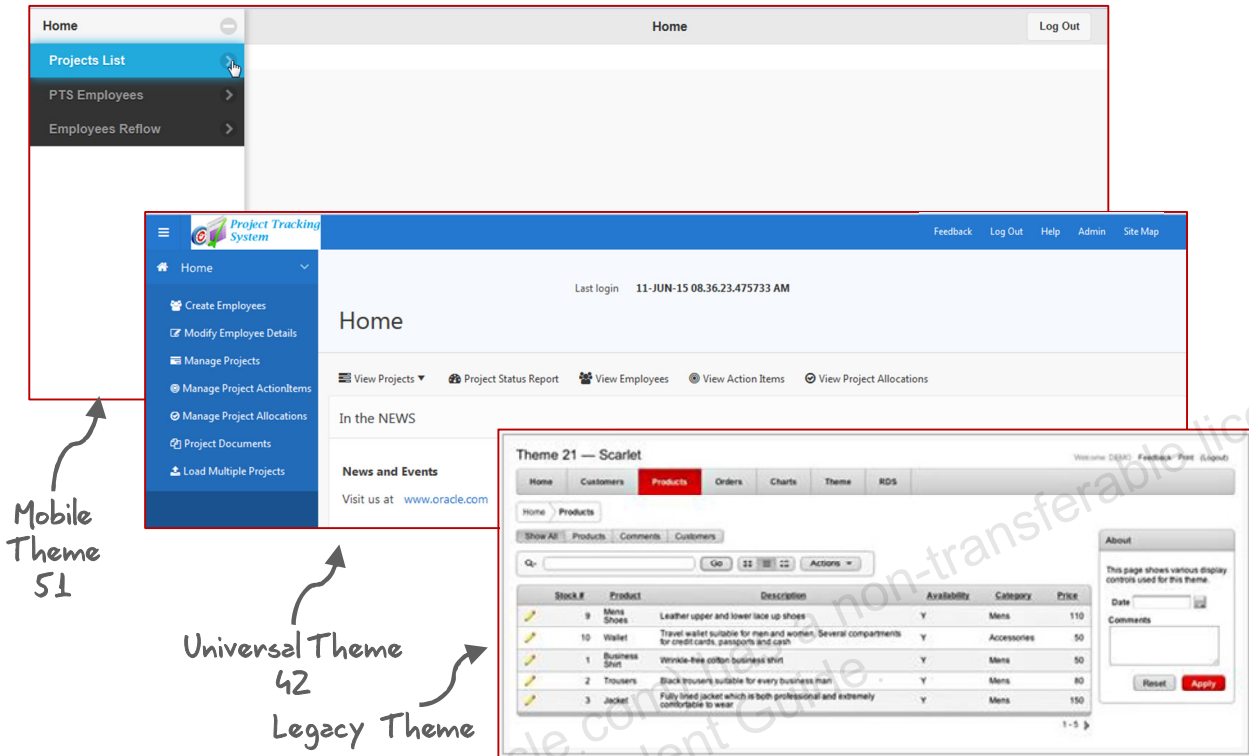
Lesson Agenda

- 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?



Mobile Theme 51

Universal Theme 42

Legacy Theme



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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 themes 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.

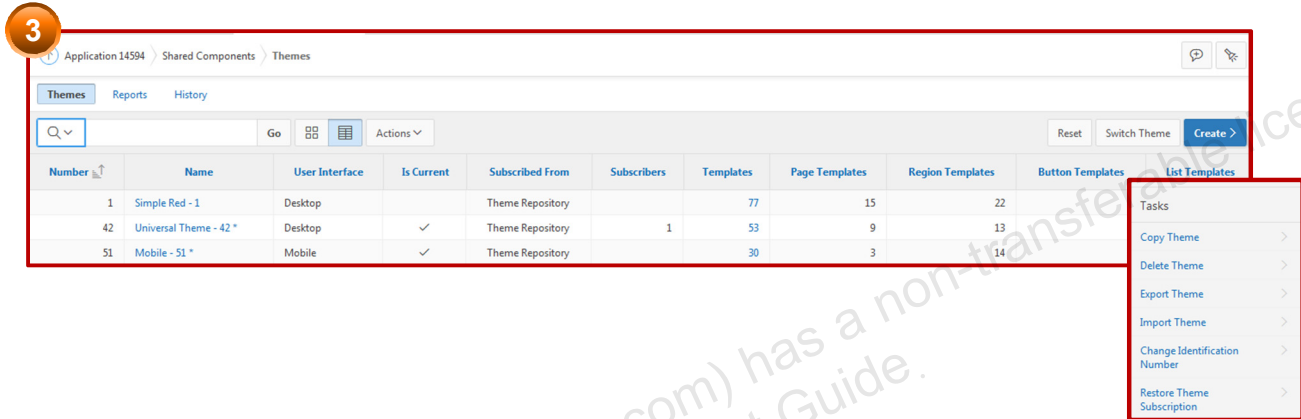
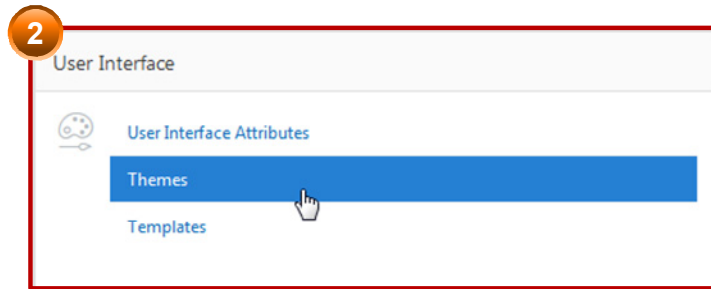
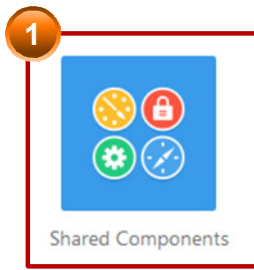
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Each theme comes with one or more templates for application components, such as reports, forms, charts, and so on. You can also create a new theme from the beginning and define templates for an application. In this lesson, you learn how to use the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

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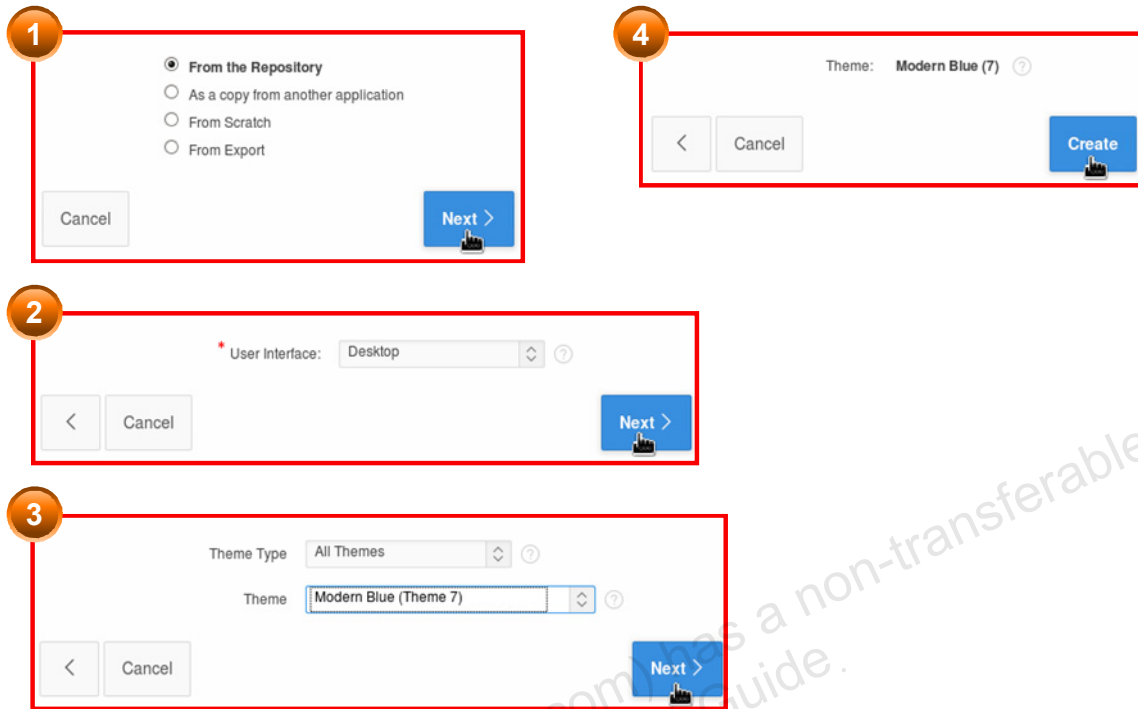
Accessing the Themes Page



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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



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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

1

Application: 105 - Demo App

Currently Active Theme: 1. Simple Red

Switch to Theme: 7. Modern Blue

Reset Grid: Keep current region and item grid settings

Match Template Classes: Yes

Cancel Create Theme Next

2

| Template Type | From Template | To Template | Status |
|---------------|--|---|------------------|
| Breadcrumb | Breadcrumb Menu | Breadcrumb Menu | ✓ |
| Button | Button | Button | ✓ |
| Label | Optional with help | Optional with help | ✓ |
| Page | Printer Friendly | Printer Friendly | ✓ |
| | No Tabs - Right Sidebar (optional / table-based) | No Tabs - Right Sidebar (fixed-width / DIV based) | Multiple matches |
| | Login | Login | ✓ |
| Region | Form Region | Form Region | ✓ |
| | Breadcrumb Region | Breadcrumb Region | ✓ |

row(s) 1 - 8 of 8

Cancel Next

3

Application: 105 - Demo App

Currently Active Theme: 1. Simple Red

Switch To Theme: 7. Modern Blue

Cancel Switch Theme



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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

The image shows three sequential screenshots of the Oracle AEM interface, illustrating the process of creating a copy of an existing theme. Each screenshot is enclosed in a red rectangular box with a numbered orange circle in the top-left corner.

- Step 1:** A 'Tasks' menu is open, showing several options. The 'Copy Theme' option is highlighted with a blue background and a right-pointing arrow.
- Step 2:** The 'Copy Theme' configuration screen is shown. It includes the following fields:
 - 'Application': 105 Demo App
 - 'Copy from Theme': 1. Simple Red
 - 'Copy to this Theme ID': 101
 - 'Subscribe Theme': YesButtons for 'Cancel' and 'Next >' are visible at the bottom.
- Step 3:** The 'Copy Theme' confirmation screen is shown. It includes the following fields:
 - 'Application': 105 - Demo App
 - 'Copy Theme ID from': 1
 - 'Copy Theme ID to': 101Buttons for '<', 'Cancel', and 'Copy Theme' are visible at the bottom.

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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

1

| 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 | Simple Red - 101 | Desktop | | 105 | |

2

Theme

Cancel Apply Changes

Show All Name Theme ... JavaSc... Compo... Region ... Dialog ... Global ... Icons Image Styles Files

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 -

Footer Toolbar - Select Template -



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- 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.

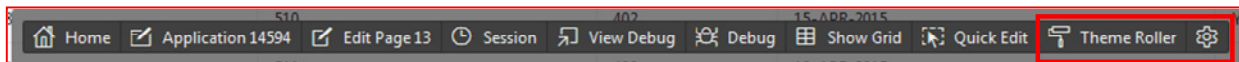
Universal Theme and Theme Roller

- 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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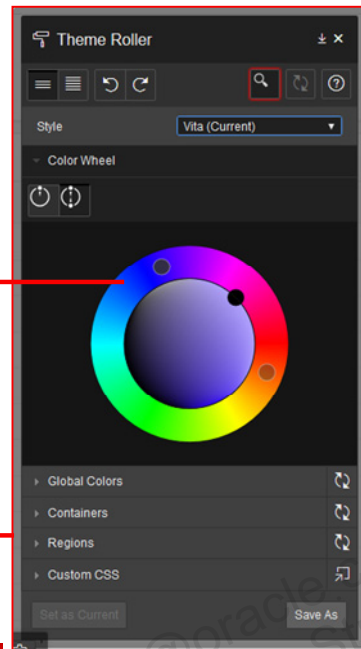
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Universal Theme and Theme Roller



Color Wheel

Other Theme Options



There are few limitations with Universal Theme... guess what?

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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 shows a web application interface for a 'PROJECT TRACKING SYSTEM'. On the left is a 'Side Navigation Menu page' with options like Home, Create Employees, and Admin. The main area displays a 'Data Load Source' wizard with a progress bar and steps: Data Load Source, Data / Table Mapping, Data Validation, and Data Load Results. A 'Next' button is visible. Below the wizard is a 'Templates' table with columns for Name, Subscribed From, Subscribers, References, Updated, Updated By, Default, Preview, Theme, and Copy. The table lists templates for 'Breadcrumb' and 'Button' types.

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



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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.

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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 |
| Popup LOV | Popup LOV |
| Popup LOV | Popup LOV |
| Popup LOV | Popup LOV |

| Type | Name |
|-----------------|--------------------|
| Legacy Calendar | Basic Calendar |
| Legacy Calendar | Calendar |
| Legacy Calendar | Calendar |
| Legacy Calendar | Calendar |
| Legacy Calendar | Calendar, Alternat |

| Type | Name |
|--------|-----------------------|
| Region | Alert |
| Region | Alert |
| Region | Blank with Attributes |
| Region | Blank with Attributes |
| Region | Borderless Region |

| Type | Name |
|-------|------------------------------|
| Label | Hidden |
| Label | Hidden |
| Label | No Label |
| Label | No Label (For Screenreaders) |

| Type | Name |
|------|-----------------------------|
| Page | Dialog |
| Page | Left Side Column |
| Page | Left Side Column |
| Page | Left and Right Side Columns |
| Page | Left and Right Side Columns |

| 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 |



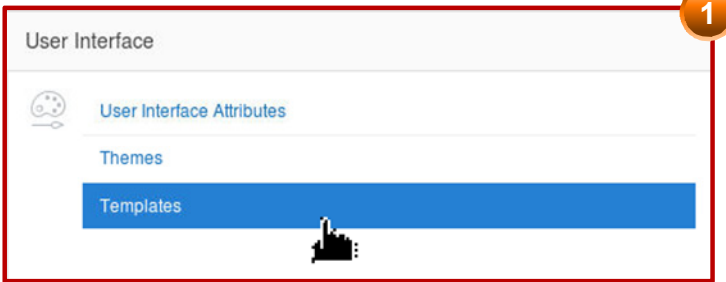
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Templates are first organized by template type. Oracle Application Express offers nine types of templates. Each theme comes with one or more template classes for each template type.

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



Templates Subscription Publish Utilization History

Q Go Actions Reset Create

| 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 | |

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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.

1

| | 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 | |

2

Copy Template

Template: **Standard** ⓘ

New Template Name:

Tasks



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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

| 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 | Standard Customized | Theme | 0 | 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

Cancel Delete Apply Changes

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

Definition

Template

```
2 <div class="t-Region" #REGION_CSS_CLASSES# ID="#REGION_STATIC_ID#" #REGION_ATTRIBUTES# role="group" aria-label="body" #REGION_STATIC_ID#_heading">
3 <div class="t-Region-header">
4 <div class="t-Region-headerItems t-Region-headerItems--title">
5 <h2 class="t-Region-title" id="#REGION_STATIC_ID#_heading">#TITLE#</h2>
6 </div>
7 <div class="t-Region-headerItems t-Region-headerItems--buttons">#COPY##EDIT#<span class="js-maximizeButtonContainer"></span></div>
8 </div>
9 <div class="t-Region-bodyWrap">
10 <div class="t-Region-buttons t-Region-buttons--top">
11 <div class="t-Region-buttons-left">#PREVIOUS#</div>
12 <div class="t-Region-buttons-right">#NEXT#</div>
13 </div>
14 <div class="t-Region-body">
15 #BODY#
16 </div>
17 <div class="t-Region-buttons t-Region-buttons--bottom">
18 <div class="t-Region-buttons-left">#CLOSE##HELP#</div>
19 <div class="t-Region-buttons-right">#DELETE##CHANGE##CREATE#</div>
20 </div>
21 </div>
22 <div>
23 ORACLE CONFIDENTIAL - INTERNAL ONLY
24 </div>
25 </div>
26
```

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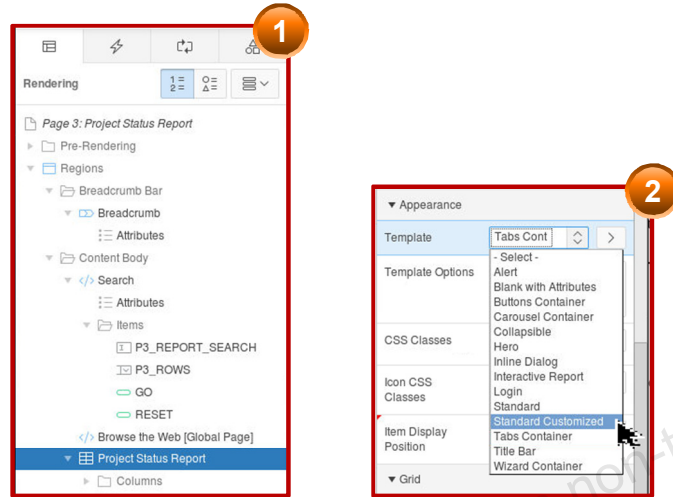
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If you want to add some company-specific text or style, you can edit the template by performing the following steps:

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

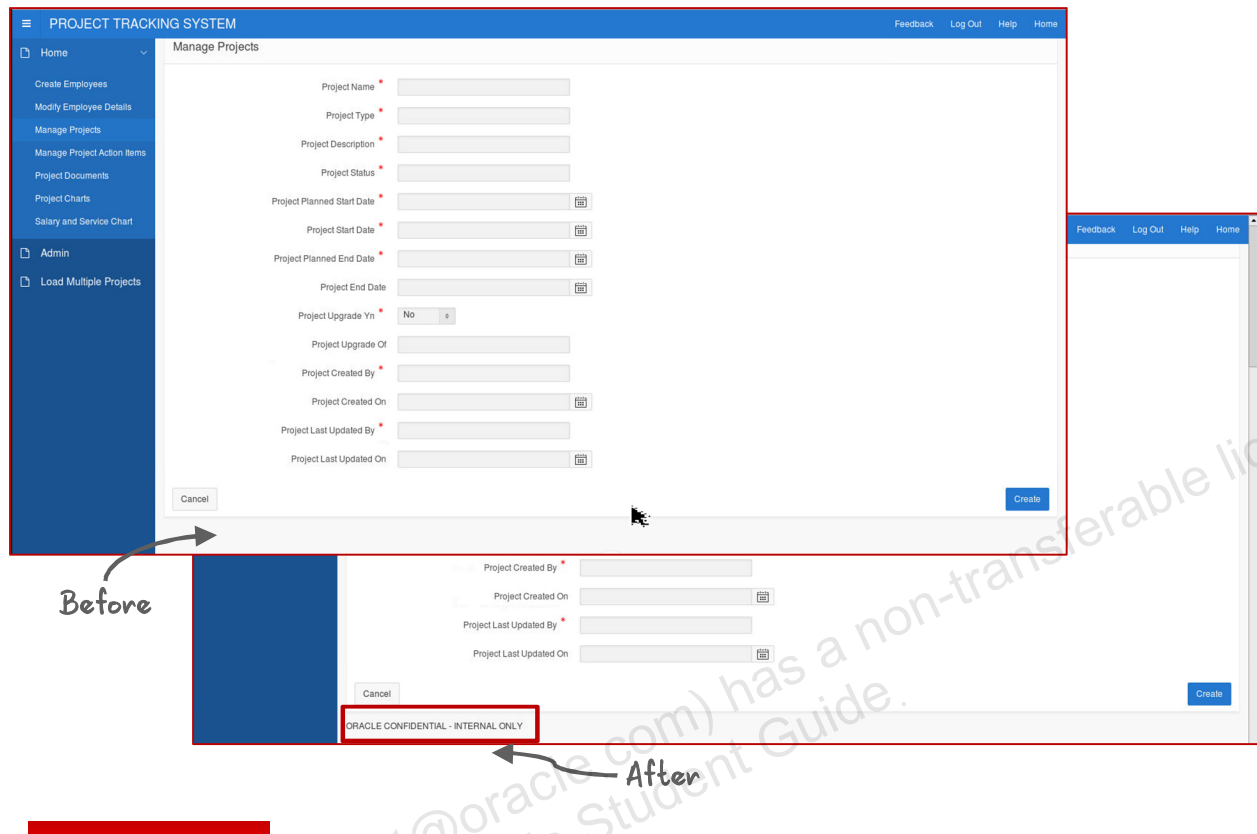


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To associate a template with a region, navigate to the page definition in page designer mode. For the region to which you want to apply a new template, click the Region node under page rendering tree. In its property editor, locate Appearance and select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

Applying a Template: Output



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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 AEM Themes console. At the top, there is a 'Themes' tab with sub-tabs for 'Reports' and 'History'. Below this is a search bar and a 'Go' button. A table lists several themes:

| Number | Name | User Interface | Is Current | Subscribed From |
|--------|-----------------------------|----------------|------------|------------------|
| 1 | Simple Red - 1 | Desktop | | Theme Repository |
| 42 | <u>Universal Theme - 42</u> | Desktop | ✓ | Theme Repository |
| 51 | Mobile - 51 | Mobile | ✓ | Theme Repository |
| 101 | My New Theme - 101 | Desktop | | |
| 105 | Universal Theme - 105 | Desktop | | 2 |

Below the table, there is a 'Theme' configuration page for 'Universal Theme - 42'. The 'Component Defaults' tab is selected, showing a list of component types and their default templates. A dropdown menu is open for the 'Page' component, showing options like 'Standard', 'Left Side Column', and 'Right Side Columns'. A red box highlights the table and the configuration page, with a '1' in a circle pointing to the table and a '2' in a circle pointing to the 'Apply Changes' button.

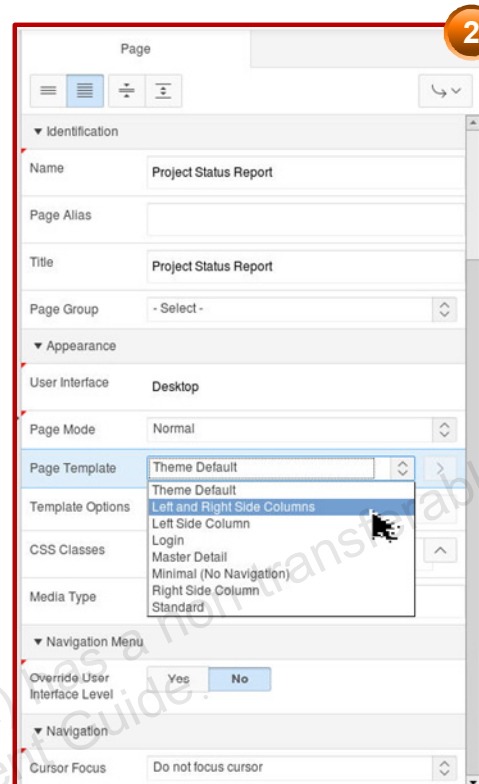
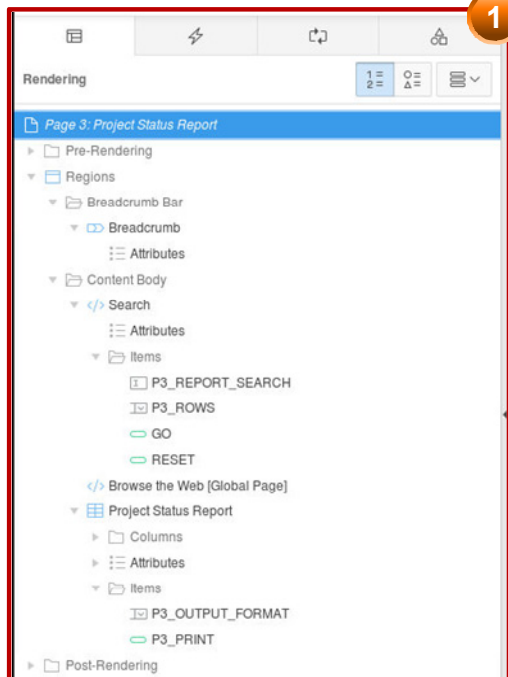
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You can change the default templates for each type of template in a theme. To do so, perform the following steps:

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

The screenshot illustrates the process of uploading a Cascading Style Sheet (CSS) file in the Oracle APEX Shared Components interface. It is divided into three numbered steps:

- Step 1:** The user navigates to the 'Files' section and selects 'Static Application Files'.
- Step 2:** The user clicks the 'Upload File' button in the top right corner of the file list.
- Step 3:** The 'Upload File' dialog box is shown. The 'File' field contains the path `/home/vncuser/Downloads/apexstyle.css`. The 'File Character Set' is set to 'Unicode UTF-8' and 'Unzip File' is set to 'Yes'. The 'Upload' button is highlighted.

| File Name | Mime Type | File Size | Reference | File |
|-----------|-----------|-----------|----------------------|----------|
| Logo.png | image/png | 1KB | #APP_IMAGES#Logo.png | Download |

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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

1. Select the page from the Rendering pane. In this example, the Page 14: Help is selected.

2. Enter Cascading Style Sheet File URL to be loaded.

3. Reference a style from style sheet

4. The page looks like this now.



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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

The screenshot shows the Oracle APEX interface for uploading an image. The interface is divided into three main sections, each marked with a red circle and a number:

- 1**: The "Files" section at the top left, where "Static Application Files" is selected.
- 2**: The "Upload File" button in the top right corner of the file list.
- 3**: The "Upload" button in the bottom right corner of the upload dialog box.

The upload dialog box contains the following fields and options:

- Directory: A dropdown menu.
- File: A text input field containing the path `/home/vncuser/Downloads/Logo.png`.
- File Character Set: A dropdown menu set to "Unicode UTF-8".
- Unzip File: A dropdown menu set to "Yes".
- Buttons: "Cancel", "Upload and Upload Another", and "Upload".

Below the dialog box, there is a table with the following columns: File Name, Mime Type, File Size, Reference, and File. The table contains one row with the following data:

| File Name | Mime Type | File Size | Reference | File |
|-----------|-----------|-----------|----------------------|----------|
| Logo.png | image/png | 1KB | #APP_IMAGES#Logo.png | Download |

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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 screenshot illustrates two methods for using an uploaded image in Oracle APEX:

- Footer Text:** A text editor window shows the HTML code ` `. A handwritten note with an arrow points to this code, stating "Reference the image in a page region." Below the code, the Oracle logo is displayed as a preview.
- Application Logo:** The Oracle APEX workspace interface is shown. In the "User Interface" tab, the "Logo" field is set to `#APP_IMAGES#PTS Logo.png`. A handwritten note with an arrow points to this field, stating "Reference the image as a logo." To the right, a preview of the application home page is shown, featuring the "Project Tracking System" logo and a "Home" button.

At the bottom of the workspace interface, the Oracle logo and the copyright notice "Copyright © 2015, Oracle and/or its affiliates. All rights reserved." are visible.

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

Q

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

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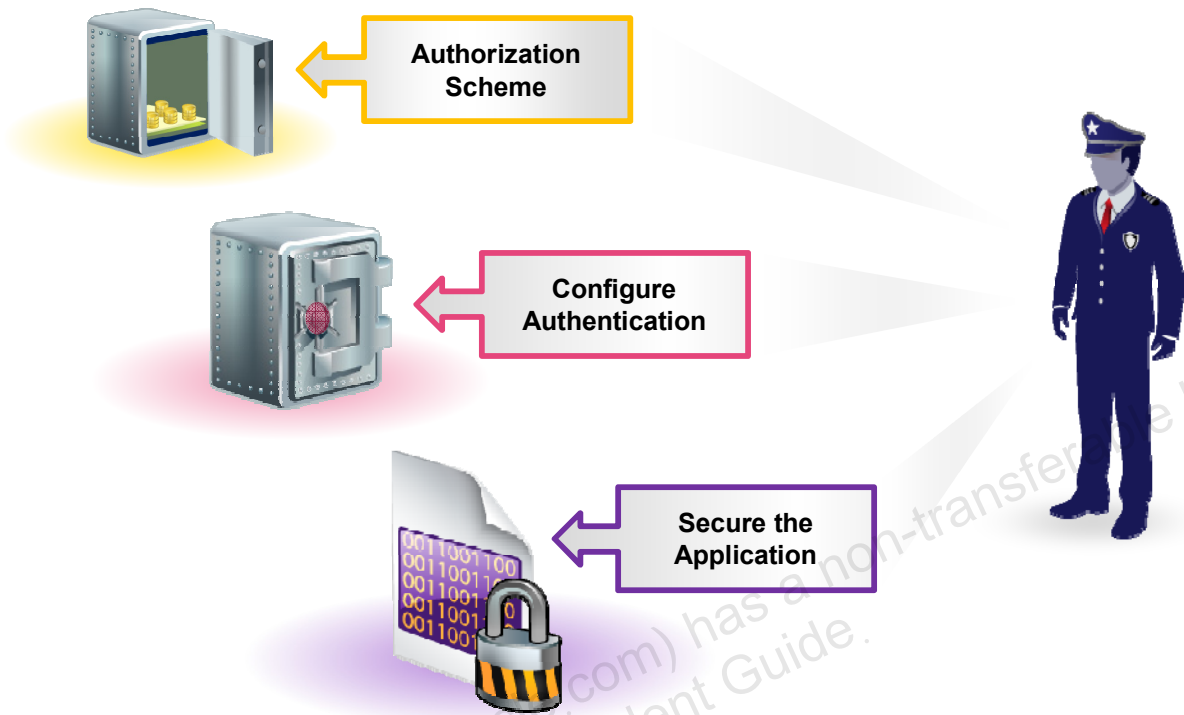
This lesson provided an overview of the themes and the page, region, report, and other templates in Oracle Application Express.

Implementing Security



Adam Grant (adam.grant@oracle.com) has a non-transferable license to use this Student Guide.

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



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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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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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.

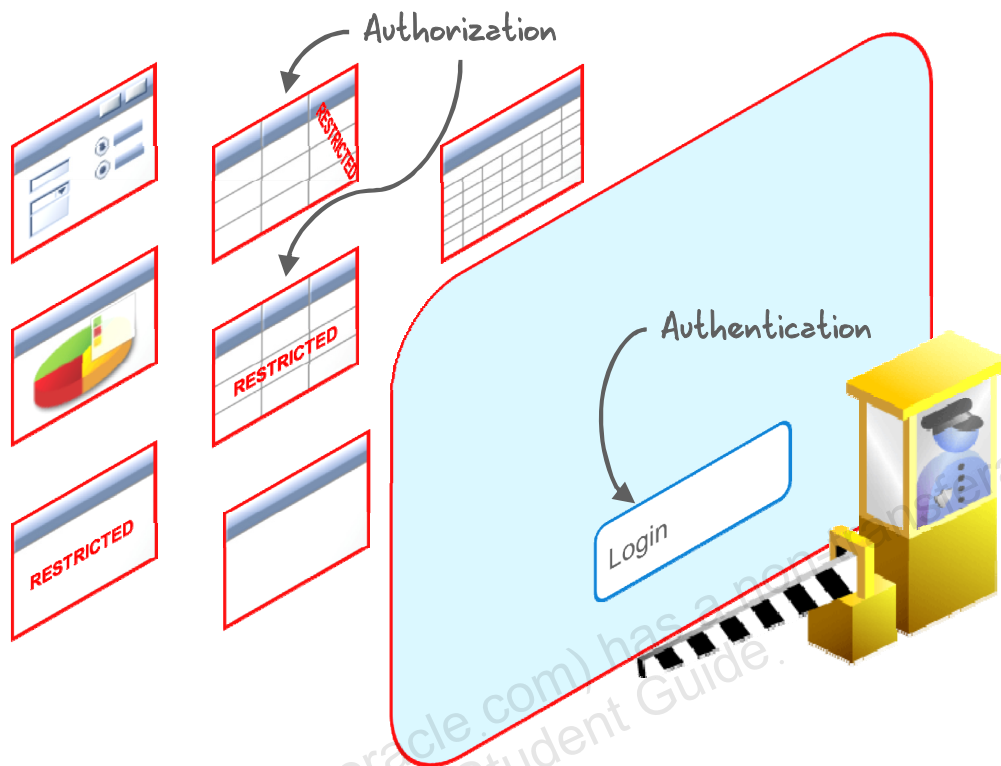
Lesson Agenda

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

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Securing an Application: Overview



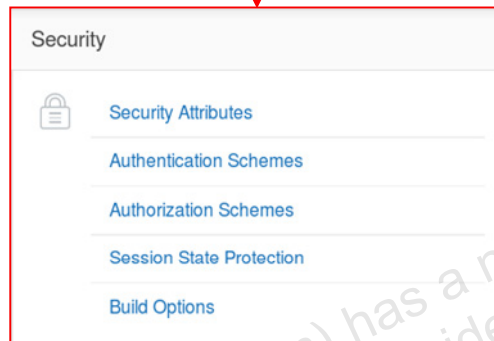
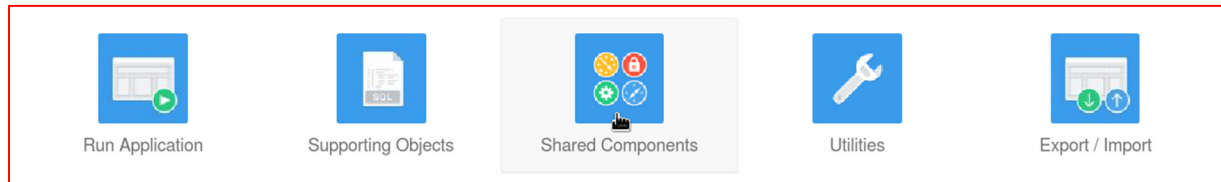
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After creating an application, you want to ensure that only authorized users can access the application. You can provide security to your application through the following methods:

- **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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To create security mechanisms for an application, navigate to the Shared Components page and click the appropriate link in the Security list.

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

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

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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.

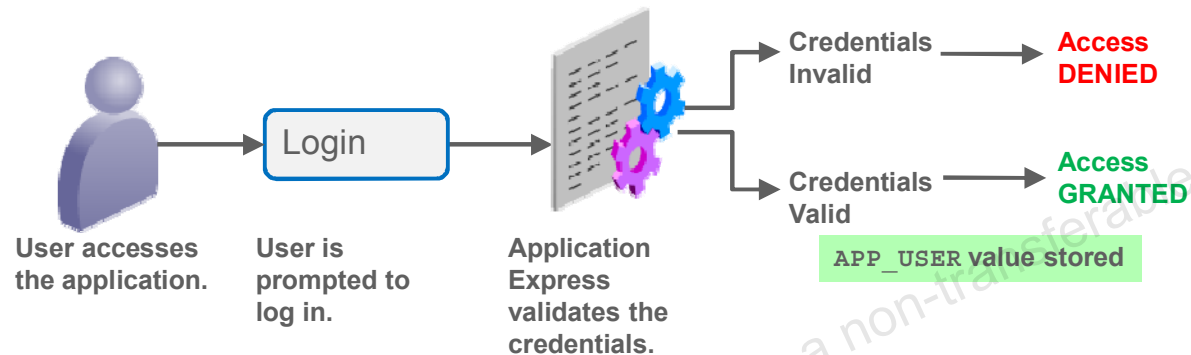
The Application Express Authentication scheme enables access to users created in Application Express. When you run an application by using this scheme, a custom login page 101 is displayed, prompting you for a username and password. You must enter the user credentials created by using Oracle Application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

The screenshot shows the 'Create Authentication Scheme' wizard. Step 1 shows the 'Create Scheme' options: 'Based on a pre-configured scheme from the gallery' (selected) and 'As a copy of an existing authentication scheme'. Step 2 shows the 'Name' field set to 'Open Door Credentials' and the 'Scheme Type' dropdown set to 'Open Door Credentials'. Step 3 shows a success message: 'Action processed. Authentication scheme activated as current authentication scheme.' Below this is a table of authentication schemes.

| Name | Scheme Type |
|---------------------------------|------------------------------|
| Application Express Accounts | Application Express Accounts |
| Open Door Credentials - Current | Open Door Credentials |

New schema becomes the current authentication scheme

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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

1. Create Scheme: Based on a pre-configured scheme from the gallery As a copy of an existing authentication scheme

2. Use this page to copy an authentication scheme from another application.
Copy From Application: 102 PROJECT TRACKING SYSTEM

| Application | From Name | To Name | Copy |
|------------------------------------|-----------|--|------|
| Application Express Authentication | | Copy of Application Express Authentication | Yes |

4. Authentication scheme copied.

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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

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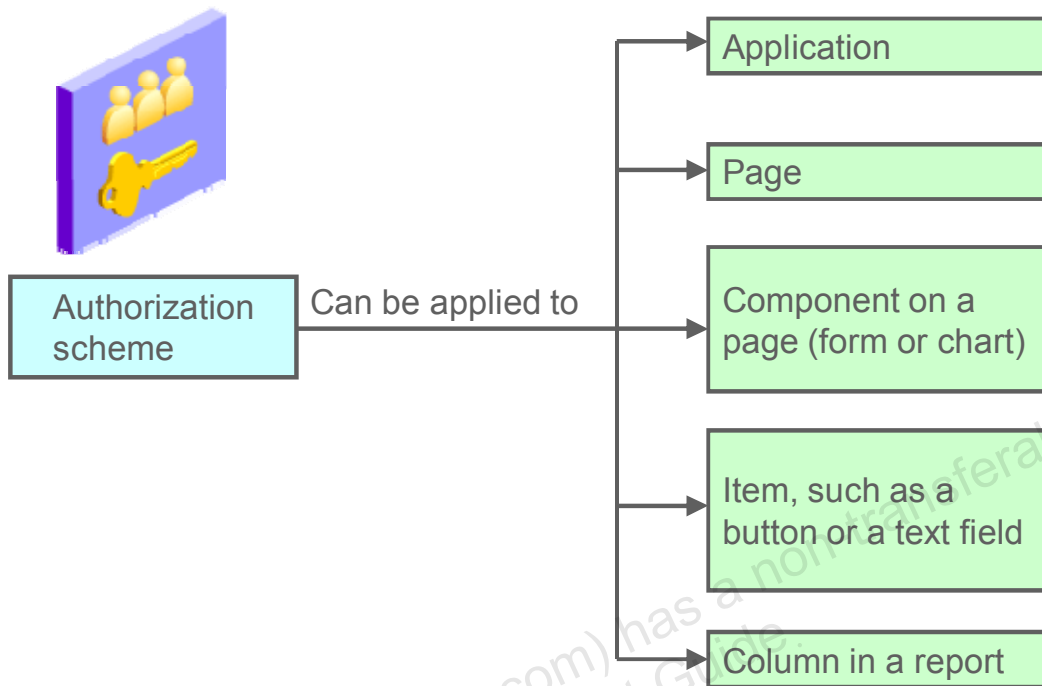
Lesson Agenda

- 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?



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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

The screenshot shows the Oracle Application Express interface for creating an authorization scheme. The breadcrumb navigation is 'Application 100 > Shared Components > Authorization Schemes'. The page title is 'Authorization Schemes'. There are tabs for 'Subscription', 'by Component', 'Utilization', and 'History'. A search bar is present. The 'Create >' button is highlighted with a red box and a circled '1'. Below the search bar, the 'Create Authorization Scheme' dialog is open. It has two radio buttons: 'From Scratch' (selected) and 'As a Copy of an Existing Authorization Scheme'. The 'Next >' button is highlighted with a red box and a circled '2'. Below the dialog, the 'Create Authorization Scheme' form is shown. It has four required fields: 'Name' (Admin Access), 'Scheme Type' (Value of Item in Expression 1 Equals Expression 2), 'Item' (APP_USER), and 'Value' (demo). There is also a field for 'Identify error message displayed when' with the text 'You do not have the required privileges.'. The 'Create Authorization Scheme' button is highlighted with a red box and a circled '3'.

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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

1 Create Page >

2 Access Control

3 Administration Page Number: 32
 Page Mode: Normal
 Page Group: - Select Page Group -

4 Navigation Preference: Do not associate this page with a navigation menu entry
 Create a new navigation menu entry
 Identify an existing navigation menu entry for this page

5

| | |
|--------------|------------------------------------|
| Application | 100 |
| Page | 32 |
| Page Name | Access Control Administration Page |
| Page Title | Access Control Administration Page |
| Create Table | APEX_ACCESS_SETUP |
| Table | APEX_ACCESS_CONTROL |
| name | access control - administrator |
| name | access control - edit |
| name | access control - view |

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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

Application Administration

Application Mode Full access to all, access control list not used. Restricted access. Only users defined in the access control list are allowed. Public read only. Edit and administrative privileges controlled by access control list. Administrative access only.

Set Application Mode

Access Control List

Identify usernames which correspond to this application's authentication scheme.

Find

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

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

The image consists of three numbered screenshots illustrating the process of applying an authorization scheme to an application in Oracle APEX.

- Step 1:** Shows the 'Application 100 - Sample Database Application' home page. The 'Edit Application Properties' button in the top right corner is highlighted with a red box.
- Step 2:** Shows the 'Application 100 > Edit Application Definition' screen. The 'Security' tab is highlighted with a red box.
- Step 3:** Shows the 'Application 100' configuration page with the 'Authorization' tab selected. The 'Authorization Scheme' dropdown menu is open, showing various schemes. The 'Apply Changes' button is highlighted with a red box.

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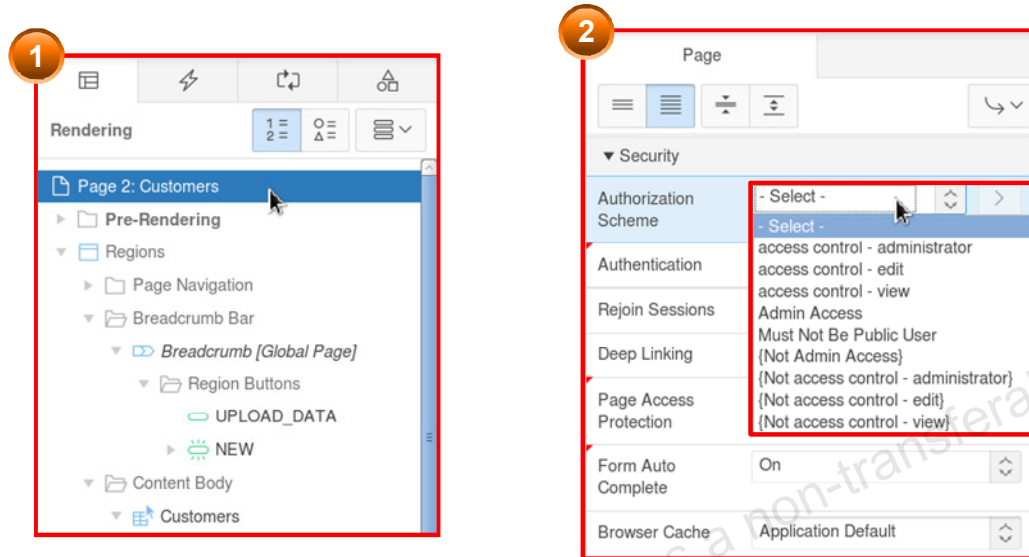
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To apply an authorization scheme to an entire application, navigate to the application home page and perform the following steps:

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



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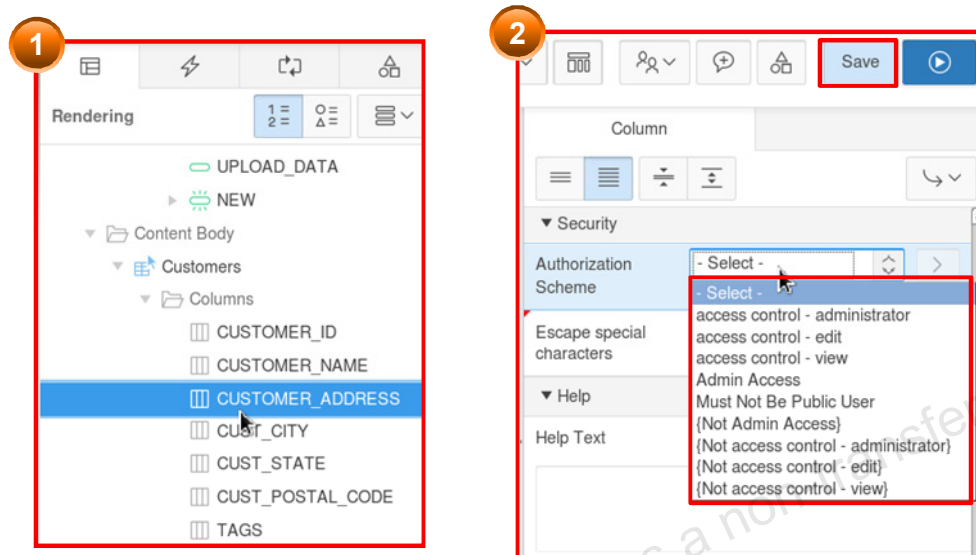
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To apply an authorization scheme to a page, perform the following steps:

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

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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

The image consists of three numbered screenshots illustrating the process of enabling Session State Protection in Oracle APEX:

- 1:** The 'Application 100 - Sample Database Application' home page. The 'Edit Application Properties' button in the top right corner is highlighted with a red box.
- 2:** The 'Edit Security Attributes' page for 'Application 100'. The 'Security' tab is selected and highlighted with a red box. The 'Session State Protection' tab is also highlighted with a red box.
- 3:** The 'Session State Protection' configuration page. The 'Session State Protection' dropdown menu is set to 'Enabled' and is highlighted with a red box. The 'Apply Changes' button is also highlighted with a red box.

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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

1. Shared Components icon.

2. Security menu with Session State Protection selected.

3. Application Items table:

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

4. Session State Protection configuration page. Select Action: Enable, Configure. Buttons: Cancel, Next >

5. Confirmation dialog: Application: 100 - Sample Database Application. Session State Protection: Disabled. Confirm your request to enable Session State Protection. This action will not alter page or item attributes. Buttons: <, Cancel, Enable



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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

The screenshot shows the configuration for 'Sample Database Application'. The 'Page Access Protection' dropdown is set to 'Arguments Must Have Checksum'. The 'Display Item Type' dropdown is also set to 'Arguments Must Have Checksum'. Other options visible in the dropdowns include 'Unrestricted', 'No Arguments Allowed', and 'No URL Access'.

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

1 Application Items

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

3 Page Access Protection

- Arguments Must Have Checksum
- Page Data Entry Item Protection: Checksum Required - Session Level
- Page Display-Only Item Protection: Checksum Required - Session Level
- Application Item Protection: Checksum Required - Session Level

2 Select Action: Disable, Enable, Configure

- Page Level Session State Protection Summary
- Page Item Session State Protection Summary
- Application Item Session State Protection Summary

4 Pages: Arguments Must Have Checksum

- Application Items: Checksum Required - Session Level
- Data Entry Items: Checksum Required - Session Level
- Display Only Items: Checksum Required - Session Level

Pages To Be Updated

Application Items To Be Updated

Data Entry Items To Be Updated

Display-Only Items To Be Updated

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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

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 | | | |

2

| 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 |

3 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 image shows two screenshots from the Oracle APEX interface. The first screenshot, labeled '1', shows a table titled 'Application Items' with columns 'Item Access Level' and 'Items'. The table contains three rows: 'Restricted - May not be set from browser' with 3 items, and two 'Unrestricted' rows with 2 items each. A 'Go To Pages' button is visible. The second screenshot, labeled '2', shows the 'Application Item' configuration form for 'ENABLE_FEEDBACK'. The form includes fields for 'Name' (ENABLE_FEEDBACK) and 'Scope' (Application), and an 'Apply Changes' button.

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

Application Item configuration form:

Application: 100 Sample Database Application

Name: ENABLE_FEEDBACK

Scope: Application

Buttons: Cancel, Delete, Apply Changes

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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

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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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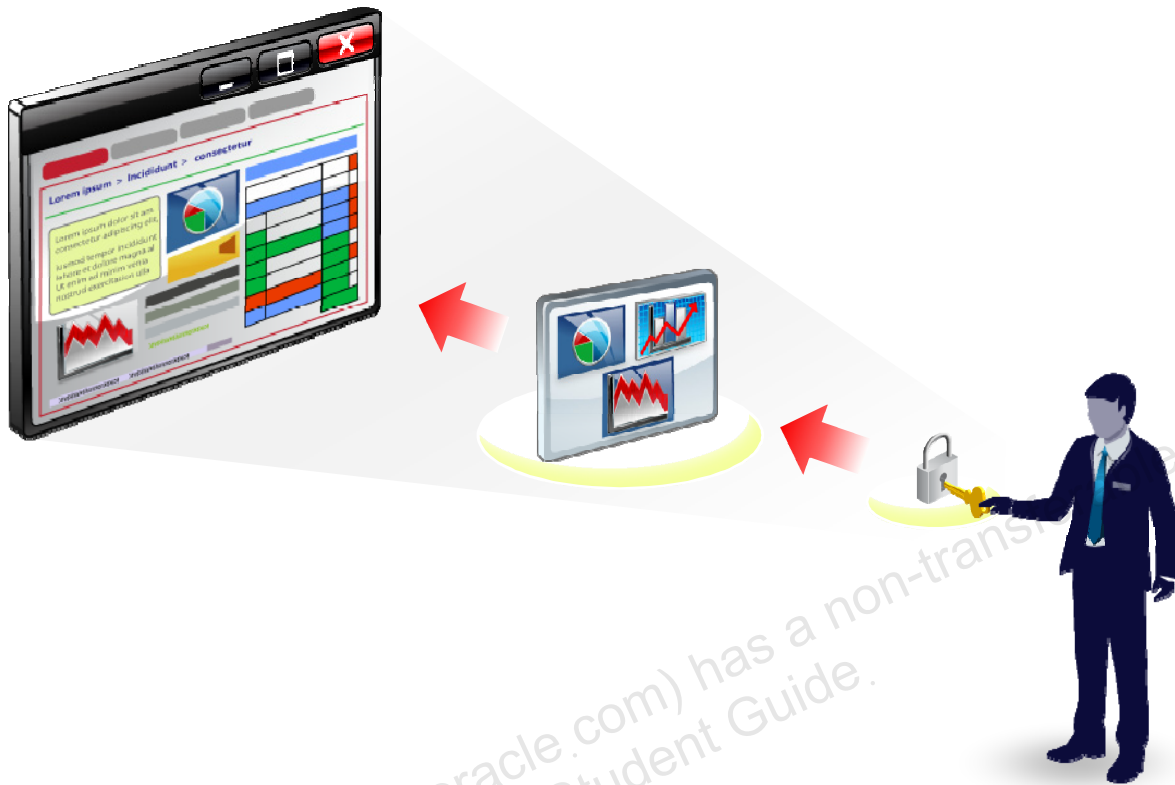
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Managing Application Navigation



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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

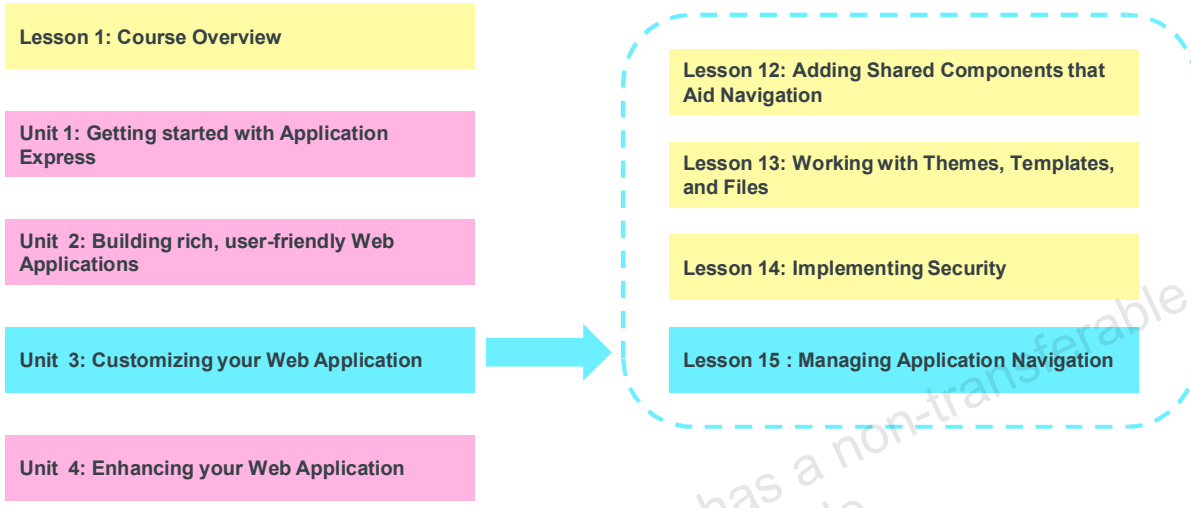


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In this lesson, you learn to build a hierarchical list with images on the home page. You also build a database-driven navigation report and a site map, and incorporate security into your site map.

You Are Here in This Course



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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.

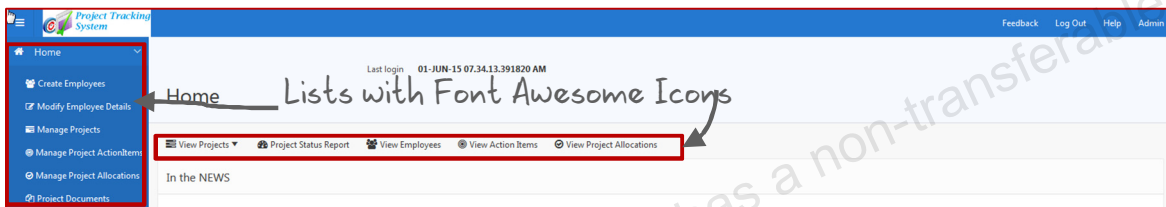
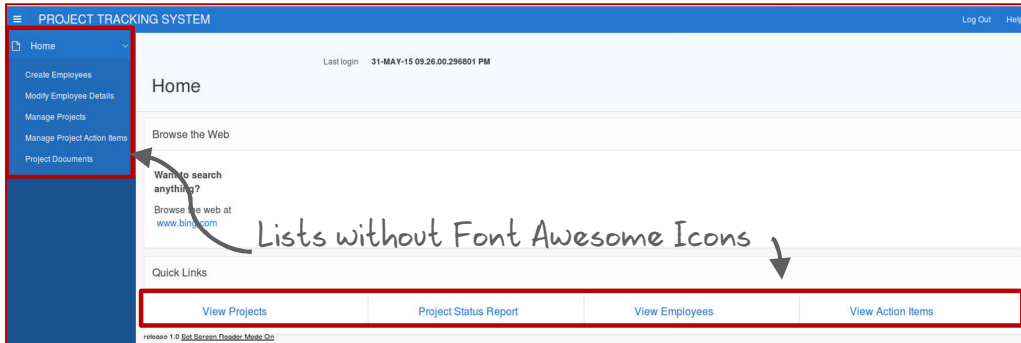
Lesson Agenda

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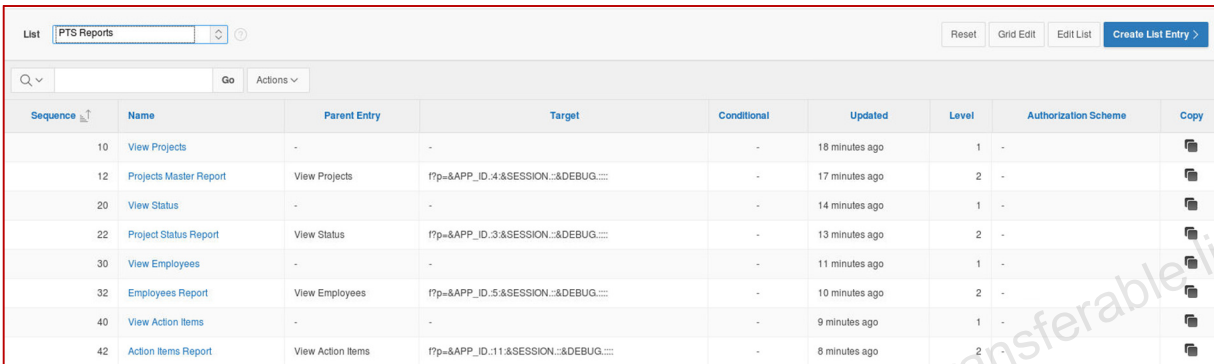
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To build a hierarchical list with images, you need to perform a series of steps:

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.



The screenshot shows an Oracle APEX list interface for 'PTS Reports'. The list contains 8 entries with columns for Sequence, Name, Parent Entry, Target, Conditional, Updated, Level, Authorization Scheme, and Copy. The entries are as follows:

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

1

2

3

4

| File Name | Mime Type |
|-----------|-----------|
| Logo.png | image/png |

This step is not required for Font Awesome Icons.

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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.

The screenshot illustrates the process of associating an image or font awesome icon with a list item in Oracle APEX. It is divided into three numbered steps:

- Step 1:** Select the list 'PTS Reports' from the 'List' dropdown menu.
- Step 2:** Click on the list entry 'View Projects' to open its configuration pop-up. The configuration fields include: List (PTS Reports), Parent List Entry (- No Parent List Item -), Sequence (10), Image/Class (fa-tasks), Attributes, Alt Attribute, and List Entry Label (View Projects).
- Step 3:** Click the pop-up LOV (Look Up Value) icon next to the Image/Class field. This opens a window titled 'Font Awesome Icons' with a 'Go' button. The window displays a grid of icons with labels: fa-adjust, fa-adn, fa-align-center, fa-align-left, fa-align-right, and fa-ambulance.

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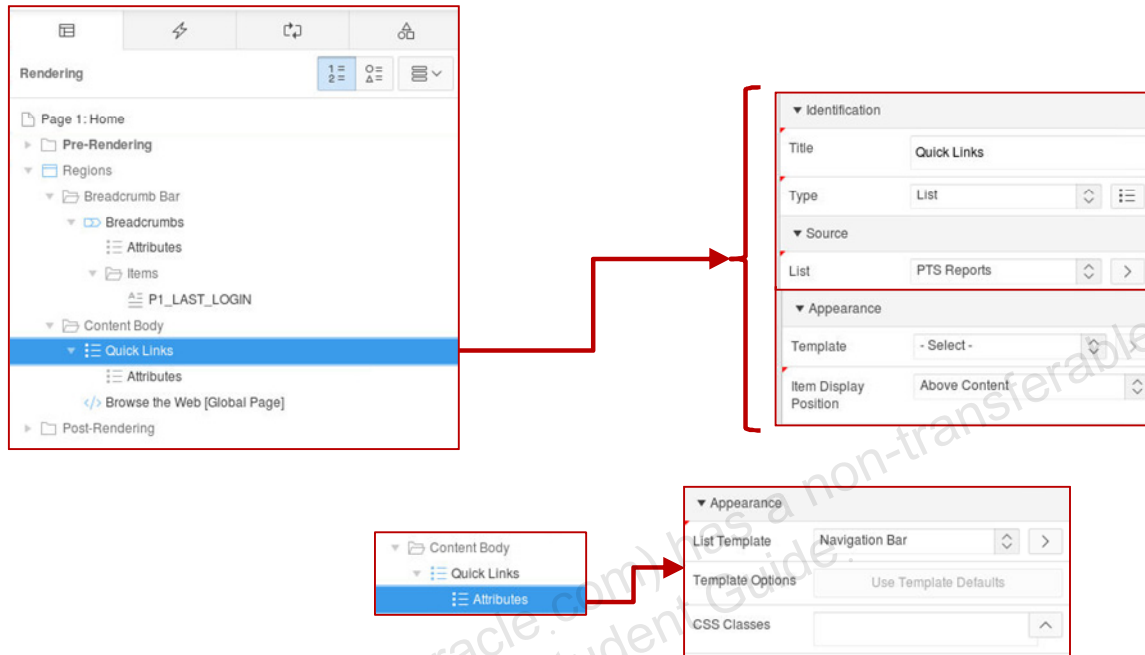
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Associate an image or font awesome icon with a list item.

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

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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 image shows two screenshots from an Oracle APEX application. The left screenshot, titled "Database Driven Projects Navigation", displays a table with two columns: "PROJECTS" and "Project Name". The table lists various projects such as "MFG Sugar Industries", "APEX4.2 Course Development", "APEX5.0 Course Development", "AMEX Cobrand", "Order Management", "Super Insurance Solutions", "MFP Firmware Testing", "SPRINT P2K", "Peoplesoft", "XYZ Store CRM", and "Superia Banking Solutions". A red box highlights the table, and a handwritten note with an arrow pointing to the "MFG Sugar Industries" link says "Click project name." The right screenshot, titled "Manage Projects", shows a form with fields for project details. A red box highlights the form, and a handwritten note with an arrow pointing to the form says "Displays project details". The form fields include: 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 Enroll 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), and Project Last Updated On (23-MAR-15).

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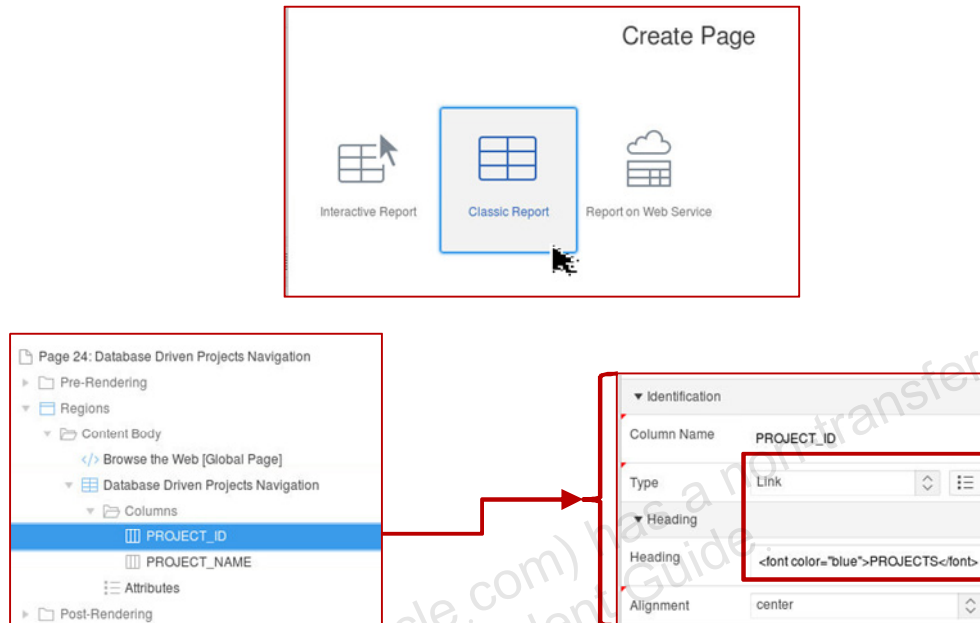
Often, you want to handle navigation through shortcuts. In this case, you want to show a list based on values in the database. In the example in this slide, a list of Projects shortcuts is shown. The user selects a project, which populates the project detail page based on the project.

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.



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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.

The image shows three overlapping screenshots from the Oracle APEX interface. The top-left screenshot shows the 'Rendering' tree for 'Page 24: Database Driven Projects Navigation', with the 'PROJECT_ID' column selected. The bottom-center screenshot shows the 'Link' configuration dialog, where the 'Target' is set to 'Page 7' and the 'Link Text' is '#PROJECT_NAME#'. The right-side screenshot shows the 'Link Builder - Target' dialog, where the 'Type' is 'Page in this application', the 'Page' is '7', and a 'Set Items' table is configured with 'Name' 'P7_PROJECT_ID' and 'Value' '#PROJECT_ID#'. Red arrows indicate the flow of information from the rendering tree to the link configuration and then to the link builder.

| Name | Value |
|---------------|--------------|
| P7_PROJECT_ID | #PROJECT_ID# |

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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

Q

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

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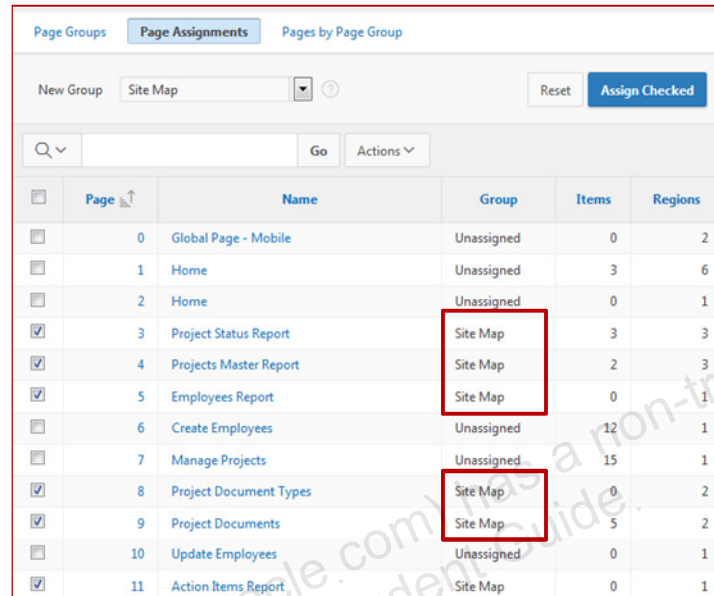
Site maps are typically useful for applications that are display- or query-only. For larger online transaction processing (OLTP) applications, site maps may not be as useful because there are many pages that perform similar functionality.

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 in the Oracle interface. At the top, there are tabs for 'Page Groups', 'Page Assignments', and 'Pages by Page Group'. Below the tabs, there is a 'New Group' dropdown menu set to 'Site Map', a 'Reset' button, and an 'Assign Checked' button. A search bar with a 'Go' button and an 'Actions' dropdown is also present. The main table lists various pages and their assignments to the 'Site Map' group. The 'Group' column for several rows is highlighted with a red box, showing 'Site Map'.

| <input type="checkbox"/> | Page | Name | Group | Items | Regions |
|-------------------------------------|------|------------------------|------------|-------|---------|
| <input type="checkbox"/> | 0 | Global Page - Mobile | Unassigned | 0 | 2 |
| <input type="checkbox"/> | 1 | Home | Unassigned | 3 | 6 |
| <input type="checkbox"/> | 2 | Home | Unassigned | 0 | 1 |
| <input checked="" type="checkbox"/> | 3 | Project Status Report | Site Map | 3 | 3 |
| <input checked="" type="checkbox"/> | 4 | Projects Master Report | Site Map | 2 | 3 |
| <input checked="" type="checkbox"/> | 5 | Employees Report | Site Map | 0 | 1 |
| <input type="checkbox"/> | 6 | Create Employees | Unassigned | 12 | 1 |
| <input type="checkbox"/> | 7 | Manage Projects | Unassigned | 15 | 1 |
| <input checked="" type="checkbox"/> | 8 | Project Document Types | Site Map | 0 | 2 |
| <input checked="" type="checkbox"/> | 9 | Project Documents | Site Map | 5 | 2 |
| <input type="checkbox"/> | 10 | Update Employees | Unassigned | 0 | 1 |
| <input checked="" type="checkbox"/> | 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

2. 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'
```

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

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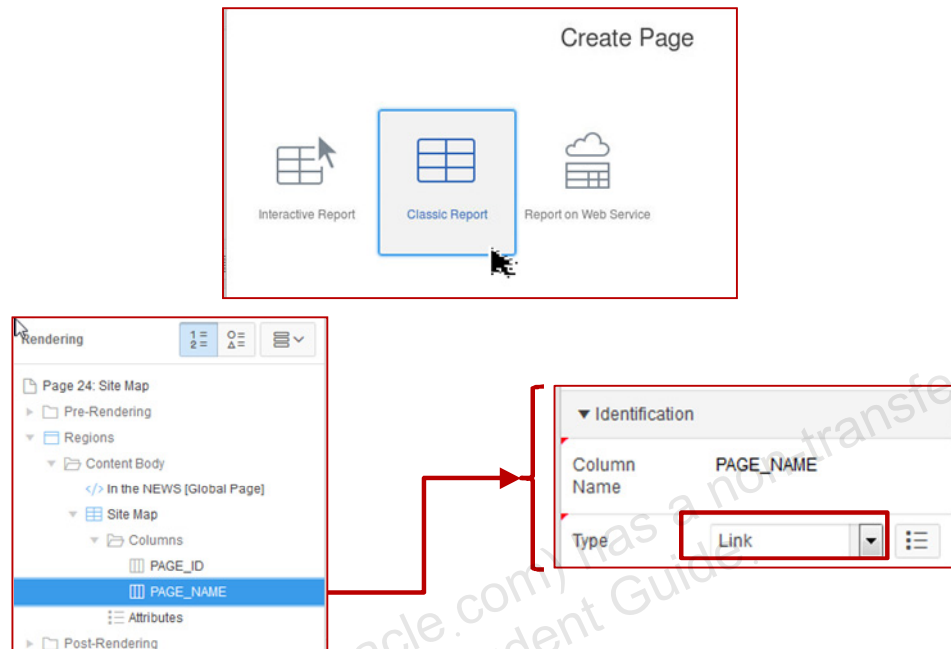
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The next step in building your site map is to generate the SQL statement that you want to run to produce the site map. To produce the SQL statement, perform the following steps:

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.



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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 displays the Oracle AEM Property Editor interface for a Site Map. The left pane shows the 'Rendering' section with a tree view: Page 24: Site Map > Pre-Rendering > Regions > Content Body > In the NEWS [Global Page] > Site Map > Columns > PAGE_ID, PAGE_NAME, Attributes. The 'Attributes' item is selected. The right pane shows the 'Attributes' configuration for the selected item, with three sections: 'Pagination' (Type: No Paginati), 'Identification' (Column Name: PAGE_NAME, Type: Link), and 'Link' (Target: Page #PAGE_ID#, Link Text: #PAGE_NAME#, Link Attributes: empty). Red boxes and arrows highlight the 'Attributes' item in the tree, the 'PAGE_NAME' column in the 'Identification' section, and the 'Link' section.

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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.



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

Quiz

Q

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

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Lesson Agenda

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

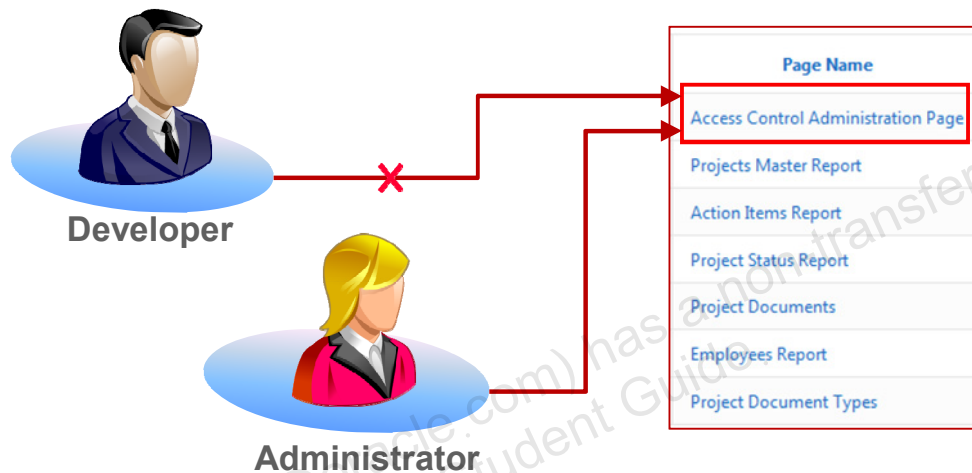
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Enforcing Authorization on Your Site Map

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



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 completed four topics.

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Unit IV: Enhancing Your Web Application



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Jack Enhances Project Tracking System



Let me
enhance the
application!



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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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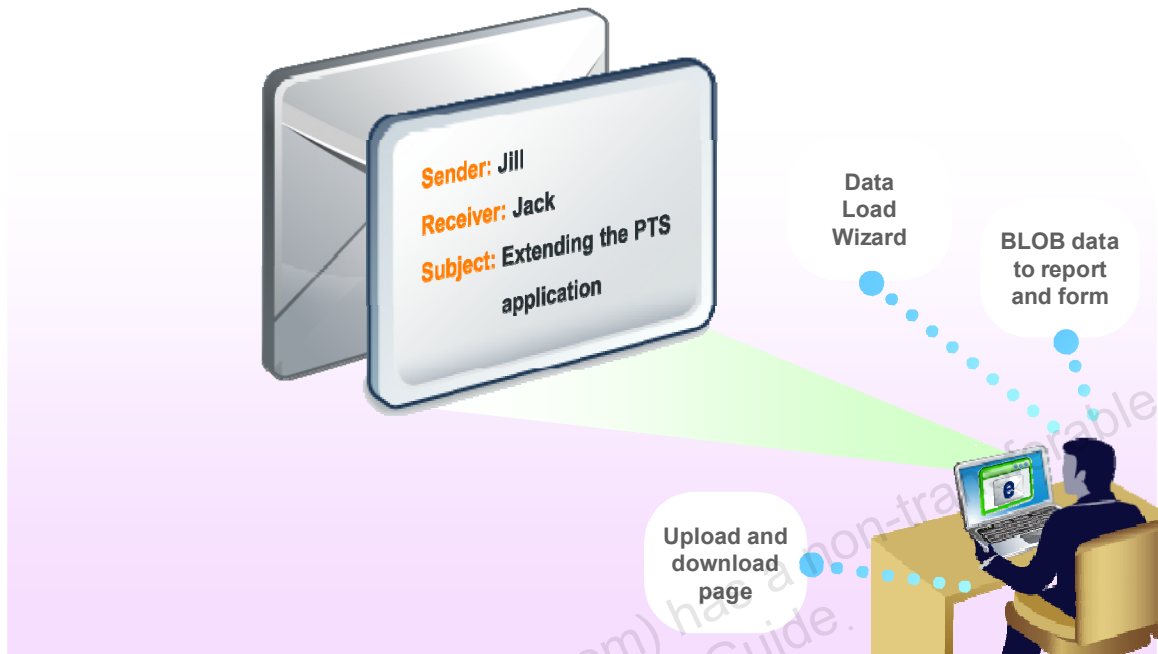
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Extending Your Application



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Jack Extends the Application



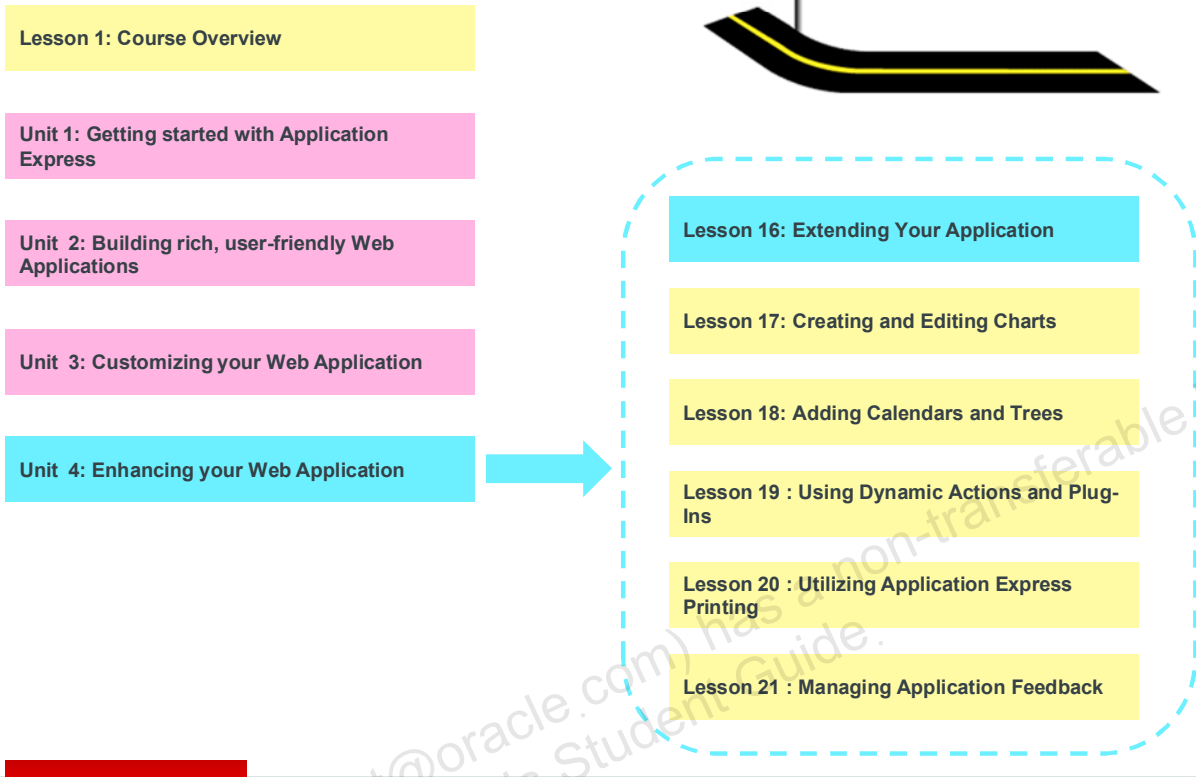
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Jack has a functional PTS application that he developed using APEX.

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



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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

The screenshot shows the 'Data Load Source' step of a wizard. It features a progress bar at the top with four steps: 'Data Load Source' (active), 'Data / Table Mapping', 'Data Validation', and 'Data Load Results'. Below the progress bar, there are 'Cancel' and 'Next' buttons. The main area contains the following options:

- Import From:** Radio buttons for 'Upload file, comma separated (*.csv) or tab delimited' and 'Copy and Paste' (selected).
- Separator:** A text input field containing a tab character and a help icon.
- Optionally Enclosed By:** A text input field containing a double quote character and a help icon.
- First Row has Column Names:** A checked checkbox and a help icon.
- Use Application Date Format:** A checked checkbox and a help icon.
- File Character Set:** A dropdown menu set to 'UTF-8' and a help icon.
- Copy and Paste Delimited Data:** A text input field.

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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

The screenshots illustrate the following steps:

- Step 1:** Clicking the 'Create Page >' button on the application home page.
- Step 2:** Selecting the 'Data Loading' option from the menu.
- Step 3:** The 'Data Load' definition page where fields for Definition Name (Data Load), Owner (PTS), Table Name (PROJECTS (table)), and Unique Column 1 (PROJECT_ID (Number)) are filled. The 'Next >' button is visible.
- Step 4:** The 'Transformation Rules' page showing a rule with Sequence 10, Rule Name 'PROJECT_UPGRADE_YN to upper case', and the selected column 'PROJECT_UPGRADE_YN'. The 'Add' button is highlighted.
- Step 5:** The 'Lookup Definition' page with fields for Column Name, Owner (PTS), Table Name, and Return Column. The 'Create' button is visible.
- Step 6:** The 'Page Name' and 'Page Number' configuration page showing Step 1 (Data Load Source, 20) and Step 2 (Data / Table Mapping, 21). The 'Next >' button is visible.
- Step 7:** The 'Navigation' page where 'Cancel Button Branch to Page' is set to 1, 'Finish Button Label' is 'Finish', and 'Finish Button Branch to Page' is 'f'. The 'Next >' button is visible.
- Step 8:** The 'Finish' page where the 'Create' button is clicked to complete the wizard.



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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 in 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

The screenshot displays the Oracle Data Load Wizard interface with four numbered steps highlighted by red boxes and orange circles:

- Step 1: Data Load Source** - Shows a progress bar with four steps. The first step is active. Below the progress bar, there are options for 'Import From' (Upload file, comma separated (*.csv) or tab delimited; Copy and Paste) and a 'File Name' field with a 'Browse...' button.
- Step 2: Data / Table Mapping** - Shows a 'Column Mapping' table. The first row is selected. The columns are PROJECT_ID, PROJECT_NAME, PROJECT_TYPE, and PROJECT_DESCRIPTION. The values are 612, MFG Petrol Industry, 304, and Engineering Design Capabilities in the Petrol Industry.
- Step 3: Data Validation** - Shows a table with columns: Sequence, Action, PROJECT_ID, PROJECT_NAME, PROJECT_TYPE, PROJECT_DESCRIPTION, PROJECT_STATUS, and PROJECT_PL. The first two rows are visible.
- Step 4: Data Load Results** - Shows a summary of the data load results: Inserted Row(s): 2, Updated Row(s): 0, Failed Row(s): 0, and To be Reviewed Row(s): 0.

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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.



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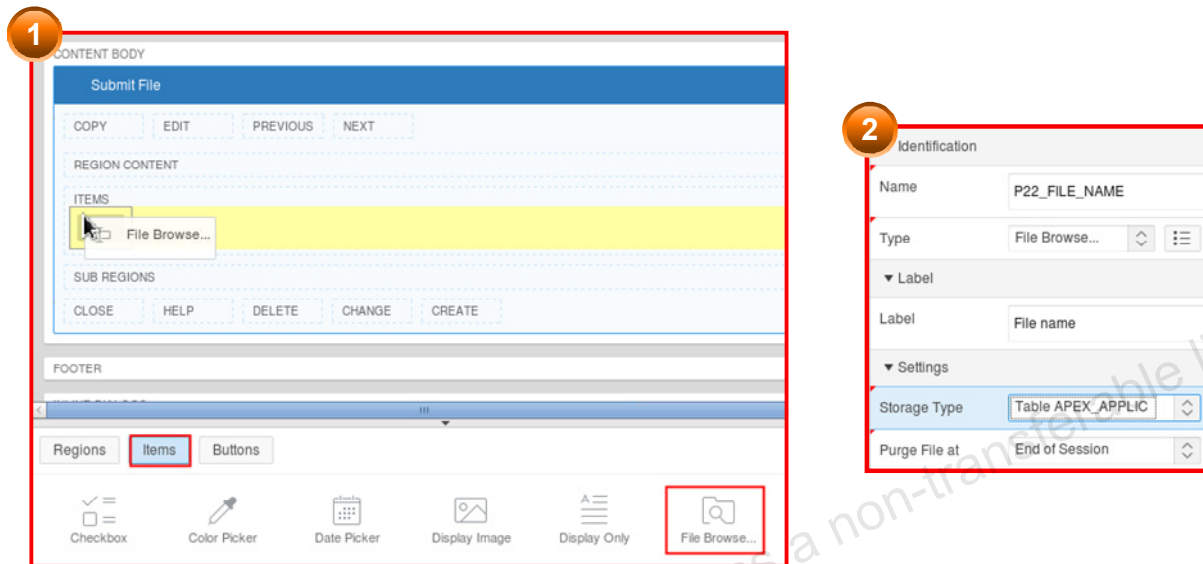
Lesson Agenda

- 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



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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

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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

Form

Scott Jordan Customer Details

Cust First Name

Cust Last Name

Cust Email

Account Manager
[Bates, Elizabeth, Russell, John, Cambraut, Gerald](#) ?

Country

City


Phone number

Photo **Download**

The record created or modified in this form is reflected in the Customer Report.

[Download 4KB](#)

Report

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

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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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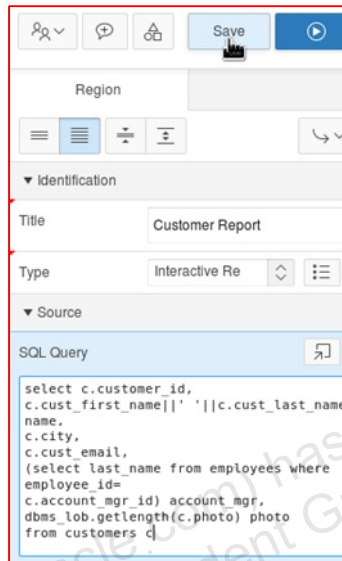
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To generate the appropriate code to store and display BLOB data declaratively, you create a form and/or form with a report by using wizards. In this example, you create a form with an interactive report. Select only the BLOB column when selecting the 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 configuration interface for an Oracle BI report. The report is titled "Customer Report" and is of type "Interactive Re". The source is defined by an SQL query that retrieves customer information and includes a subquery to get the manager's last name. The query also includes a call to `dbms_lob.getlength(c.photo)` to check for BLOB data.

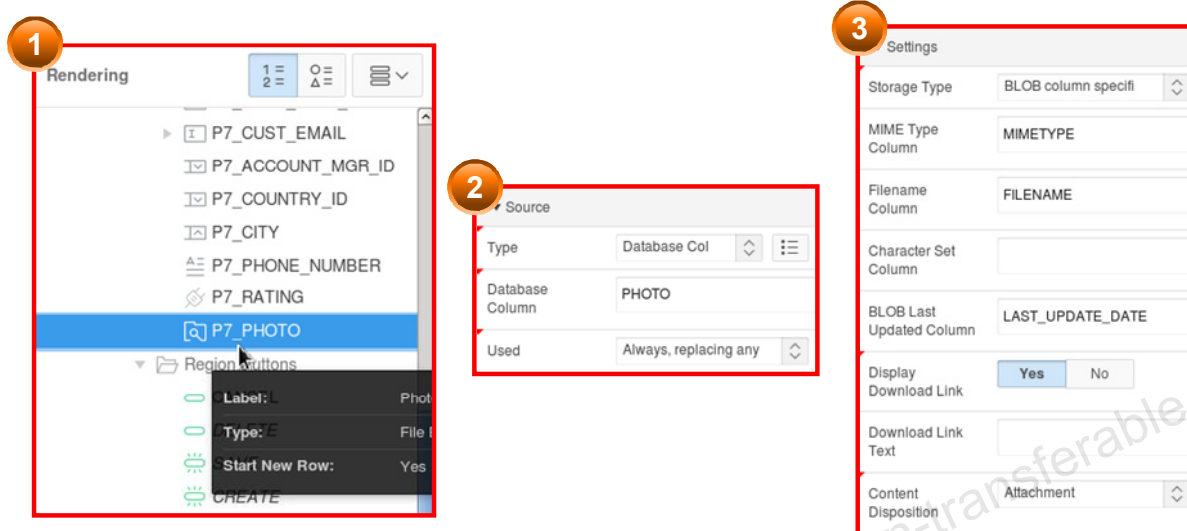
```
select c.customer_id,
c.cust_first_name||' '||c.cust_last_name
name,
c.city,
c.cust_email,
(select last_name from employees where
employee_id=
c.account_mgr_id) account_mgr,
dbms_lob.getlength(c.photo) photo
from customers c
```

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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 *

Cust Last Name *

Cust Email

Account Manager [Bates, Elizabeth, Russell, John, Cambraut, Gerald](#) ?

Country

City


Phone number

Rating

Photo [Download](#)

The record created or modified in this form is reflected in the Customer Report.

Photo Image



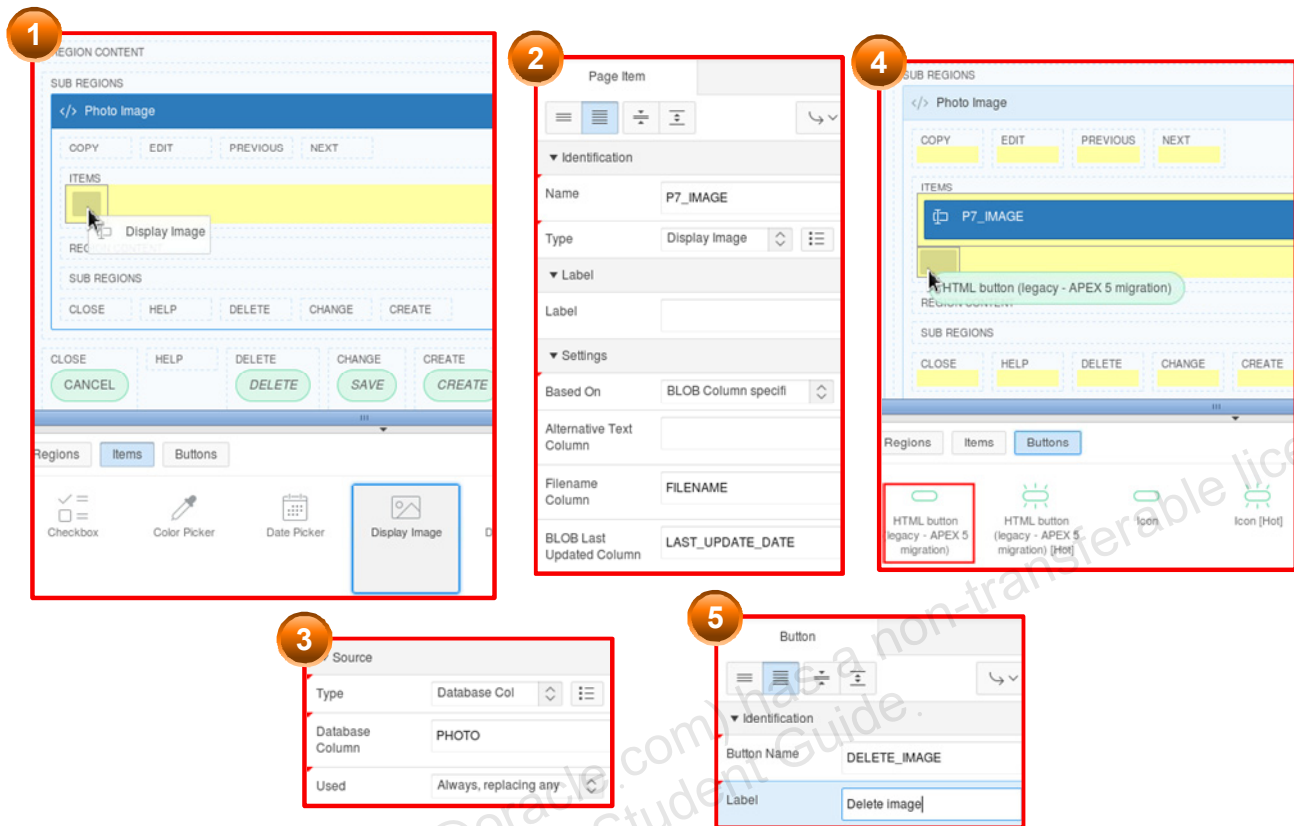
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The form created through the wizards does not allow you to update a row and set a BLOB column to null. You can add a delete image region. Perform the following steps:

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



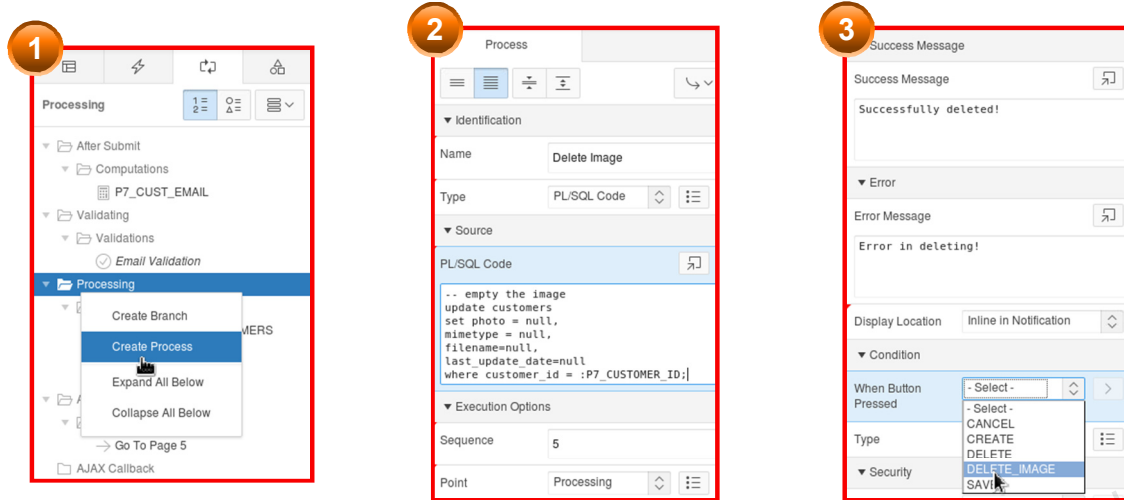
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To create an item that will store the image on the page, perform the following steps:

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

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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:

Contact Us

From:

Subject:

Message:

Rendering

Page 34: Contact Us

- Pre-Rendering
- Regions
 - Content Body
 - Contact Us**
 - Attributes
 - Items
 - P34_FROM
 - P34_SUBJECT
 - P34_MESSAGE
 - SUBMIT
 - In the News [Global Page]
 - 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

1 Processing

2 Identification

3 Settings

4 Success Message

5 Condition



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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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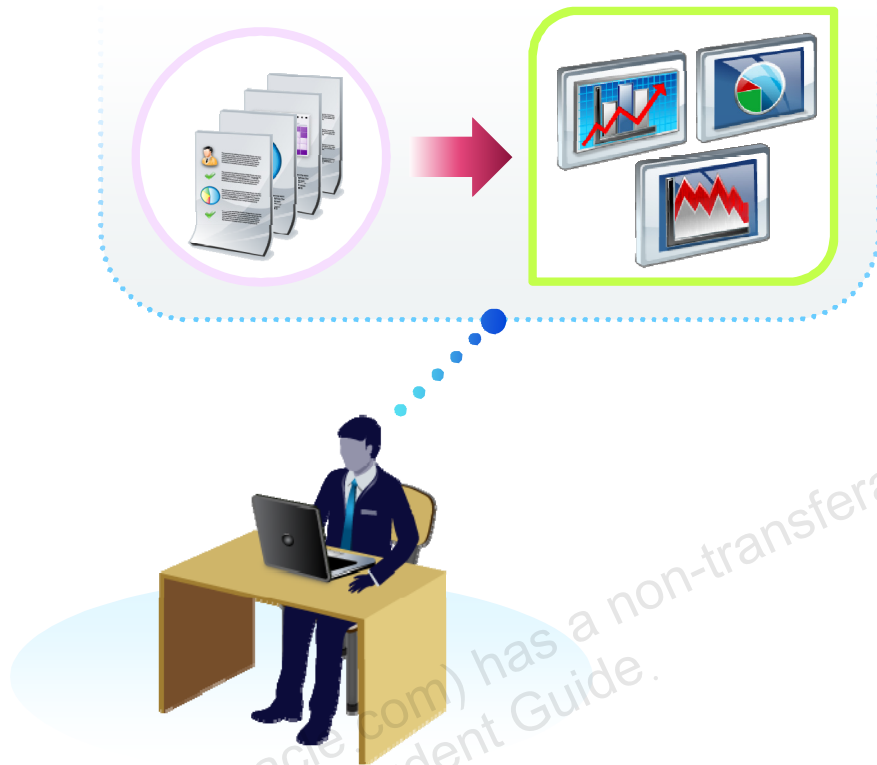
Creating and Editing Charts

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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

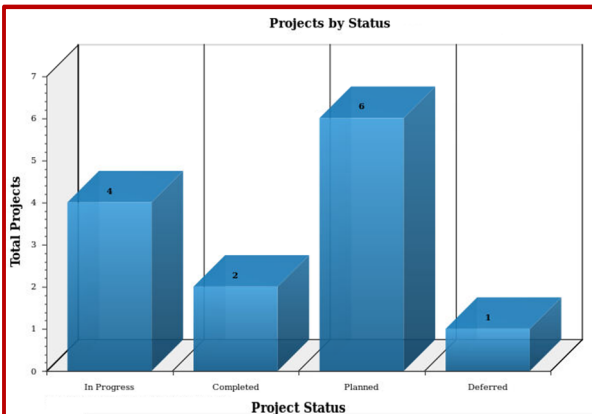
- Creating and Using Charts
 - Creating a Flash Chart
 - Viewing and Modifying Chart Attributes
 - Creating an HTML5 Chart for Mobile Applications
- Reviewing Additional Charting Examples

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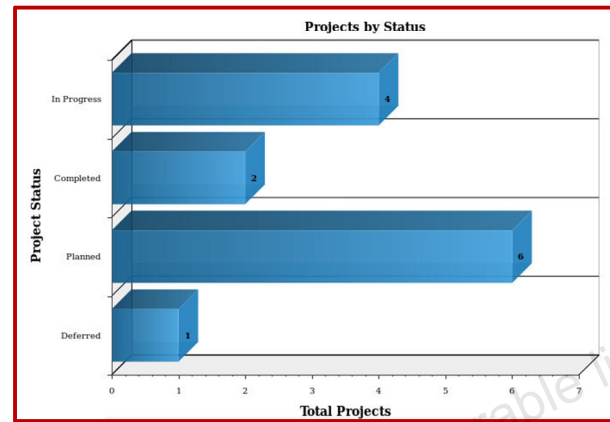
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Building Charts

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) value  
from "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

The screenshot illustrates the 'Create Page' wizard in Oracle APEX. It is divided into four numbered steps:

- Step 1:** Selecting 'Chart' from the 'Create Page' options.
- Step 2:** In the 'Chart Rendering' section, selecting 'Flash Chart' and 'Column' as the chart type.
- Step 3:** In the 'Select Chart Type' section, selecting '2D Column'.
- Step 4:** In the 'Page Properties' section, accepting the default values for Page Number (37), Page Name (Projects by Status Chart), Page Mode (Normal), Region Template (Standard), Region Name (Projects by Status Chart), and Breadcrumb (- do not use breadcrumbs on page -).



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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

5 Navigation Preference

Do not associate this page with a navigation menu entry

Create a new navigation menu entry

Identify an existing navigation menu entry for this page

New Navigation Menu Entry: Projects by Status Chart

Parent Navigation Menu Entry: - No parent selected -

6 Chart Properties

Chart Title: Projects by Status

Chart Animation: None

Background Type: Transparent Solid Color Gradient

Background Color 1: #eeeeee

Background Color 2: #eeeeee

Gradient Angle:

Color Scheme: Look 6

X Axis Title: Project Status

Y Axis Title: Total Projects

7 Build Query

Owner: PTS

Table: PROJECT_STATUS_VIEW

Label: STATUS_NAME (Varchar2)

Value: PROJECT_ID (Number)

Aggregate Function: COUNT

8 Confirmation Summary

You have requested to create a Flash chart page with the following attributes. Please confirm your selection.

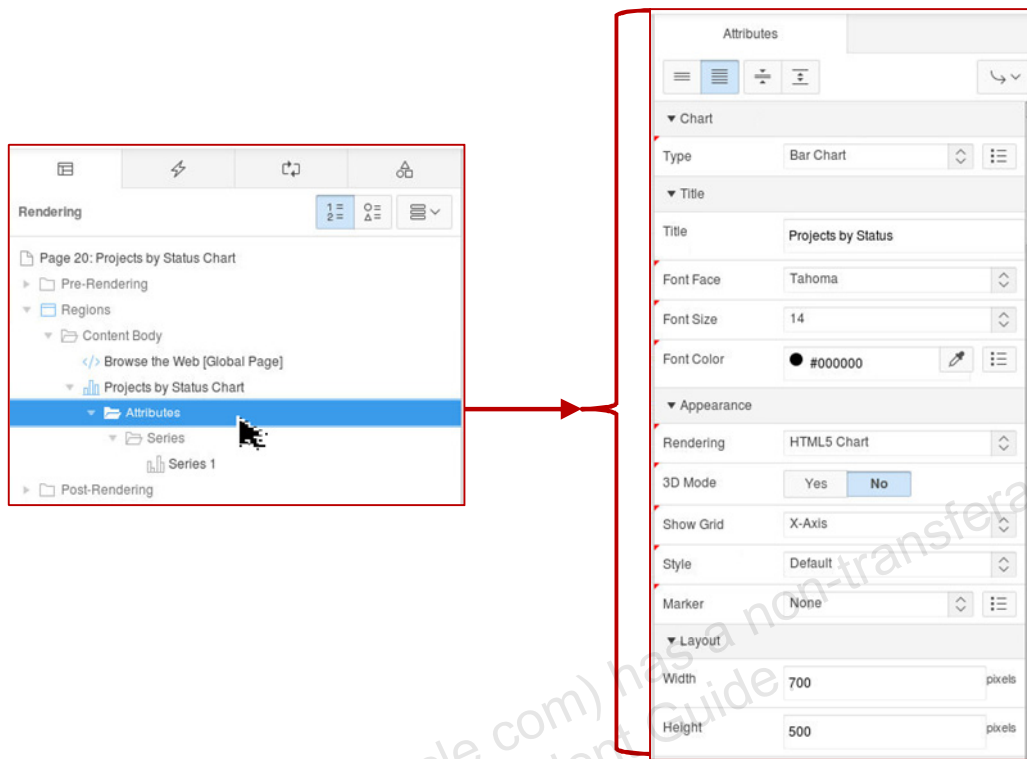
| | |
|-----------------|--------------------------|
| Application | 2 |
| Page | 37 |
| Page Name | Projects by Status Chart |
| Region Title | Projects by Status Chart |
| Region Template | Standard |
| Chart Type | 2D Column |

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.

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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

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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.

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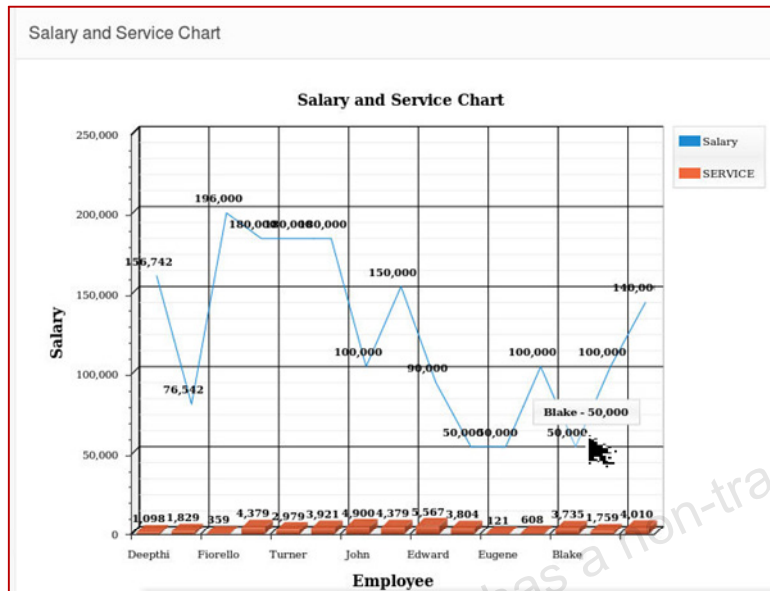
Lesson Agenda

- 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 steps to create a combined chart in Oracle APEX:

- Chart Configuration:** Chart Type is set to 3D Column. Chart Title is "Salary and Service Chart". Background Type is Transparent. X Axis Title is "Employee" and Y Axis Title is "Salary".
- SQL Query:** The query is:


```
SELECT NULL LINK,
       LAST_NAME LABEL,
       SALARY "Salary",
       (SYSDATE - HIRE_DATE) "SERVICE"
FROM EMPLOYEES
ORDER BY SERVICE
```
- Confirmation Dialog:** A dialog box shows the chart attributes: Application (2), Page (21), Page Name (Salary and Service Chart), Region Title (Salary and Service Chart), Region Template (Standard), and Chart Type (3D Column).
- Rendering Tree:** The tree shows the hierarchy: Page 21: Salary and Service Chart > Pre-Rendering > Regions > Content Body > Browse the Web (Global Page) > Salary and Service Chart > Attributes > Series > Series 1.
- Property Editor:** The "Series 1" properties are shown. Under "Identification", the "Type" is set to "Line". A handwritten note says "Editing attributes in page designer".

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:

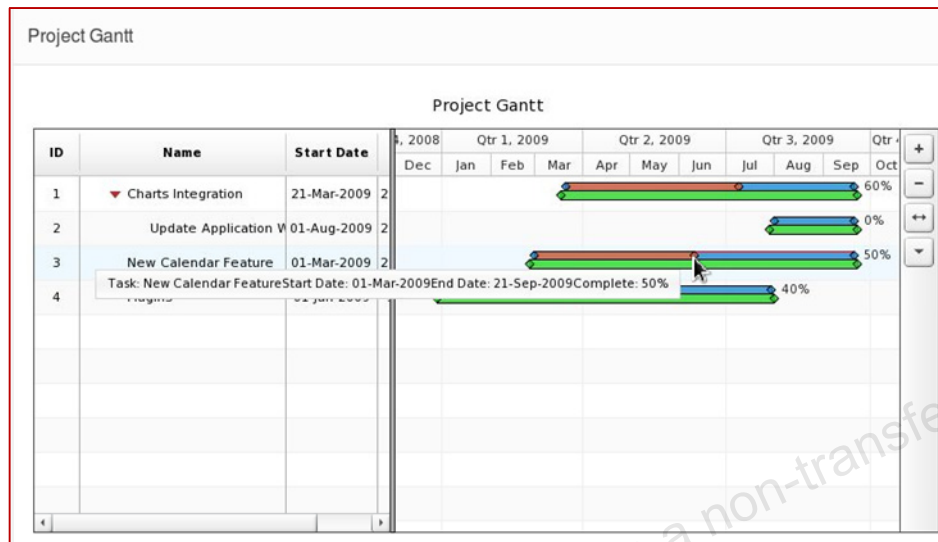
- a. Text that is displayed in the bar
- b. Column that defines the bar size
- c. Starting point
- d. URL

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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
```

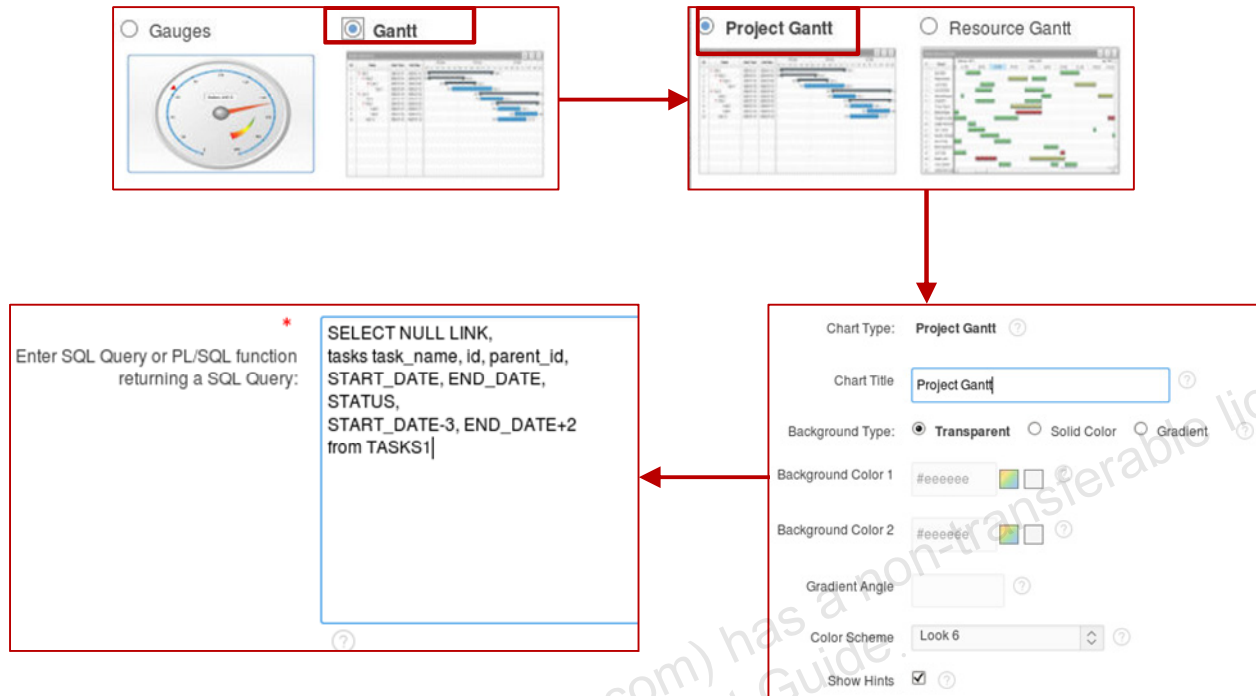
```
SELECT LINK,  
       TASK_NAME,  
       TASK_ID,  
       PARENT_ID,  
       ACTUAL_START_DATE,  
       ACTUAL_END_DATE,  
       PROGRESS,  
       PLANNED_START,  
       PLANNED_END  
FROM TASKS1
```

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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



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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

Q

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

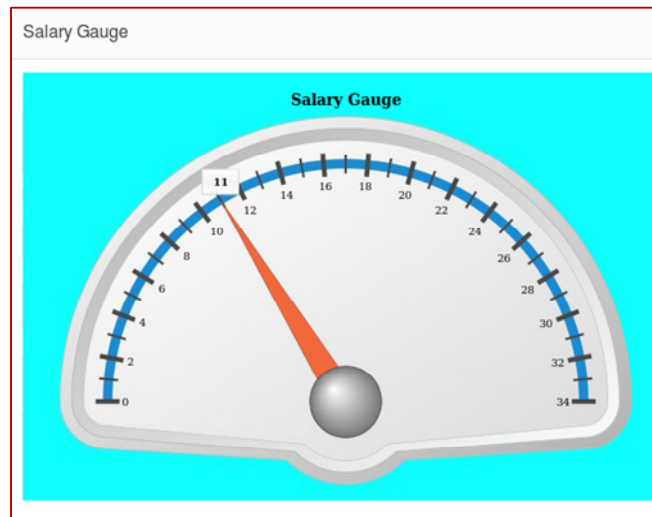
- a. True
- b. False

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Answer: a

Creating a Circular Gauge Chart



```
Enter SQL Query or PL/SQL function returning a SQL Query:
select sum(case when salary <10000 then 0 else 1 end) value,
count(*) max_value
from employees
where department_id=80
```



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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

Enter SQL Query or PL/SQL function returning a SQL Query:

```
select sum(case when salary <10000 then 0 else 1 end) value, count(*) max_value from employees where department_id=80]
```

You have requested to create a Flash chart page with the following attributes. Please confirm your selections.

| | |
|-----------------|--------------|
| Application | 1 |
| Page | 27 |
| Page Name | Salary Gauge |
| Region Title | Salary Gauge |
| Region Template | Standard |
| Chart Type | Dial |

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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 oehr_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

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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.

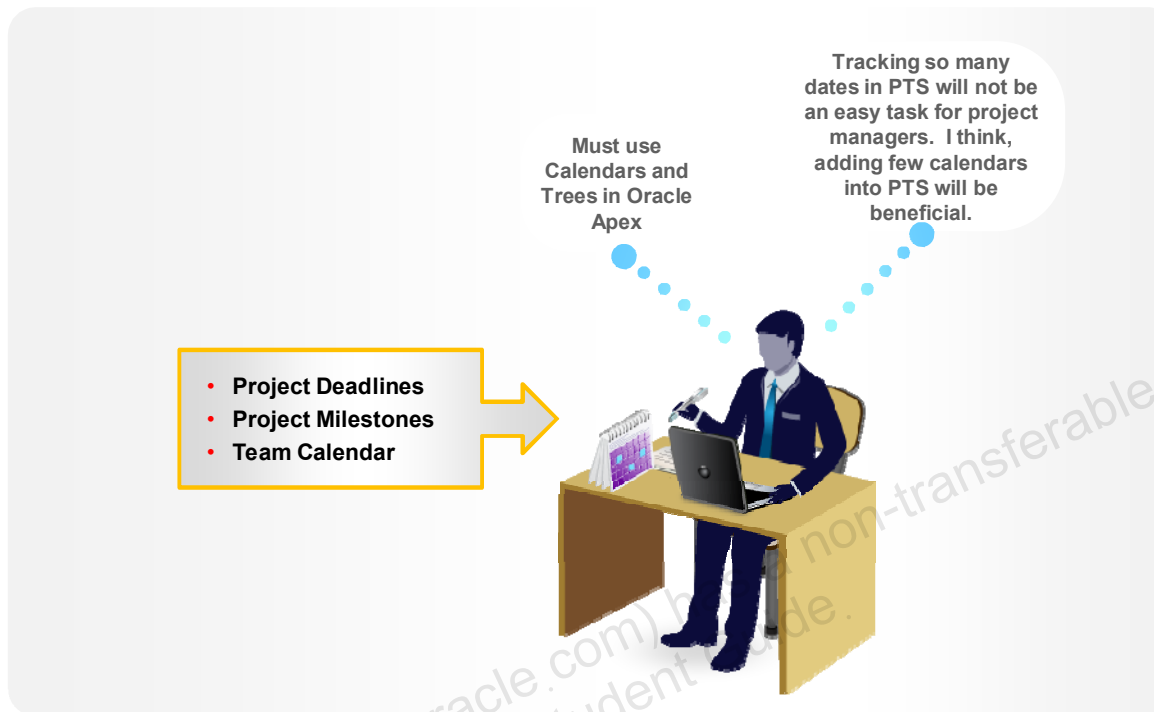
Adding Calendars and Trees

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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



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 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.

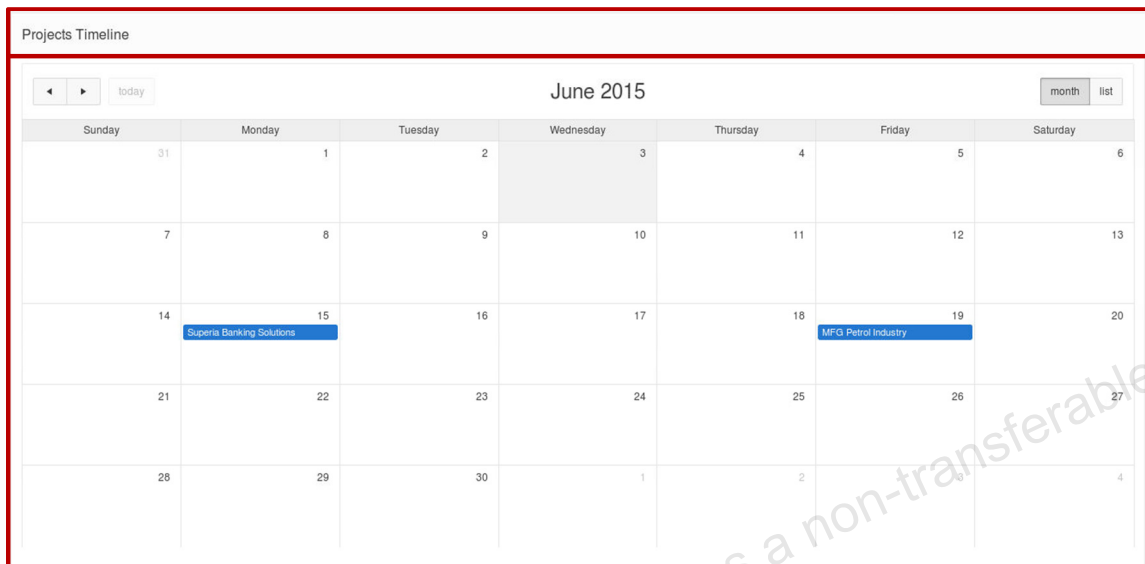
Lesson Agenda

- 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



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Oracle Application Express supports two types of calendars:

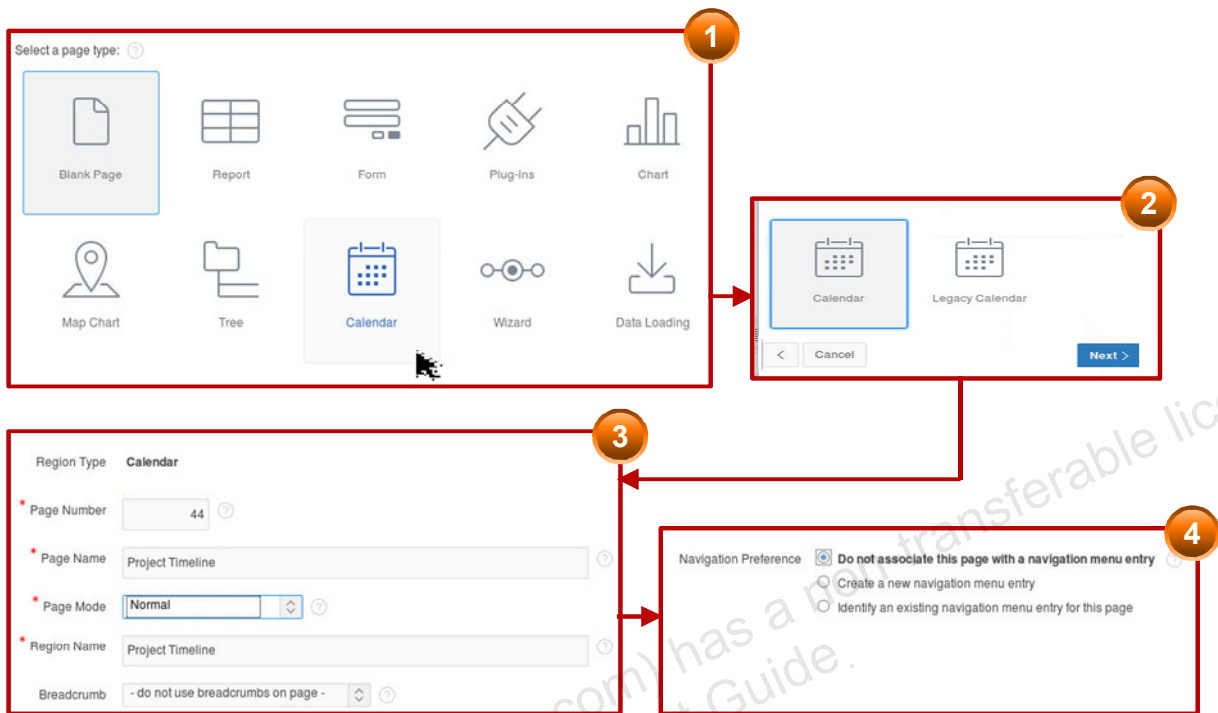
- **Calendar:** This type of calendar is based on the FullCalendar jQuery library and can be customized only through CSS.
- **Legacy Calendar:** This is a template-based calendar and may be deprecated in further releases of Oracle APEX. This is the same as “Easy Calendar,” which was created using a wizard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



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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.

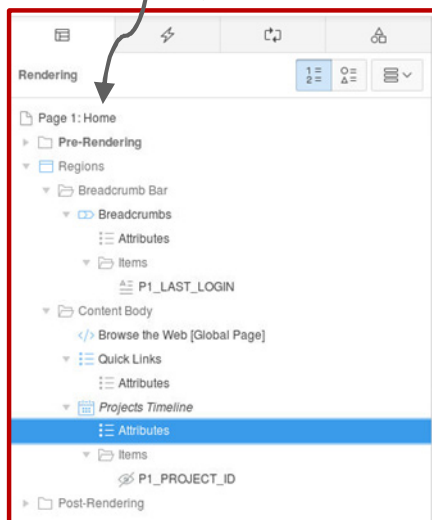
Creating a Calendar

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.

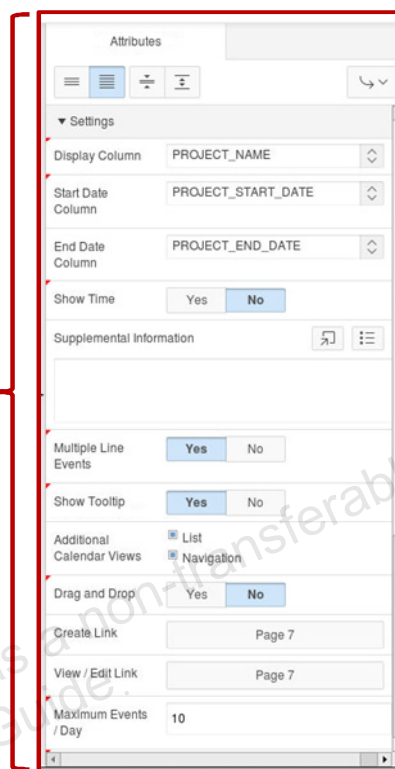
For the PTS application, Jack wants to create a “Projects Timeline” calendar that displays all the projects as an event between planned start date and planned end date. He also plans to create a new project from this calendar (new entry on calendar) or edit any project from the calendar itself.

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

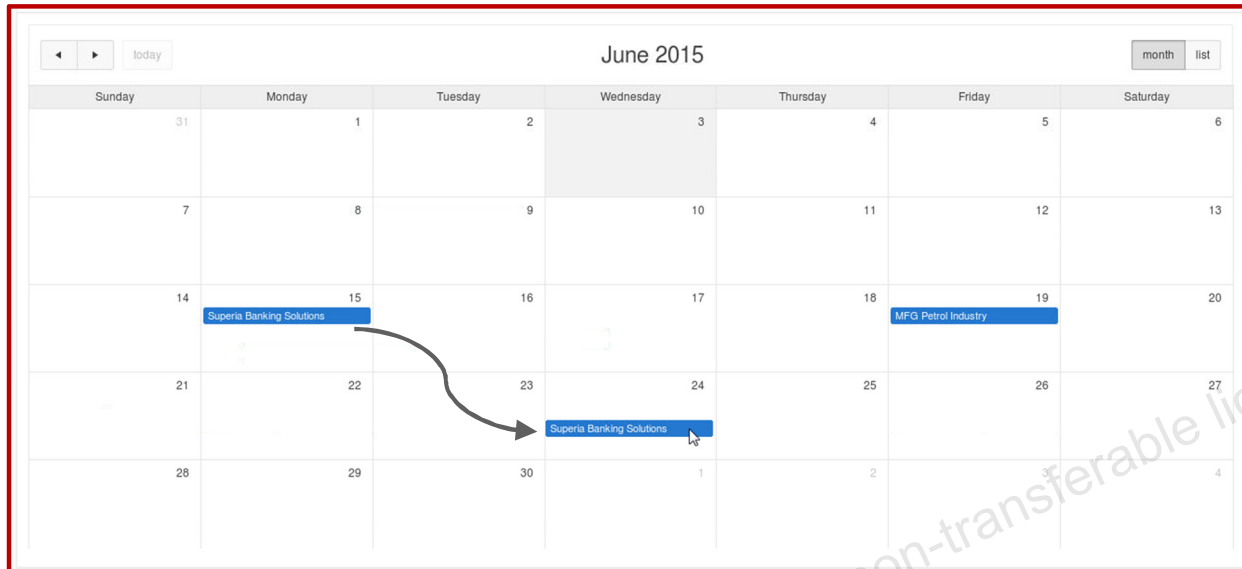
The image shows the Oracle APEX interface for editing calendar attributes. It features a rendering tree on the left with a red box around the 'Attributes' section of the 'Projects Timeline' region. Two dialog boxes, 'Link Builder - Create Link' and 'Link Builder - View / Edit Link', are shown in the center. Both dialog boxes have a 'Set Items' section with a table for defining link attributes. A red arrow points from the 'Attributes' section in the rendering tree to the 'Set Items' section in the dialog boxes. A red box labeled '2' highlights the 'Create Link' and 'View / Edit Link' buttons in the calendar interface.

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
15th to June 24th

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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

The screenshot displays the Oracle APEX Code Editor interface. The main window, titled "Code Editor - Drag and Drop PL/SQL Code", contains the following PL/SQL code:

```
1 begin
2   update "PROJECTS"
3     set "PROJECT_PLANNED_START_DATE" = to_date(:APEXSNEW_START_DATE, 'YYYYMMDDHH24MISS'),
4       "PROJECT_PLANNED_END_DATE" = to_date(:APEXSNEW_END_DATE, 'YYYYMMDDHH24MISS')
5   where "PROJECT_ID" = :APEXSPK_VALUE;
6 end;
```

To the right of the code editor is a configuration panel for the "Drag and Drop" feature. The "Drag and Drop" checkbox is checked (Yes). The "Primary Key Column" is set to "PROJECT_ID". The "Drag and Drop PL/SQL Code" field contains the same PL/SQL code as shown in the editor. Other settings include "Create Link" (No Link Defined), "View / Edit Link" (No Link Defined), "Maximum Events / Day" (10), "Show Weekend" (Yes), "CSS Class" (- Select -), and "Export" options for CSV and PDF.

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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

The screenshots show the process of configuring a button's action to redirect to a specific page. The 'Pick Page' dialog lists various pages, including 'Project Timelines' (Page 27). The 'Link Builder - Target' dialog shows 'Page 27' selected. The 'Behavior' dialog shows the action set to 'Redirect to Page in this Application' and the target set to 'Project Timelines'.

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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 interface with a 'Quick Filters' section at the top containing dropdown menus for 'Project status' and 'Project type'. Below this is a 'Calendar View' button, highlighted with a red box. A red arrow points from this button to a calendar view for June 2015. The calendar shows dates from Sunday to Saturday, with project dates represented by blue horizontal bars. Two projects are visible: 'Superia Banking Solutions' on June 15 and 'MFG Petrol Industry' on June 19. The calendar also includes navigation arrows, a 'today' button, and 'month' and 'list' view options.

| 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 |
|---------|----------------------------|--------------|---|----------------|----------------------------|--------------------|--------------------------|------------------|--------------------|--------------------|--------------------|-------------------------|------------------------------|
| 504 | 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 | APEX4.2 Course Development | 302 | 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 | | | | | | | | | | | | |

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

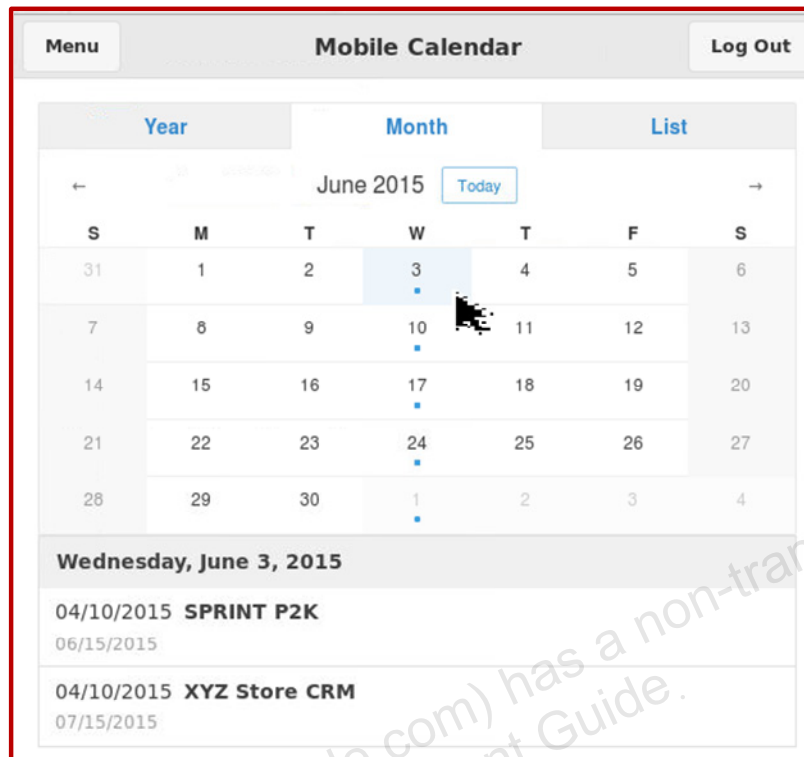
Practice 18-1 Overview: Creating a Calendar

This practice covers creating a calendar for a desktop application.

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Calendars for Mobile Applications



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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

The screenshot shows the Oracle APEX wizard for creating a new page. The application is '14594 - Project Tracking System_V1'. The 'User Interface' dropdown is set to 'Mobile'. The 'Calendar' page type is selected. The 'Page Number' is 33, 'Page Name' is 'Mobile Calendar', 'Page Mode' is 'Normal', 'Page Group' is '- Select Page Group -', and 'Region Name' is 'Mobile Calendar'. The 'Navigation Preference' is set to 'Do not associate this page with a navigation menu entry'. The 'Source Type' is 'Table', 'Table / View Owner' is 'APEX\$WSI', and 'Table / View Name' is 'PTS_PROJECTS (table)'. The Oracle logo is at the bottom left, and the copyright notice 'Copyright © 2015, Oracle and/or its affiliates. All rights reserved.' is at the bottom right.

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

The image shows two screenshots from the Oracle APEX 'Create Page' wizard. The first screenshot, labeled '6', shows the configuration page where the following settings are made: Display Column is set to 'PROJ_ID', Start Date Column is 'PROJ_START_DATE', End Date Column is '- Select -', Show Time is 'No', and Add Create/Edit Page is 'No'. The second screenshot, labeled '7', shows the 'Confirm' page with a summary table of the page attributes.

| Attribute | Value |
|--------------|-----------------|
| Application | 14594 |
| Page | 33 |
| Page Name | Mobile Calendar |
| Region Title | Mobile Calendar |

The main screenshot below shows the 'Mobile Calendar' region in the APEX editor. The 'Attributes' panel on the right is visible, showing settings for Display Column (PROJECT_NAME), Start Date Column (PROJECT_PLANNED_START_D), End Date Column (PROJECT_PLANNED_END_DA), Show Time (Yes/No), and Supplemental Information. A 'Create' button is highlighted with a red arrow.

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.

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

This practice covers creating a calendar for a mobile application.

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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
 - OHare
 - Dulles
 - Emanuel
 - Hartsfield
 - Johnson
 - Logan
 - Williams
 - Thomas
 - Bradley
 - Henry
 - James
 - Joesph
 - John
 - Kiran
 - Lambert
 - Roberts

Collapse All Expand All

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                 -1
5             end as status,
6             level,
7             "LAST_NAME" as title,
8             null as icon,
9             "EMPLOYEE_ID" as value,
10            null as tooltip,
11            null as link
12 from "#OWNER#". "EMPLOYEES"
13 start with "MANAGER_ID" is null
14 connect by prior "EMPLOYEE_ID" = "MANAGER_ID"
15 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

The screenshot illustrates the 'Create Page' wizard in Oracle APEX, divided into four numbered steps:

- Step 1:** Select a page type. The 'Tree' option is highlighted.
- Step 2:** Enter page details. Fields include Page Number (13), Page Name (Project Tree), Page Mode (Normal), Region Template (Standard), Region Name (Project Tree), and Breadcrumb (- do not use breadcrumbs on page -).
- Step 3:** Navigation Preference. The default option 'Do not associate this page with a navigation menu entry' is selected.
- Step 4:** Table / View Name. The 'PROJECTS (table)' is selected from a dropdown list.



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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

The screenshot shows the Oracle Query Builder interface for creating a tree. It is divided into two main sections, labeled 5 and 6.

Section 5: This section contains five dropdown menus for configuring the tree structure:

- ID:** PROJECT_ID (Number)
- Parent ID:** PROJECT_UPGRADE_OF (Number)
- Node Text:** PROJECT_NAME (Varchar2)
- Start With:** PROJECT_ID (Number)
- Start Tree:** Value is NULL

Section 6: This section is for configuring the query and viewing the generated SQL:

- Where Clause:** A text area for specifying a where clause (example: ename = 'JONES').
- Order Siblings By:** A dropdown menu for specifying the column to order siblings by (example: ENAME, selected: LAST_NAME (Varchar2)).
- Current Query:** A text area showing the generated SQL 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,
```

Buttons for '< Cancel' and 'Next >' are visible at the bottom of the interface.

- 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.
- 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

7

8

9

| | |
|-----------------|--------------|
| Application | 2 |
| Page | 13 |
| Page Name | Project Tree |
| Region Title | Project Tree |
| Region Template | Standard |

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

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.

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Manipulating a Tree

The image displays two screenshots of the Project Tracking System interface. The left screenshot shows the 'Project Tree' with a red box around the 'Super Insurance Solutions' project, and a red arrow pointing to the right. The right screenshot shows the 'Manage Projects' form with 'Super Insurance Solutions' entered in the 'Project Name' field. The form includes fields for 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 (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). The form also has 'Cancel' and 'Apply Changes' buttons.

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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 displays the Oracle Project Tracking System interface. On the left is a navigation menu with options like Home, Create Employees, and Admin. The main area is titled 'Manage Projects' and contains a form for editing project details. The 'Project Name' is 'Super Insurance Solutions', 'Project Type' is '305', 'Project Description' is 'Application development for Sup', and 'Project Status' is '102'. The 'Project Upgrade Of' field is set to '602'. A 'Project Tree' window is open on the right, showing a hierarchical list of projects. The 'Super Insurance Solutions' project is highlighted in the tree. A handwritten note with an arrow points to this project in the tree, stating: 'Super Insurance Solutions became upgrade of Project ID 602'. The 'Project Tree' window also includes 'Collapse All' and 'Expand All' buttons.

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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

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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 improve 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:

The image shows two side-by-side screenshots of the 'Manage Action Items' form. Both forms have the same fields: Project, Actionitem Created By, Actionitem Assigned To, Actionitem Name, Actionitem Description, Actionitem Status, Milestone Yn (radio buttons for No and Yes), Milestone Date (text field with a calendar icon), and Actionitem Created On (text field with a calendar icon). In the left screenshot, 'Milestone Yn' is set to 'Yes' and the 'Milestone Date' field is active. In the right screenshot, 'Milestone Yn' is set to 'No' and the 'Milestone Date' field is disabled. Arrows point from the text below to the 'Milestone Date' fields in both screenshots.

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

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

1. Click 'Create Dynamic Action' in the Dynamic Actions pane.

2. Select the 'Disable Milestone Date' dynamic action under the 'Change' event.

3. Configure the 'When' section: Event: Change, Selection Type: Item(s), Item(s): P12_MILESTONE, Condition: equal to, Value: N.

4. Configure the 'Action' section: Action: Disable, Selection Type: Item(s), Item(s): P12_MILESTONE_DATE, Fire When Event Result is: True.

5. Configure the 'Affected Elements' section: Action: Enable, Selection Type: Item(s), Item(s): P12_MILESTONE_DATE.

FALSE action (step 5)



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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 improve 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.

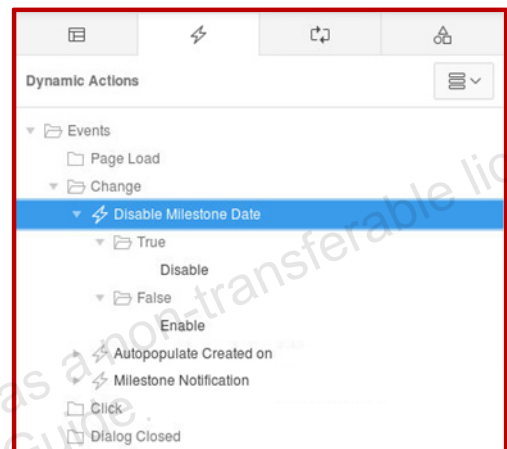
An example of a dynamic action is to enable and disable an item based on the value of the item. To create this type of dynamic action, navigate to the page that contains the item for which you want to create a dynamic action. In the page designer's Dynamic Actions tab, perform the following steps:

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 Selection Type: Item(s) Item(s): P<n>_MILESTONE_YN Condition: equal to Value: N |
| Action(s) | True: Disable False: Enable |
| Affected Elements | Selection Type: Item(s) Item(s): 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 screenshot shows the 'Manage Action Items' form. The 'Actionitem Name' field contains the text 'Create project plan'. The 'Actionitem Created On' field is currently blank. A red box highlights the 'Actionitem Created On' field, and an arrow points from the text below to it.

"Actionitem Created On" is blank when the cursor is still in the "Actionitem Name" field.

The screenshot shows the 'Manage Action Items' form. The 'Actionitem Name' field contains the text 'Create project plan'. The 'Actionitem Created On' field is now populated with the date '05-JUN-15'. A red box highlights the 'Actionitem Created On' field, and an arrow points from the text below to it.

"Actionitem Created On" populated as soon as value is entered into "Actionitem Name"

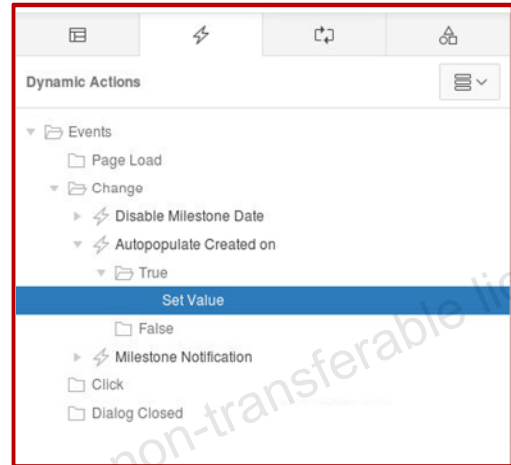
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The example in the slide has a dynamic action that fires when the value of the page item P<n>_DEPARTMENT_ID changes. The dynamic action uses a SQL statement to select the City for the department and populates the Location page item.

Setting the Value of an Item When Another Item Changes

| | |
|-------------------|--|
| When | Event: Change Selection Type: Item(s) Item(s): P<n>_ACTIONITEM_NAME Condition: none |
| Action(s) | True: Set Value |
| Settings | Set Type: SQL Statement SQL Statement: SELECT SYSDATE FROM DUAL; Page Items to Submit: None |
| Affected Elements | Selection Type: Item(s) Item(s): 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 in the Project Tracking System. The form is populated with the following values:

| Field | Value |
|----------------------------|---------------------------------|
| 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 |
| Project Last Updated On | 02-MAY-15 |

The 'Reset Values' button is highlighted with a red box and a mouse cursor is pointing at it.

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

The screenshot shows the 'Manage Projects' form in the Project Tracking System after the 'Reset Values' button has been clicked. All fields are now empty:

| Field | Value |
|----------------------------|-------|
| 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 | Yes |
| Project Upgrade Of | |
| Project Created By | |
| Project Created On | |
| Project Last Updated By | |
| Project Last Updated On | |

The 'Reset Values' button is highlighted with a red box and a mouse cursor is pointing at it.

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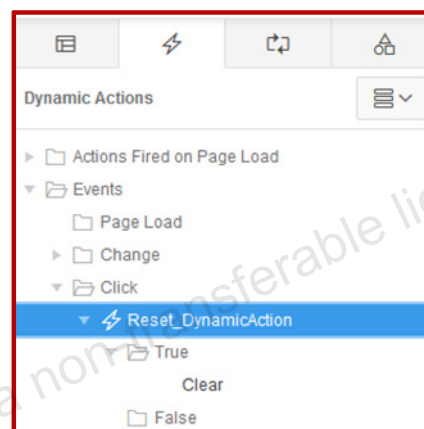
The example in the slide uses a dynamic action that fires whenever the user clicks the "Reset Values" button on the form. As soon as the button is clicked, the dynamic action fires and clears the values from all the fields on the form.

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 Selection Type: Button Button: Reset |
| Action(s) | True: Clear No False action |
| Affected Elements | Selection Type: Item(s) Item(s): P7_PROJECT_NAME, P7_PROJECT_TYPE, P7_PROJECT_DESCRIPTION, P7_PROJECT_STAT US, P7_PROJECT_PLANNED_START_DATE, P7_PROJECT_START_DATE, P7_PROJECT_PLAN NED_END_DATE, P7_PROJECT_END_DATE, P7_PROJECT_UPGRADE_YN, P7_PROJECT_CREA TED_BY, P7_PROJECT_UPGRADE_OF, P7_PRO JECT_CREATED_ON, P7_PROJECT_LAST_UPD ATED_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

A screenshot of a web form for updating project information. The form contains several fields: 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), and Project Last Updated On (20-APR-2015). At the bottom left is a 'Cancel' button, and at the bottom right is an 'Apply Changes' button. A red box highlights the 'Apply Changes' button, and a mouse cursor is shown clicking it. A red arrow points from the caption below to this button.

Button before clicking it.

A screenshot of the same web form as in the previous image. The 'Apply Changes' button is now disabled, appearing in a lighter blue color. A red box highlights the disabled button, and a mouse cursor is shown hovering over it. A red arrow points from the caption below to this button.

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 Selection Type: Button Button: SAVE |
| Actions(s) | Behavior Action: Submit Page True Event Action: Disable |
| Settings | Request/Button Name: SAVE |
| Affected Elements | Selection Type: Button(s) 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

1 Quick Filters

Project status:
 Project type:

| Project Id | Project Name | Project Type | Project Description | Project Status | Project Planned Start Date |
|------------|---------------------|--------------|--|----------------|----------------------------|
| 612 | MFG Petrol Industry | 304 | Engineering Design Capabilities in the Petrol Industry | 101 | 19-JUN-15 |

2 Quick Filters

Project status:
 Project type:

| Project Id | Project Name | Project Type | Project Description | Project Status | Project Planned Start Date |
|------------|----------------------------|--------------|--|----------------|----------------------------|
| 601 | APEXS.0 Course Development | 302 | Developing Course Lessons for APEX 5.0 | 102 | 01-JAN-15 |
| 602 | AMEX Cobrand | 301 | Cobrand Application Development for | 102 | 01-FEB-15 |

3 Quick Filters

Project status:
 Project type:

| Project Id | Project Name | Project Type | Project Description | Project Status | Project Planned Start Date |
|------------|----------------------------|--------------|--|----------------|----------------------------|
| 601 | APEXS.0 Course Development | 302 | Developing Course Lessons for APEX 5.0 | 102 | 01-JAN-15 |

4 Quick Filters

Project status:
 Project type:

| Project Id | Project Name | Project Type | Project Description | Project Status | Project Planned Start Date |
|------------|----------------------------|--------------|--|----------------|----------------------------|
| 601 | APEXS.0 Course Development | 302 | Developing Course Lessons for APEX 5.0 | 102 | 01-JAN-15 |

Filter applied on Status
 Filter applied on Status and Project Type

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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 displays the Oracle APEX rendering page for 'Page 4: Projects Master Report'. The 'Quick Filters' region contains two filter items: 'P4_PROJECT_STATUS' and 'P4_PROJECT_TYPE'. Red boxes highlight these items and their respective 'List of Values' definitions. The 'List of Values' for 'P4_PROJECT_STATUS' is defined by the SQL query: `select STATUS.STATUS_NAME as d, STATUS.STATUS_ID as r from STATUS STATUS`. The 'List of Values' for 'P4_PROJECT_TYPE' is defined by the SQL query: `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 Selection Type: Item(s) Item(s): P<n>_PROJECT_STATUS, P<n>_PROJECT_TYPE Condition: none |
| Action(s) | True: Refresh |
| Affected Elements | Selection Type: Region 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 No

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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

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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

Feedback Log Out Help Home

Create Employees

First Name * Ronald

Last Name * Roger

Email * rr@oracle.com

Phone Number * 8904566754

Mobile number () - -

Address

Hire Date *

Designation *

Salary *

Manager Id ^

Frank OHare, Turner Thomas

Get Manager Reportees

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

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

Application 1 > Shared Components > Plug-ins

Plug-ins Utilization History

Search [] Go [] Actions []

Reset View Plug-in Repository Import > Create >

Other Components

- List of Values
- Plug-ins**
- Component []
- Shortcuts

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](#)

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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

1

2

3

Import a SQL file that contains the plug-in definition.

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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

Import

The export file has been imported successfully.
If you wish to install now, click the **Next** button. You can also install this file at a later time by navigating to the Export Repository.

> **Tasks**

5

When you install a plug-in into the current application, the new plug-in will overwrite an existing plug-in having the same plug-in name. If the installation succeeds, the installation of the plug-in becomes permanent. If any errors are encountered, the actions are rolled back, resulting in no permanent changes.

Export File Version: 2010.05.13

Name: Notification

Internal Name: COM.ORACLE.APEX.GRITTER_NOTIFICATION

Install Into Application: 2 PROJECT TRACKING SYSTEM

Action: Existing plug-in in application 2 will be replaced.

After you import the file, you must install it.

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.

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Reviewing a Plug-in Definition

Plug-in: Notification

Show All | Name | Subscription | Source | Callbacks | User Interfaces | Standard Attributes | Custom Attributes | Files | File URLs to Load | Events | Information | Help Text | Comments

Name

Name: Notification

Internal Name: COM.ORACLE.APEX.GRITTER_NOTIFICATION

Type: Dynamic Action

Category: Notification

Subscription

Reference Master Plug-in From: [dropdown] Refresh

This

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_rende  
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  
12  l_result      apex_plugin.t_dynamic_actio
```

Standard Attributes

Attributes:

- For Item(s)
- For Button
- For Region
- For jQuery Selector
- For JavaScript Expression
- For Triggering Element
- For Event Source
- Affected Element Required
- Check "Fire on page load"
- Has Stop Execution on Error Attribute
- 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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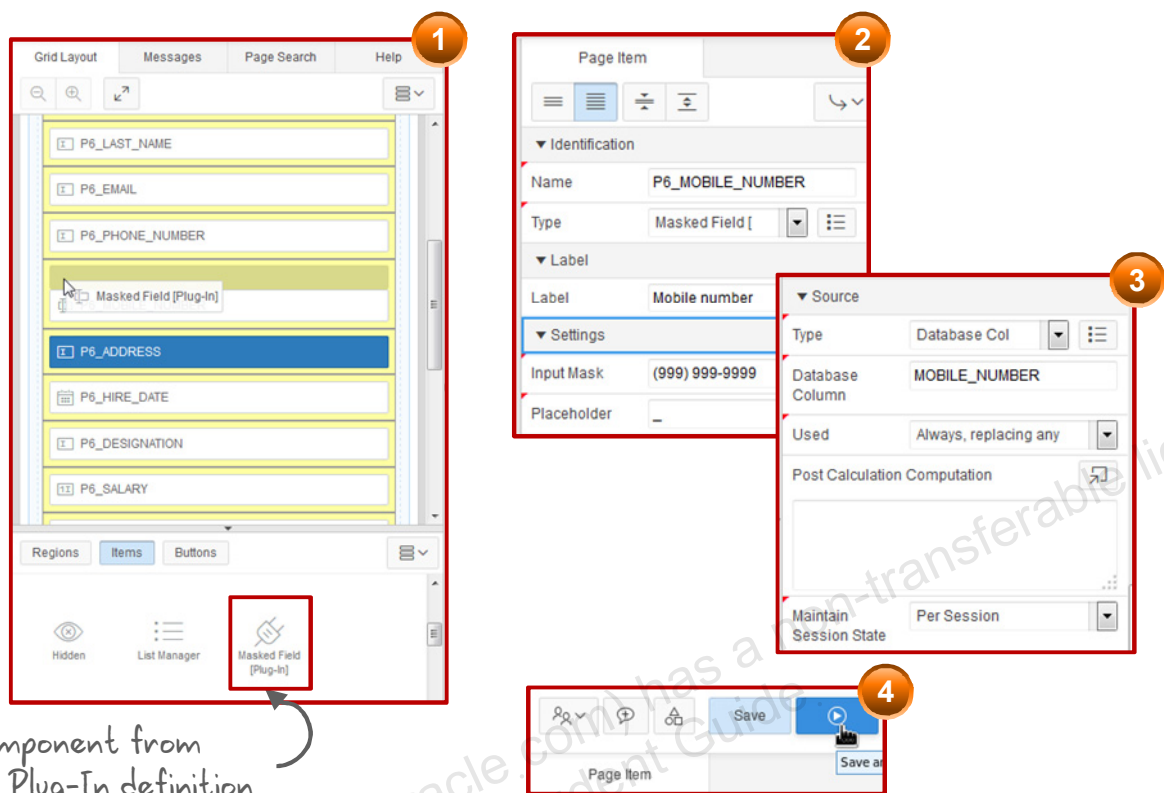
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To review the contents of a plug-in, from Shared Components > Plug-ins for your application, click the plug-in icon. Some of the sections that appear in the definition include:

- **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

The screenshot shows the Oracle APEX 5.0 interface. A red box highlights the 'Import file' section where a file named 'item_type_plugin_com_oracle_apex_simple_checkbox.sql' is selected. A red box labeled '1' points to this file. Another red box labeled '2' highlights the 'Plug-in' option under 'File Type'. A third red box labeled '3' highlights the configuration panel for the 'Simple Checkb' item, showing properties: Name (P5_NEW), Type (Simple Checkb), Label (New), Checked Value (Y), Unchecked Value (N), and Checkbox Label (Existing Customer|).

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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

1

2

3

4

5

Selecting 'Yes' displays notification

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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)

| Field | Value (Left Screenshot) | Value (Right Screenshot) |
|----------------------------|---|---|
| Project Name | AMEX Cobrand | AMEX Cobrand |
| Project Type | 301 | 301 |
| Project Description | Cobrand Application Development for AME | Cobrand Application Development for AME |
| Project Status | 102 | 104 |
| Project Planned Start Date | 01-FEB-15 | 01-FEB-15 |
| Project Start Date | 10-FEB-15 | 10-FEB-15 |
| Project Planned End Date | 05-MAY-15 | 05-MAY-15 |
| Project End Date | | Highlighted in Red |
| Project Upgrade Yn | No | No |
| Project Upgrade Cf | | |
| Project Created By | 518 | 518 |
| Project Created On | 10-FEB-15 | 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 Selection Type: Item(s) Item(s): P<n>_PROJECT_STATUS |
| Actions(s) | Action: Highlight [Plug-in] |
| Affected Elements | Selection Type: Item(s) Items(s): P<n>_PROJECT_END_DATE Color: Red Speed: Slow 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

The image shows three sequential screenshots of the Oracle APEX interface, numbered 1, 2, and 3, illustrating the process of creating a dynamic action.

- Step 1:** A screenshot of the APEX page editor showing the 'Rendering' pane on the left. The 'P7_PROJECT_STATUS' item is selected, and the 'Create Dynamic Action' option is highlighted in the context menu.
- Step 2:** A screenshot of the 'Dynamic Action' property editor. The 'Name' is 'Highlight end date for completed projects', the 'Event' is 'Change', the 'Selection Type' is 'Item(s)', and the 'Item(s)' is 'P7_PROJECT_STATUS'. The 'Condition' is set to 'in list' with 'Values' of '103,104'.
- Step 3:** A screenshot of the 'Action' property editor. The 'Action' is set to 'Highlight [Plug-in]'. Under 'Settings', 'Color' is 'red' and 'Speed' is 'Slow'. Under 'Affected Elements', 'Selection Type' is 'Item(s)' and 'Item(s)' is 'P7_PROJECT_END_DATE'. Under 'Execution Options', 'Sequence' is '10', 'Event' is 'Highlight end date for completed proje', 'Fire When Event Result Is' is 'True', and 'Fire On Page Load' is 'No'.

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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 image shows two side-by-side screenshots of a project management form. Both screenshots show the same form with the following fields: Project Name (AMEX Cobrand), Project Type (301), Project Description (Cobrand Application Development for AME), Project Status (102 in the first, 104 in the second), Project Planned Start Date (01-FEB-15), Project Start Date (10-FEB-15), Project Planned End Date (05-MAY-15), Project End Date (empty in the first, 10-JUN-15 in the second), Project Upgrade Yn (No), Project Upgrade Of (empty), Project Created By (518), and Project Created On (10-FEB-15). In the second screenshot, the Project End Date field is highlighted in red and contains the date 10-JUN-15. A red box highlights the Project Status field in both. A black arrow points from the handwritten text above to the Project End Date field in the second screenshot.

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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.

| | |
|-------------------|---|
| 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 |



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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.

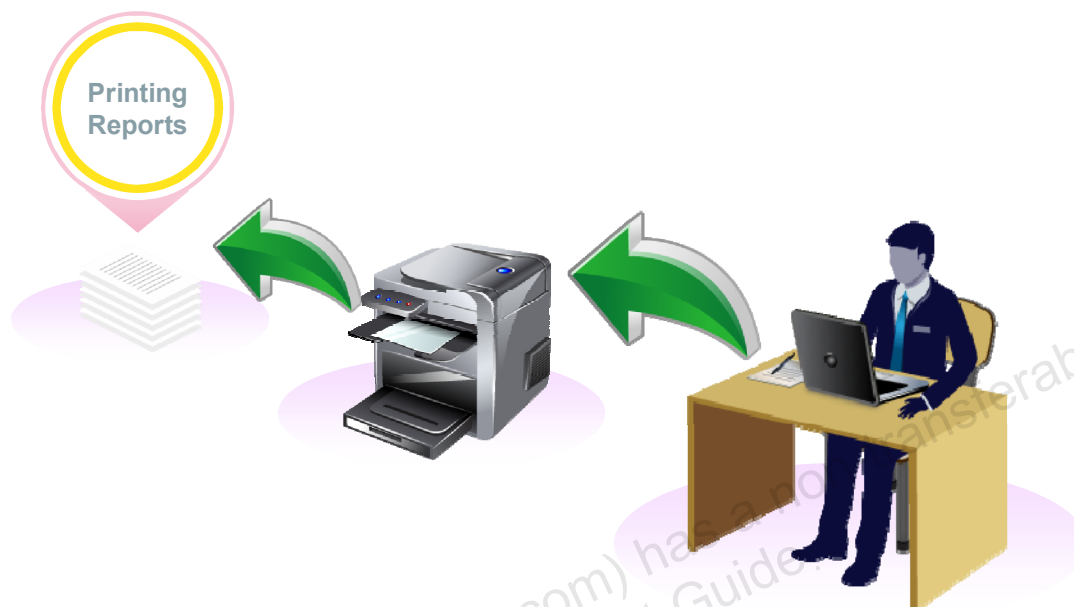
Utilizing Application Express Printing

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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

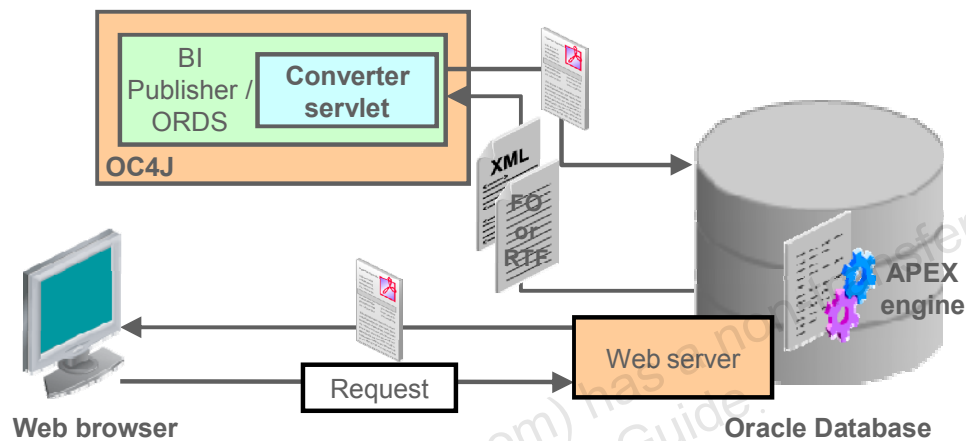
- Understanding Application Express printing architecture
- Customizing and Printing a Standard Report
- Creating a Customized Report

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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

| 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 |

[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 |
| Grant | KGRANT | 7000 |
| Sewall | SSEWALL | 7000 |
| Tuvault | OTUVVAULT | 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

Q

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

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Lesson Agenda

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

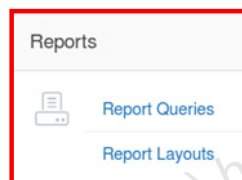
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Report Queries

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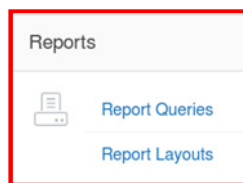
You can print a report region by defining a report query as a shared component. Unlike SQL statements contained in regions, report queries are not validated to ensure that they are formatted correctly and the objects they reference exist. With report queries, the query is used to generate the file that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

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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.

Creating a Report Query



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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:

Layout Name:

Report Layout File:

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 you 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:

Report Layout:

Output Format:

URL (To integrate this report, use the URL below as target for buttons, list items, etc):



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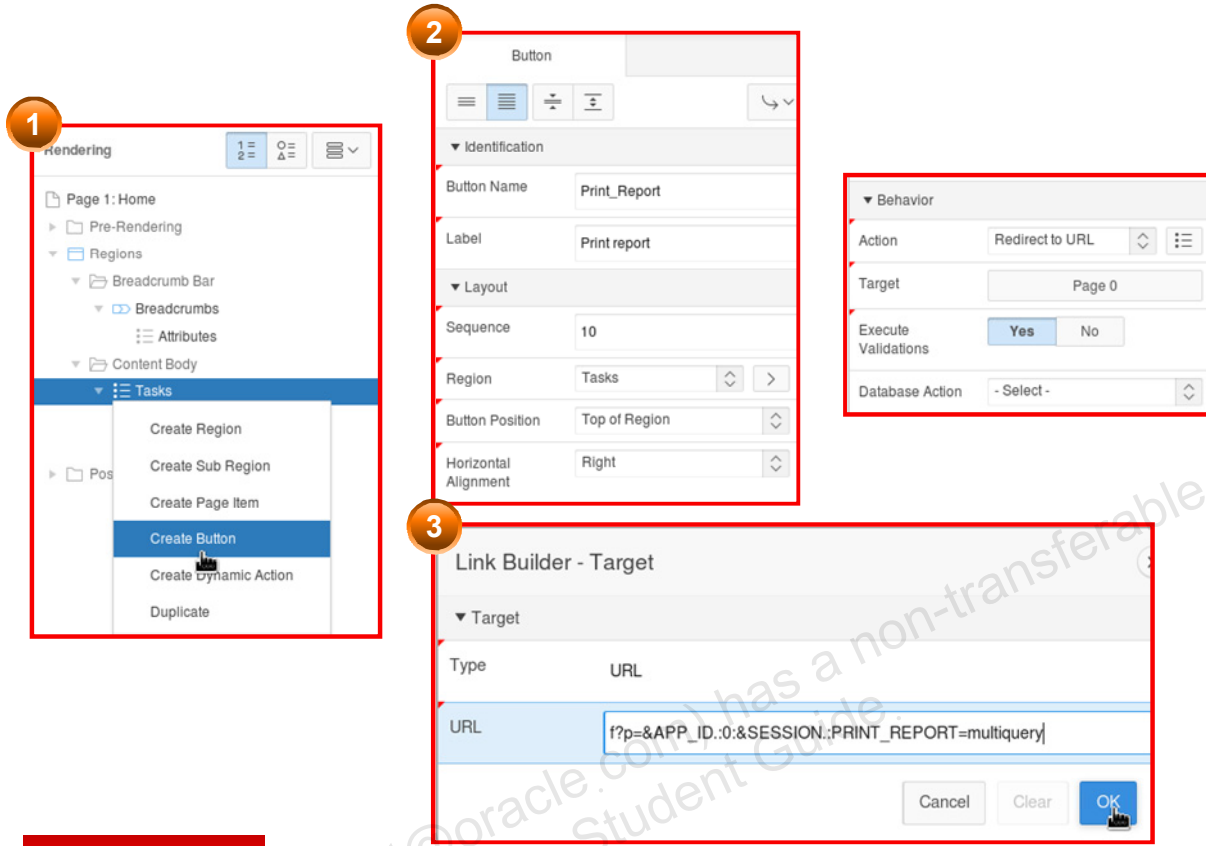
You can upload the RTF to create your report layout and change the report query to use this layout. Perform the following steps:

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



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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

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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

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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.

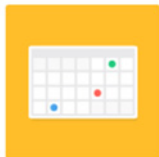
Lesson Agenda

- 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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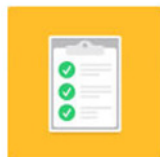
What Is Team Development?



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

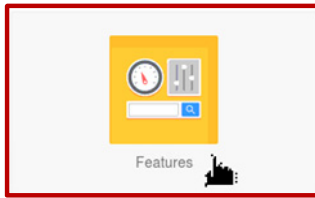
- Create and update features.
- Create and update milestones.
- Create bugs.
- Create and update to dos.
- Review the progress of your milestones and features (dashboards).

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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



Click the Feature Name to see details.

A screenshot of the 'Features' dashboard. It shows a navigation bar with tabs: Dashboard, Report, Tree, Calendar, History, Progress Log, Focus Areas, Owners, and Utilities. Below the navigation bar are filters for Assignee, Release, and Application. The dashboard displays three main metrics: 'Feature Count' with a badge showing '1', 'Functionally Complete Features' with a badge showing '100%', and 'Past Due Features' with a badge showing '0%'. A 'Features with Due Dates' section shows a '100%' badge. A 'Create Feature' button is visible in the bottom right corner.

Create Feature button

A screenshot of the 'Features' report table. The table has columns: Feature, Number, Updated, Due/Completed, Release, Milestone, Owner, Status Percent, Progress Entries, To Dos, Parent, and Copy. The first row contains the following data: 'Date format needs to be changed on Master Detail', '1', '29 hours ago', '07/03/2015', '3.0', 'bob', '80', '0', '0', and a copy icon. The table footer shows '1 - 1 of 1' and 'Application Express 5.0.0.00.31'.

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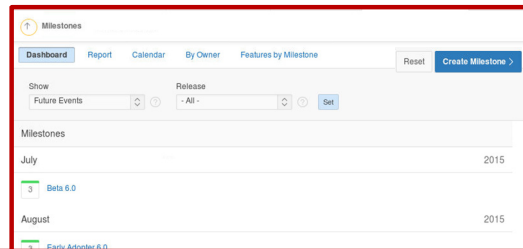
Use the Features page to track the features from initial concept through implementation. You can organize features by release, assignee, tags, or associated milestones. Click the Features icon to view the features created. You can see various badges with the count of features based on various categorizations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

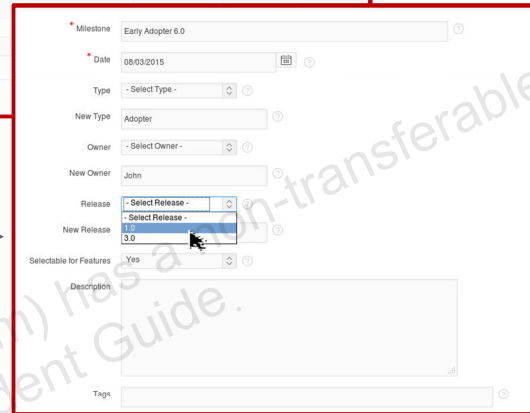
Creating Milestones



Milestones dashboard



Create Milestone form



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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.

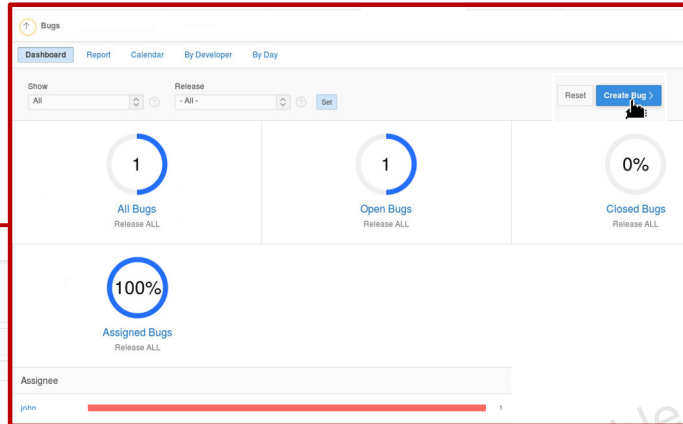
Creating Bugs



Bugs Bug

Bug:

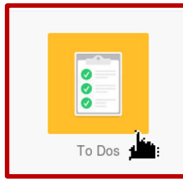
| Show At | Bug | Resolution | Description |
|--------------------|----------------------------------|------------|-------------|
| Bug | | | |
| Bug Title | Form loading with incorrect date | | |
| Status | 10. Entered | | |
| Severity | 4. Moderate Impact | | |
| Priority | 1. As soon as possible | | |
| Resolution | | | |
| Assigned To | bob | | |
| New Assignee | | | |
| Fix By Release | 3.0 | | |
| New Release | | | |
| Target Milestone | - Select Milestone - | | |
| Estimated Fix Date | 06/09/2015 | | |
| Actual Fix Date | | | |
| Description | Bug Description | | |



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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



Dashboard Report Calendar Progress Log

Show All To Dos Release Assignee Application Set

Developer Percent Complete

| Assignee | Open | Closed | Count | % Complete | Graph | Updated |
|----------|------|--------|-------|------------|-------|--------------|
| bob | 1 | 0 | 1 | 0 | | 43 hours ago |

1 - 1

Dashboard Report Calendar Progress Log

Assigned To = 'bob'

| To Do | To Do Number | Assigned To |
|--------------------------------------|--------------|-------------|
| Add label help text on projects page | 1 | bob |

To Do:

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%

Dates

Start Date: 06/03/2015

Due Date: 06/12/2015

Date Completed:

Details

Category: Documentation

Release: Select Release

Handwritten notes: To Dos Report (pointing to the report table), Create To Do Form (pointing to the form fields)

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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

Q

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

Q

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

Q

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

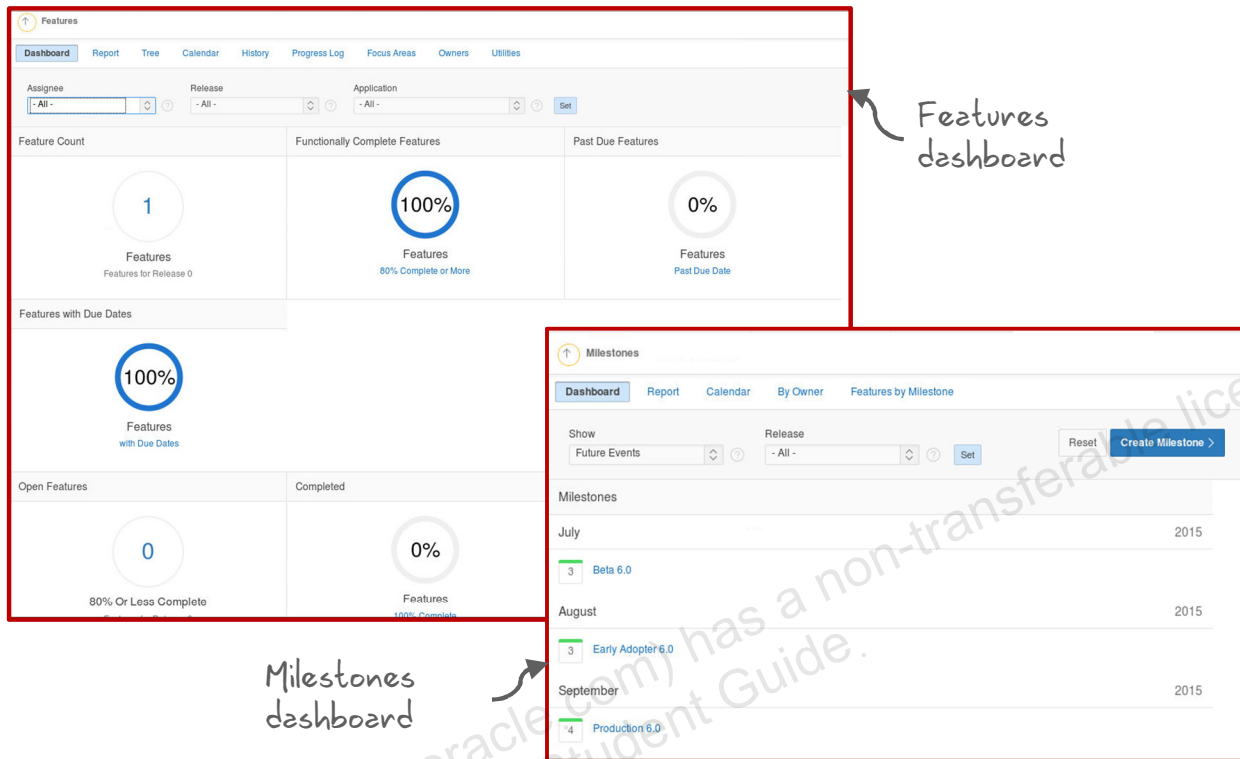
Lesson Agenda

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

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Review the Progress of Your Milestones and Features



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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

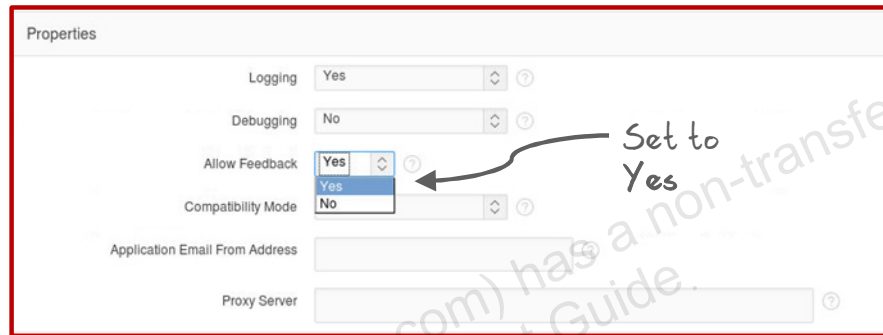
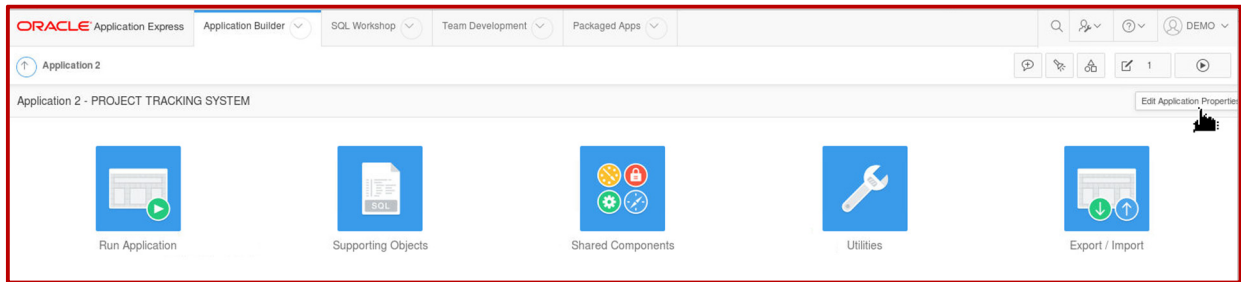
1. Enable feedback in application properties.
2. Create a feedback page.
3. Submit feedback.
4. Access the submitted feedback in Team Development.

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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



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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

The screenshot shows the Oracle APEX 'Create a Page' wizard. On the left, a grid of page types is displayed, with 'Feedback Page' selected and highlighted in blue. A red box labeled '1' encompasses this grid. On the right, the 'Create Feedback Page' configuration screen is shown, with a red box labeled '2' encompassing it. The configuration includes the following fields and options:

- Page Number:** 102
- Page Name:** Feedback
- Page Mode:** Non-Modal Dialog
- Popup Page Template:** Use Theme Default
- Form Region Template:** 42. Wizard Container
- Label Template:** Optional
- Extra Attributes:** 0
- Navigation Bar:**
 - Create Navigation Bar Entry:** Yes No
 - Entry Label:** Feedback

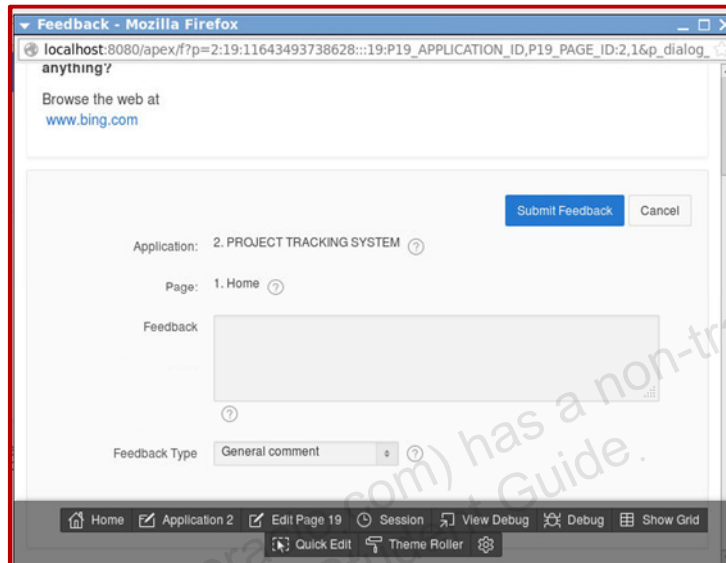
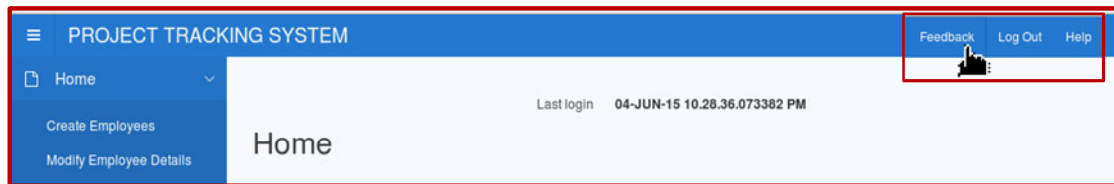
Buttons for 'Cancel' and 'Create' are visible at the bottom of the configuration screen.

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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



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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 displays the Oracle Team Development interface. At the top, there is a navigation bar with five icons: Milestones (calendar), Features (gauge), To Dos (checklist), Bugs (ladybug), and Feedback (speech bubbles). Below this, the Feedback dashboard is shown, which includes a 'Feedback Users' section with a count of 1, and a 'Feedback Entries' section with a count of 3. A table below the dashboard shows feedback by status and by application. The table has two columns: 'By Status' and 'By Application'. The 'By Status' column lists 'No status' (0), 'Acknowledged' (0), 'Additional information requested' (0), 'Open, processing feedback' (0), and 'Closed' (3). The 'By Application' column lists 'PROJECT TRACKING SYSTEM' (2) and 'mgr1' (3). A handwritten arrow points to the dashboard area with the text 'Feedback dashboard'.

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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

Q

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

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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.



Unit V: Oracle Cloud



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Oracle Application Express on Oracle Cloud



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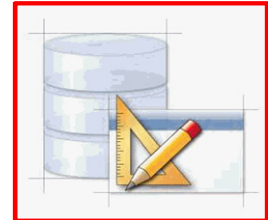
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Objectives

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.



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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.

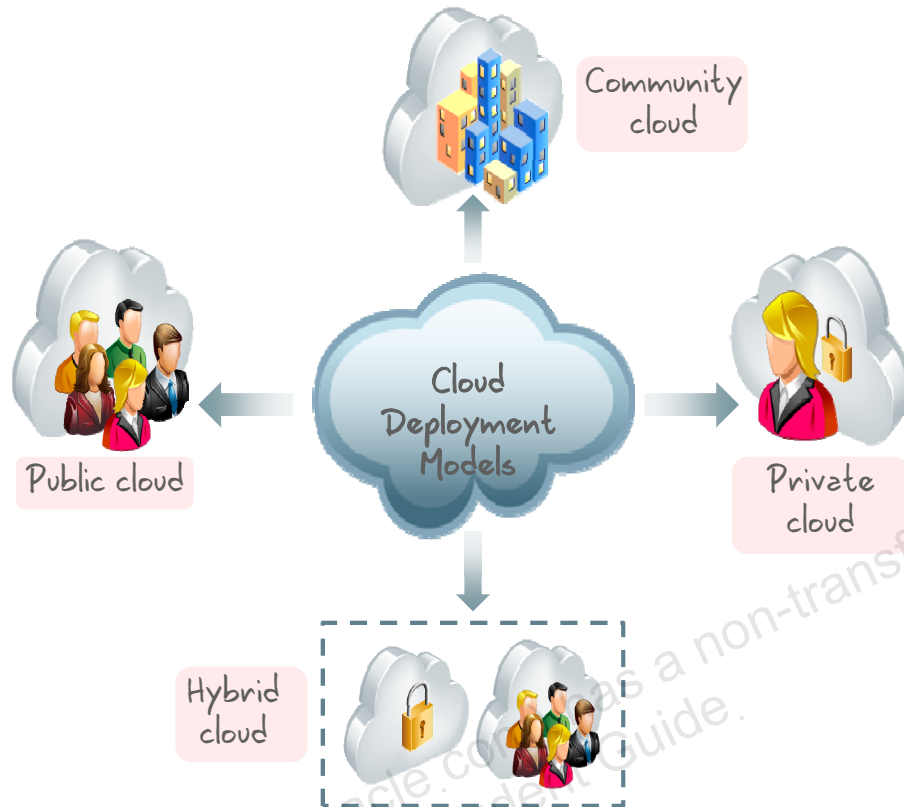
As a result, the applications and databases deployed in the Oracle Cloud are portable and you can easily move them to or from a private cloud or on-premise environment.

- 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.

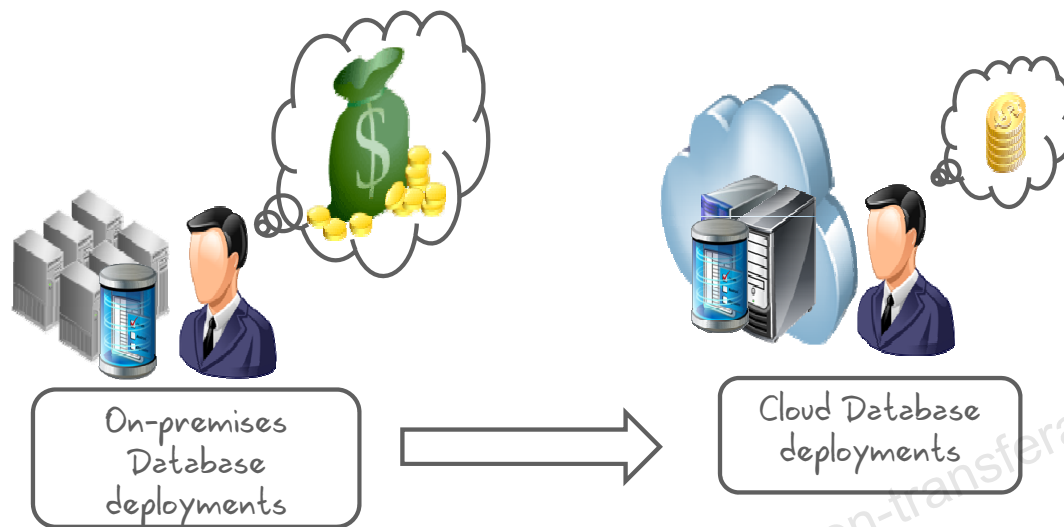
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Oracle Cloud provides several Oracle Cloud service deployment choices for Data Management as PaaS (Platform as a Service) offerings. They provide many options as single schemas, dedicated pluggable databases, virtualized databases, databases running 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.

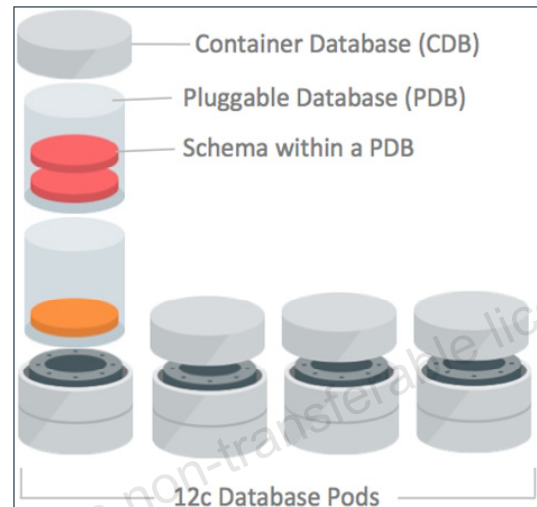
Dynamic provisioning of resources allows users to access huge amount of compute and storage resources in no time.

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 is ideal for production applications that consist of small to medium sized data as well as developers, testers, evaluators and other users who are looking for a full Oracle Database experience at an affordable entry-level price. It is a fully managed database service, is organized into Container databases(CDBs). These container databases are also known as database pods.

Each container database in turn can contain several Pluggable databases(PDBs). When a user subscribes to the Exadata Service, a pluggable database is provisioned. Within the PDB, the user can create several schemas. However, PDB Services are constrained by CPU, storage and memory.

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.

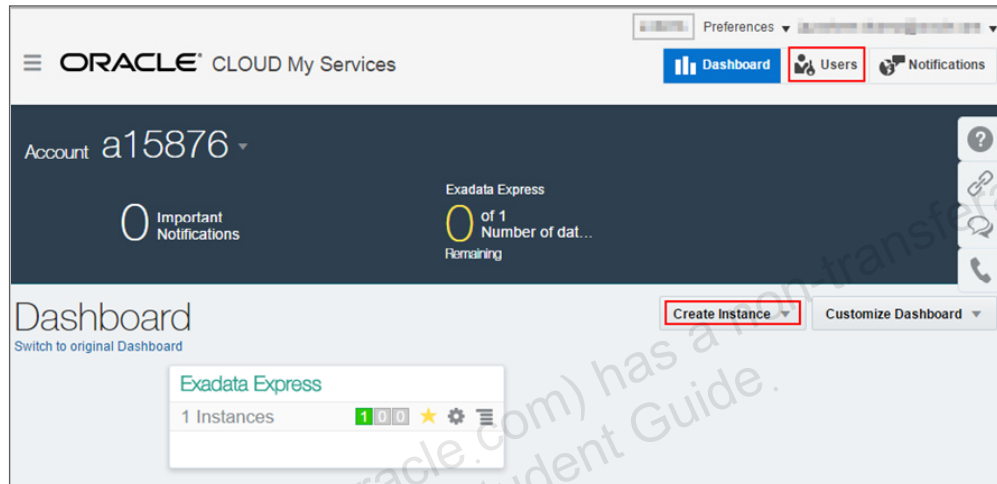
You can view the demonstration of these steps, along with a tour of Exadata Express Cloud Service by opening this link:

<http://oukc.oracle.com/public/redirect.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.



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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 displays the Oracle Exadata Express Cloud Service dashboard. At the top, there are buttons for 'Create Service Instance' and 'Show: Active'. Below this, a service instance named 'exa4' is listed with details: Service Type: Exadata Express, Instance Id: 500033811, Status: Active, Size: BASIC, Service SFTP User Name: us148271, and Service SFTP Host & Port: den00xrc.us.oracle.com. An 'Open Service Console' button is highlighted with a red box and a red arrow pointing to the 'Service Console: exa4' panel. This panel contains a grid of service options: Web Access, Client Access, Administration, Go to SQL Workshop, Define REST Data Services, Download Client Credentials, Disable Client Access, Create Database Schema, Set Administrator Password, Develop with App Builder, Install Productivity Apps, Download Drivers, and Download Tools.

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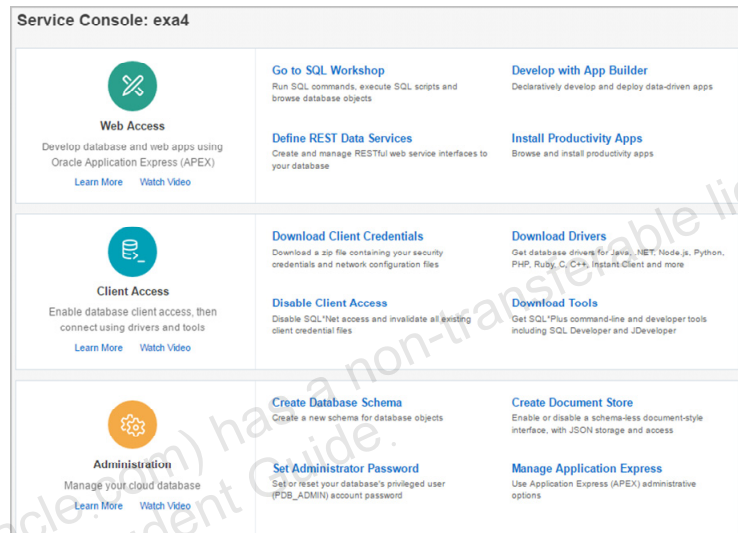
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On clicking the instance on the dashboard, you see various details about the dashboard. You can access the services by clicking on 'Open Service Console'.

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



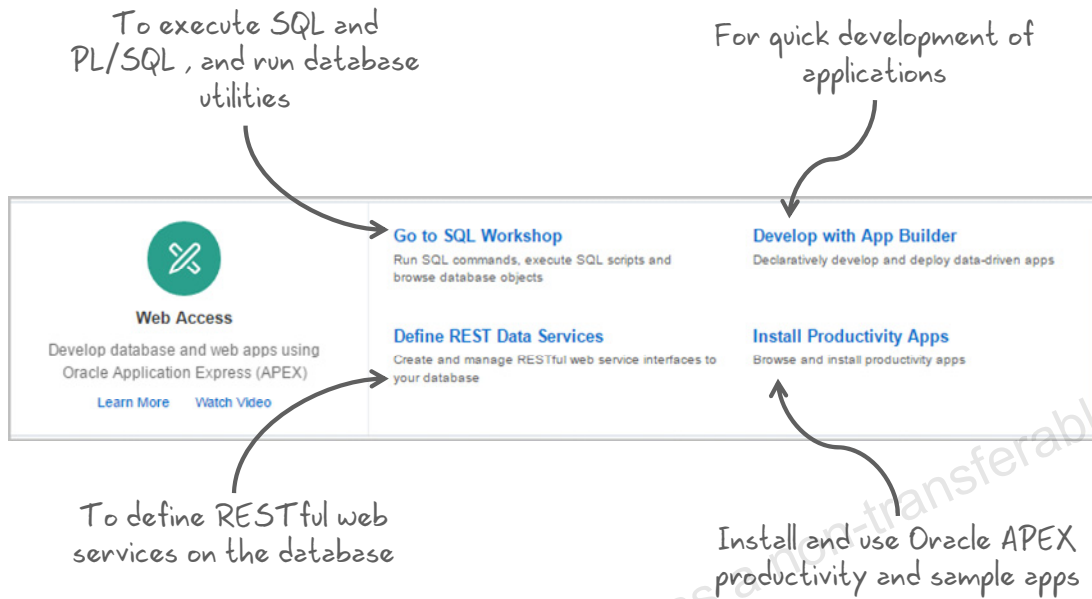
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Web access provides utilities which enable you to develop database and web applications using Oracle Application Express(APEX).

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

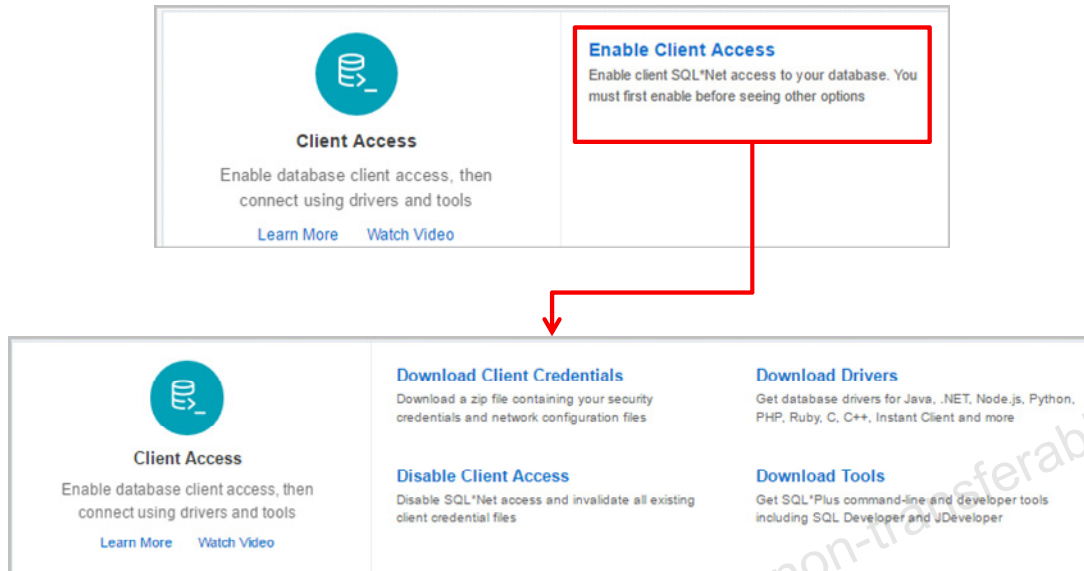


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| Option | Description |
|---------------------------|---|
| Go to SQL Workshop | Allows you to go directly to browser-based SQL Workshop, where you can run SQL statements, execute scripts and explore database objects. |
| Develop with App Builder | 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. |

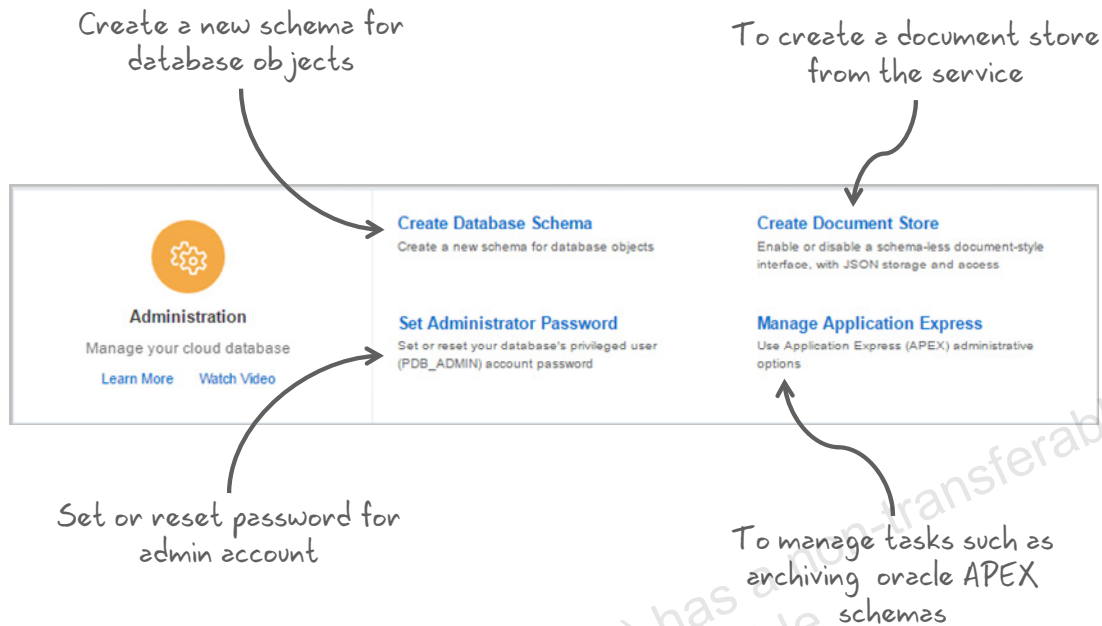
Client Access Configuration through Service Console



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| 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

Develop with App Builder
Declaratively develop and deploy data-driven apps

Define REST Data Services
Create and manage RESTful web service interfaces to your database

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

Go Actions Reset Create >

Sample Database Application 63400200000

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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

The screenshot shows the Oracle Application Express console. In the 'Web Access' section, the 'Go to SQL Workshop' option is highlighted with a red box. A red arrow points from this box to the 'SQL Workshop' tab in the Application Builder component. The Application Builder component shows five tabs: Application Builder, SQL Workshop, Team Development, and Packaged Apps. Below the tabs are five icons representing different tools: Object Browser, SQL Commands, SQL Scripts, Utilities, and RESTful Services.

1

Go to SQL Workshop
Run SQL commands, execute SQL scripts and browse database objects

Develop with App Builder
Declaratively develop and deploy data-driven apps

Define REST Data Services
Create and manage RESTful web service interfaces to your database

Install Productivity Apps
Browse and install productivity apps

2

ORACLE Application Express

Application Builder SQL Workshop Team Development Packaged Apps

Object Browser SQL Commands SQL Scripts Utilities RESTful Services

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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

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

RESTful Services

Search: Go

oracle.example.hr



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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

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

| | | |
|--|---|---|
| APEX Application Archive Software Development | Application Standards Tracker Tracking, Knowledge Management | Bug Tracking Software Development, Tracking |
| Checklist Manager Tracking, Team Productivity | Community Requests Software Development, Community | Customer Tracker Tracking, Marketing |
| Data Reporter Knowledge Management, Tracking, Proje | Decision Manager Team Productivity, Tracking | Expertise Tracker Tracking, Knowledge Management |
| Feedback Software Development | Go Live Checklist Project Management | 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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Additional Resources



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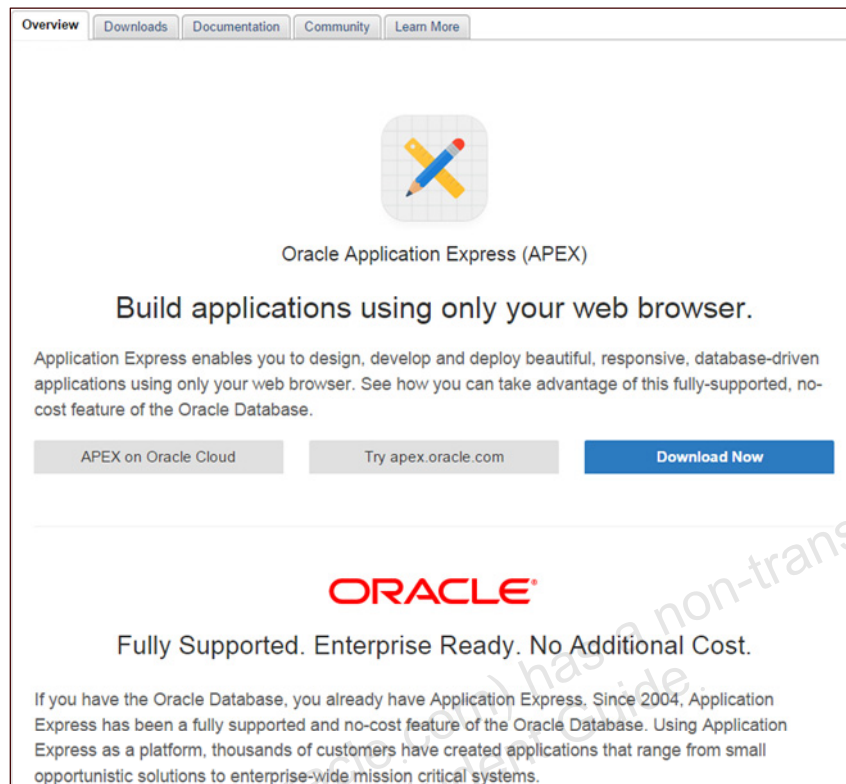
Additional Resources

- 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



Overview Downloads Documentation Community Learn More



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](#)

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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

Overview Downloads **Documentation** Community Learn More

 Oracle Application Express
Documentation

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.

- 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

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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

ORACLE Learning Library

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Home **Products** Search My Library

Oracle Application Express Learning Library...

Learning Library for Oracle Application Express

Oracle Application Express: Workshop I
Take this 5 day course from Oracle University!

Oracle Application Express: Workshop II
Take this 3 day course from Oracle University!

Oracle Application Express: Administration
Take this 2 day course from Oracle University!

Search content title, description and tags...

Welcome Overview Latest Additions Getting Started Learn by Action Additional Resources

Welcome

Welcome to the Oracle Application Express Learning Library. The library is home to information about Oracle Application Express and links to other Application Express related content.

- Click on the **Overview** tab to read the 2 minute elevator pitch for Application Express.
- View the latest content added to the learning library for Oracle Application Express on the **Latest Additions** tab.
- If you are new to Oracle Application Express begin at the **Getting Started** tab for general guidance.
- Review the role-specific highlights, activities, and tutorials on the **Learn by Action** tab.
- Check out the **Additional Resources** tab to access a wealth of collateral from outside the Oracle Application Express Learning Library.

All tabs provide links to general documentation, training, support, customer, and partner web sites.

Click [here](#) to see a listing of all available training for Oracle Application Express on the Oracle Learning Library (OLL).

Useful Links

- Oracle Technology Network
- Product Documentation
- OTN Discussion Forum
- apex.oracle.com - Free ho...

My Oracle Support

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MY ORACLE SUPPORT

Support solutions for Oracle Premier Support Customers

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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.

Q

| Blogger ↑ | URL | Blog Name | Language |
|--|---|--|----------|
| APEX.dbe.pl | http://apex.dbe.pl | APEX.dbe.pl - Blog o Oracle Application Express | Polish |
| APEXtras | http://blog.apextras.com/ | APEXtras | English |
| Absodia.com | http://www.absodia.com/ | Absodia.com | French |
| Andy Tulley | http://andrew.tulley.co.uk/ | andrew.tulley.co.uk - SELECT * FROM RANDOM.stuff WHERE subject IN ('Application Express','Oracle','PL/SQL','SQL','Javascript') | English |
| Anthony Rayner | http://anthonyrayner.blogspot.com/ | Let's talk about APEX, with Anthony Rayner | English |
| Anton Neilsen | http://c2anton.blogspot.com/ | Anton Neilsen - Mostly Randon experience with Oracle technologies. It is mostly specific solutions to isolated problems. | English |
| Austrian Competence Center for Oracle APEX | http://blog.oracleapex.at/ | Der Oracle Experten Blog | German |
| Ben Burell | http://munkben.wordpress.com/ | Munky's Blog - Yet more APEX musings | English |
| Bernard Fischer-Wasels | http://htmldb-de.blogspot.com/ | Rund um Oracle APEX - erstes BLOG in DEUTSCH mit Hauptfokus Oracle Application Express (vormals HTML DB) Entwicklung von Bernhard Fischer-Wasels | German |
| BlueTIC | http://www.oracleapex.es/ | El blog de Oracle Apex | Spanish |
| Bradley Brown | http://www.tuscsoftware.com/brown | 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 | http://carlback.blogspot.com/ | Carl Backstrom's Blog - Where spellcheck is just another word. | English |
| Carsten Cerny | http://cc13.com/ | Oracle Application Express in der Praxis | German |
| Carston Czarski | http://sql-plsql-de.blogspot.com/ | Oracle SQL und PL/SQL - TIPPS, TRICKS, "BEST PRACTICE" | German |
| Chaitanya Koratamaddi | http://chaitanyain.blogspot.com/ | Chaitanya's APEX Blog | English |
| Christopher Beck | http://christopherbeck.wordpress.com/ | 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. | http://www.oracleapplicationexpress.com/ | Oracle Application Express | English |
| Dan McGhan | http://www.danielmcghan.us/ | 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 | http://dancingwithapex.blogspot.com/ | Dancing and Wrestling with Oracle APEX - An Oracle Forms developer's journey into the "exciting new world" of Oracle Application Express | English |
| David Peake | http://dpeake.blogspot.com/ | David Peake on Oracle APEX - Product Manager for Oracle Application Express (APEX); formerly HTML-DB | English |
| Denes Kubicek | http://deneskubicek.blogspot.com/ | Denes Kubicek APEX Blog | English |
| Dietmar Aust | http://daust.blogspot.com/ | Oracle XE / APEX | English |
| Dimitri Gielis | http://dgielis.blogspot.com/ | Dimitri Gielis Blog | English |
| Douwe Pieter Van den Bos | http://www.ome-b.nl/ | Ome-B.nl - APEX Specialists | Dutch |
| Duncan Mein | http://dmein.blogspot.com/ | Duncan Mein's Blog | English |
| E-DBA | http://application-express-blog-e-dba.com/ | 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 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

Hosted Online Help Center

The screenshot shows the Oracle Help Center interface. At the top, there is a navigation bar with the Oracle logo, 'Help Center', a 'Database' dropdown menu, a search bar with the text 'Search products', and a 'Welcome' message. Below the navigation bar is a sidebar menu with the following items: '< Database', 'Overview' (highlighted), 'Tasks', 'Install and Upgrade', 'Build Applications', 'Tutorials', 'Videos', 'Collateral', and 'Training'. The main content area is titled 'Oracle Application Express Documentation Release 5.0' and 'Overview'. It features a 'Welcome' section with the text: 'Oracle Application Express is Oracle's primary tool for developing Web applications with SQL and PL/SQL. Using only a web browser, you can develop and deploy professional Web-based applications for desktops and mobile devices.' To the right of the welcome section is a list of documentation links, each with an information icon and a download icon: 'Application Express Release Notes', 'Application Express Installation Guide', 'Application Express Application Builder User's Guide', 'Application Express Application Migration Guide', 'Application Express SQL Workshop Guide', 'Application Express API Reference', and 'Application Express Administration Guide'.

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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

Learn More

Overview Downloads Documentation Community **Learn More**

 Oracle Application Express
Learn More

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.

- › [Datasheet](#)
- › [Technical Overview](#)
- › [Statement of Direction](#)

Topics

- › [Getting Started](#)
- › [New Features in Release 5.0](#)
- › [Collateral](#)
- › [Deployment](#)
- › [Books](#)
- › [News](#)
- › [Success Stories](#)
- › [Customer Quotes](#)
- › [Videos and Podcasts](#)
- › [Education and Certification](#)
- › [Plug-Ins](#)
- › [Packaged Applications](#)

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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

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Training Search Training Certification Community Cart Help

Home > Training > Database > Database Application Development > Oracle Application Express (Oracle APEX) 1.800.529.0165

Oracle Application Express (Oracle APEX)

Help your business develop & deploy professional applications securely & rapidly.

Training Courses Certification Learning Paths

Oracle Application Express (Oracle APEX) Certification

Click on the boxes below to learn detailed requirements for achieving each certification. ?

Certified Expert

Oracle Application Express Developer Certified Expert

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.

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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.

B

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

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

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Objectives

After completing this lesson, you should be able to:

- Identify the different components of a worksheet application
- Create a worksheet application
- Create sections on a worksheet 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 worksheet application, create sections on a worksheet page, annotate pages with files, notes, and tags, and also learn how to create and manipulate a data grid.

Lesson Agenda: Create a Worksheet Application

- Overview
- Working with Pages and Sections
- Creating Data Grids
- Manipulating Data Grids

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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

Control Panel New Section

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 |



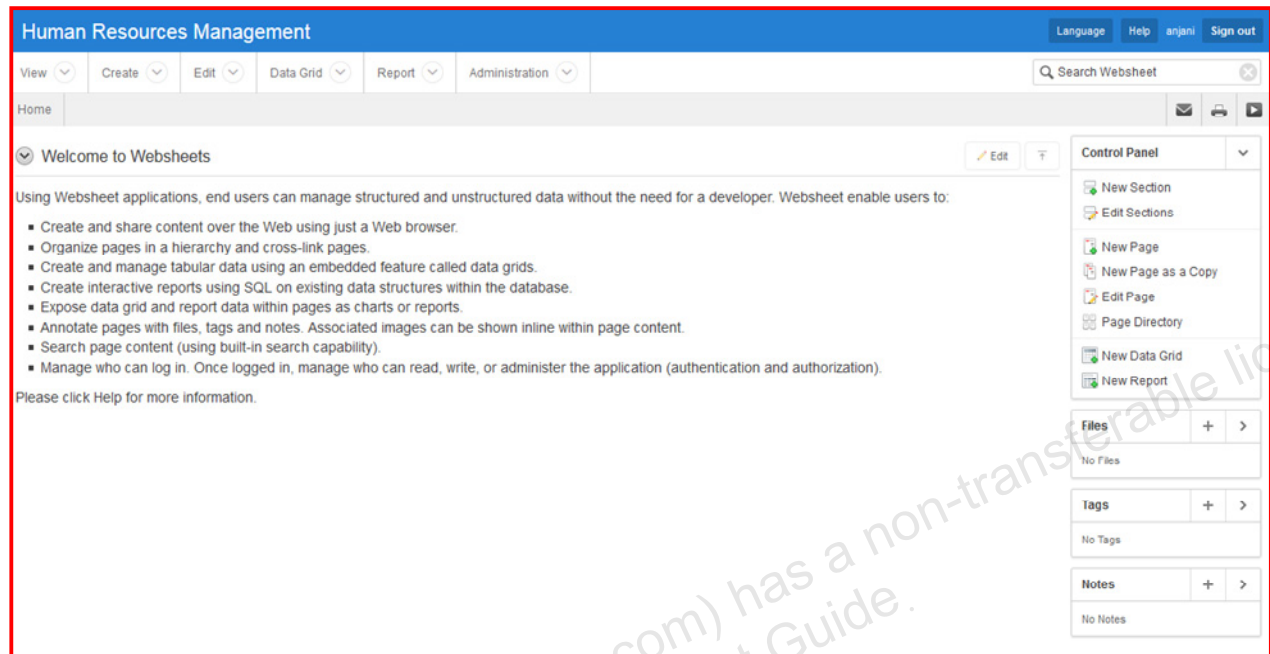
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Building an APEX database application is very easy for an IT professional and for many “power users.” They typically understand database concepts. They are comfortable using wizards to create an application and then working within the declarative framework 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



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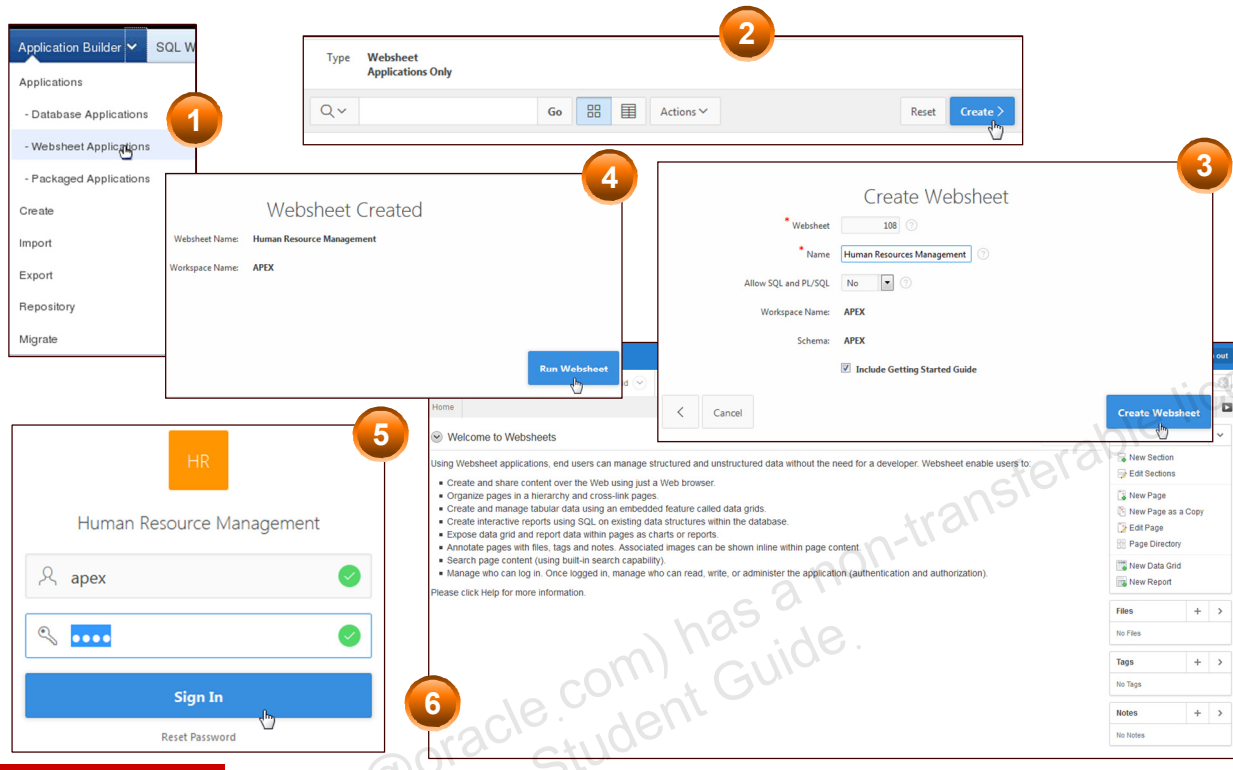
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The slide shows the interface that gets created when you use the Create Application Wizard to create a websheet application. A default home page is created with new websheet application. The look and feel of all websheet applications will be the same. 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



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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 Worksheet 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



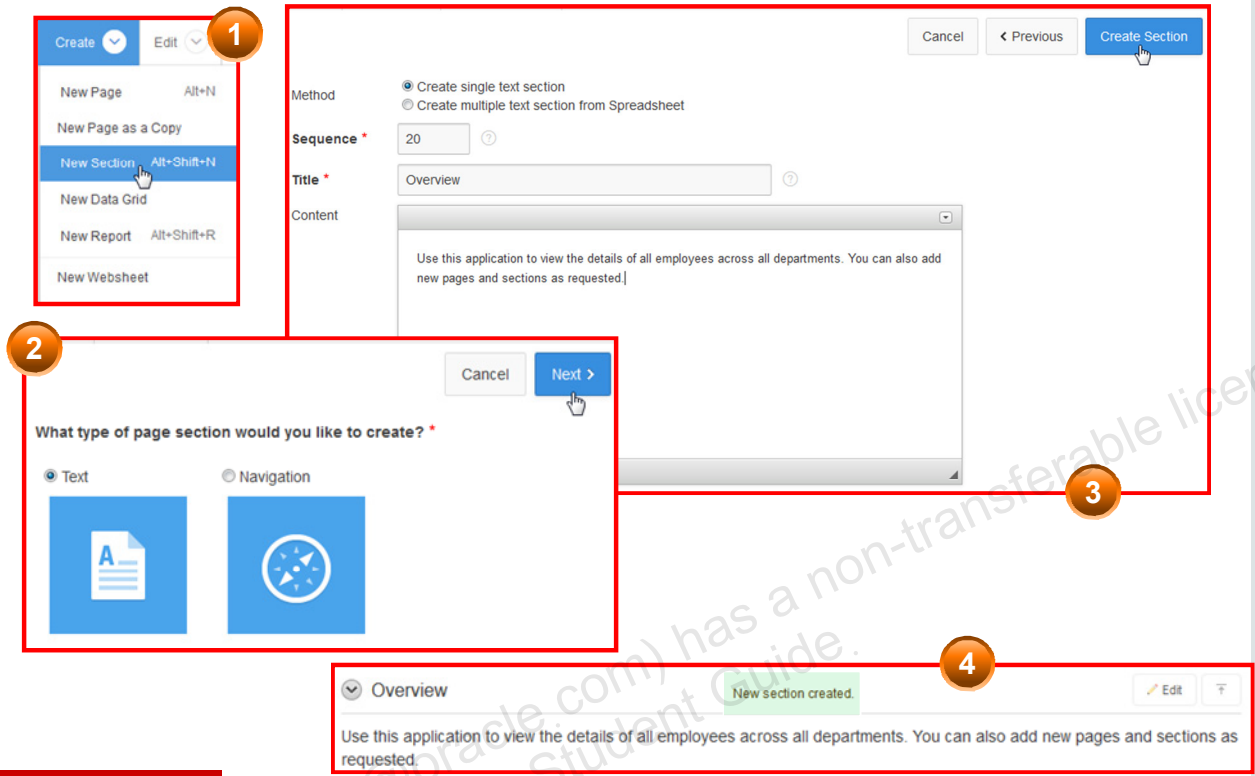
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The different types of sections that you can create are shown in the slide. The Text and Navigation options are available when the worksheet is created. The Data and Chart options are available only when either a data grid or a report exists in the worksheet.

These options are discussed in detail later in this appendix.

Creating a Text Section



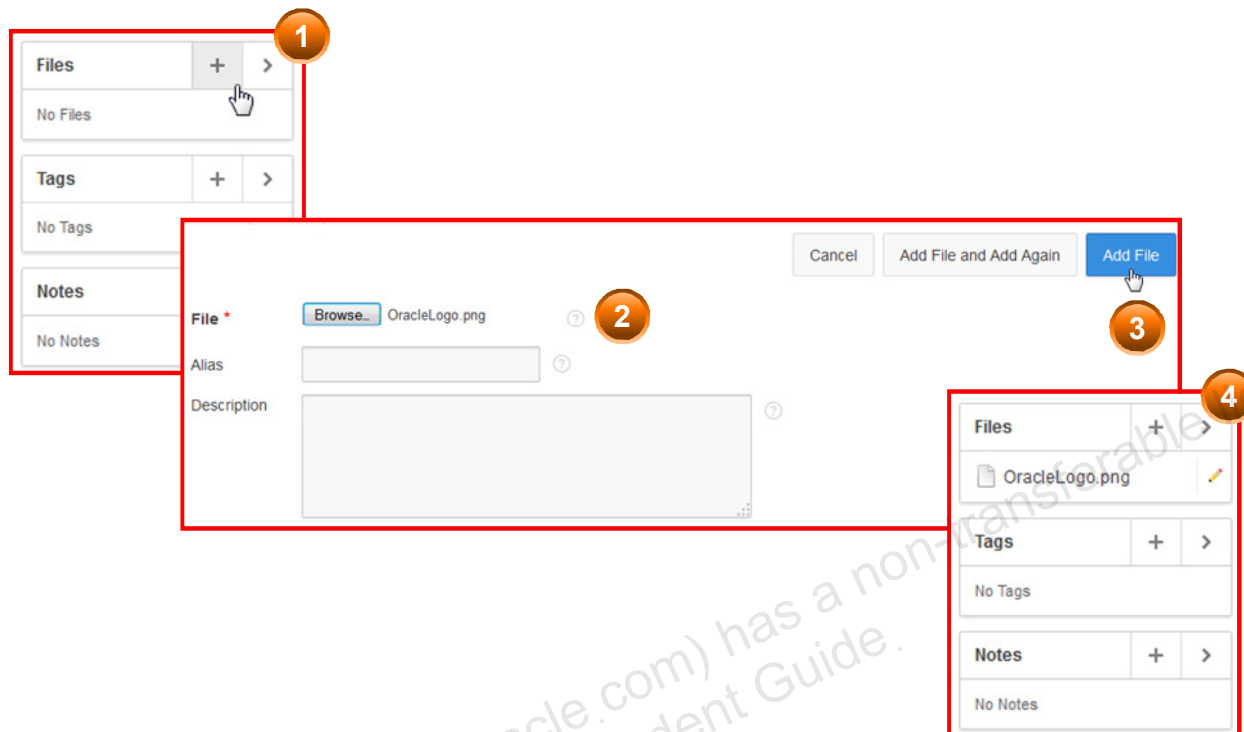
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You can add textual content to your pages by creating a Text section. To create a Text section, perform the following steps:

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



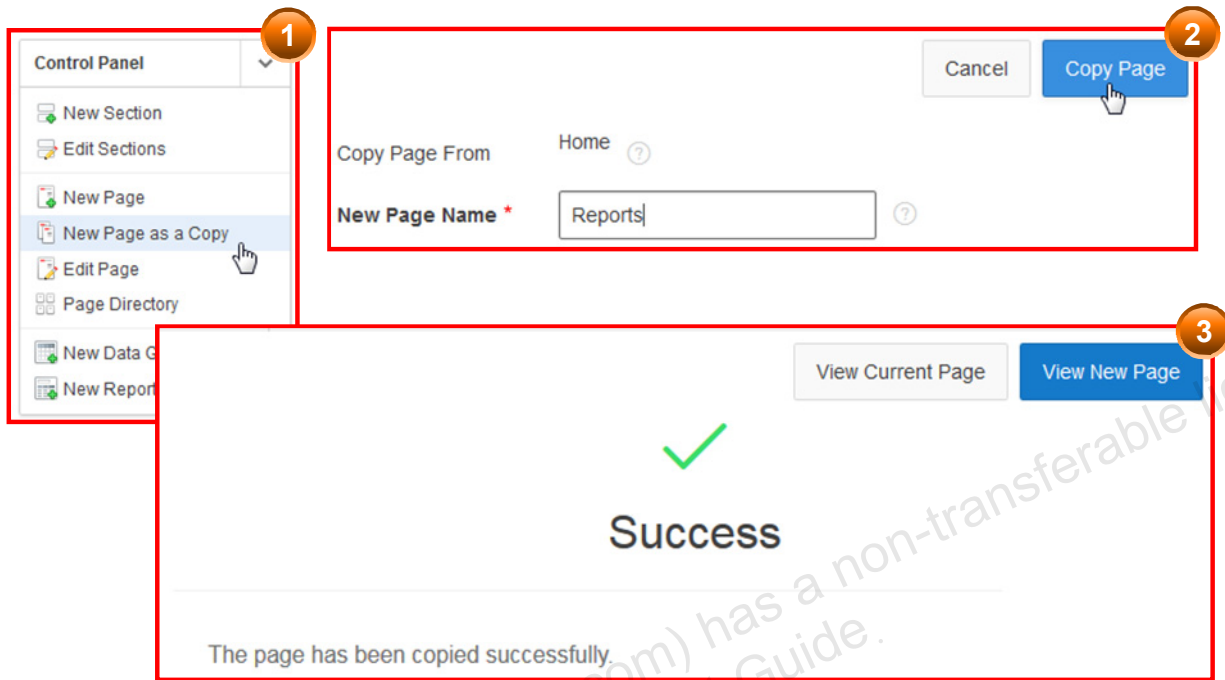
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You can add files, tags, and notes to the worksheet pages. These are displayed on the bottom-right side of a page. You can click the plus icon (+) depending on what you want to add to the page. The slide shows an example of annotating a page with an 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



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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

1. Click the Edit button for that section.

2. Make your changes and click the Apply Changes button.

3. The section is updated with the new content, and a 'Section saved.' message is displayed.

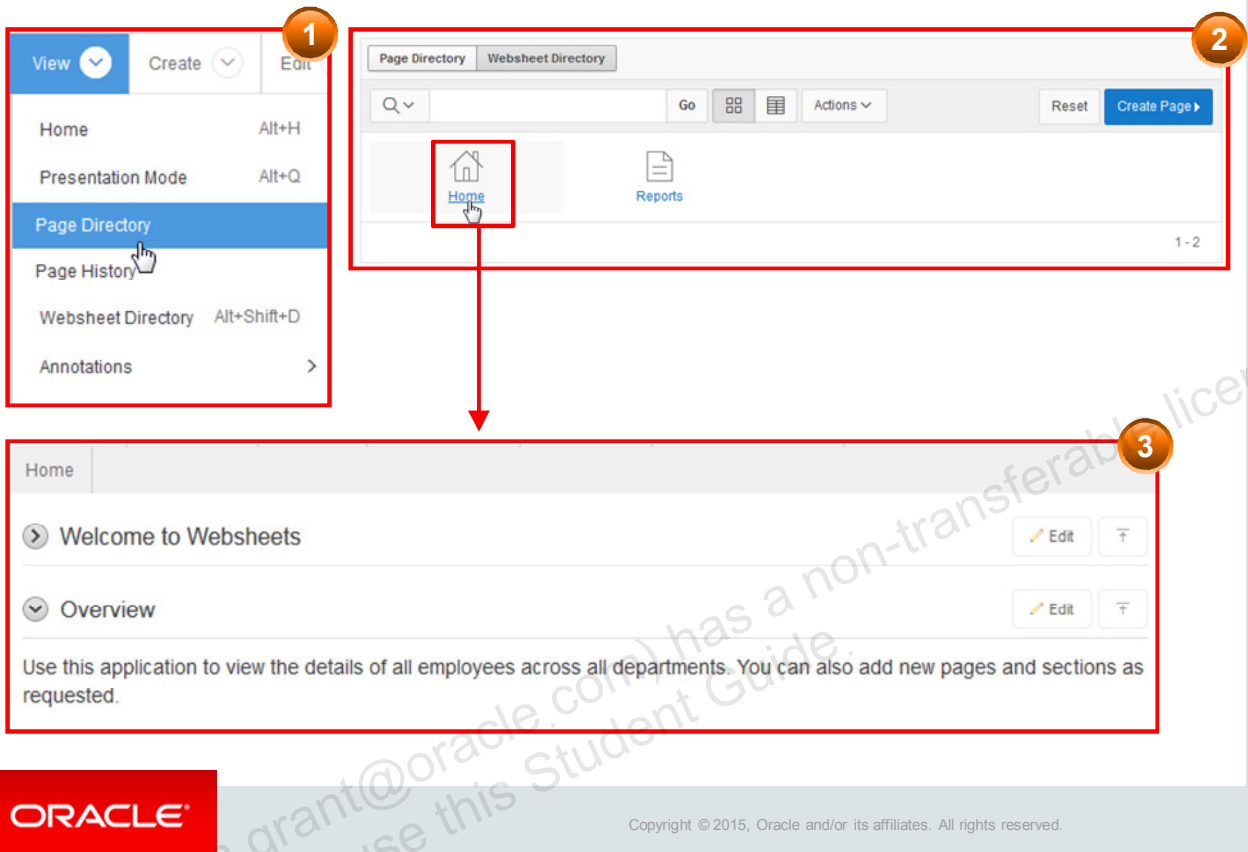
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At any point, you can edit the sections on a page to change its title or contents. To edit a page section, perform the following steps:

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

The image illustrates the process of displaying an image in an Oracle APEX application through four numbered steps:

- Step 1:** The 'Files' region is used to upload the image 'OracleLogo.png'.
- Step 2:** The 'Overview' section is selected for editing. The content area contains the text: 'Use this application to view the details of all employees across all departments. You can also add new pages and sections as requested.'
- Step 3:** The 'Edit Section' dialog is open. The 'Content' field contains the markup: `[[IMAGE:OracleLogo.png]]`.
- Step 4:** After clicking 'Apply Changes', the 'Overview' section is updated to display the Oracle logo image.

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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

The screenshot shows the Oracle Human Resource Management interface. At the top, a blue header bar contains the text "Human Resource Management" and a "Help" button. A red box labeled "1" highlights the "Help" button. Below the header is a navigation menu with tabs: "About", "Overview", "Access Control", "Markup Syntax", "Data Grid", "Application Content", and "FAQ". A red box labeled "2" highlights the "Markup Syntax" tab. The main content area is titled "Show All" and lists various topics: "Page Linking", "Section Linking", "External URLs", "Files", "Images", "Data Grid Linking", "Report Linking", "SQL", and "Advanced Data Grid Queries". The "Page Linking" section is expanded, showing instructions on how to use markup syntax to include links in page sections. It provides the following syntax examples:

```
[[ 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]].
```

The "Section Linking" section is also expanded, showing instructions on how to use markup syntax to include links to a section of a page. It provides the following syntax examples:

```
[[ 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

Q

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 Worksheet 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

The screenshot illustrates the process of creating a data grid in Oracle APEX, divided into four numbered steps:

- Step 1:** The user navigates to the 'Data Grid' menu and selects 'New Data Grid'.
- Step 2:** The user chooses 'From Scratch' as the creation method and clicks the 'Next' button.
- Step 3:** The user defines the data grid's name ('Deadlines'), alias, and columns. The columns are defined as follows:

| Column Name | Type | Move |
|-------------|--------|------|
| Event | String | |
| Date | Date | |
| | String | |
| | String | |
| | String | |
| | String | |
| | String | |
| | String | |

The user then clicks the 'Add Column' button.
- Step 4:** The data grid is created and displayed as empty. The user clicks the 'Add Row' button to begin populating the grid.

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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

The screenshot illustrates the process of creating a data grid from a spreadsheet in Oracle APEX. It is divided into four numbered steps:

- Step 1:** The user navigates to the 'Data Grid' menu and selects 'New Data Grid'.
- Step 2:** The user chooses the 'Copy and Paste' option and clicks the 'Next' button.
- Step 3:** The user provides a name for the data grid (e.g., 'Tasks'), pastes the spreadsheet data into the 'Paste Spreadsheet Data' field, and checks the 'First Row Contains Column Headings' checkbox.
- Step 4:** The user clicks the 'Upload' button to create the data grid.

| 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 |



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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

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**.

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The data grids that you created in the preceding slides are located as data components in the Data section of your worksheet. To display data from these data grids on your worksheet 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

1 Select Chart Type *
Column Horizontal Bar Pie Line

2 Chart Type: Pie
Chart Source: Data Grid Report
Display Sequence: 30
Data Grid: Tasks
Report Settings to Use: Primary Report (Primary Default)
Section Title: Tasks Status

3 Chart Label: STATUS Axis Title for Label: Project Status
Chart Value: COST Axis Title for Value: Project Cost
Function: Select Function
Sort: Default
Enable 3D:

4 You have requested to create a chart section with the following attributes. Please confirm your selections.

| | |
|------------------------|----------------------------------|
| Display Sequence | 30 |
| Section Title | Tasks Status |
| Chart Type | Pie |
| Enable 3D | |
| 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 | |
| Sort | Default |

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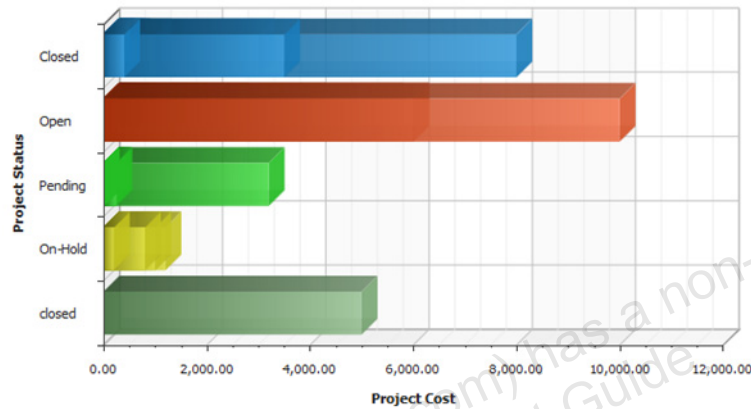
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In the preceding slide, you learned how you can display data from data grids as reports. You can also display the data in the data grids as charts. For this, you need to create a chart section. Create a new section on a page and select the Chart option. 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 Edit ⌵
- Overview Edit ⌵
- Tasks Edit ⌵
- Tasks Status Edit ⌵



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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 Worksheet 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.

| 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 |
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|  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

The screenshot illustrates the process of adding a new column to a data grid in Oracle Application Express. It is divided into four numbered steps:

- Step 1:** The user navigates to the **Manage** menu, selects **Columns**, and then clicks **Add**.
- Step 2:** The **Add Column** dialog box is shown. The **Column Name** is set to **Priority**. The **Type** is **Number**, **Value Required** is **No**, and **Display As** is **Select List**. The **List of Values** is **-New List of Values-**, the **List of Values Name** is **Priorities**, and the **List of Values Definition** is **1,2,3,4,5**. The **Default Type** is **Text** and the **Default Text** is **3**.
- Step 3:** The user clicks the **Apply** button to save the new column.
- Step 4:** The new **Priority** column is added to the data grid. The grid shows columns: PROJECT, TASK_NAME, START_DATE, END_DATE, STATUS, ASSIGNED_TO, COST, BUDGET, and Priority. The Priority column contains the values 3 for all rows.

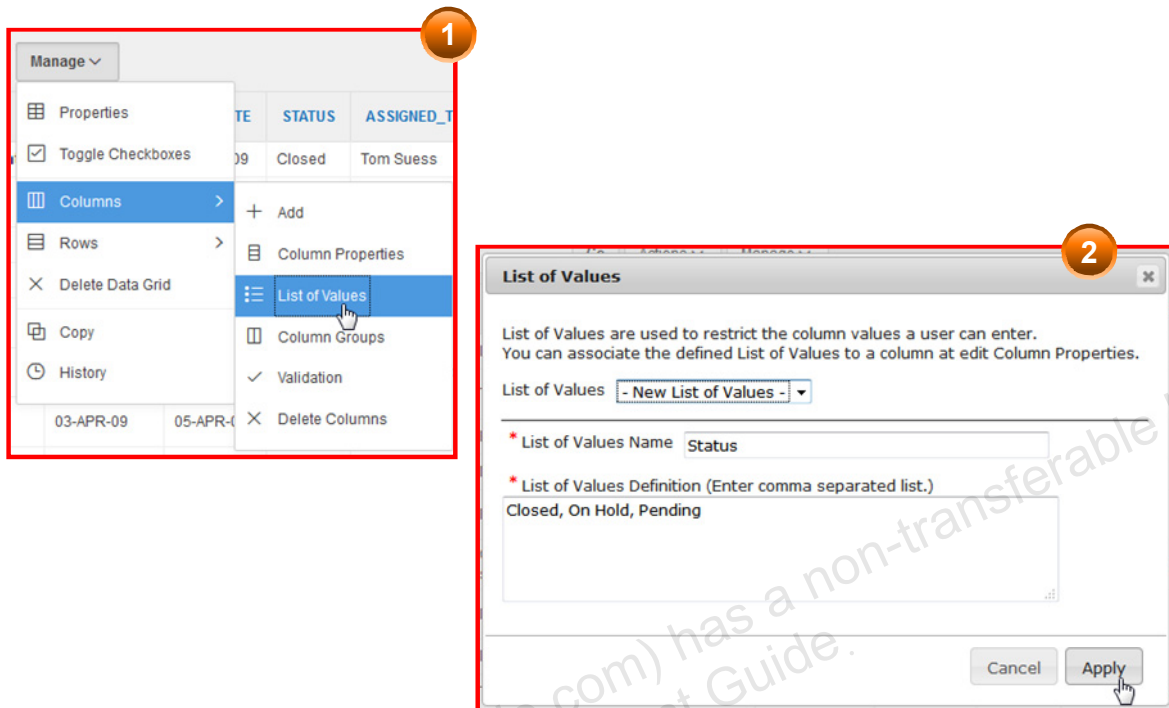
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To add a column to a data grid, perform the following steps:

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

The screenshot illustrates the process of editing column properties in three steps:

- Step 1:** The 'Manage' menu is open, and the path 'Columns > Column Properties' is selected.
- Step 2:** The 'Column Properties' dialog box is shown for the 'STATUS' column. The 'Display As' field is set to 'Select List', and the 'List of Values' is defined as 'Closed, On Hold, Pending'.
- Step 3:** The 'STATUS' column in the data grid is highlighted, and a drop-down list is open, showing the values 'Closed', 'On Hold', and 'Pending'.

| START_DATE | END_DATE | STATUS | ASSIGNED_TO |
|------------|-----------|---------|-------------|
| 25-JUL-09 | 02-AUG-09 | Closed | Tom Suess |
| 10-APR-09 | 25-OCT-09 | On Hold | John Watson |
| 03-JAN-10 | 05-MAR-10 | Pending | John Watson |
| 20-MAY-10 | 03-AUG-10 | Pending | Mark Nile |

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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

Validation

Validation: - New Validation -

Name: Is Numeric

Sequence: 10

Type: Column specified is numeric

Column Name: COST

Validation Expression:

Error Message: Only Numeric Values are Allowed !

Only Numeric Values are Allowed !

| 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 | 10000 Rs | 8000 | 3 |
| Migrate Access Application | End-user Training | 03-JAN-10 | 05-MAR-10 | Pending | John Watson | 0 | 2000 | 3 |
| Migrate from SQL Server | Map data usage | 20-MAY-10 | 03-AUG-10 | Pending | Mark Nile | 0 | 8000 | 3 |

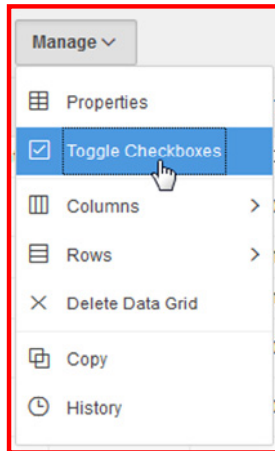
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You can create validations for columns in a data grid. Perform the following steps:

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.

Toggleing Check Boxes



Adding check boxes enables you to perform multirow or multicolumn tasks.

A screenshot of a data grid interface. At the top, there is a search bar with a magnifying glass icon and a dropdown arrow, followed by 'Go', 'Actions', and 'Manage' buttons. Below this is a table with five columns: a checkbox column, an edit icon column, 'PROJECT', 'TASK_NAME', 'START_DATE', and 'END_DATE'. The table contains six rows of data.

| <input type="checkbox"/> | | 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

1

2

3

Only the rows that are selected are changed.

| 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 | 450 | 8000 |
| Migrate Access Application | End-user Training | 03-JAN-10 | 05-MAR-10 | Pending | John Watson | 450 | 2000 |

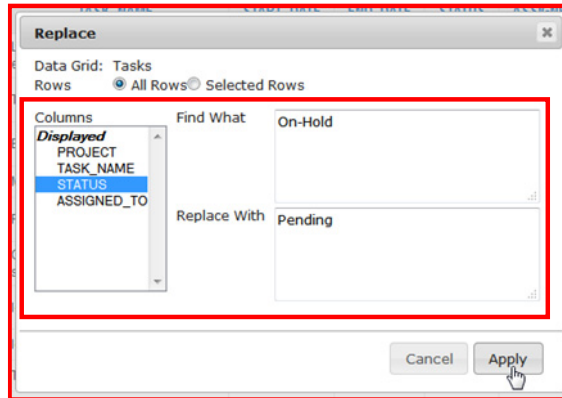
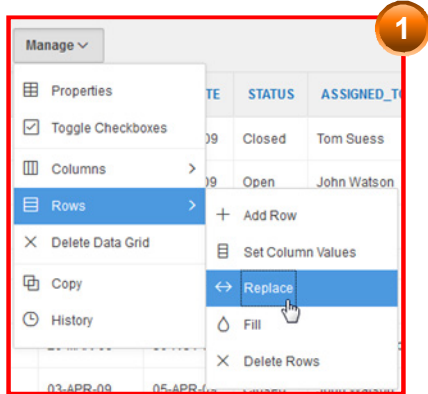
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You can change the values for a particular set of rows. Turn toggle check boxes on and select the columns for which you want to change values. Then perform the following steps:

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



| | 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 |



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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

1

| | PROJECT | TASK_NAME | START_DATE | END_DATE | STATUS |
|--|----------------------------|-------------------------------------|------------|-----------|--------|
| | Software Projects Tracking | Load current tasks and enhancements | 25-JUL-09 | 02-AUG-09 | Closed |
| | Packaged applications | Train developers / users | 10-APR-09 | 25-OCT-09 | Open |

2

Actions

- Add Row
- Add File
- Add Note
- Add Link
- Add Tags
- History
- Add Column
- Column Properties
- Column Groups
- Delete Columns
- List of Values
- Validation

3

Add Tags

Tags David, Robert

Cancel Apply

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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 worksheet application
- Create a worksheet application
- Create sections on a worksheet 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 worksheet application. You should have learned how to create a worksheet application, create sections on a worksheet page, annotate pages with files, notes, and tags, and also create and manipulate a data grid.

Manipulate and Administer a Websheet Application

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

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Objectives

After completing this lesson, you should be able to:

- Enable a worksheet to interact with a database
- Create SQL and report sections
- Create navigation sections
- Administer a worksheet

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In this lesson, you learn how to edit a worksheet application's properties and manipulate a worksheet. You also learn how to share a worksheet across different users.

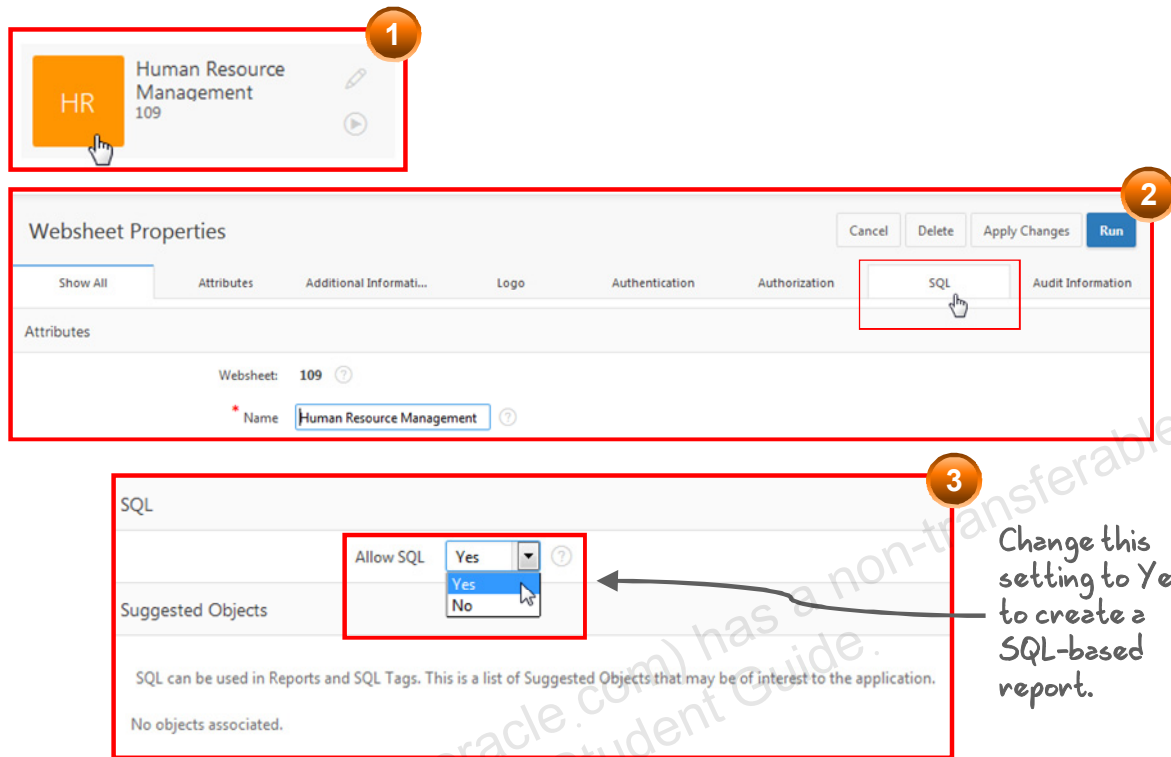
Lesson Agenda: Manipulate and Administer a Websheet Application

- Interacting with the Database
 - Editing Websheet Properties
 - Creating a Report
 - Using SQL Markup
- Enhancing Websheet Applications
- Administering Websheet Applications

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Editing Websheet Properties



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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 displays the Oracle Human Resource Management web application interface. At the top, there is a navigation bar with the title "Human Resource Management" and links for "Language", "Help", "anjan", and "Sign out". Below this is a menu bar with options like "View", "Create", "Edit", "Data Grid", "Report", and "Administration". A search bar labeled "Search Websheet" is also present. The main content area shows a breadcrumb trail: "Home > Data > List of Employees". Below the breadcrumb, there is a search and action bar with a search icon, a "Go" button, and "Actions" and "Manage" dropdown menus. The primary element is a table listing employee details. The table has columns for Employee Id, First Name, Last Name, Email, Phone Number, Hire Date, Job Id, Salary, Commission Pct, Manager Id, and Department Id. The data rows show employees such as Steven King, Neena Kochhar, Lex De Haan, Alexander Hunold, Bruce Ernst, David Austin, Valli Pataballa, Diana Lorentz, Nancy Greenberg, Daniel Faviet, John Chen, and Ismael Sciarra. A date stamp "Monday, August 03, 20" is visible in the bottom right corner of the table area.

| 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 | FL_MGR | 12000 | | 101 | 100 |
| 109 | Daniel | Faviet | DFAVIET | 515.124.4169 | 16-AUG-94 | FL_ACCOUNT | 9000 | | 108 | 100 |
| 110 | John | Chen | JCHEN | 515.124.4269 | 28-SEP-97 | FL_ACCOUNT | 8200 | | 108 | 100 |
| 111 | Ismael | Sciarra | ISCIARRA | 515.124.4369 | 30-SEP-97 | FL_ACCOUNT | 7700 | | 108 | 100 |
| 112 | José Manuel | Ullman | JULLMAN | 515.124.4469 | 07-MAR-98 | FL_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

1

Create Edit

- New Page Alt+N
- New Page as a Copy
- New Section Alt+Shift+N
- New Data Grid
- New Report Alt+Shift+R**
- New Worksheet

2

Cancel < Previous Next >

Schema APEX

Report Source Table SQL Query

Table or View Name * OEHR_EMPLOYEES

Report Name * List of Employees

Report Alias

Select an existing table or specify a SQL query against an existing table.

3

Cancel < Previous Create Report

You have requested to create a report with the following attributes. Please confirm your selections.

| | |
|---------------|-------------------|
| Schema | APEX |
| Report Name | List of Employees |
| Report Source | Table |
| Table Name | OEHR_EMPLOYEES |

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

1 Manage > Edit Query

2 Report Attributes | Report Query | Cancel | Apply Changes

Report Name: List of Employees

Report Query: `select EMPLOYEE_ID, FIRST_NAME, SALARY from OEHR_EMPLOYEES`

3 Report Attributes | Report Query | Cancel | Apply Changes

You have requested to change the report query. If you added columns to the query, they will not be displayed when the report is run. You will need to use the actions menu and either select the columns or click **Reset**. If you removed any columns from the query, it will disable existing filters, highlight rules, and other report settings referencing those columns. Please confirm your request.

Removed Columns: LAST_NAME (STRING), EMAIL (STRING), PHONE_NUMBER (STRING), HIRE_DATE (DATE), JOB_ID (STRING), COMMISSION_PCT (NUMBER), MANAGER_ID (NUMBER), DEPARTMENT_ID (NUMBER)

New Columns: .

4 Report query changed successfully.

View | Create | Edit | Data Grid | Report | Administration | Q Search Worksheet

Home > Data > List of Employees

| Employee Id | First Name | Salary |
|-------------|------------|--------|
| 100 | Steven | 24000 |
| 101 | Neena | 17000 |
| 102 | Lex | 17000 |
| 103 | Alexander | 9000 |



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

The screenshot illustrates the 'New Section' wizard in Oracle APEX. It is divided into three numbered steps:

- Step 1:** The 'Control Panel' on the left shows the 'New Section' option selected.
- Step 2:** The 'What type of page section would you like?' dialog shows 'Text' selected over 'Navigation'.
- Step 3:** The 'Create Section' dialog is shown with the following details:
 - Method: Create single text section
 - Sequence: 40
 - Title: Employee Details
 - Content: A text area containing two lines of SQL markup:

```
Current Employee Count [[sqlvalue: select count(employee_id) from gehr_employees]]  
[[sql: select * from gehr_employees]]
```

A handwritten note 'Markup Syntax' with an arrow points to the SQL markup in the content field. The 'Create Section' button is highlighted with a mouse cursor.

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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

Q

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

1. Control Panel menu with 'New Section' selected.

2. 'What type of page section would you like to create?' dialog with 'Navigation' selected.

3. 'Navigation Type' dialog with 'Page Navigation' selected.

4. Configuration form for 'Page Navigation' with fields for Sequence, Title, Starting Page, Maximum Levels, and Order Siblings By.

5. Resulting navigation section showing a tree view with 'Home' and 'Reports' items.

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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 worksheet after you create the navigation section, it is automatically added to the navigation section.

Linking Pages

1

Cancel X Delete Apply Changes

Edit Section

Page Home

Sequence * 10 ?

Title * Overview ?

Content

Use this application to view details of a `[[Employees | employees]]` across a `[[Departments | departments]]`. You can also add new pages and sections as required.

`[[IMAGE:oralogo.gif]]`

2

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

1

Employee Details

Current Employee Count 107

Search Report

| EMPLOYEE_ID | FIRST_NAME | LAST_NAME | EMAIL | PHONE_NUMBER | HIRE_DATE | JOB_ID | SALARY | COMMISSION_PCT | MANAGER_ID | DEPARTMENT |
|-------------|------------|-----------|----------|--------------|-----------|---------|--------|----------------|------------|------------|
| 100 | Steven | King | SKING | 515.123.4567 | 17-JUN-87 | AD_PRES | 24000 | | | |
| 101 | Neena | Kochhar | NKOCHHAR | 515.123.4568 | 21-SEP-89 | AD_VP | 17000 | | 100 | |
| 102 | Lex | De Haan | LDEHAAN | 515.123.4569 | 13-JAN-93 | AD_VP | 17000 | | 100 | |

2

Sections

Overview
anjani — 4 minutes ago

Navigation
anjani — 13 minutes ago

Employee Details
anjani — 19 minutes ago

Edit Section

- Edit Multiple Sections
- Move Section To New Page
- Move Section to Another Page
- Show Section History

3

Move Section to Another Page

Current Page: Home

Section Name: Employee Details

New Page: Employees

New Section Sequence: 10

Cancel Move Section

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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 APEX. It is divided into two main parts, indicated by numbered callouts:

- Callout 1:** Shows the 'View' menu with 'Page History' selected. The menu items are: Home (Alt+H), Presentation Mode (Alt+Q), Page Directory, Page History (highlighted), Websheet Directory (Alt+Shift+D), and Annotations (>).
- Callout 2:** Shows the 'Page Section History' report for the 'Employees' page. The report includes a search bar, a 'Go' button, and an 'Actions' dropdown. The data table is as follows:

| 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 |

Page 1 - 2



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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 worksheet authentication method.
2. Create users in Application Express Administration.
3. Define an Access Control List (ACL) in the worksheet.
4. Change worksheet authorization to use a custom ACL.
5. Test user access to the worksheet.

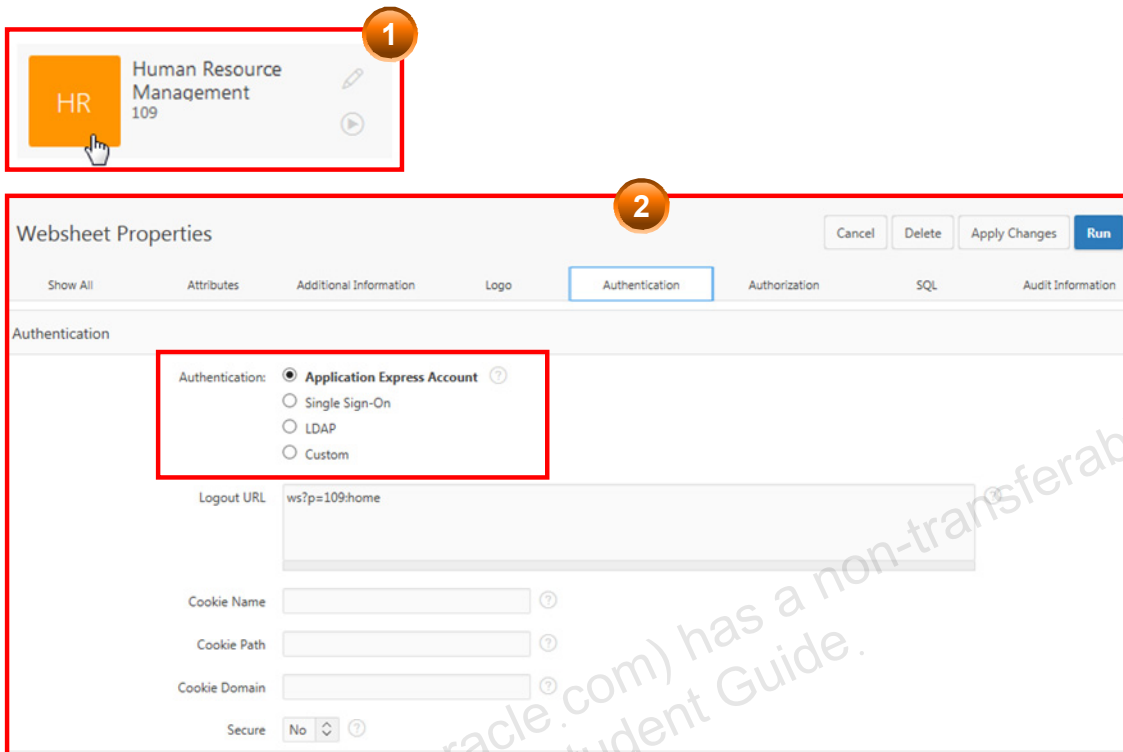
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To share the pages in your worksheet with the user community, you must provide them with a username and password to log in. Depending on the username, you can authorize each user to have a particular level of access. The slide provides an overview of the steps required to set up an ACL, which determines who has access to your worksheet and what privileges (if any) they have.

These steps are discussed in detail in the following slides.

1. View the Current Websheet Authentication Method



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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

The screenshot shows the Oracle Application Express Administration interface. A red box highlights the navigation menu on the left, where 'Manage Users and Groups' is selected. Another red box highlights the 'Manage Users and Groups' page, showing the 'Users' tab and the 'Create User' button. A third red box highlights a table of existing users.

| User | Email | Account Type | Locked | Builder Last Login | Created |
|----------------|---------------------------|-------------------------|--------|--------------------|----------------|
| WS_ADMIN | ws_admin@oracle.com | Workspace Administrator | No | | 53 seconds ago |
| WS_CONTRIBUTOR | WS_CONTRIBUTOR@oracle.com | Developer | No | | 25 seconds ago |
| WS_READER | ws_reader@oracle.com | End User | No | | Now |

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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

The screenshot illustrates the process of creating an ACL in a websheet through three steps:

- Step 1:** In the 'Websheet Properties' dialog, the 'Authorization' tab is selected. The 'Access Control List Type' is set to 'Default', and 'Allow Public Access' is set to 'No'. The 'Edit Access Control List' button is highlighted.
- Step 2:** In the 'Application Human Resource Management' interface, the 'Create Entry' button is highlighted.
- Step 3:** In the 'Entry Details' dialog, the 'Username' is set to 'ws_reader' and the 'Privilege' is set to 'Reader'. The 'Create' button is highlighted.

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:

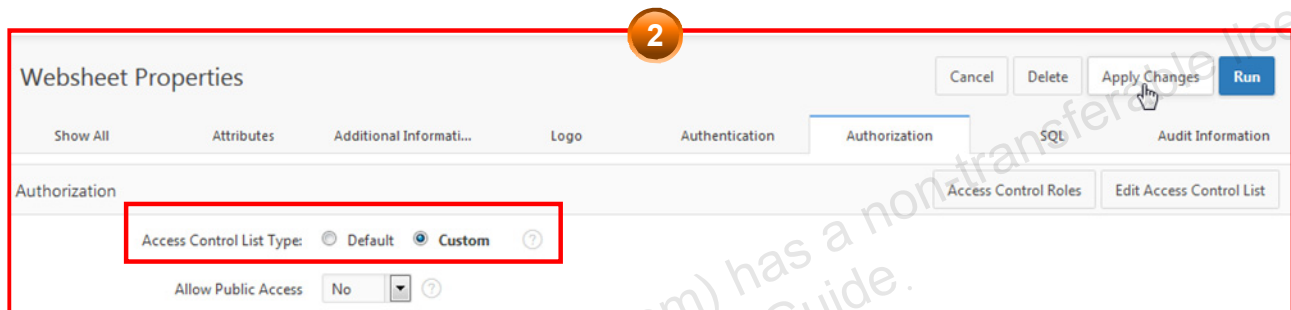
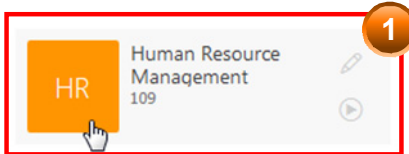
1. On the Websheet applications home page, click the websheet icon.
2. Click the Authorization subtab.
3. Click Edit Access Control List.
4. Click Create Entry.
5. Enter the user ID and select appropriate access.
6. Click Create. Alternatively, click “Create and Create Another” to create another user.

Note: You must also add the creator of the worksheet 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).

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4. Change Worksheet Authorization to Use a Custom ACL



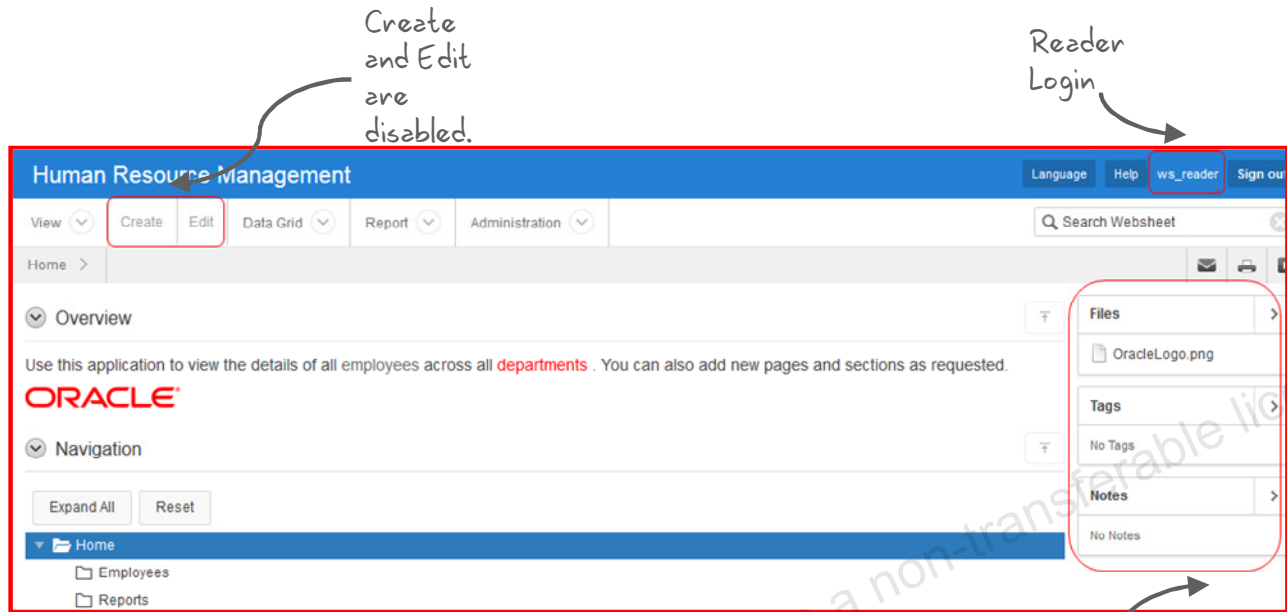
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To enable the ACL that you created in the previous step, perform the following steps:

1. On the Worksheet applications home page, click the worksheet 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



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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 worksheet. Which worksheet 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 worksheet to interact with a database
- Create SQL and report sections
- Create navigation sections
- Administer a worksheet

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In this lesson, you should have learned how to enable a worksheet to interact with the database. You should have learned how to create SQL, PL/SQL, report sections, navigation sections, and administer a worksheet 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

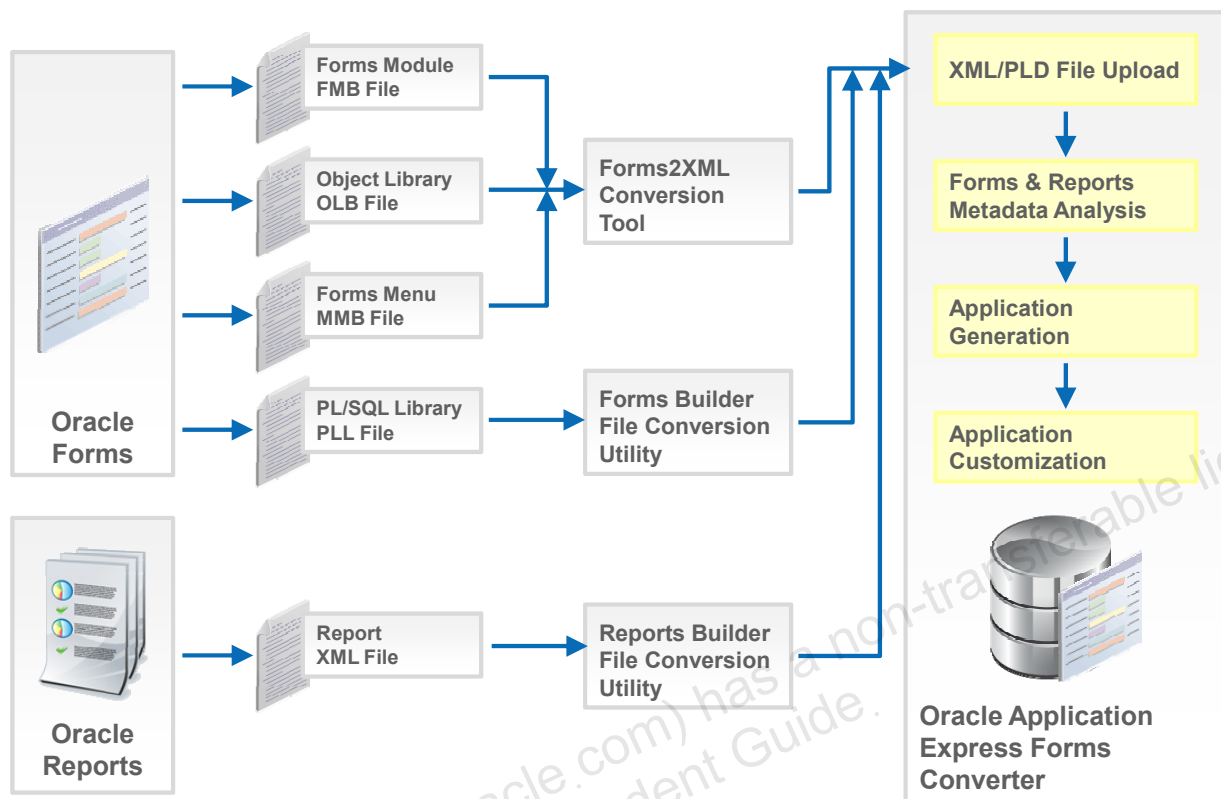
The Oracle logo, consisting of the word "ORACLE" in white capital letters on a red rectangular background.

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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

The image shows three sequential screenshots of the Oracle APEX administration interface, numbered 1, 2, and 3.

Step 1: The 'Administration Services' page. The 'ADMIN' user is logged in. The 'Sign In to Administration' button is highlighted.

Step 2: The 'Create Workspace' wizard. The 'Confirm Request' step is active. The workspace information is as follows:

| Workspace Information: | |
|------------------------|-----------------|
| Name | Workshop1 |
| Workspace ID | System Assigned |
| Description | --- |

Administrator Information:

| | |
|-----------|-----------------|
| User Name | workshop1 |
| E-mail | *****@*****.com |

Schema Information:

| | |
|----------------------------|---|
| Reuse Existing Schema | No |
| Schema Name | WORKSHOP1 |
| Tablespace will be created | APEX_XXX |
| Datfile for tablespace | C:/APP/ORACLE/ORADATA/APEX/APEX_XXX.DBF |

The 'Create Workspace' button is highlighted.

Step 3: The 'Manage Users and Groups' page. The 'Create User' button is highlighted.

| User | Email | Account Type | Locked | Builder Last Login | Created |
|-----------|-----------------|-------------------------|--------|--------------------|----------------|
| WORKSHOP1 | *****@*****.com | Workspace Administrator | No | 6 seconds ago | 73 seconds ago |

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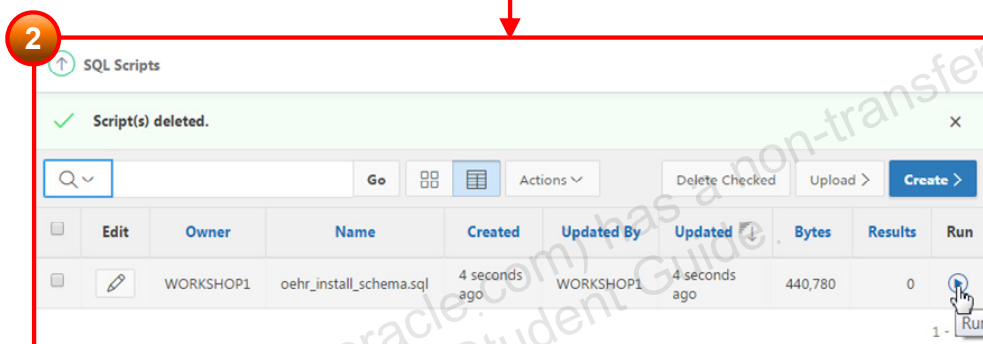
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Perform the following steps to create a workspace and add Oracle Application Express users:

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 tablesRemRemRem Copyright (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 countr_reg_fk FOREIGN KEY
(region_id) REFERENCES regions(region_id) ) ORGANIZATION
INDEX: REM
```



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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

1 Application Builder

2 Migrations

3 Create Project

4 Create Migration Project

Project Details

* Project Name OEHR Project

* Type Forms

Description

Schema WORKSHOP1

Locate the Forms Module XML file generated by the Forms2XML conversion tool. Click [here](#) for information on how to generate a Forms Module XML file.

* Forms Module XML File Choose File | oehr.xml

Next >

5

Following script. Please confirm your request.

Forms XML File Name oehr.xml Size in Bytes 440,780

Upload Another File > Create

6

You have requested to run the following script. Please confirm your request.

Forms XML File Name oehr.xml Size in Bytes 440,780

PL/SQL Library File Name oehr.pld Size in Bytes 440,780

Upload Another File > Create

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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.