

**Oracle Application Express:  
Developing Web Applications**

Student Guide - Volume II

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**Authors**

Dimpí Sarmah  
Salome Clement

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**Technical Contributors and Reviewers**

Anthony Rayner  
Bryan Roberts  
Chaitanya Koratamaddi  
Christina Cho  
Christopher Wensley  
Drue Baker  
Ganesh Pitchaiah  
Hailing Huang  
Hilary Farrell  
Iloon Ellen  
Jason Straub  
Jean-Paul Fillon  
Joel Kallman  
Linda Ross  
Nancy Greenberg  
Madhavi Siddireddy  
Maria Billings  
Matthew Gregory  
Michael Hichwa  
Patrick Wolf  
Sharon Kennedy  
Terri Jennings  
Yi Lu  
Wayne Abbott

**Editors**

Malavika Jinka  
Richard Wallis  
Vijayalakshmi Narasimhan

**Graphic Designer**

Maheshwari Krishnamurthy

**Publishers**

Jayanthy Keshavamurthy  
Revathi V. Ramamoorthy

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# 10

## Creating Page Processes

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## Objectives

After completing this lesson, you should be able to do the following:

- Explain the difference between page rendering and page processing
- Create computations on application pages
  - Create page processes
- Create validations to verify user input
- Create branches within an application



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This lesson explains how the Oracle Application Express engine renders and processes a page. You create computations, validations, and processes that are executed when the page is processed. You create page branches to enable navigation between pages after processing.

## Lesson Agenda

- Introducing Page Processing
  - Page Rendering Versus Page Processing
  - Types of Logic
  - Scenarios
- Including Computations
- Including Processes
- Including Validations
- Including Branches

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## Page Rendering Versus Page Processing



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Oracle Application Express performs page rendering and page processing.

Page rendering occurs when the APEX engine assembles a page from the database, using a Show Page process. For example, when you request a page by using a URL, the APEX engine runs Show Page. You use the Page Rendering section of a page definition to modify the controls that impact the rendering of a page, including page attributes, regions, buttons, items, computations, and processes.

Page processing occurs when the APEX engine executes a process by using the data submitted from a page. For page processing, the APEX engine runs an Accept Page process. Typically, a page is submitted when a user clicks a button. You use the Page Processing section of page definition to specify application logic such as computations, validations, processes, and branches.

## Types of Logic

	Page Rendering	Page Processing
Computations	✓	✓
Processes	✓	✓
Validations		✓
Branching		✓

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There are four types of logic that you can perform on a page: computations, processes, validations, and branching. The point at which the logic is performed can be specified when the logic is created. If you have more than one process or computation defined at the same point, you can specify a sequence order.

Page rendering computations and processes are performed when the HTML page is assembled and displayed, whereas page-processing computations and processes are performed when the page is submitted to the APEX engine.

## Scenario 1: Page Rendering

The screenshot shows two pages from an Oracle Application Express application. On the left is a grid of customer data with columns: Customer Name, Address, City, State, and ZIP Code. A red box highlights the 'Create Customer >' button at the top right of the grid. An arrow points from this button to a callout text: 'Click Create Customer to view empty form page.' On the right is a modal dialog titled 'Customer Details'. It contains fields for First Name, Last Name, Street Address (with Line 2), City, State (a dropdown menu), Postal Code, Email, Phone Number, Alternate Number, and Credit Limit. A red box highlights the 'Cancel' button. Another arrow points from this button to a callout text: 'On Cancel, another page is rendered.'

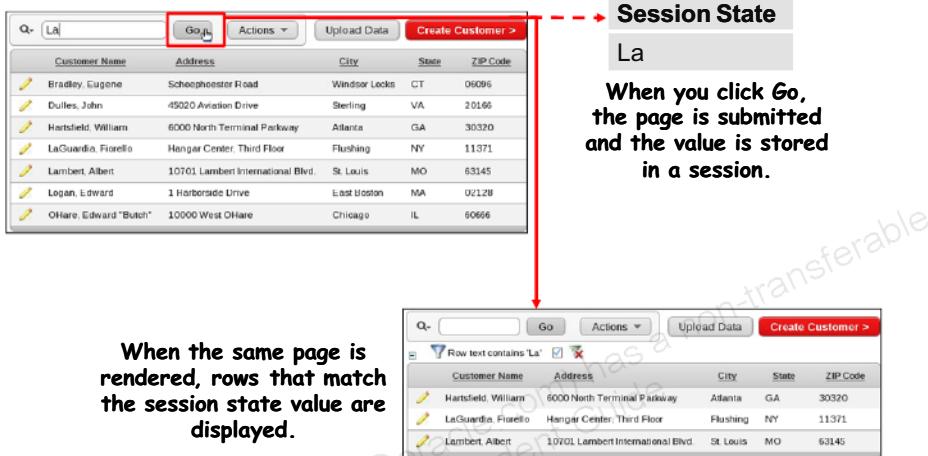
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In the example in the slide, one page redirects to another page. When you click the Create Customer button, the page is submitted and a branch to a form page is invoked.

When you click the Cancel button on the form page, you are redirected to the previous page. Nothing is submitted, so there is no page processing.

## Scenario 2: Page Processes



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In the example in the slide, you have a report with a search bar. When you enter a search criterion and click the Go button, the page is submitted. A process stores the search value in a session state and a branch to the same page is invoked. When the page is displayed again, a process runs to display only those rows that match the value stored in the session state.

## Scenario 3: Page Processes

The screenshot illustrates a two-page process. The first page is a report titled 'Customer Details' with columns for Customer Name, Address, City, State, and ZIP Code. A row for 'Bradley, Eugene' is selected and highlighted with a red box. An arrow points from this red box to a 'Session State' panel on the left, which contains the value 'ID'. The second page is a form titled 'Customer Details' with fields for First Name, Last Name, Street Address, City, State, Postal Code, Email, Phone Number, Alternate Number, and Credit Limit. The 'First Name' field is populated with 'Eugene' and the 'Last Name' field with 'Bradley'. The 'Street Address' field shows 'Schoephoester Road'. The 'City' field shows 'Windsor Locks', the 'State' field shows 'Connecticut', and the 'Postal Code' field shows '06096'. The 'Phone Number' field shows '(860) 555-1035'. The 'Credit Limit' field shows '1000'. Buttons for 'Cancel', 'Delete', and 'Apply Changes' are visible at the top right of the form.

The session value is used to fetch the row.

### Session State

ID

When you click Edit, the ID value is stored in session state, and the page is redirected.

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This slide explains another scenario to understand page processing. In this example, you have an editable reports page. When you click the Edit icon for a row in the report, the ID value for the row is stored in session state and you are redirected to a forms page. When the form page is displayed, a process runs to fetch the row details by using the ID value stored in the session state.

## Scenario 4: Page Validation

The screenshot illustrates two pages related to customer data entry:

- Customer Details Page:** A form with fields for First Name (Eugene), Last Name (Bradley), Street Address (Schoephoester Road), Line 2 (Windsor Locks), City (Windsor Locks), State (Connecticut), Postal Code (06096), Email, Phone Number ((860) 555-1835), Alternate Number, and Credit Limit (1000). The "Apply Changes" button is highlighted with a red box and arrow.
- Notification Message:** A modal window titled "1 error has occurred" with the message "Credit Limit must not exceed \$5,000. (Go to error)". A large red X is drawn over this window.
- Success Message:** A modal window titled "Customer Record Processed." containing the text "On success, the insert row process is executed and another page is displayed." A green checkmark is drawn over this window.
- Customer Record Processed Page:** A grid showing a list of customers with columns: Customer Name, Address, City, State, and ZIP Code. The data includes:

Customer Name	Address	City	State	ZIP Code
Bradley, Eugene	Schoephoester Road	Windsor Locks	CT	06096
Dulles, John	45020 Aviation Drive	Sterling	VA	20166
Hancock, William	6000 North Terminal Parkway	Arlington	VA	22207
LaGuardia, Florella	Hanger Center, Third Floor	Flushing	NY	11371
Lambert, Albert	10701 Lambert International Blvd.	St. Louis	MO	63145
Logan, Edward	1 Harborside Drive	East Boston	MA	02128
OHare, Edward "Butch"	10000 West OHare	Chicago	IL	60666

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In the example in the slide, you have a forms page. You enter the form details and click the Apply Changes button. The page is submitted and the validations that are created for the page are executed. If you entered data as required by the form and all validations run without error, a success message is displayed. In this example, an insert row process is executed and you are redirected to another page with a success message displayed in the notification area. If any validation fails, an error message is displayed.

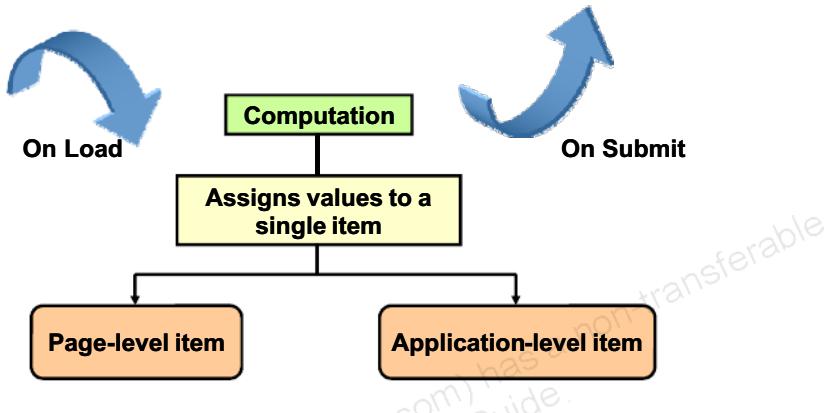
## Lesson Agenda

- Introducing Page Processing
- Including Computations
  - What Is a Computation?
  - Computation Use Cases
  - Creating an On Load Computation
  - Creating an On Submit Computation
- Including Processes
- Including Validations
- Including Branches

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## What Is a Computation?



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A computation is logic that assigns values to a single item. You can create computations that are executed when a page is rendered or when a page is processed. You can use computations on page items and application-level items. Application-level computations assign a value to an application item when any page in an application is rendered or processed. A typical use of application computation is to store the number of the last page visited. In contrast, page-level computations assign a value to an identified item when a page is displayed or submitted (rendered or processed). The following slides discuss how to create page computations.

## Computation Examples

- Page-rendering computations
  - You want to retrieve values (such as total order or existing orders) from the database when a page is displayed.
  - You want to set the value of an item, depending on the existing values in the database or on some conditions.
- Page-processing computations
  - You want to store the values that are entered in two or more fields in a form in a single database column.
  - You want to perform calculations (such as handling fees) based on the values (the order) entered in a form.

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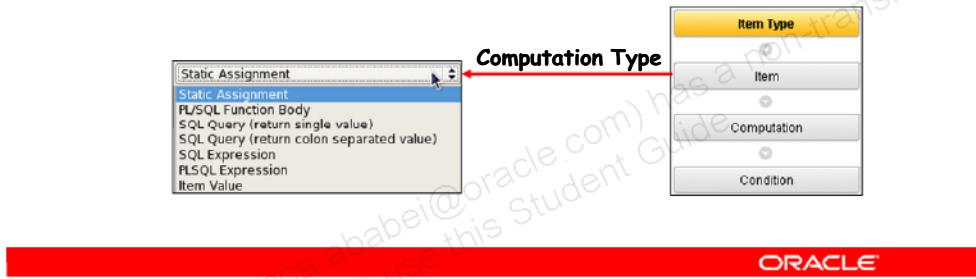
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The slide lists some scenarios when you can create page rendering or page-processing computations.

## Creating Computations

Access the Create Computation wizard, and then do the following:

1. Specify the item type.
2. Select the item, computation point, and computation type.
3. Enter the computation.
4. Specify a condition (optional).

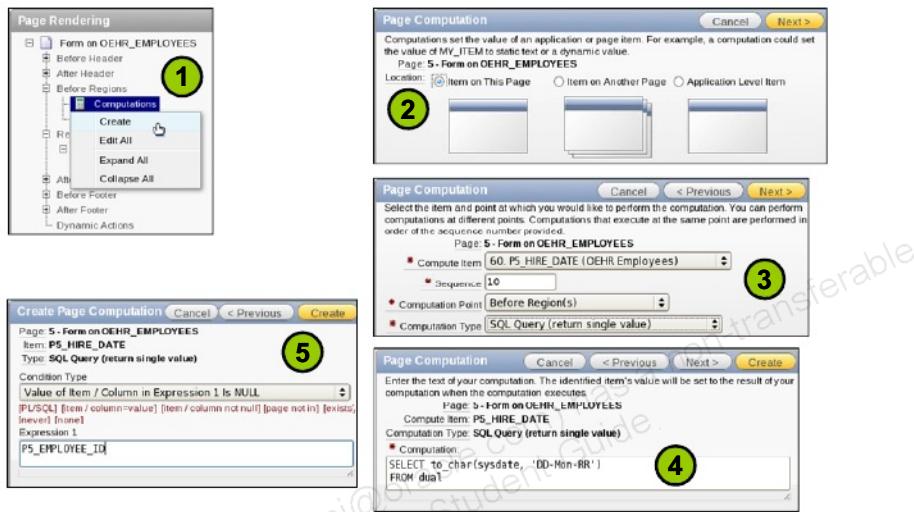


To access the Create Computation wizard in tree view, identify the node where you want to create the computation. For example, before or after a header, region, or footer in the Page Rendering section or after submit in the Page Processing section. To access the wizard in the Component view, click the create icon in the Computation section of page rendering or page processing.

To create a computation, perform the following steps:

1. Identify whether the item on which you want to create a computation is an item on the current page or a different page, or is an application item. Click Next.
2. Select the item from the list on which you want to create a computation. Specify whether the computation should be executed before or after the header, region, or footer or on submit. Select On New Instance if you want the computation to be executed for each new session. Select the type of computation that you want to create. Click Next.
3. Enter the computation to be executed. The syntax of the computation should correspond to the computation type that you selected in step 2. Click Next.
4. Optionally, add a condition. The computation will be executed only when the condition is met. Click Next.

## Creating a Page-Rendering Computation



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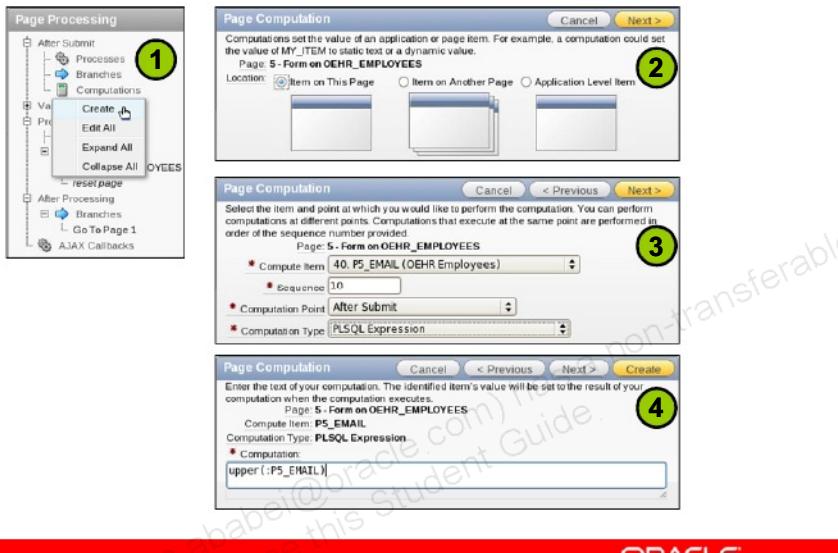
In this example, you create a computation before the regions are rendered to set the value of the hire\_date field to the current date. To create this page-rendering computation, perform the following steps:

1. Right-click Computation under the Before Regions node in the Page Rendering section and select Create.
2. Select “Item on This Page.” Click Next.
3. Select P<n>\_HIRE\_DATE for Compute Item. Select SQL Query for Computation Type. Click Next.
4. In the Computation field, enter TO\_CHAR (sysdate, ‘DD-Mon-RR’) and click Create.

The Computation is created and is listed under the Computations node.

When the hire\_date item is created by the Create Form wizard, the default value of the item Source Used is “Always, replacing any existing value in the session state.” For this example to work, you need to change this to “Only when current value in session state is null.”

## Creating a Page-Processing Computation



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You can define the computations to be performed when the page is submitted from the Computations region of the Page Processing section. This computation is different from the computations of the page-rendering process.

In this example, you want to specify that `P<n>_CUST_EMAIL` that is entered should be stored in the database in uppercase. To create this page-processing computation, perform the following steps:

1. Right-click Computation under the After Submit node in the Page Processing section and click Create.
2. Select “Item on This Page” and click Next.
3. Select `P<n>_EMAIL` for Compute Item, PLSQL Expression for Computation Type, and click Next.
4. In the Computation field, enter `upper (:P<n>EMAIL)`. In this example, you do not want any conditions. Click Create to create the computation. (To specify a condition, click Next).

The Computation is created and is listed under the Computations node.

## Quiz

Which of the following computation points would you select to execute the computation before the page is rendered?

- a. On New Instance
- b. Before Header
- c. After Header
- d. After Submit

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**Answer: b**

## Lesson Agenda

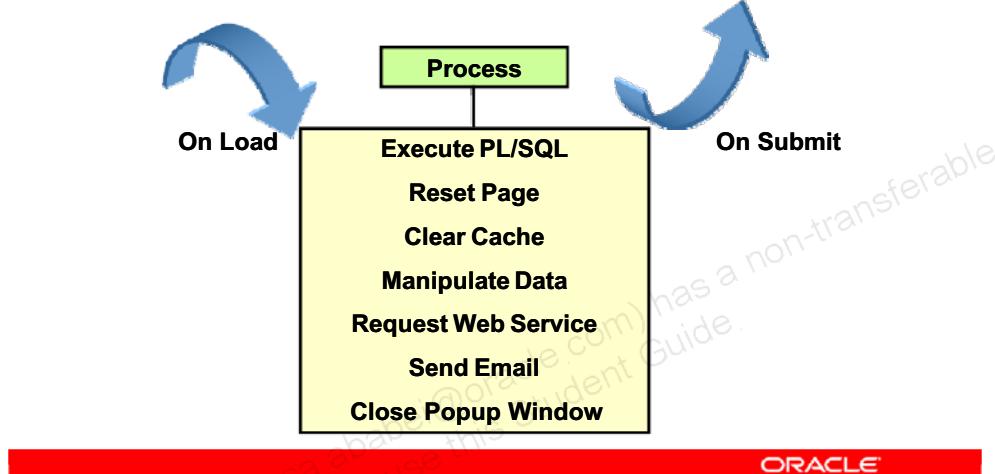
- Introducing Page Processing
- Including Computations
- Including Processes
  - What Is a Page Process?
  - Reviewing Automatically Created Processes
  - Creating an On Load Process
  - Creating an On Submit Process
  - Options to Populate Items in a Form
  - Creating a Tabular Form Process
- Including Validations
- Including Branches

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## What Is a Page Process?

A page process is used to perform a specific action when a page is rendered or submitted.



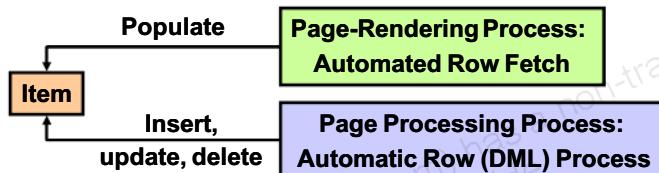
A page process is a specific event that runs when a page is loaded or submitted. You create a page process to execute some code (such as SQL or PL/SQL) or to make a call to the rendering engine. For example, you create a page process to alter data through an `INSERT`, `UPDATE`, or a `DELETE` statement.

When you use wizards, such as Create Report or Create Form, some processes are automatically created. For example, a process to insert, update, or delete a row from the database is created when the user clicks the appropriate button. The next few slides discuss some automatically created processes.

## Automatic Processing Processes

Oracle Application Express provides automatic data manipulation language (DML) processing.

- You are not required to provide any SQL code.
  - Just reference a database column.
- The processes automatically perform lost update detection.



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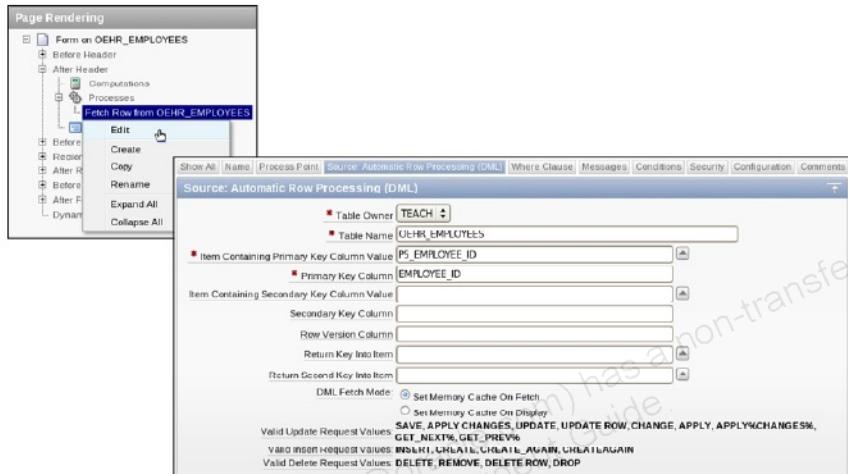
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When you create a form by using the Create Form wizard, the wizard creates two processes:

- The Automated Row Fetch process that is executed when a page is rendered. This process populates the items by fetching data from the database.
- The Automatic Row (DML) process that is executed when a page is submitted. This process updates the database by using `INSERT`, `DELETE`, or `UPDATE` commands.

These processes are automatic in that you must specify only the database column names and not any SQL code. They also perform lost update detection. Lost update detection ensures that data integrity in applications is maintained where data can be accessed concurrently.

## Reviewing an Automated Row Fetch Process



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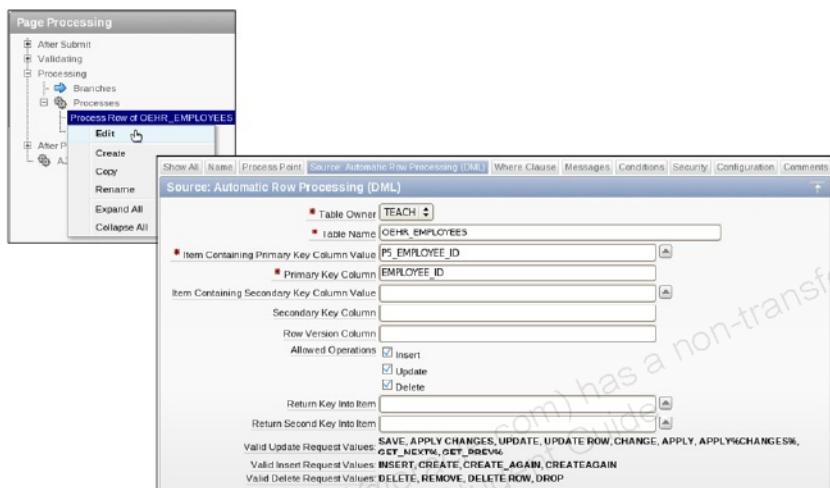
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An Automated Row Fetch process populates the fields in a form by retrieving data from a database table, by using a primary key column value.

To view an Automated Row Fetch process, navigate to the page definition of the page that contains a form created by the Create Form wizard. Perform the following steps:

1. Under the Page Rendering section, right-click "Fetch Row from <table\_name>" under the After Header node and select Edit.
2. The Edit Page Process page opens. You can view the process details. Click the Source tab. The table name, item name, and column name are listed.

## Reviewing an Automatic Row (DML) Processing Process



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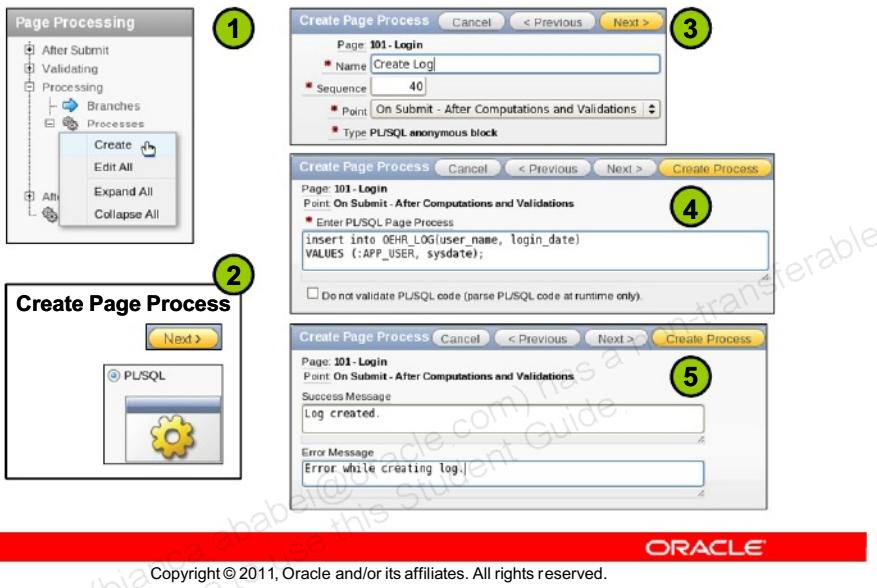
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An Automatic Row (DML) Processing process updates the database.

To view an Automated Row (DML) process, navigate to the page definition of the page that contains a form created by the Create Form wizard. Perform the following steps:

1. Under the Page Processing section, right-click "Process row of <table\_name>" under the Processing node and select Edit.
2. The Edit Page Process page opens. You can view the process details. Click the Source tab. The table name, item name, column name, and the operations that are allowed on the table are listed.

## Creating an On Submit Process



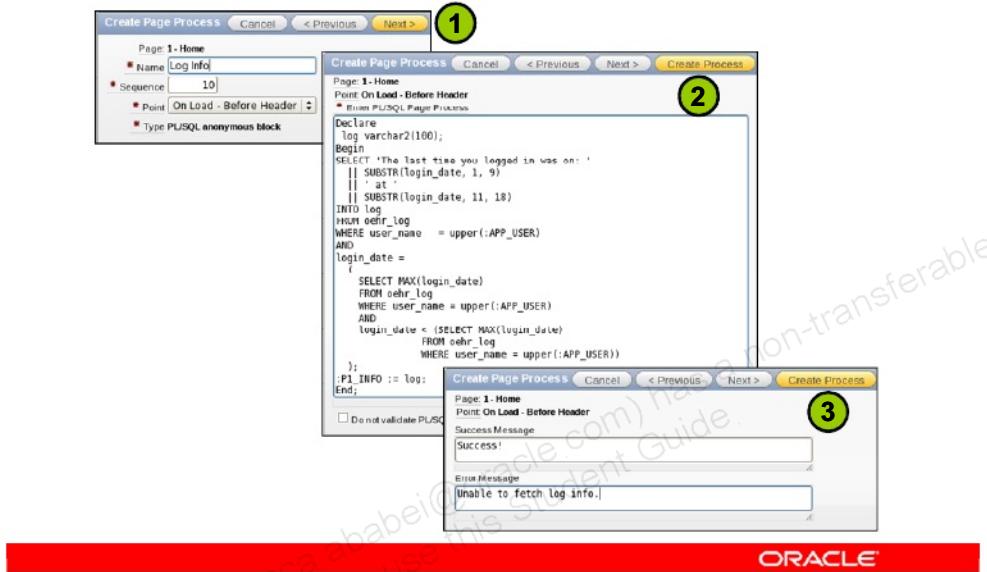
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In this example, you create an On Submit process to perform a logging function. Whenever users log in to the application, you want to store the user's name and the login date and time in a database table. To create the page process, perform the following steps:

1. From the page definition for the Login page, right-click the Processes node under Processing in the Page Processing section and select Create.
2. Select PL/SQL for process type and click Next.
3. Enter a name for your process and accept the other default values. Click Next.
4. Enter the PL/SQL code in the text area. In this example, an `INSERT` command to enter the application user name (`:APP_USER`) and the date/time information (`sysdate`) into an `OEHR_LOG` table is entered.
5. Enter the Success and Failure messages. Click Create Process. Optionally, you can specify a condition for executing the process by clicking Next.

## Creating an On Load Process



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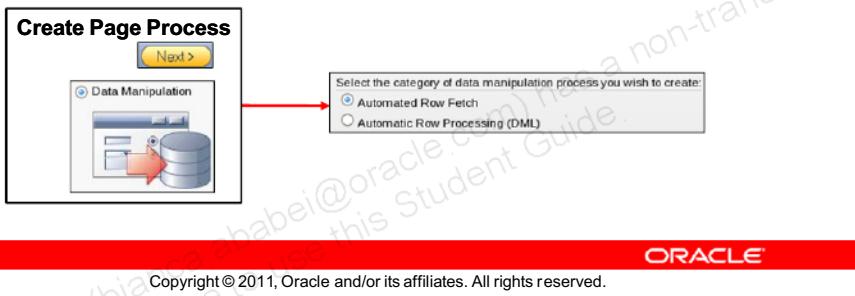
In this example, you create an On Load process to retrieve the date and time that a user last logged in to the application. To create the page process, navigate to the page definition for the page where you want to display the details. Right-click the Processes node under Before Regions in the Page Rendering section and select Create. Select PL/SQL for the process type, click Next and then perform the following steps:

1. Enter a name for your process and accept the other default values. Click Next.
2. Enter the PL/SQL code in the text area. In this example, a `SELECT` query to retrieve the date and time that the user last logged in is entered.
3. Enter the Success and Failure messages. Click Create Process. Optionally, you can specify a condition for executing the process by clicking Next.

## Options to Populate Items in a Form

Items in forms are populated in one of the following ways:

- Create a form by using the wizard, and an Automated Row Fetch process is created automatically.
- Create a page-rendering process manually and define the type as Automated Row Fetch.
- Populate the form manually by referencing an item in a session state.



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In the previous slides, you reviewed the Automated Row Fetch process and also saw how to create a page process. To populate items in a form, you can use the Create Form wizard so that the wizard automatically creates the required processes for you. Using the Create Form wizard was covered in the lesson titled “Creating Forms.”

You can also create your own process. For this, you must select the Data Manipulation process type in the Create Page Process wizard. You can then use the available options to create an automated process.

Alternatively, you can also populate the form manually by referencing an item in a session state.

## Creating a Tabular Form Process



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You can create processes on tabular forms. Perform the following steps:

1. Navigate to the page definition where the tabular form is created.
2. Select the Processes node, depending on when you want the process to execute.
3. Right-click the Processes node and select Create.
4. Select the tabular form from the Tabular Form list.
5. Select the type of process that you want to create and follow the wizard instructions.

## Lesson Agenda

- Introducing Page Processing
- Including Computations
- Including Processes
- Including Validations
  - What Are Validations?
  - Using the Create Validation Wizard
  - Creating a SQL Validation
  - Creating a PL/SQL Validation
  - Creating an Item String Comparison Validation
  - Creating a Regular Expression Validation
  - Creating a Tabular Form Validation
- Including Branches

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## What Are Validations?

The screenshot shows a 'Customer Details' form with the following fields and validation errors:

- \* First Name: Jackson
- \* Last Name: (empty)
- Last Name must have some value.
- \* State: Alabama
- \* Postal Code: 35291
- Email: (empty)
- \* Credit Limit: 6000
- Salary should be less than 5000.

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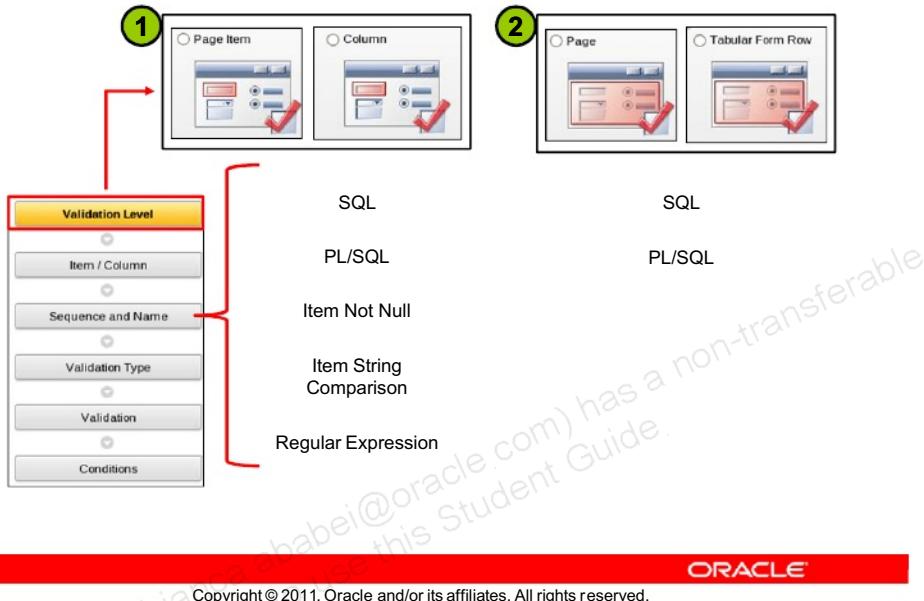
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A validation is a logical control to verify data. You create validations to ensure that an application user enters valid and accurate data. If all the validations created on the page succeed, Oracle Application Express proceeds to the next step of processing; otherwise, Oracle Application Express redraws the page and displays the items along with the validation messages.

When you use the Create Form wizard, some validations are automatically created. For example, a Not Null validation is created for items that refer to a database column that is defined as Not Null. Similarly, if the database column is of type NUMBER, a validation to check that only numeric values are entered is created.

The slide example shows a form created by using the Create Form wizard. The Not Null validations are created automatically by the wizard. The form also displays a red symbol for items that have their columns set as Not Null. A validation for the Credit Limit field is manually created to ensure that a value higher than 5000 is not entered.

## Using the Create Validation Wizard



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You can define a validation declaratively by using the Create Validation wizard. To access the Create Validation wizard, navigate to the page definition of the page where you want to create the validation. In the Page Processing section, right-click Validations under the validating node and select Create.

You can create two types of validations, depending on your form type:

- Page Item/Column Validation:** This validation is specific to a single item. If you select this option, the items on the current page are listed and you can choose the item that you want to validate. You can select from five methods, as listed in the slide, to define the validation. In the next few slides, you will see the creation of validations by using four of the methods. How to create a Not Null validation is not discussed. You can actually specify an item to be Not Null in the attributes of the item itself. If your form is a tabular form, you can create a validation on an entire column.
- Page / Tabular Form Row Validation:** This validation does not apply to any single item. It applies to an entire page. Or, in the case of a tabular form, it applies to a row. These validations can be of type SQL or PL/SQL.

The validation that you enter must be consistent with the validation type that you select.

## SQL Validation: Example

Create a validation to ensure that the salary entered is not a negative number.

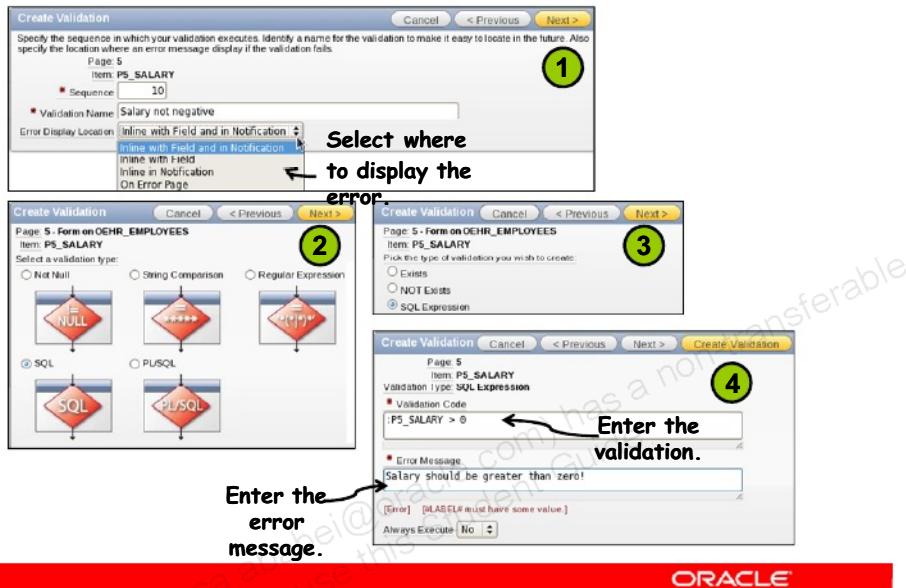
The screenshot shows a web-based application titled "OEHR Employees". A modal dialog box is open at the top, displaying a red error message: "1 error has occurred" followed by "Salary should be greater than zero! (Go to error)". The main form contains fields for First Name (Jackson), Last Name (Lord), Email (JACKSON.LORD@ORACLE.COM), Phone Number, Hire Date (12-Oct-11), Salary (-250), Commission Pct, Manager Id, Department Id, and Job Id Id (AC\_ACCOUNT). The "Salary" field is highlighted in red, indicating it is the source of the error.

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In this example, you create a validation to ensure that the value entered in the Salary field is not a negative value. You will display the error message in the notification area and next to the Salary item.

## Creating a SQL Validation



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To create a SQL validation, access the Create Validation wizard. Select Page Item Validation and click Next. Select the salary item and click Next. Perform the following steps:

1. Enter a name for the validation and from the Error Display Location drop-down list, select a location to display the error. In this example, "Inline with Field and in Notification" is selected. Click Next.
2. Select SQL and click Next.
3. Select the type of SQL validation that you want to create and click Next. In this example, SQL Expression is selected.
4. Enter the validation and the error message. In this example, the value of the salary item should be greater than zero. Therefore, :P<n>\_SALARY > 0 ; is entered. Click Create.

Run the form and fill in the details. In the Salary field, enter a negative number and click Apply Changes. You should get an error message in the notification area and next to the Salary item.

## PL/SQL Validation: Example

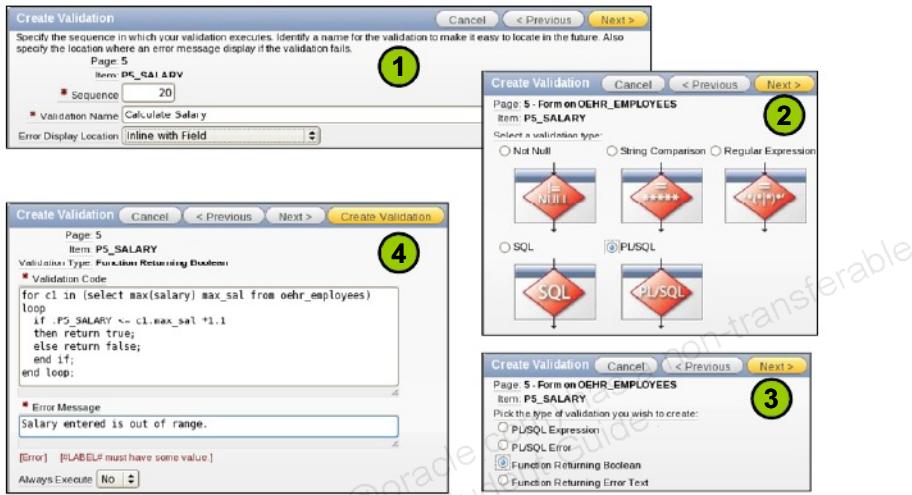
Create a validation to calculate the maximum salary and to ensure that the salary entered is not more than 10% of the maximum salary.

The screenshot shows a modal dialog titled "1 error has occurred" over a form titled "OEHR Employees". The form has fields for First Name (Jackson), Last Name (Lord), Email (JACKSON.LORD@ORACLE.COM), Phone Number, Hire Date (12-Oct-11), Salary (100000), Commission Pct, Manager Id, Department Id, and Job Id Id (AC\_ACCOUNT). A red error message "Salary entered is out of range." is displayed next to the Salary field. The Oracle logo is at the bottom right.

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In this example, you want to make sure that the salary entered is not higher than 10% of the maximum salary. You will display the error message only next to the Salary item.

## Creating a PL/SQL Validation



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To create a PL/SQL validation, access the Create Validation wizard. Select Page Item Validation and click Next. Select the salary item and click Next. Perform the following steps:

1. Enter a name for the validation, and from the Error Display Location drop-down list, select a location to display the error. In this example, “Inline with Field” is selected. Click Next.
2. Select PL/SQL and click Next.
3. Select the type of PL/SQL validation that you want to create and click Next. In this example, Function Returning Boolean is selected.
4. Enter the validation and the error message. In this example, the maximum salary is retrieved. The value entered in the Salary field is compared to a value 10% higher than the maximum salary. If the entered salary is less than the calculated value, true is returned; otherwise, false is returned. Click Create.

Run the form and fill in the details. In the Salary field, enter 100000 and click Apply Changes.

You should get an error message next to the Salary item.

## Item String Comparison Validation: Example

Create a validation to ensure that the specified special characters are not entered in the Email field.

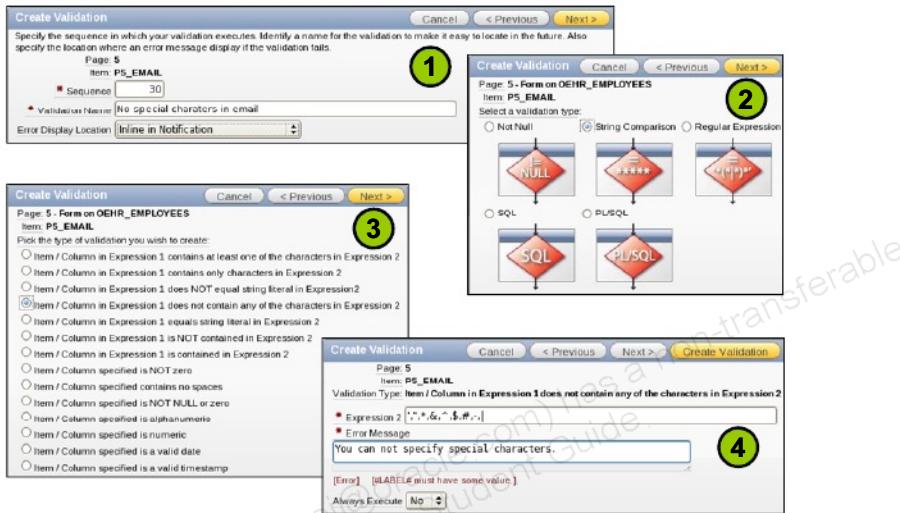


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In this example, you want to make sure that the Email field does not contain special characters, which are ', ", \*, &, ^, \$, #, -, and | . You will display the error message only in the notification area.

## Creating an Item String Comparison Validation



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To create an Item String Comparison validation, access the Create Validation wizard. Select Page Item Validation and click Next. Select the email item and click Next. Perform the following steps:

1. Enter a name for the validation and from the Error Display Location drop-down list, select a location to display the error. In this example, “Inline in Notification” is selected. Click Next.
2. Select String Comparison and click Next.
3. Select the type of comparison that you want to perform and click Next. In this example, “Item in Expression 1 does not contain any of the characters in Expression 2” is selected.
4. Enter the special characters in the Validate String2 field. In this example, ('!', ',', '&', '\$', '#', -, |) are entered. Enter the error message text. Click Next.

Optionally, specify a condition and click Create. Run the form and fill in the details. In the

Email field, enter jackson-lord@aol.com and click Apply Changes. You should get an error message in the notification area.

## Regular Expression Validation: Example

Create a validation to ensure that the phone number is entered in a particular format.

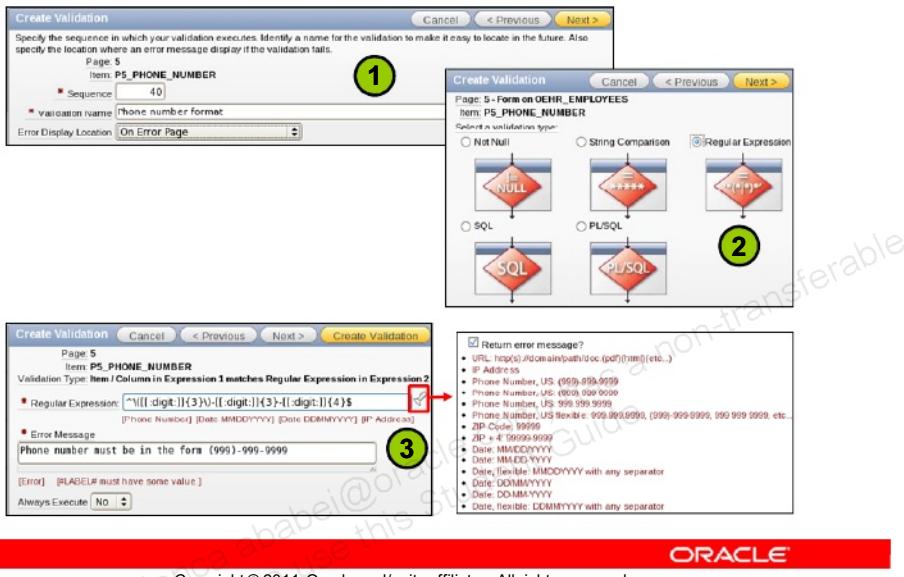


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In this example, you want the phone number to be entered in this particular format:  
999.999.9999. You will display the error message on the Error Page.

## Creating a Regular Expression Validation



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To create a Regular Expression validation, access the Create Validation wizard. Select Item Level Validation and click Next. Select the phone number item and click Next. Perform the following steps:

1. Enter a name for the validation and select a location to display the error. In this example, On Error Page is selected. Click Next.
2. Select Regular Expression and click Next.
3. Select an expression. You can click the search icon next to the Regular Expression field and select an expression from the pop-up window. In this example, Phone Number, US, 999.999.9999 is selected. This specifies the format in which the phone number can be entered in this field. Enter the error message text. Click Create.

Run the form and fill in the details. In the Phone Number field, enter 100305000 or any other invalid format and click Apply Changes. The Error Page should appear and display the error message.

## Tabular Form Validation: Example

Create a validation to ensure that the value entered in the Email column has no spaces.

The screenshot shows a tabular form titled "Tabular Form" with columns: Employee Id, First Name, Last Name, Email, Hire Date, Department Id, and Job Id Id. The "Email" column contains values like "DO CONNEL", "DGRANT", etc. An error message box at the top says "1 error has occurred" with the message "No spaces allowed in email (Row 1)".

Employee Id	First Name	Last Name	Email	Hire Date	Department Id	Job Id Id
198	Donald	O'Connell	DO CONNEL	21-JUN-99	50	SH_CLERK
199	Douglas	Grant	DGRANT	13-JAN-00	50	SH_CLERK
200	Jennifer	Walen	JWALEN	17-SEP-87	10	AU_ASS_F
201	Michael	Hartstein	MHARTSTE	17-FEB-96	20	MK_MAN
202	Pat	Fay	PFAY	17-AUG-97	20	MK_REP
203	Susan	Mavris	SMAVRIS	07-JUN-94	40	HR_REP

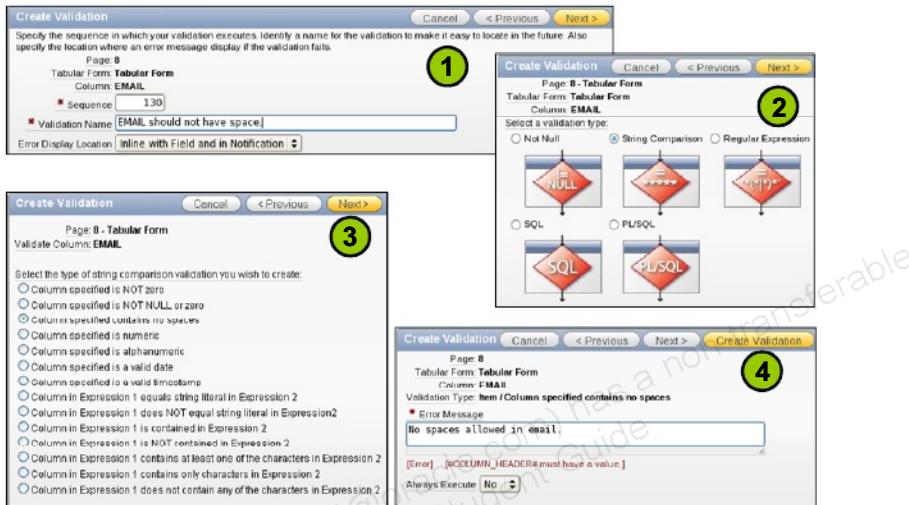
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In this example, you want to ensure that the value entered in the Email column does not have any spaces.

**Note:** Remember that a Tabular Form Validation can be created only on a page that contains a tabular form. Also, when you create a tabular form by using a wizard, it automatically creates some validations (such as not null, column must be numeric, and valid date), based on the column definition in the database.

## Creating a Tabular Form Validation



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To create a Tabular Form validation, access the Create Validation wizard. Select Tabular Form from the list. Select Column type and click Next. Select the email item and click Next. Perform the following steps:

1. Enter the validation name and select the location to display the error message. In this example, “Inline in Notification” is selected. Click Next.
2. Select a validation and click Next. In this example, “String Comparison” is selected.
3. Select the comparison type and click Next. In this example, “Column specified contains no spaces” is selected.
4. Specify the error message and click Next.

Specify a condition if necessary, and click Create. Run the page. In the Email field, for any row, enter a space in the value and click Apply Changes. The error message should be displayed in the notification area.

## Quiz

Which of the following is not a validation method?

- a. PL/SQL
- b. Item Level Null
- c. HTML
- d. Regular Expression

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**Answer: c**

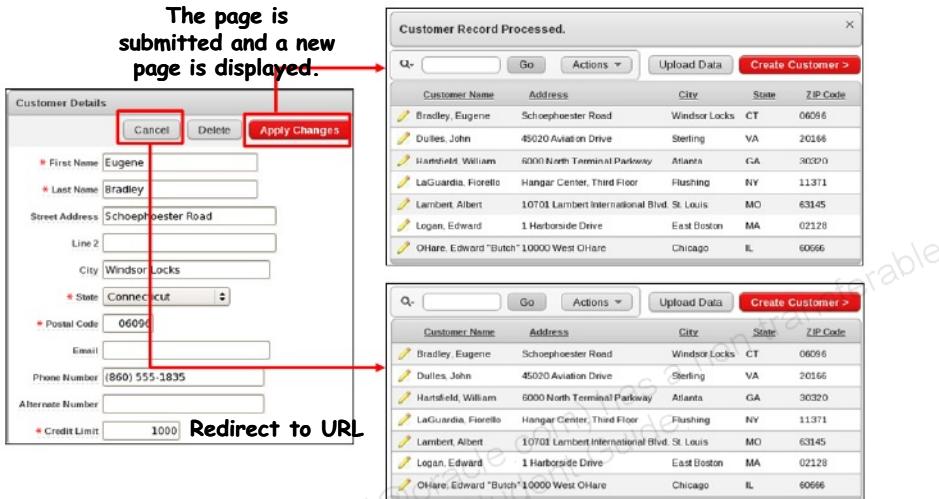
## Lesson Agenda

- Introducing Page Processing
- Including Computations
- Including Processes
- Including Validations
- Including Branches
  - What Is Branching?
  - Creating a Branch

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## What Is Branching?

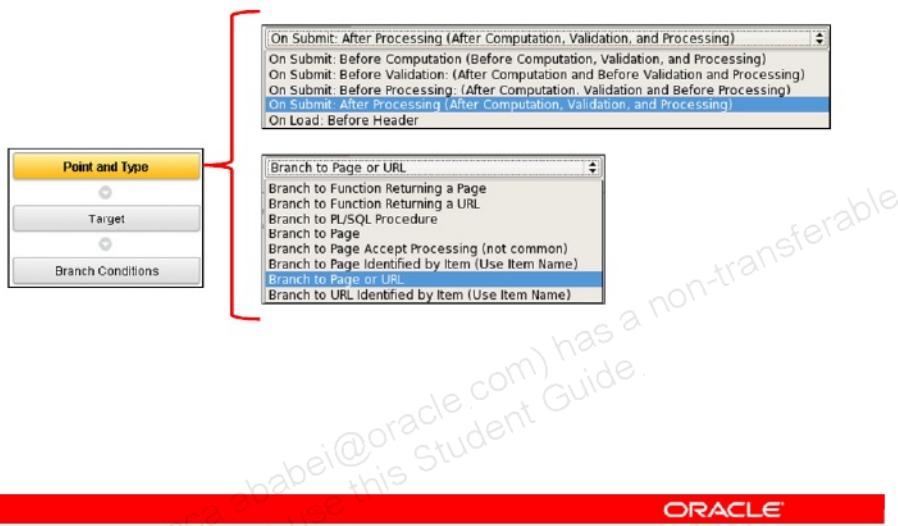


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A branch is an instruction executed in the Oracle Application Express engine to take the user from one page to another page, a URL, or a procedure. For example, you have a form page that accepts values from the user. After the form page is submitted, the Oracle Application Express engine executes the branch that navigates the user to another page. If the Cancel button is clicked, no processing occurs and a redirect to another page is invoked.

## Creating a Branch



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You can create a new branch by running the Create Page Branch wizard and specifying the branch point and branch type. The branch points and branch types are shown in the slide. To access the Create Branch wizard, right-click the branch node from the Page Processing section and click Create.

## Creating a Branch

The figure consists of three screenshots of the 'Create Branch' wizard, numbered 1, 2, and 3. Each screenshot shows a different step in the process.

- Screenshot 1:** Shows the first step of the wizard. It displays the 'Page: 5 - Form on OEHR\_EMPLOYEES' and the 'Branch Point: On Submit: After Processing (After Computation, Validation, and Processing)'. The 'Branch Type: Branch to Page' is selected. A dropdown menu shows options like 'Branch to Page', 'Branch to Item', etc.
- Screenshot 2:** Shows the second step. It displays the 'Branch to Page' field containing '1'. There are checkboxes for 'branch to page using redirect' and 'include process success message'.
- Screenshot 3:** Shows the third step. It displays the 'Branch Action' field with the value '17#&APP\_ID.:1:&SESSION::&DEBUG.&success\_msg=&SUCCESS\_MSG'. The 'Sequence' is set to '11'. The 'When Button Pressed' dropdown shows 'SAVE (Apply Changes)'. The 'Condition Type' dropdown shows 'Select Condition type'.

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In this example, a branch to another page is created on submit, after computations, processes, and validations. To create the branch, access the Create Branch wizard and perform the following steps:

1. Select the branch point and the branch type. Click Next.
2. Enter the page or URL to branch to. Click Next.
3. Specify conditions, if any, and click Create Branch.

## Summary

In this lesson, you should have learned to:

- Explain the difference between page rendering and page processing
- Create computations on application pages
- Create page processes
- Create validations to verify user input
- Create branches within an application

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This lesson explained the difference between page rendering and page processing. You should also have learned how to create computations, processes, and validations.

## Practice 10: Overview

This practice covers the following topics:

- Creating an On Load computation
- Creating an On Submit computation
- Creating an On Submit process
- Validating Form Items



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## Using Application and Page Utilities

# 11

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## Objectives

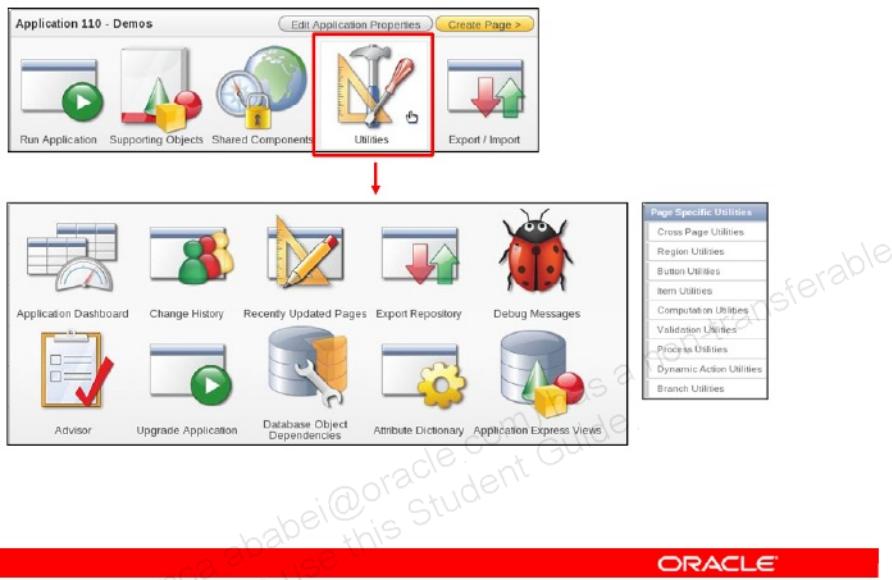
After completing this lesson, you should be able to:

- Identify the available application and page utilities
- Use the Advisor to verify your application
- Identify an application's database object dependencies
- Manage defaults by using the Attribute Dictionary



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## Accessing the Utilities Page



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To access the Utilities page, click the Utilities icon on the application home page. From the Utilities page, you can access application utilities as well as page-specific utilities. Application utilities summarize information from throughout the application and provide access to useful tools. The Page Specific Utility menu contains links to numerous object utilities, such as regions, buttons, and items. The page-specific utilities are not discussed in detail in this lesson, but you can examine these pages during the practice.

## Application Dashboard

Application Overview	
ID	110
Name	Demos
Alias	F110
Parsing Schema	TEACH
Group	
Pages	15
Theme	Scarlet

Security	
Authentication	PLUGIN
public Pages	1
Non Public	14
Authorization Schemes	0

Templates	
Region	30
List	20
Page	15
Report	10
Button	7
Label	5
LOV	1

Pages by Type	
Static HTML	3
Report	3
DML Form	3
Interactive Report	2
Login	1
Page 0	1
Home	1
Tabular Form	1

Application Components	
Lists of Values	4
Shortcuts	2
Tabs	1
Application Items	1
Plug-ins	0
Application Computations	0
Validations	0
Lists	0
Application Processes	0

Page Components	
Classic Report Columns	50
Items	37
Buttons	22
Interactive Report Columns	22
Regions	21
Validations	23
Processes	20
Branches	7
Computations	3

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The Application Dashboard provides information about application components and attributes.

The Application Dashboard has the following sections:

- **Application Overview** lists detailed information and statistics about the current application, including the ID, name, alias, parsing schema, associated group, number of pages, and associated theme.
- **Security** lists the current authentication scheme, number of public and non public pages, and the number of authorization schemes used within the current application.
- **Templates** contains links to reports of templates used within the current application.
- **Pages by Type** lists counts of components, including types of reports and forms and dynamic HTML.
- **Application Components** contains links to reports of application-level controls and logic, including lists of values, tabs, lists, application items, application processes, and application computations.
- **Page Components** contains links to reports of page-level controls and logic, including items, buttons, processes, branches, validations, and dynamic actions.

## Application Change History

The screenshot shows the Oracle Application Express Change History report. On the left, there is a small icon of three colored circles (green, yellow, red) with a cursor pointing at it, labeled "Change History". A red arrow points from this icon to the main report page on the right. The main page has a header with search and filter buttons. Below the header is a table showing audit logs. The table has columns: Audit Date, Page, Audit Action, Developer, Component Type, and Component Name. The data in the table is as follows:

Audit Date	Page	Audit Action	Developer	Component Type	Component Name
13 hours ago	8	Create	TEACH	Page Validations	-
14 hours ago	5	Create	TEACH	Page Validations	-
14 hours ago	5	Create	TEACH	Page Validations	-
15 hours ago	5	Create	TEACH	Page Validations	-
16 hours ago	5	Create	TEACH	Page Validations	-
23 hours ago	1	Create	TEACH	Page Items	-
23 hours ago	1	Create	TEACH	Page Region	Welcome
23 hours ago	101	Change	TEACH	Page Processing	Create Log
23 hours ago	1	Create	TEACH	Page Processing	Log Info
24 hours ago	101	Create	TEACH	Page Processing	Create Log

At the bottom right of the report area, there is a red bar containing the ORACLE logo and the copyright notice: "Copyright © 2011, Oracle and/or its affiliates. All rights reserved."

The Change History report displays a summary report of edits to the current applications by developer, component type, and page number. This report is a combined list of the changes displayed on the individual page History tabs.

## Recently Updated Pages

The screenshot shows the Oracle Application Express interface. On the left, there's a sidebar with a 'Recently Updated Pages' icon (a pencil and ruler). A red arrow points from this icon to the main content area. The main area is titled 'Recently Updated Pages' and contains a search bar and a filter section ('Updated By = TEACH'). Below is a table listing 15 recently updated pages, each with a link to view details. The table includes columns for Page, Page Name, Updated (with a dropdown arrow), Updated By, Regions, Items, and Page Group. The first few rows show pages like 'Tabular Form', 'Form on OEHR\_EMPLOYEES', and 'Home'.

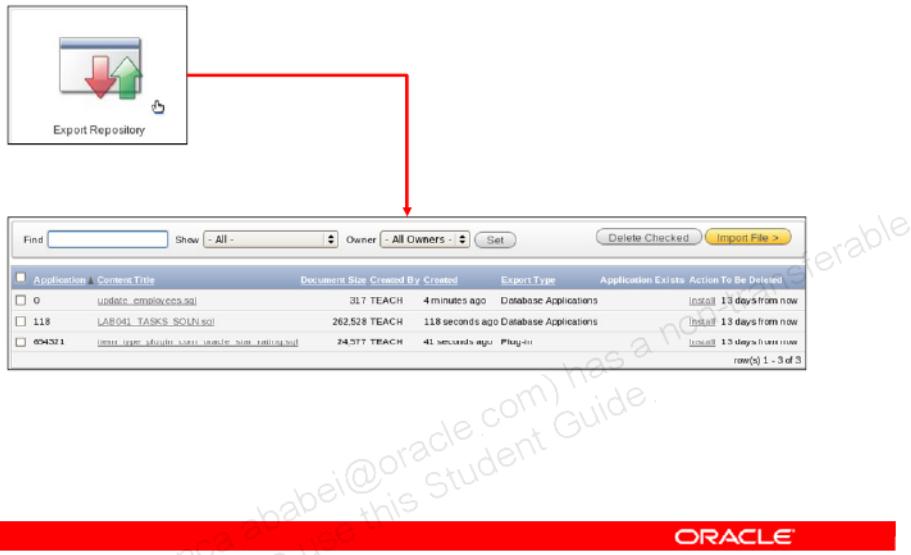
Page	Page Name	Updated	Updated By	Regions	Items	Page Group
8	Tabular Form	13 hours ago	TEACH	1	0	-
5	Form on OEHR_EMPLOYEES	14 hours ago	TEACH	1	11	-
1	Home	23 hours ago	TEACH	2	1	-
101	Login	23 hours ago	TEACH	1	3	-
13	Items and Buttons	37 hours ago	TEACH	3	0	-
12	Demme Session State	37 hours ago	TEACH	3	0	-
9	O	37 hours ago	TEACH	0	0	-
11	Region Display Selector	37 hours ago	TEACH	0	0	-
9	OEHR_ORDERS Report	37 hours ago	TEACH	2	0	-
10	Master Detail Form	37 hours ago	TEACH	3	11	-
6	Report on OEHR_EMPLOYEES	38 hours ago	TEACH	1	0	-
7	Form on OEHR_EMPLOYEES	38 hours ago	TEACH	1	11	-
4	Wizard Report	38 hours ago	TEACH	1	0	-
3	Classic Report	38 hours ago	TEACH	1	0	-
2	Interactive Report	38 hours ago	TEACH	1	0	-

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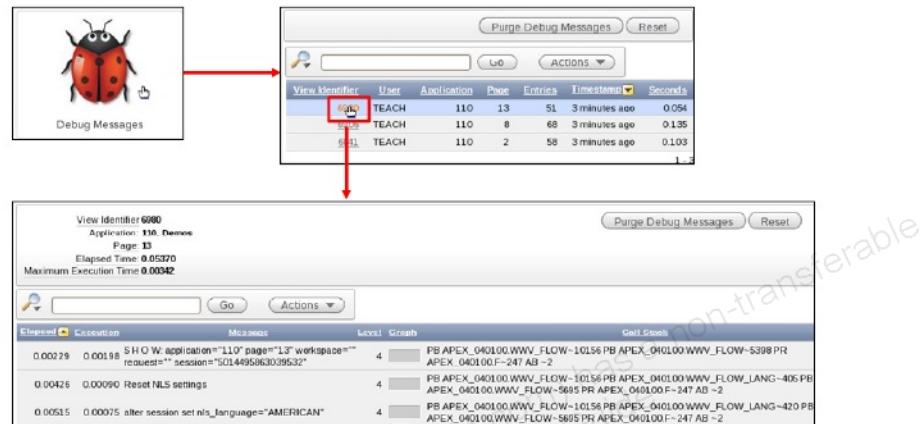
The Recently Updated Pages report displays a report of pages recently updated by the current user. If you want to view the pages updated by all users, you can remove the filter that is applied by default.

## Export Repository



The Export Repository contains a list of the files that you imported previously. You have the option to install the file again or import a new file. In addition, you see the type of the export file. The export repository consumes space within your workspace. As a good practice, you should remove old files that are no longer needed.

## Debugging Messages

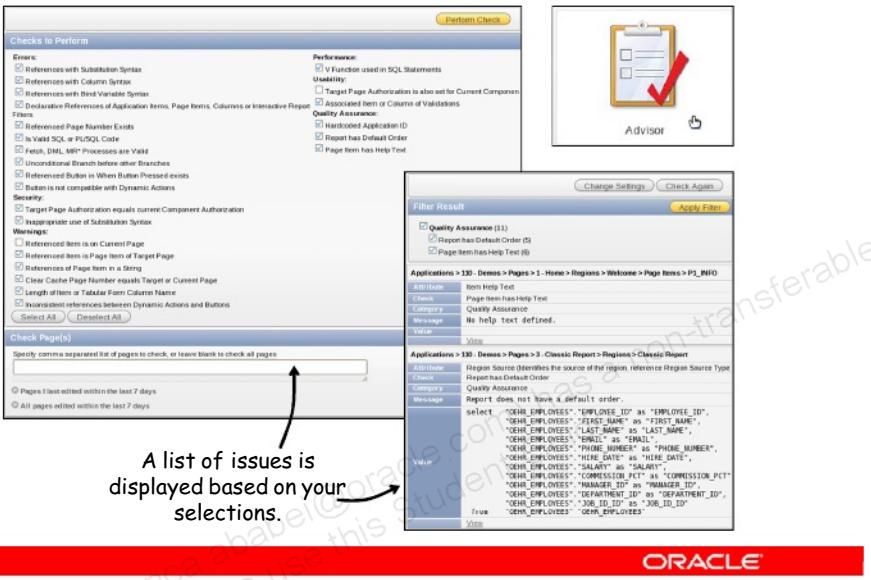


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As discussed in the previous lesson, you can also access the debug messages from the Application Utilities page.

## Using the Advisor



A list of issues is displayed based on your selections.

The Oracle Application Express Advisor (Advisor) enables you to check the integrity and quality of your Oracle Application Express application. Advisor functions like a compiler or LINT flagging suspicious behavior or errors. (LINT is a utility that examines and analyzes programs for style, usage, and portability issues.) By running the Advisor, you can check the integrity of your application based on the underlying metadata.

The Advisor performs several checks on your application or page(s) in your application, including programming errors, security issues, quality assurance, and other best practices.

Once executed, your previous settings will be recalled for the next use. You can also save the settings without executing by using the "Save as My Preferences" task in the Task menu.

To not perform a check on a particular violation, deselect the check box. When there are no violations, you receive a message indicating that no errors or warnings were found.

In the slide example, you see that errors and quality assurance violations were found. You can click the View link for each violation to go to the page where you can correct the issue and then return to the Advisor to recheck. In the screenshot in the slide, a quality assurance anomaly was detected because there is a report that does not contain a default order.

Note that many of the checks are for informational purposes only and do not need to be resolved before deploying your application (unless you choose to do so).

## Resolving Advisor Errors/Warnings

The screenshot shows two parts of the Oracle Application Express interface. The top part is a 'Report Attributes' dialog with tabs for 'Region Definition', 'Report Attributes' (which is selected and highlighted with a red box), and 'Print Attributes'. It shows 'Region: 1 of 1 Name: Classic Report' and 'Type: SQL Query'. The bottom part is a 'Column Sort Sequence' configuration screen for a report. It lists columns: EMPLOYEE\_ID, FIRST\_NAME, LAST\_NAME, EMAIL, PHONE\_NUMBER, HIRE\_DATE, SALARY, COMMISSION\_PCT, MANAGER\_ID, DEPARTMENT\_ID, and JOB\_ID\_ID. Each column has fields for Alias, Link Edit, Heading, Column Width, Column Alignment, Heading Alignment, Show Sum, Sort, and Sort Sequence. A red box highlights the 'Sort Sequence' dropdown for the 'FIRST\_NAME' column, which contains the value '1'. An arrow points from the text 'Specify a sort sequence for a column in your report.' to this dropdown. The Oracle logo is at the bottom right.

Specify a sort sequence for a column in your report.

Alias	Link Edit	Heading	Column Width	Column Alignment	Heading Alignment	Show Sum	Sort	Sort Sequence
EMPLOYEE_ID	EMPLOYEE_ID			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
FIRST_NAME	FIRST_NAME			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
LAST_NAME	LAST_NAME			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
EMAIL	EMAIL			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
PHONE_NUMBER	PHONE_NUMBER			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
HIRE_DATE	HIRE_DATE			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
SALARY	SALARY			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
COMMISSION_PCT	COMMISSION_PCT			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MANAGER_ID	MANAGER_ID			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
DEPARTMENT_ID	DEPARTMENT_ID			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
JOB_ID_ID	JOB_ID_ID			left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

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You can click the View link (visible in the screenshot in the previous slide); the Report definition for the page is displayed. To define the sort sequence, click the Report Attributes tab and select the sort sequence for one of the columns (in this case, FIRST\_NAME) and click Apply Changes. Rerun the Advisor to see that the violation is no longer in the list.

## Quiz

You must resolve all errors and warnings before deploying your application.

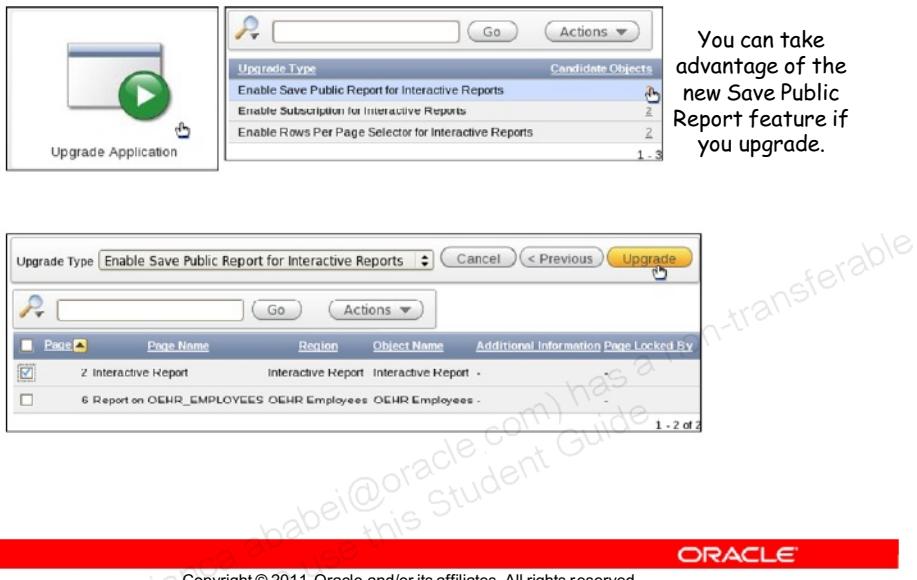
- a. True
- b. False

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**Answer: b**

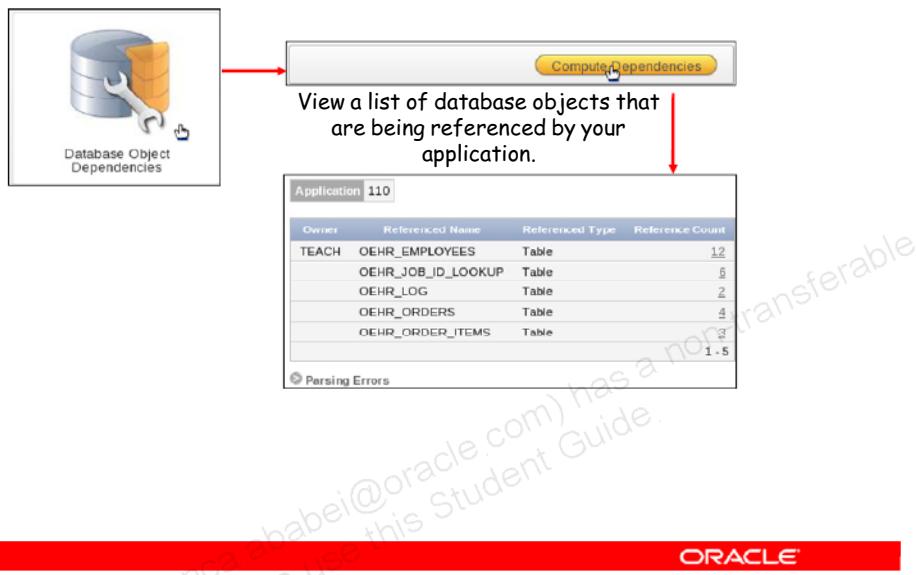
## Upgrading Application Components



The screenshot shows the Oracle Application Express Upgrade interface. On the left, there is a small icon of a computer monitor with a play button, labeled "Upgrade Application". To the right, there are two windows. The top window is titled "Candidate Objects" and lists three upgrade types: "Enable Save Public Report for Interactive Reports" (selected), "Enable Subscription for Interactive Reports", and "Enable Rows Per Page Selector for Interactive Reports". The bottom window is titled "Upgrade Type" and shows a list of pages being upgraded. It includes columns for "Page", "Page Name", "Region", "Object Name", and "Additional Information". Two rows are visible: one for page 2 (Interactive Report) and one for page 6 (Report on OEHR\_EMPLOYEES). Both rows show "Interactive Report" in the Region column and "Interactive Report" in the Object Name column. The Additional Information column shows "-". The bottom right of the interface has a red bar with the text "Copyright © 2011, Oracle and/or its affiliates. All rights reserved." and the Oracle logo.

If your application was created before a new release, the Application Upgrade utility enables you to add the newly available features to your existing application. In the slide's example, you see a list of pages that you can upgrade with new features. For example, you can add (to interactive reports on pages 2 and 6) the ability to save public reports. You simply select the pages that you want to upgrade, and then click Upgrade.

## Computing Database Object Dependencies



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The Database Object Dependencies report identifies database objects referenced by the current application. Review this report to determine which objects to move when deploying an application. After clicking Database Object Dependencies from the Application Utilities page, click Compute Dependencies to see the list.

## Managing Your Attribute Dictionary

The diagram illustrates the process of managing the Attribute Dictionary. On the left, there is a small icon representing the Attribute Dictionary, which is a yellow gear inside a blue square. A red arrow points from this icon to a screenshot of a web-based application interface. The interface has a header bar with 'Actions' and a search bar. Below this is a table titled 'PAGE' with columns: #, Name, Page Type, Group Name, Displayed Items, and Displayed Report Columns. The table lists various page definitions, such as 'Page 0', 'Home', 'Interactive Report', 'Classic Report', 'Wizard Report', etc., along with their respective details. At the bottom right of the table, there is a page number '1 - 18'.

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The Attribute Dictionary contains a set of attributes about a column that are used in creating forms and reports. The definitions are matched by column name and a particular definition can be shared by several columns by using synonyms.

You can use Page Item and Report Column definitions to update the Attribute Dictionary. You can also use the Attribute Dictionary to update page items and report columns.

Hidden objects, those in hidden regions, and button items are not counted in the number of candidate items and report columns, because these are not used in the updates.

Select the page that you want to work with. In the slide example, you select the page for your Master Detail Form page. You can also access the Attribute Dictionary for a particular page by navigating to the page definition and selecting Utilities > Attribute Dictionary.

## Reviewing Items and Report Columns

The screenshot shows the Oracle Application Express interface with two main sections: "Page Items" and "Report Columns".

- Page Items:**
  - Update Page:** Shows 0 items for update.
  - Update Attribute Dictionary:** Shows 10 items for insert into the Attribute Dictionary and 0 items for update of the Attribute Dictionary.
  - Summary:** Total Page Items: 11, Total Report Columns: 0.
- Report Columns:**
  - Update Page:** Shows 0 Report Columns for update.
  - Update Attribute Dictionary:** Shows 0 items for insert into the Attribute Dictionary and 0 Report Columns for update of the Attribute Dictionary.
  - Summary:** Total Report Columns: 0.

A detailed view of the "Update Attribute Dictionary" dialog is shown, titled "Page 5 - Form on OEHR\_EMPLOYEES". It lists various attributes with checkboxes for "Include In Update" and other configuration options like Label, Help Text, General Format Mask, Default, Form Format Mask, Width, Height, and Data Type.

Item	Will Process	Label	General Mask	Help Text	Default	Width	Height	Data Type
OEHR_Employees_P5_COMMISION_PCT	Commission Pct	Commission percentag...	-	30 1	VARCHAR			
OEHR_Employees_P5_DEPARTMENT_ID	DEPARTMENT_ID	Department Id where ...	-	30 1	VARCHAR			
OEHR_Employees_P5_EMAIL	EMAIL	Email id of the empl...	-	30 1	VARCHAR			
OEHR_Employees_P5_FIRST_NAME	FIRST_NAME	First name of the em...	-	30 1	VARCHAR			
<input checked="" type="checkbox"/> OEHR_Employees_P5_HIRE_DATE	HIRE_DATE	Hire Date	-	Date when the employ...	30 1	VARCHAR		
OEHR_Employees_P5_JOB_ID_ID	JOB_ID_ID	Job id id	-	-	30 1	VARCHAR		
OEHR_Employees_P5_LAST_NAME	LAST_NAME	Last Name	-	Last name of the emp...	30 1	VARCHAR		
OEHR_Employees_P5_MANAGER_ID	MANAGER_ID	Manager id	-	Manager id of the em...	30 1	VARCHAR		
OEHR_Employees_P5_PHONE_NUMBER	PHONE NUMBER	Phone Number	-	Phone number of the ...	30 1	VARCHAR		
OEHR_Employees_P5_SALARY	SALARY	Salary	-	Monthly salary of the ...	30 1	VARCHAR		

Review the list of items or report columns. Determine which attributes to include in the Attribute Dictionary.

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When you create an item on a page or create a report, you must review and evaluate which attributes you want to update in the dictionary. In the slide example, you want to update the Attribute Dictionary with all the attributes (such as Label and Help text) for the P5\_HIRE\_DATE item. Select the check box for the appropriate row and click Update Attribute Dictionary. The page number prefix is removed when the Attribute Dictionary enter is created. For example, P5\_HIRE\_DATE becomes HIRE\_DATE.

## Modifying Attributes in the Dictionary

You can modify attributes in the Attribute Dictionary within SQL Workshop Utilities.

Column: 1 of 1

Cancel Delete Apply Changes

Show All Details Form Specific Attributes Report Specific Attributes

**Details**

Column Name: **HIRE\_DATE**

Label: Hire Date

Format Mask:

Default Value:

Help Text: Date when the employee started on this job. A not null column.

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User Interface Defaults enable you to assign default user interface properties for regions and items. The wizard allows you to specify whether you want to use user interface defaults if they exist. When you create a form or report by using a wizard, the wizard uses this information to create default values for region and item properties. Utilizing user interface defaults can save valuable development time and has the added benefit of providing consistency across multiple pages in an application. User interface defaults are divided into two categories, the Table Dictionary and the Attribute Dictionary.

- The Table Dictionary enables you to specify defaults for tables and columns that are initialized from the database definition.
- The Attribute Dictionary enables you to create defaults based on attribute or column names (and thereby usable for all tables). Attribute definitions can also have synonyms, allowing more than one attribute to share a common definition.

The Table Dictionary takes priority over the Attribute Dictionary when user interface defaults are used during creation of pages and regions. If a table-and-column combination exists, that combination is used rather than an attribute definition of the same name.

This can be useful, for example, when you want to have a specific label or help text for the `CREATED_BY` column in the `EMP` table but then use more generic defaults for `CREATED_BY` in another table.

To view a list of the columns in the Attribute Dictionary, select SQL Workshop> User Interface Defaults and select the Attribute Dictionary tab. To make changes to a column, click the Edit icon for the column, make your changes, and click Apply Changes.

## Quiz

Nancy wants to apply the same Help text to all her Order Status items on all pages in her application. What must she do to make this happen? (Choose all that apply.)

- a. Add an item on a page with the Help text.
- b. Add a table with a new Status column.
- c. Review the column and update the directory.
- d. Create a new page with the column already in the dictionary.

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**Answer: a, b, d**

## Application Express Views



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Application Express views are data dictionary views that expose the metadata for the applications within the current workspace. In Application Express Views, you can see a view and its data.

## Application Express Views

The screenshot shows the Oracle Application Express interface. At the top, there are tabs for 'Report View', 'Tree View', 'Select Columns', 'Filter', and 'Results'. The 'Select Columns' tab is active, showing a list of columns for the 'APEX\_APPLICATIONS' view, including OWNER, APPLICATION\_GROUP, APPLICATION\_GROUP\_ID, HOME\_LINK, PAGE\_TEMPLATE, ERROR\_PAGE\_TEMPLATE, LOGO\_TYPE, APPLICATION\_PRIMARY\_LANGUAGE, LANGUAGE\_DERIVED\_FROM, CSV\_ENCODING, DATE\_FORMAT, DATETIME\_FORMAT, TIMESTAMP\_FORMAT, TIMESTAMP\_TZ\_FORMAT, AUTO\_TIME\_ZONE, ERROR\_HANDLING\_FUNCTION, DEFAULT\_BROWSER\_DISPLAY\_LOCATION, IMAGE\_PREFIX, AUTHENTICATION\_SCHEME\_TYPE, AUTHENTICATION\_SCHEME, AUTHENTICATION\_SCHEME\_ID, LOGO, LOGOUT\_URL, LOGO\_TYPE, and LOGO. Below this is a 'Selected Columns' section where several columns are selected: WORKSPACE, WORKSPACE\_DISPLAY\_NAME, APPLICATION\_ID, APPLICATION\_NAME, and ALIAS. To the right of this is a table titled 'Selected View: APEX\_APPLICATIONS' with columns: WORKSPACE, WORKSPACE\_DISPLAY\_NAME, APPLICATION\_ID, APPLICATION\_NAME, and ALIAS. The table contains data for various applications, such as 'TEACH' with ID 280, 'Demos' with ID 110, and 'Order Management' with ID 144. At the bottom of the table is a 'Query' section with a 'Download' link.

WORKSPACE	WORKSPACE DISPLAY NAME	APPLICATION ID	APPLICATION NAME	ALIAS
TEACH	TEACH	280	TASK	P100
TEACH	TEACH	110	Demos	P110
TEACH	TEACH	111	demo old	P110111
TEACH	TEACH	100	teach 01	P100
TEACH	TEACH	144	Order Management	P144
TEACH	TEACH	237	OEHR Sample Objects for OU	F471943654
TEACH	TEACH	247	Order Management Application F147	
TEACH	TEACH	331	Sample Database Application	COM_ORACLE_APEX_PRODUCT_PORTAL

Select the columns  
that you want to see,  
and click the Results  
tab to show the data.

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To view the data within a view, select the columns from the Select Column tab and click the Results tab. On the Results tab, expand the Query region to view the query that was executed. You can copy this query for reuse with SQL Commander or SQL Developer.

## Accessing Utilities from Page Definition

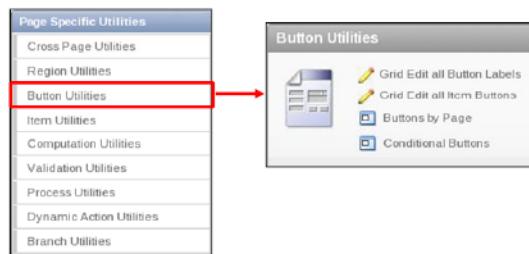


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You can also view the Utility options from within a page definition. Click the Utilities button and select the desired utility option. These include:

- **Check** executes the Advisor for the current page.
- **Clean up** resequences your page component sequence numbers by increments of 10.
- **Lock** prevents other developers from modifying the page until unlocked.
- **Delete** deletes the current page.
- **History** shows the change history for the current page.
- **Export** enables you to export the current page.
- **Caching** displays the page cache and any region cache on the page.
- **Attribute Dictionary** opens the Attribute Dictionary dashboard.
- **Cross Page** provides additional utilities to edit or delete pages, define attributes and groups, and lock multiple pages.
- **Page Events** shows the executed events listed in the order they are executed.
- **Referenced Database Objects** lists the database objects referenced on the page.
- **Switch To** changes the names of the page components to either names or labels.
- **Using the Tree View** changes the current view of page (Component versus Tree).

## Using Page Utilities



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The Page Specific Utilities region is displayed on the right side of the Utilities page. You can use these utility options to view component reports across pages in an application and by component type (for example, region, button, item, validation, process, dynamic action, or branch).

## Summary

In this lesson, you should have learned how to:

- Identify the application and page utilities available
- Use the Advisor to verify your application
- Identify an application's database object dependencies
- Manage defaults by using the Attribute Dictionary



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## Practice 11: Overview

This practice covers the following topics:

- Running the Advisor
- Correcting some of the violations
- Making changes to some page items
- Adding the items to the attribute dictionary
- Viewing and changing the columns in the attribute dictionary
- Updating the attribute dictionary with the changes
- Creating a new form page that uses the UI defaults



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In this practice, you run the Advisor and correct some of the violations contained in the list. You also make changes to an item and add the item to the Attribute Dictionary, make some changes to the UI default, and add it back to the Attribute Dictionary.

## **Adding Shared Components That Aid Navigation**

# 12

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## Objectives

After completing this lesson, you should be able to do the following:

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



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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 Tabs
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar

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## What Are Shared Components?



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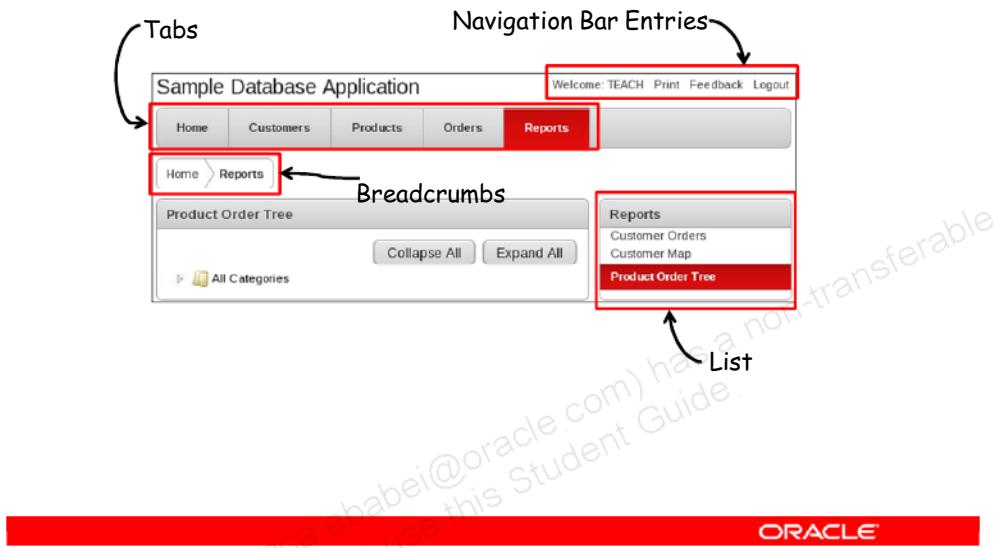
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Shared components are components that can be included on one or more pages of your application. The Shared Component Page screenshot in the slide shows the categories of shared components that you can include in your application.

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



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

- Tabs are used to provide navigation between the major components of an 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.

The slide shows the Sample Application interface. Home, Customers, Products, Orders, Reports are the tabs. Print, Feedback, Logout links at the top-right of the page are the navigation bar entries. Home > Reports are the breadcrumbs used to go back and forth between the pages within the application's major components. The Tasks section on the right is a list. Thus, you can use a combination of tabs, lists, navigation bars, and breadcrumbs to navigate within an application.

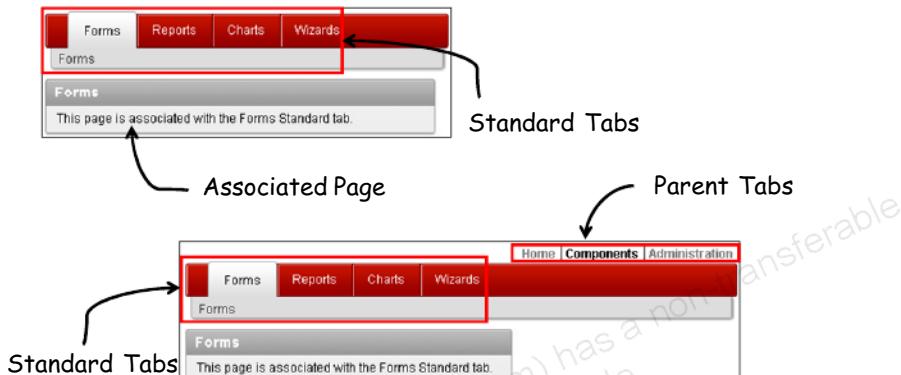
## Lesson Agenda

- Using Shared Components
- Creating Tabs
  - Types of Tabs
  - Creating a Tab Set
  - Adding Tabs
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar

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## Types of Tabs

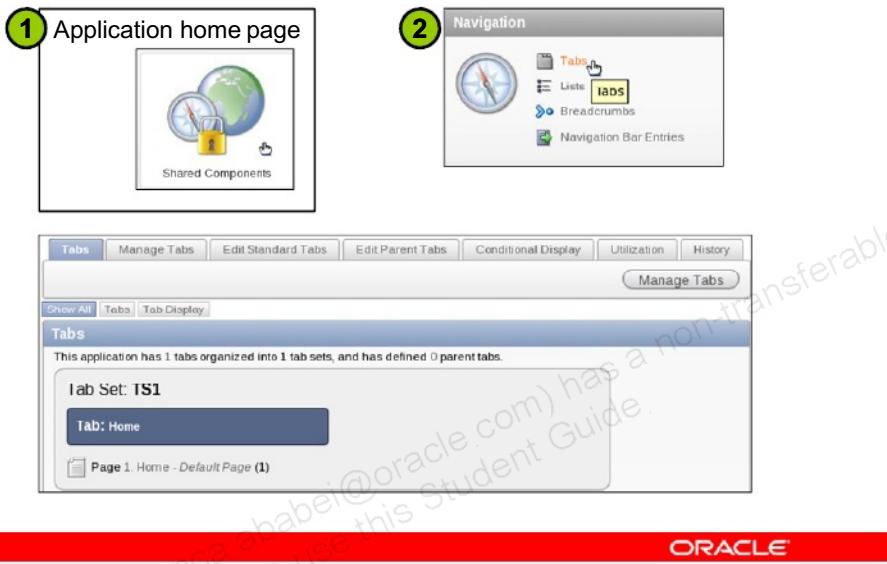


You create tabs to provide navigation within the major components of an application. Tabs are positioned at the top section of an application. When you click a tab, it displays the associated page.

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."

## Accessing the Tabs Page



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When you create an application or a page, the Create Application and Create Page wizards provide an option to create tabs in an application or on a page. You can view the existing tabs in your application and modify them or create a new tab from the Tabs page. To access the Tabs page, perform the following steps:

1. From the Application home page, click the Shared Components icon.
2. From the Shared Components page, click the Tabs link in the Navigation pane.  
The Tabs page is displayed.

Alternatively, perform the following steps:

1. From the Application home page, click a page.
2. From the Shared Components section in the page definition, right-click the Tabs node and select Create or Edit All.

## Managing Tabs

Click on a tab name to make a tab current. Once you select a tab you will be able to change that tab's properties.

Selected Pseudo Parent Tab: **TS1**

Select Standard Tab: **Home**

Tab Current for Page: **1Home**

**TS1** Add

**1** Home

**Tabs**  
This page displays a graphical representation of the Tabs defined in your application.  
Use Standard Tabs to link users to a specific page. A Parent Tab functions as a container to hold a group of Standard Tabs. Parent Tabs give users another level of navigation as well as a sense of place within the application.  
Click **Add** in the upper row to add Parent Tabs. Click **Add** in the lower row to add Standard Tabs.

**Parent Tab Tasks**  
No parent tabs exist.

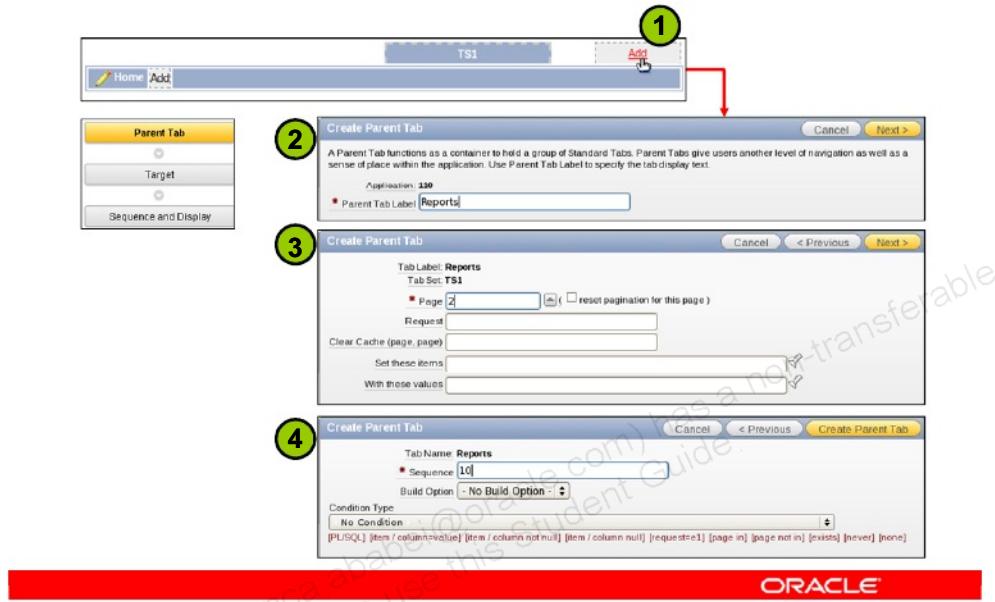
**Standard Tab Tasks**  
Rename Standard Tab Set  
Resequence display order  
Associate Page(s) with selected Standard Tab  
Create New Standard Tab  
Create New Standard Tab Set

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The Manage Tabs page has a graphical layout of the tabs. You can add a new tab to the parent or standard set. The slide shows the tabs available for the Demo application. Because no parent tab is created, a pseudo-parent tab, TS1, is assigned to hold the standard tabs. Tasks that you can perform are listed in the Parent Tab Tasks and Standard Tab Tasks lists (at the bottom-right of the page).

## Creating Parent Tabs



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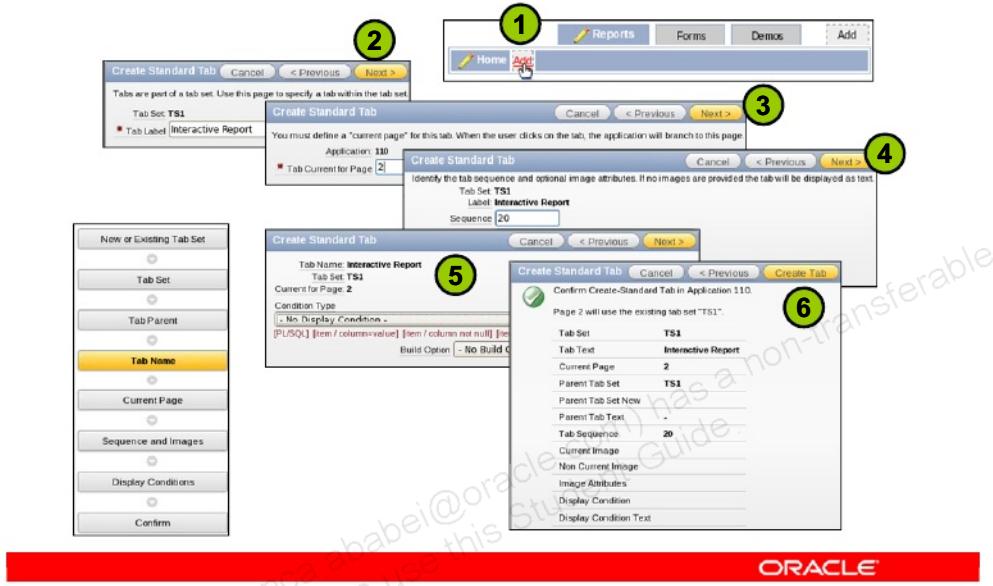
To create a parent tab, perform the following steps:

1. Click the Add link in the parent-level tabs from the Manage Tabs tab. The Create Parent Tab wizard starts.
2. Enter the Parent Tab Label and click Next. In the slide example, Reports is entered.
3. Indicate the target of the tab, and click Next. In this example, page 2 is specified.
4. Accept the default or specify a different sequence and click Create Parent Tab.

In this example, the Reports parent tab is created. Similarly, a Forms parent tab can be created.

**Note:** To be able to see two-level tabs in your application, ensure that you are using the required templates for your application and pages.

## Creating Standard Tabs

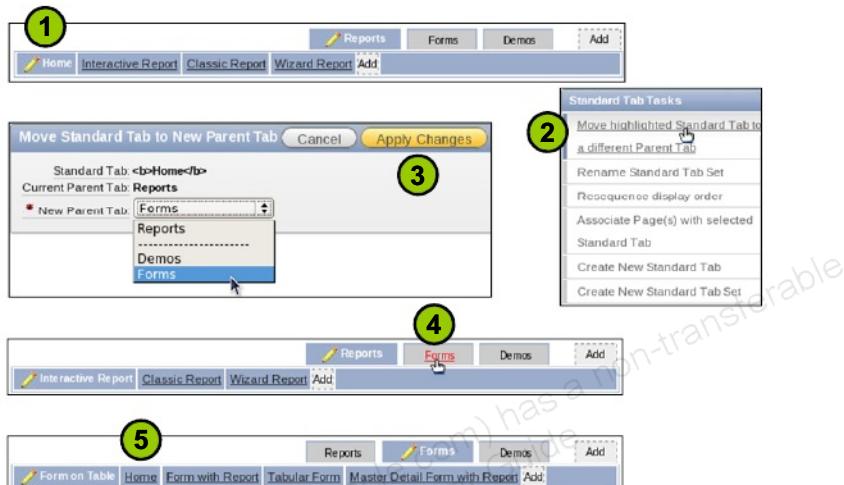


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To create a standard tab, perform the following steps:

1. In the Manage Tabs tab, ensure that the required parent tab is selected and click the Add link in the standard tabs level. The wizard automatically picks up the details for the Tab Set and Tab Parent and starts from the Tab Name step.
2. Enter the Tab Label and click Next. In the slide example, Interactive Report is entered.
3. Indicate the page that is associated with the tab and click Next. In this example, page 2 is specified.
4. Specify a sequence for the tab.
5. (Optional) Specify the conditions under which the tab is displayed.
6. Click Next.
7. Review the details and click Create Tab.

## Reassigning a Standard Tab



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You can assign a standard tab associated with a parent tab to another parent tab. Perform the following steps:

1. Ensure that the standard tab that you want to move is selected. In the slide example, the Home tab is selected.
2. Click the "Move highlighted Standard Tab to a different Parent Tab" link in the Standard Tab Tasks list.
3. Select the new parent tab for the standard tab and click Apply Changes. In this example, the Forms tab is selected.
4. Note that the Home tab is no longer listed in the standard tab set for the Reports parent tab.
5. Click the Forms parent tab to confirm that the Home tab is now listed in it.

## Lesson Agenda

- Using Shared Components
- Creating Tabs
- Creating Lists
  - Accessing the Lists Page
  - Creating a List
  - Creating a List Entry
  - Creating a List Region
  - Using a List on Page Zero
- Creating Breadcrumbs
- Creating a Navigation Bar

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## Accessing the Lists Page



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:

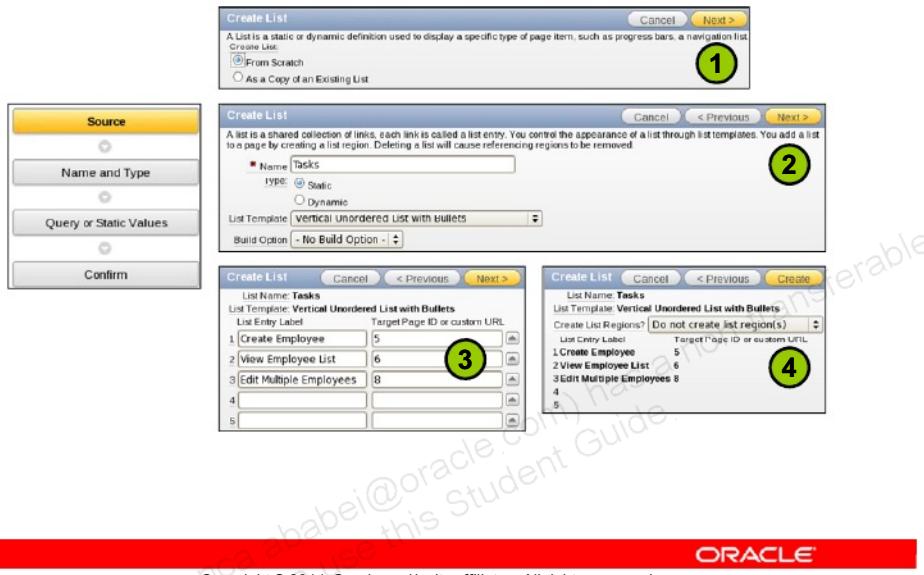
1. From the Application home page, click the Shared Components icon.
2. From the Shared Components page, click the Links link in the Navigation pane.

Alternatively, perform the following steps:

1. From the Application home page, click a page.
2. From the Shared Components section in the page definition, right-click the Lists node and select Create or Edit All.

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.)

## Creating a Static List



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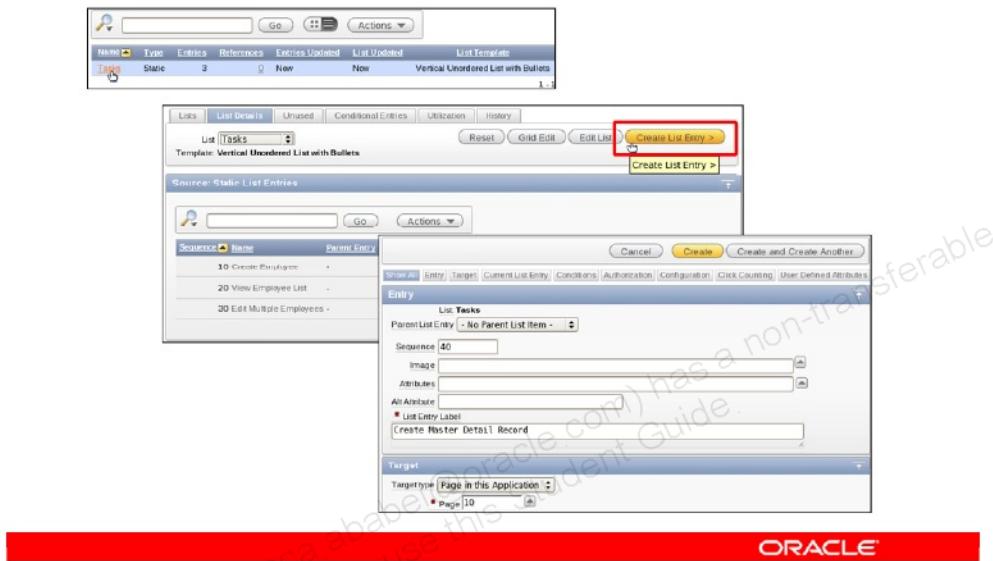
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To create a static list, click the Create button from the Lists page and perform the following steps:

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. You can create a list region on the current page. In this example, you accept the defaults and click Create.

The static list is created. You can edit the list to add additional list entries.

## Creating List Entries



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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 from the Lists page.
2. Enter the text for the link in the List Entry Label field. In 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



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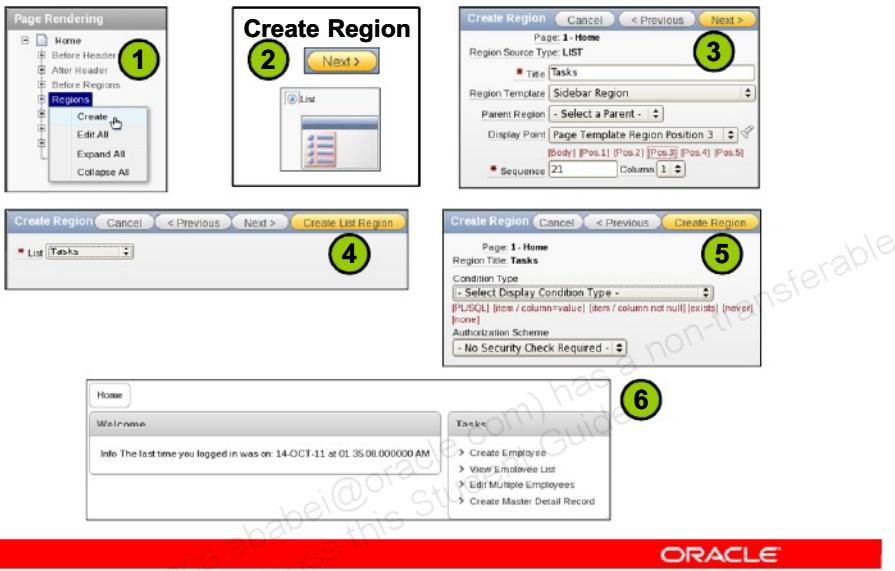
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To create a dynamic list, click the Create button from the Lists page and perform the following steps:

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.

## Creating a List Region



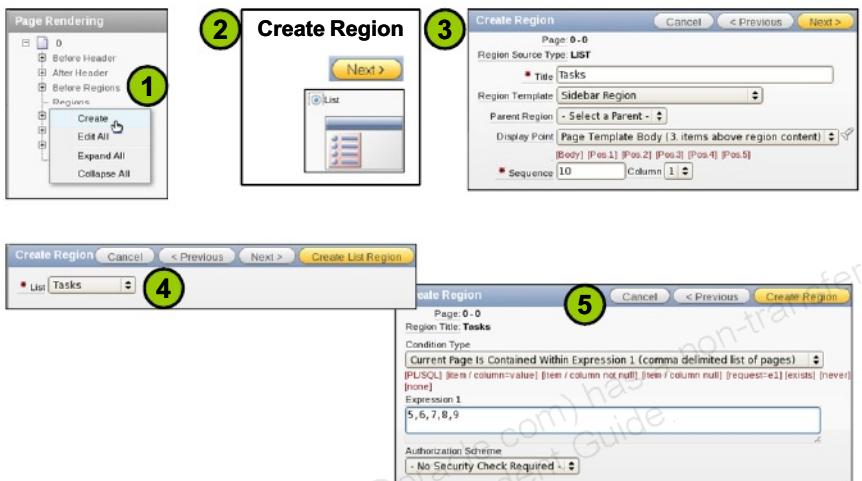
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After you create a list and populate it with values, you can add the list to a page. To add the list to a page, navigate to the page's definition and perform the following steps:

1. Right-click the Regions node and select Create.
2. Select the List option and click Next.
- Note:** You see the list option in the Create Regions wizard only if the application already has a list.
3. Specify the region details and click Next.
4. Select the list from the List drop-down list and click Next.
5. (Optional) Specify any conditions for the display of the region.
6. Click Create Region.

The list region is created on the page.

## Creating a List Region on Page Zero



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To display a list on multiple pages of an application, you can create the list region on page zero and specify the pages where the region should be displayed. Navigate to the page definition for page zero and perform the following steps:

1. Right-click the Regions node and select Create.
2. Select List and click Next.
3. Specify the region details and click Next.
4. Select the list from the Lists drop-down list and click Next.
5. Select the [page in] link below the Condition Type field and enter the pages that you want the region to be displayed on in the Expression 1 field. (You can enter multiple page numbers by separating them with a comma.) Click Create Region.

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

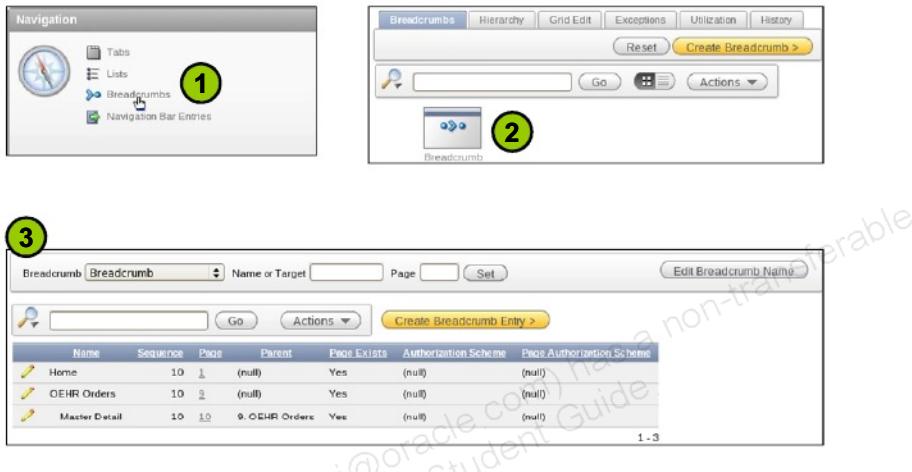
## Lesson Agenda

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

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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 standard tab at the top of each page. You can define the Breadcrumb region in page zero 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 popup 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. From the Shared Components page, click the Breadcrumbs link in the Navigation pane.
2. In 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 current breadcrumb hierarchy appears. You may navigate to a page by clicking the Create Breadcrumb Entry.

## Creating Breadcrumb Entries

The screenshot shows the 'Create Breadcrumb Entry' interface. The 'Breadcrumb' tab is active. In the 'Breadcrumb' section, a breadcrumb entry named 'Breadcrumb' is selected for page 2. In the 'Entry' section, the sequence is 10, the parent entry is 'Home (Page 1)', and the short name is 'Interactive Report'. In the 'Target' section, the target is set to a page in the application, specifically page 2, with the option to reset pagination checked.

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

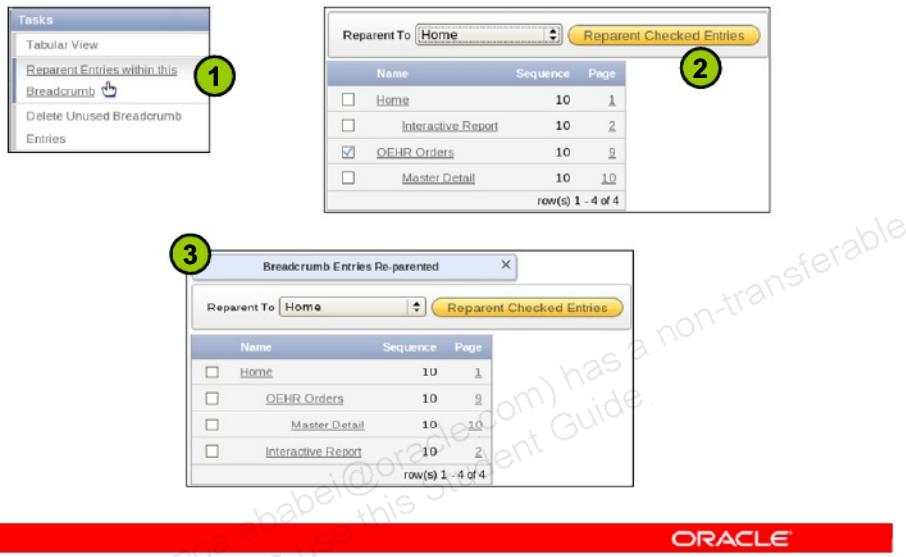
In the Breadcrumb section, ensure that the required breadcrumb is selected for the Breadcrumb field. For the Page field, enter the page on which you want the breadcrumb to appear.

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 (not shown in slide), 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 upper-right corner of the page).

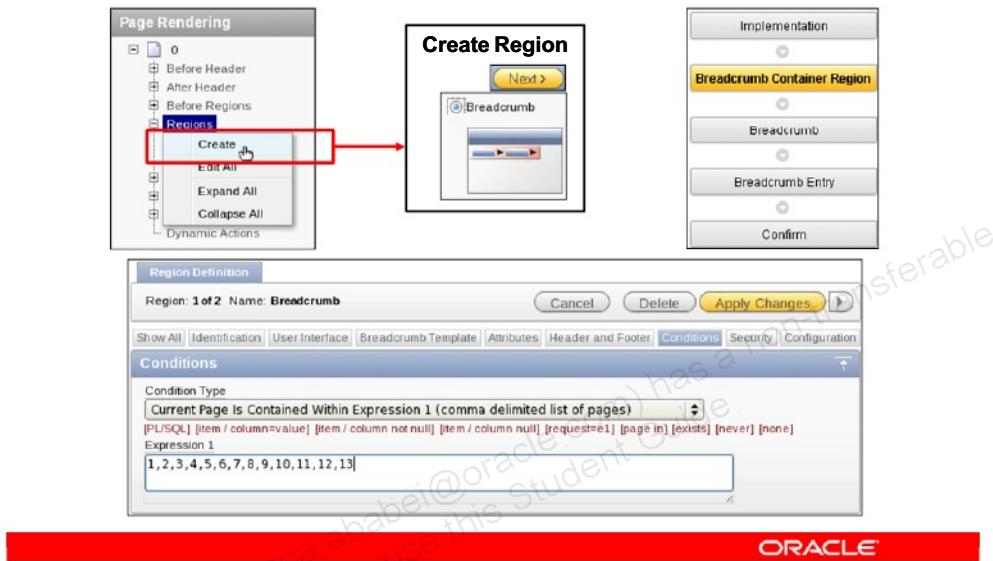
## Reparenting Breadcrumbs



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

1. On the Breadcrumb page, select “Reparent Entries within this Breadcrumb” from the Tasks menu (in the bottom-right corner of 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.
3. 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 create the breadcrumb region in page zero and then specify the pages that should display the breadcrumb.

To create a breadcrumb region, from the page definition for page zero, right-click the Regions node and click Create. Select Breadcrumb in the Create Region wizard and click Next. Follow the wizard instructions. The breadcrumb region is created.

To specify the pages on which the breadcrumb region should be displayed, right-click the breadcrumb region node and select Edit. On the Edit Region page, click the Conditions tab. Click the [page in] link for Condition Type and enter the page numbers, separated by a comma, in the Expression 1 field. Click Apply Changes.

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 Tabs
- Creating Lists
- Creating Breadcrumbs
- Creating a Navigation Bar
  - Accessing the Navigation Bar Entries Page
  - Creating a Help Page
  - Creating a Navigation Bar Entry

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## Accessing the Navigation Bar Entries Page

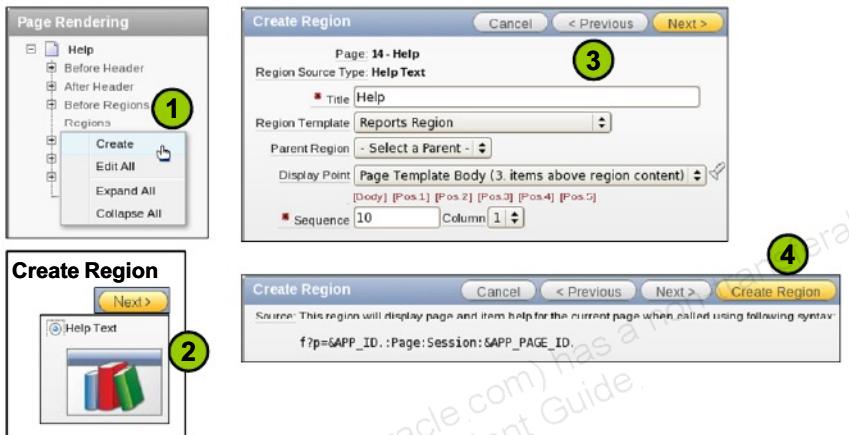


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Each application can have only one navigation bar. The items inside the navigation bar are called navigation bar entries. Some of the typical situations where you use navigation bars are accessing the home page and linking to a Help page. The location 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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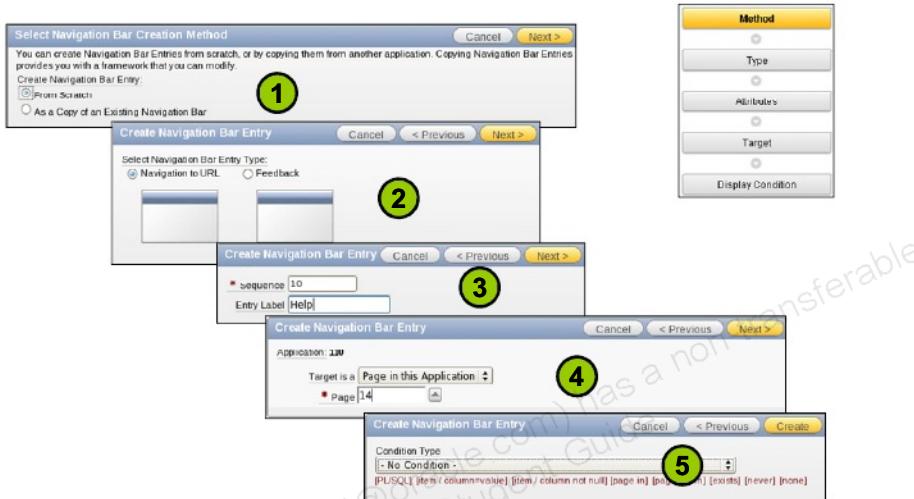
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In the next slide, you create a Help navigation bar entry. Before you do that, however, you must create a help page in the application. Create a blank page and follow these steps:

1. From the page definition of the blank page, right-click the Regions node and select Create.
2. Select the Help Text option and click Next.
3. Enter a title for the help region and click Next.
4. Click Create Region.

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



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Click the Create button in the Navigation Bar Entries page. The Create wizard opens, and you perform the following steps:

1. Select From Scratch and click Next. You can also copy from another application.
2. Select “Navigation to URL” and click Next.
3. Enter the name for the entry and click Next.
4. Specify the target help page to be linked to the entry and click Next.
5. (Optional) Specify a condition. Click Create.

The navigation bar entry is successfully created.

## Quiz

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

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

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**Answer: b**

## Summary

In this lesson, you should have learned how to:

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



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## Practice 12: Overview

This practice covers the following topics:

- Creating a list
- Creating and editing standard tabs
- Creating a Help page and adding a navigation bar entry
- Editing navigation bar entries
- Creating a conditional display of a navigation bar

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## Displaying Dynamic Content

# 13

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## Objectives

After completing this lesson, you should be able to do the following:

- Create and use a dynamic action
- Import and use a plug-in
- Create charts by using a wizard
- Create a calendar
- Create a tree



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This lesson shows you how to start using dynamic actions to define client-side behavior, by building standard and advanced dynamic actions. You learn the difference between the two types of dynamic actions. You also learn how to create charts, calendars, and trees.

## Lesson Agenda

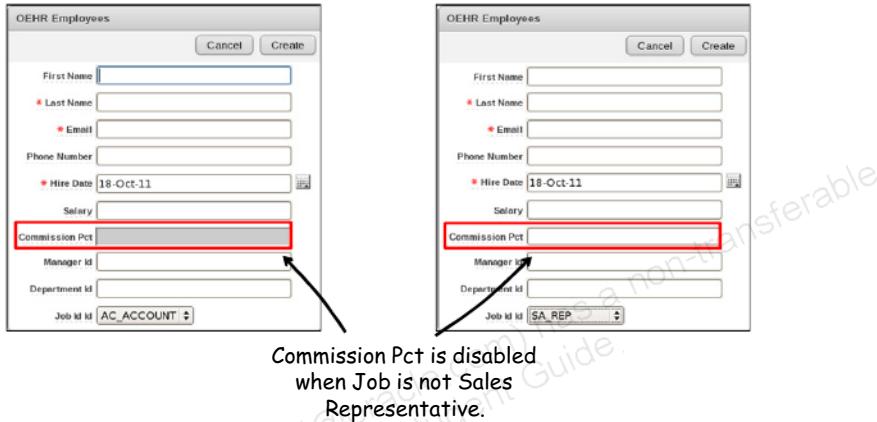
- Using Dynamic Actions
  - What Are Dynamic Actions?
  - Creating a Standard Dynamic Action
  - Creating an Advanced Dynamic Action
- ~~Creating a Dynamic Action on a Button~~
- Using Plug-Ins
- Using Charts
- Using Calendars
- Using Trees

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## What Is a Dynamic Action?

Example of a standard dynamic action for enable/disable:



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Dynamic actions provide developers a way to define client-side behavior declaratively without the need to know JavaScript.

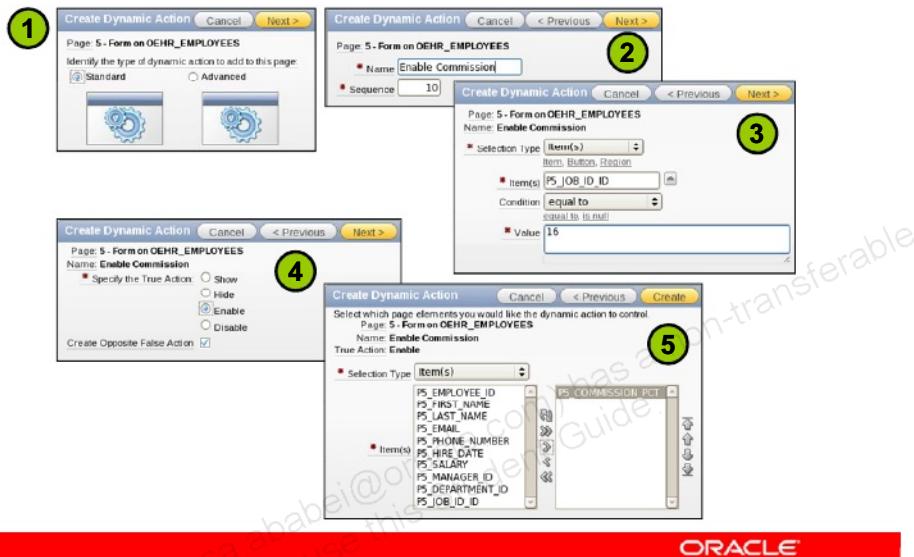
There are two classifications of dynamic actions:

- **Standard** allows you to create dynamic actions that show, hide, enable, or disable page items.
- **Advanced** allows you to create more complex native dynamic actions (such as Add Class or Set Value), specify different event types (such as Click or After Refresh), and also use plug-in dynamic actions (which are installed in your application).

Note that in the standard mode, the triggering event is Change by default, but in the advanced mode, there are many more events to choose from.

An example of a standard dynamic action is shown in the slide. In the slide example, in the left screenshot, the value for Job is Account and the Commission Pct item is disabled. In the screenshot on the right, the value for Job is Sales Representative and the Commission Pct item is enabled. 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 depth in the Advanced APEX Workshop course.

## Creating a Standard Enable/Disable Dynamic Action



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There two ways to create a dynamic action:

- From a specific item
- From the Dynamic Actions node. If you create it from the Dynamic Actions node, you can identify multiple triggering items in the When steps.

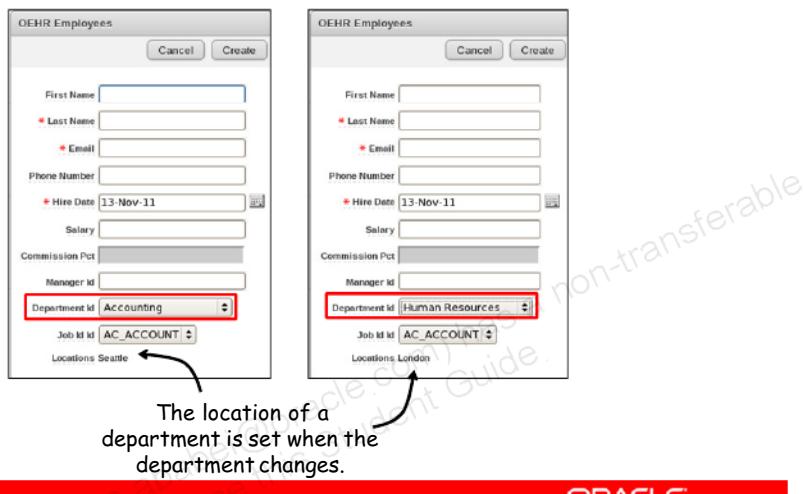
An example of a standard dynamic action is to enable and disable an item based on the value of the item. To create this type of dynamic action, navigate to the page that contains the item for which you want to create a dynamic action. In the tree view, right-click the item and select Create Dynamic Action and perform the following steps:

1. Select Standard for Dynamic Action type and click Next.
2. Enter a name for the dynamic action. In this example, the name is Enable Commission.
3. Most of the fields on the next wizard page are prepopulated. In this case, enter a Value of 16, which is the ID of the SA\_REP value that you want when the dynamic action fires. Select the true action that should be performed when the When condition is met (for example, when P5\_JOB\_ID is equal to SA\_REP), and click Next.

4. In this case, Enable is selected. In addition, the false action of Disable will be created if the When condition is not met (for example, when P5\_JOB\_ID does not equal SA REP).
5. Select the item that you want the enable and disable actions to control, and click Next. In this case, the P5\_COMMISSION\_PCT item will be enabled or disabled depending on the value of the P5\_JOB\_ID item. Click Create.

## What Is an Advanced Dynamic Action?

Example of an advanced dynamic action for Set Value with a SQL statement:

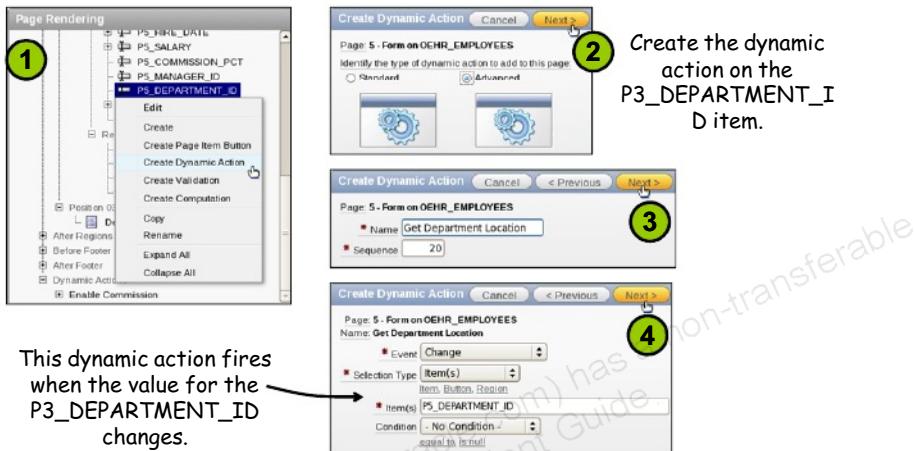


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Advanced dynamic actions enable you to create more complex native dynamic actions (such as Add Class or Set Value), specify different event types (such as Click or After Refresh), and also use plug-in dynamic actions (which are installed in your application). This slide shows an example of an advanced dynamic action. In this example, when the value of an item changes, the value of another item is set based on a SQL statement—in this case, when the Department changes the value of Location changes.

## Creating an Advanced Set Value with a SQL Statement Dynamic Action

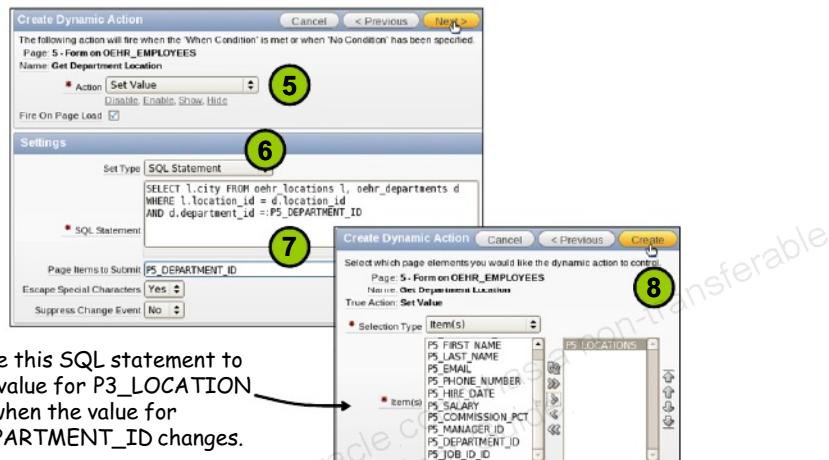


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An example of an advanced dynamic action is to change the value of an item based on the value of another item. To create this type of dynamic action, perform the following steps:

1. Navigate to the page that contains the item you want to create a dynamic action against. In the tree view, right-click the item and select Create Dynamic Action. In the slide example, because you want the dynamic action to be fired when the value for Department changes, right-click P5\_DEPARTMENT\_ID and select Create Dynamic Action.
2. Select Advanced for Dynamic Action type and click Next.
3. Enter a name for the dynamic action. In this example, the name is GET DEPARTMENT LOCATION.
4. Most of the fields on the next wizard page are prepopulated. In this case, you do not want to base the dynamic action on a particular condition, so you can accept the defaults and click Next.

## Creating an Advanced Set Value with a SQL Statement Dynamic Action



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5. Select the action to be performed when the condition is met. In this case, you want to perform a Set Value.
6. Select the type of set value to perform. In this case, you want to set the value by using a SQL statement.
7. Enter the SQL statement that you want to be submitted. Specify the “Page Items to Submit” and click Next. In this case, specify P5\_DEPARTMENT\_ID because its value has changed and needs to be set in session state in order for the SQL query to be able to bind in the new value and return the appropriate location.
8. Select the item that will be populated when the dynamic action is fired. In this case, P5\_LOCATION will be set. Click Create.

## Creating a Dynamic Action on a Button

The screenshot shows a form titled "OEHR Employees" for creating a new employee record. The "Create" button at the top right is highlighted with a red box. The form contains the following fields:

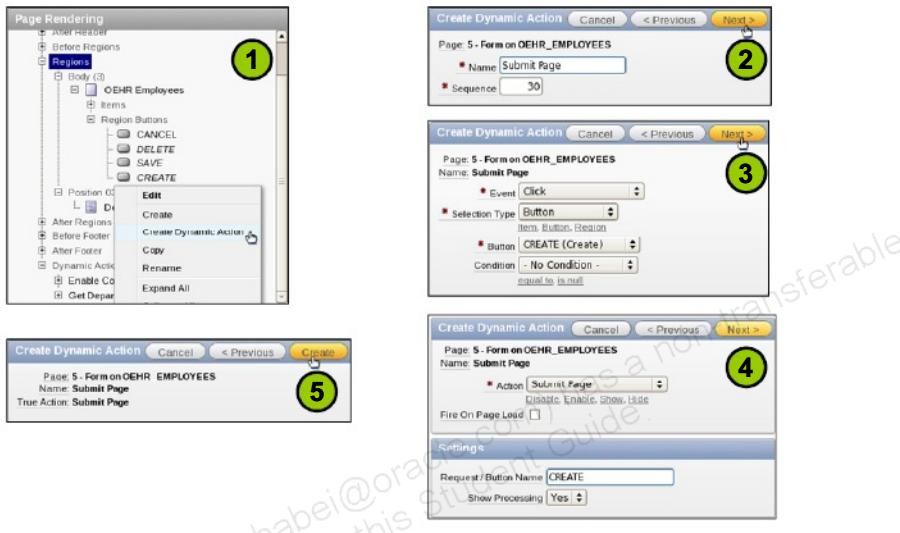
- First Name: Henry
- \* Last Name: Sharp
- \* Email: henry.sharp@oracle.com
- Phone Number: [empty]
- \* Hire Date: 13-Nov-11
- Salary: [empty]
- Commission Pct: [empty]
- Manager Id: [empty]
- Department Id: Accounting
- Job Id Id: AC\_ACCOUNT
- Locations Seattle

At the bottom right of the page is the ORACLE logo.

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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 click a dynamic action to be fired when a button is clicked, which will gray out the current page so that the user cannot make any changes. The example in the slide shows a Create form. A dynamic action is defined to fire when the Create button is clicked. It displays a grayed out page and also a progress bar. Once the page processing is complete, the resulted page is displayed.

## Creating a Dynamic Action on a Button



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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 you want to create a dynamic action against. In the tree view, right-click the button and select Create Dynamic Action. In the slide example, because you want the dynamic action to be fired when the Create button is clicked, right-click Create and select Create Dynamic Action.
2. Enter a name for the dynamic action and click Next. In this example, the name is Submit Page.
3. Most of the fields on the next wizard page are prepopulated. In this case, you do not want to base the dynamic action on a particular condition, so you can accept the defaults and click Next.
4. Select an action. In this case, Submit Page is selected. Enter the Request that should be passed in the Request/Button Name field.
5. Click Create.

## Quiz

Which of the following would be implemented as a standard 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 an item's value changing
- d. Enabling an item based on the changing of another item's value



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**Answer: a, d**

## Lesson Agenda

- Using Dynamic Actions
- Using Plug-Ins
  - What Is a Plug-In?
  - Importing a Plug-In
  - Installing a Plug-In
  - Adding a Plug-In Item to a Page
- Using Charts
- Using Calendars
- Using Trees

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## What Is a Plug-In?

Example of a rating plug-in:

The screenshot shows a form titled "OEHR Employees" with fields for First Name, Last Name, Email, Phone Number, Hire Date (set to 13-Nov-11), Salary, Commission Pct, Manager Id, Department Id (set to Accounting), Job Id Id (set to AC\_ACCOUNT), Locations Seattle, and Star Rating. The "Star Rating" field contains five yellow stars and a small icon, with a red box highlighting it. At the bottom right of the slide is the ORACLE logo.

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Plug-ins allow developers to declaratively extend the built-in types available with Application Express and to enable developers to 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 and import them into other applications in the same or another workspaces and also share them with the Application Express Plug-in community by using the Plug-in Repository.

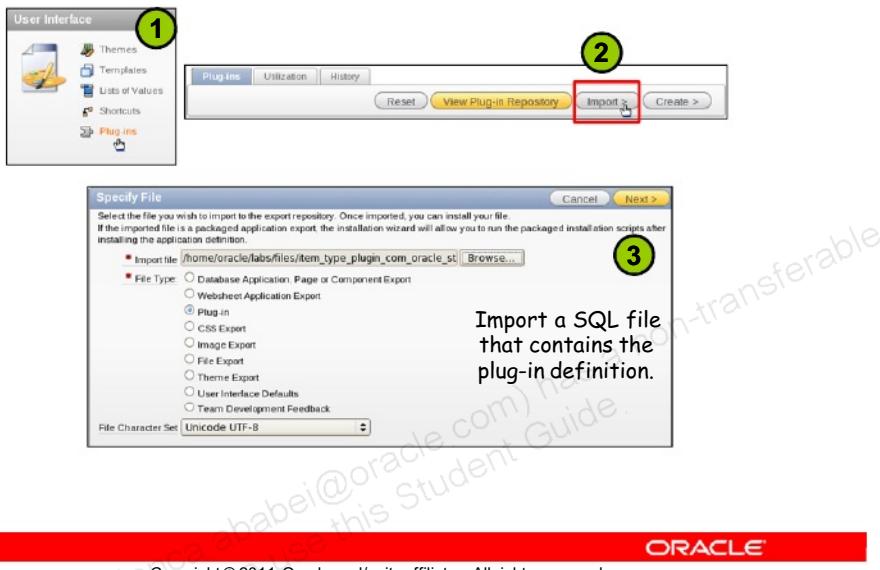
The process of implementing a plug-in involves the following:

- Create or import a plug-in in to your application workspace.
- Edit or create an item, region, process, or dynamic action type to use the plug-in.
- Run your application to test the plug-in.

The slide example shows a Rating 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*.

## Importing a Plug-In



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

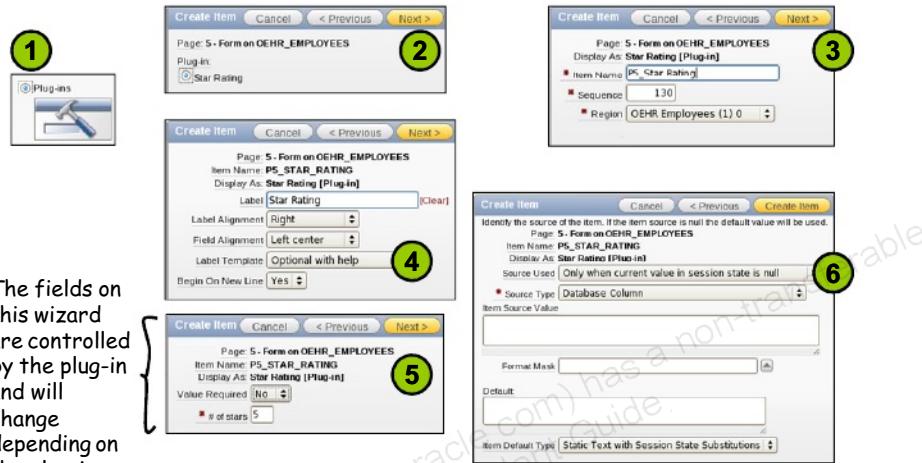
1. Navigate to your application's Shared Components page. Under User Interface, select Plug-ins.
  2. Click Import.
- Note:** You can view the Plug-in Repository for a list of available plug-ins that you can download and then import.
3. Select your plug-in import file and click Next.

## Installing a Plug-In



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

## Adding a Plug-In Item to a Page



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After the plug-in is made available to the application, you can use it. From your page definition, right-click Items and select Create Page Item. Perform the following steps to create an item plug-in:

1. Select the Plug-ins item type and click Next.
2. Select the plug-in that you want from the list, and click Next. In this case, you select the Star Rating plug-in.
3. Enter an item name and click Next.
4. Accept the defaults and click Next.
5. Select whether the value for the item is required and the number of stars that you want to show, and click Next.
6. Select Database Column for Source Type and enter the column in the table in which you want the value to be stored.

**Note:** You may need to create a new column with a data type of number(2) to store the value.

## 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.

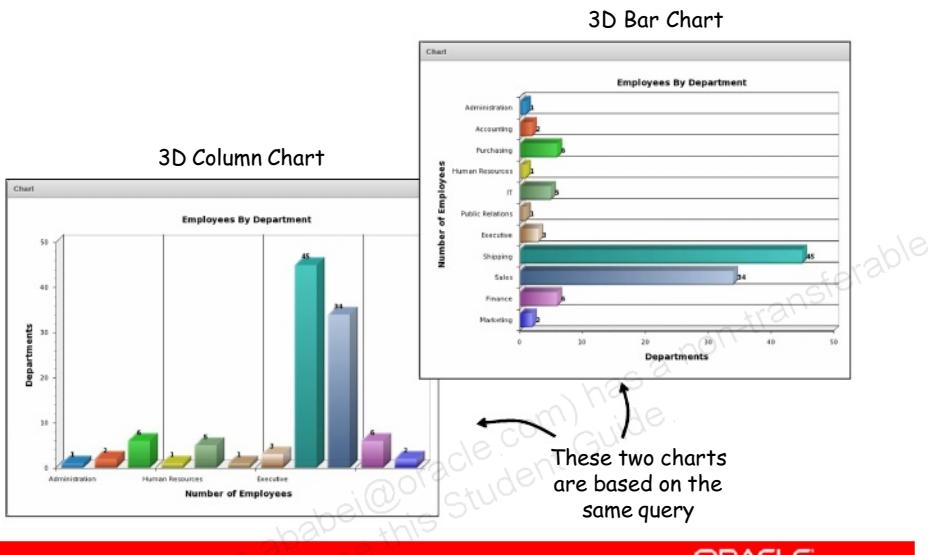
## Lesson Agenda

- Using Dynamic Actions
- Using Plug-Ins
- Using Charts
  - Building Charts
  - Creating a Flash Chart
  - Creating an HTML Chart
  - Creating a Map
  - Viewing Chart Attributes
- Using Calendars
- Using Trees

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## Building Charts



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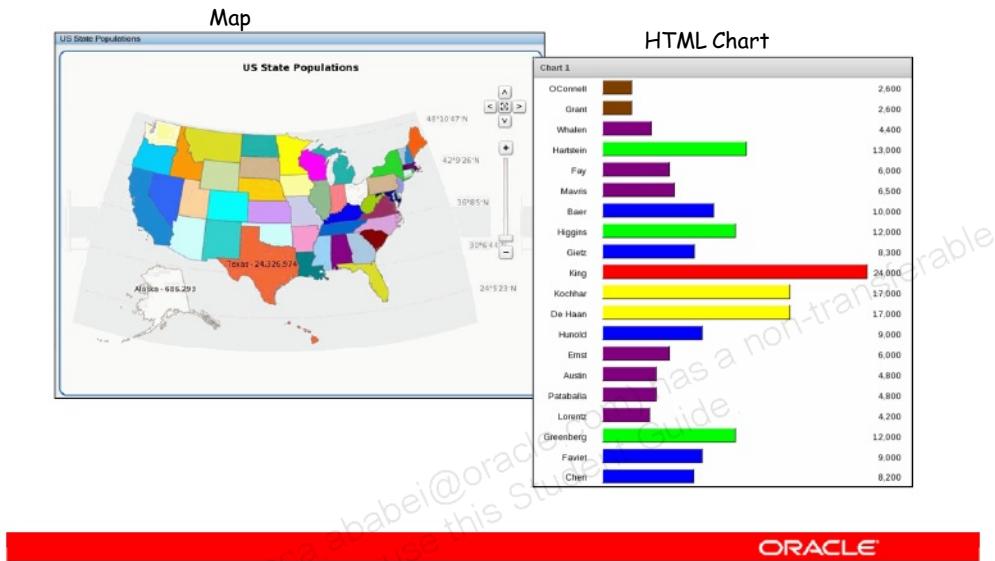
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Oracle Application Express includes built-in wizards for generating two types of charts: HTML and Flash charts.

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>.

The slide example shows two Flash charts (3D bar and 3D column) that are based on the same query and it shows the number of employees per department.

## Building Charts



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Application Builder includes built-in wizards for generating Flash maps. How you create a Flash map depends upon whether you are adding the map to an existing page, or adding a map on a new page. Flash map support in Oracle Application Express is based on the AnyChart AnyMap Interactive Maps Component. AnyMap is a flexible Macromedia Flash-based solution that enables developers to visualize geographical related data. Flash maps are rendered by a browser and require Flash Player 9 or later.

AnyChart stores map data in files with a .amap extension, and supports 300 map files for the United States of America, Europe, Asia, Africa, Oceania, North America, and South America. To render a desired map, you select the map source (for example, Germany) in the wizard, and the map XML automatically references the desired map source .amap file, germany.amap.

HTML charts are simple horizontal and vertical charts.

In the slide example, a map shows the populations of each state. In addition, an HTML chart is displayed that shows Salary by Employee.

## Creating a Flash Chart



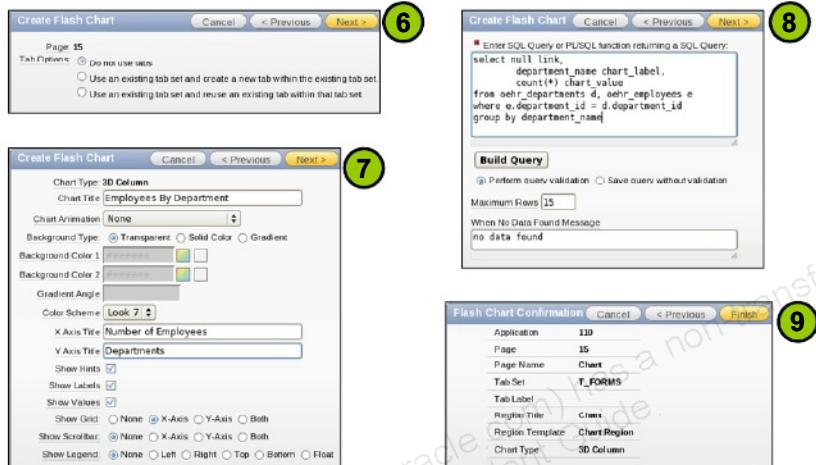
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To create a flash chart, navigate to your application home page and click Create Page. Perform the following steps:

1. Select Chart and click Next.
2. Select Flash Chart and click Next.
3. Select the type of chart that you want to create, and then click Next. **Note:** Numerous Flash charts are available.
4. 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.
5. Accept the defaults and click Next.

## Creating a Flash Chart



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6. Accept the default tabs and click Next.
7. Enter a Chart Title and specify any of the parameters in this window. In the slide example, a different Color Scheme was selected and X-Axis and Y-Axis titles were specified. Then click Next.
8. Enter a SQL query that this chart will be based on. If you want to see a sample of what one should look like, 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.
9. Click Finish.

## Creating an HTML Chart

Chart SQL

```
select null link,
       last_name label,
       salary value
  from oe01_employees
```

Build Query

Perform query validation  Save query without validation

Font Size

Maximum Rows  Number Mask

Scale  Axis center

Chart Type  Horizontal  Vertical

Include in summary:

- Number of data points  Avg
- Minimum value  Maximum value
- Average value  Sum of all values
- First value  Last value

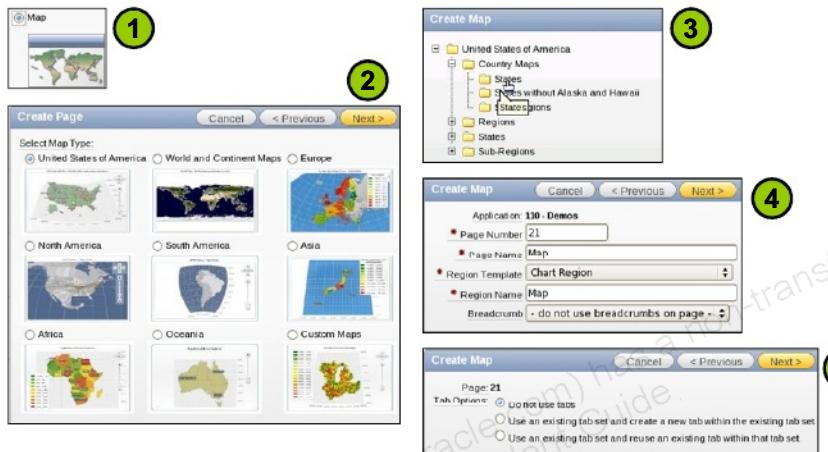
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To create an HTML chart, perform the following steps:

1. Navigate to your application home page.
2. Right-click Regions and select Create.
3. Select Chart and click Next.
4. Click HTML Chart, and then click Next.
5. Enter Page Name and Region Name, and then click Next.
6. Enter the chart SQL manually, or click Build Query. The slide shows the SQL used. If you use the query wizard, you receive the following:
  - a. Select the Table/View Owner, and then click Next.
  - b. Select the Table or View to base the chart on, and then click Next.
  - c. Select a Label (for example, LAST\_NAME) and a Value (for example, SALARY) and an Aggregate Function if necessary. Click Next.
  - d. You can link to another page or URL from the label by selecting a Target Type and selecting the page or specifying the URL. Click Next.
  - e. Click Finish.
7. Change any of the attributes of the chart and click Next.
8. Click Finish.

## Creating a Map



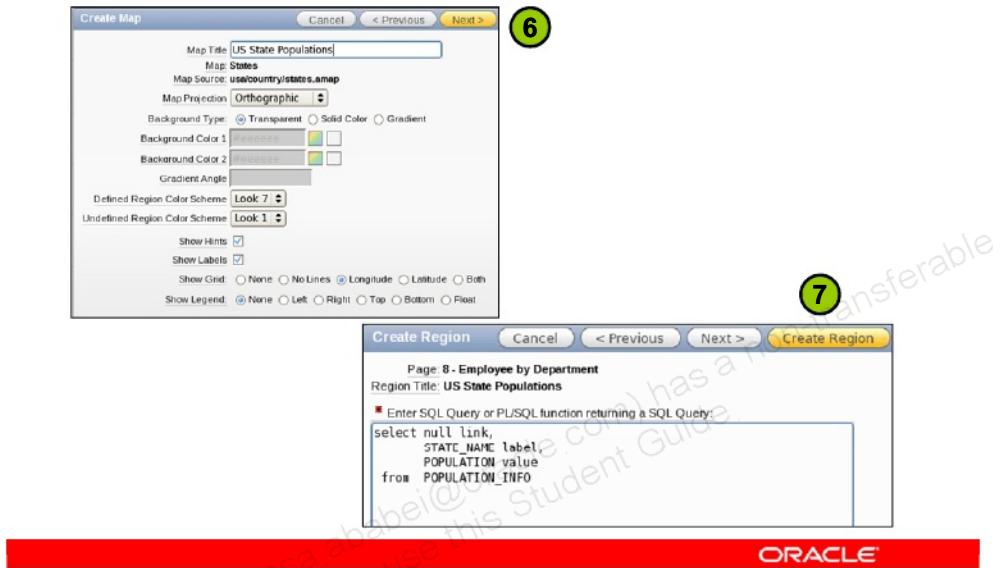
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To create a Flash Map region in an existing page, navigate to the page where you want to create the map. Right-click Regions, select Create and perform the following steps:

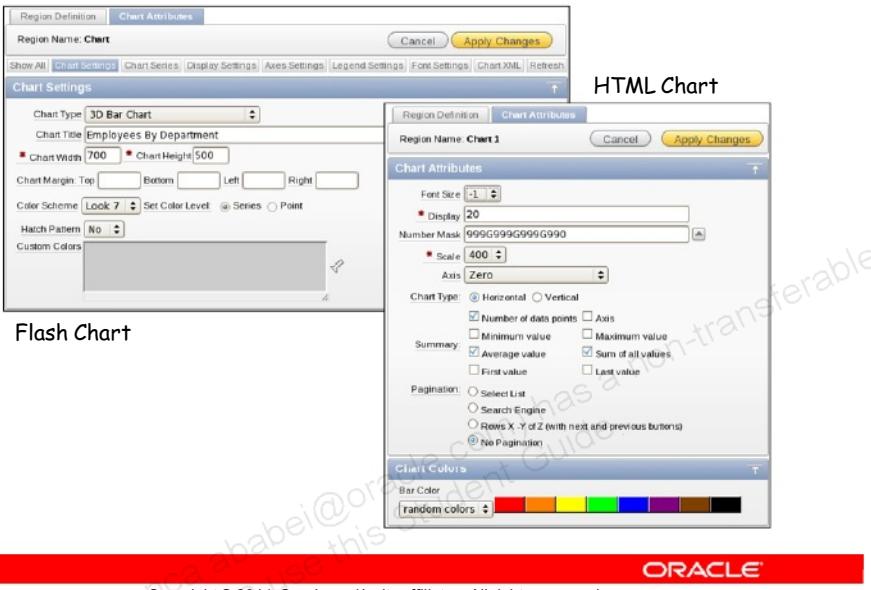
1. Select Map and click Next.
2. Select the type of map that you want and click Next. In the slide example, the United States of America map type is selected.
3. Select the map source file that you want and click Next. In the slide example, you want to show the States Map in the Country Maps category.
4. Enter a Title and click Next.
5. Accept the default for tabs and click Next.

## Creating a Map



6. Enter the Map Title and specify any map parameter changes, and click Next.
7. Enter a SQL query that this map will be based on, to associate values with points on the map. If you want to see a sample of what one should look like, you can click the Map Query Example link at the bottom of the window. By default, the value of the LABEL parameter of the query should reference a value contained in the REGION NAME column of AnyChart Map Reference information for the map. If you want to see the AnyChart Map Reference Information associated with the map, you can click the Map Region Information link at the bottom of the window. Click Create Region.

## Viewing 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 in the application home page.
2. In Component View, click the chart region and click the Chart Attributes tab. In Tree View, right-click the chart region and select Edit Chart.
3. The attribute categories may be slightly different depending on the chart type. For example, the chart attributes in this slide are for a Flash chart and an HTML chart.

## Quiz

Which type of chart would you create if you wanted to show a Gantt chart?

- a. HTML
- b. Map
- c. Flash chart
- d. Resource

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**Answer: d**

## Quiz

In the following SQL query that you provide to define a chart, what does value indicate?

```
SELECT link, label, value FROM table
```

- a. URL
- b. Text that is displayed on the chart axes
- c. Numeric column to use for the data point

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**Answer: c**

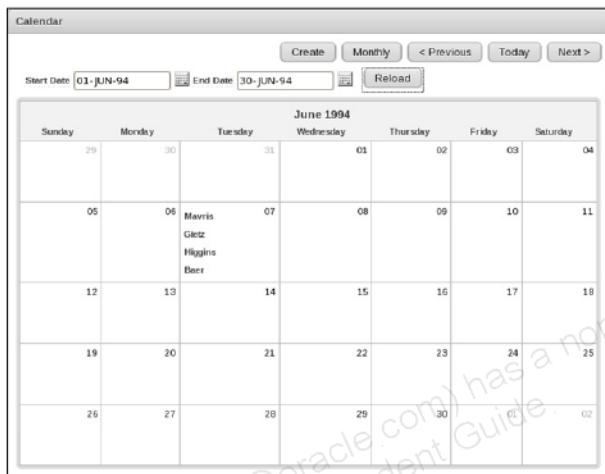
## Lesson Agenda

- Using Dynamic Actions
- Using Plug-Ins
- Using Charts
- Using Calendars
  - Creating a Calendar
  - Editing Calendar Attributes
  - Linking to a Form from a Calendar
- Using Trees

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## Creating a Calendar



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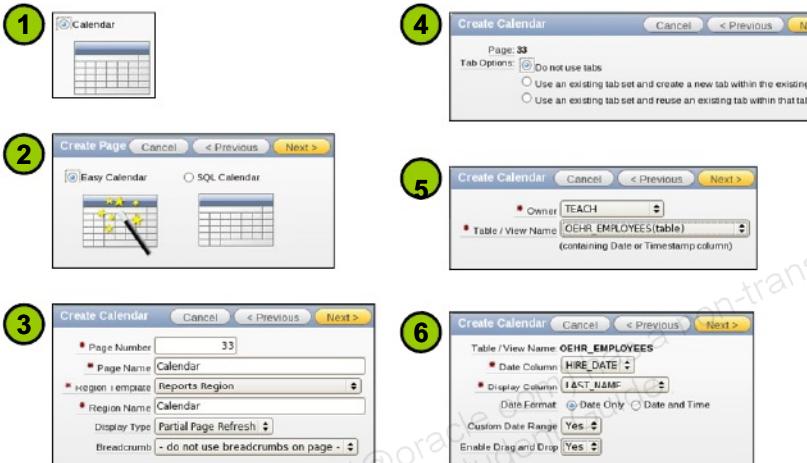
Oracle Application Express supports two calendar types:

- **Easy Calendar:** Creates a calendar based on the schema, table, and columns that you specify. The wizard prompts you to select a date column and a display column.
- **SQL Calendar:** Creates a calendar based on a SQL query that you provide. The SELECT SQL statement that you provide must include at least two columns: a date column and a display column.

The date column determines which days on the calendar will contain entries. The display column defines a specific row that will display a calendar date.

The calendar can be viewed in three different modes: monthly, weekly, and daily.

## 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. Accept the defaults and click Next.
5. Select the table, which has a date column and click Next.
6. Specify the date column and the column to display. Also specify whether you want to show a custom date range and allow drag and drop in the calendar. Click Next.

## Creating a Calendar

The figure consists of three screenshots labeled 7, 8, and 9, illustrating the process of creating a calendar in Oracle Application Express.

- Screenshot 7:** Shows the "Create Calendar" dialog for specifying link details. It includes fields for Page (33), Link Target (Create new edit page), Allowed Operations (Insert, Update, Delete), and Region Template (Reports Region). A scrollable list of columns is shown, including LAST\_NAME, EMAIL, PHONE\_NUMBER, HIRE\_DATE, SALARY, COMMISSION\_PCT, MANAGER\_ID, DEPARTMENT\_ID, JOB\_ID, and RATING.
- Screenshot 8:** Shows the "Create Calendar" dialog for specifying calendar attributes. It includes fields for Table / View Name (OEHR\_EMPLOYEES), Cancel Button Label (Cancel), Create Button Label (Create), Save Button Label (Apply Changes), and Delete Button Label (Delete). Buttons for Show Create, Save, and Delete are also present.
- Screenshot 9:** Shows the "Calendar Confirmation" dialog, which lists the configuration details for the calendar creation. The summary table is:

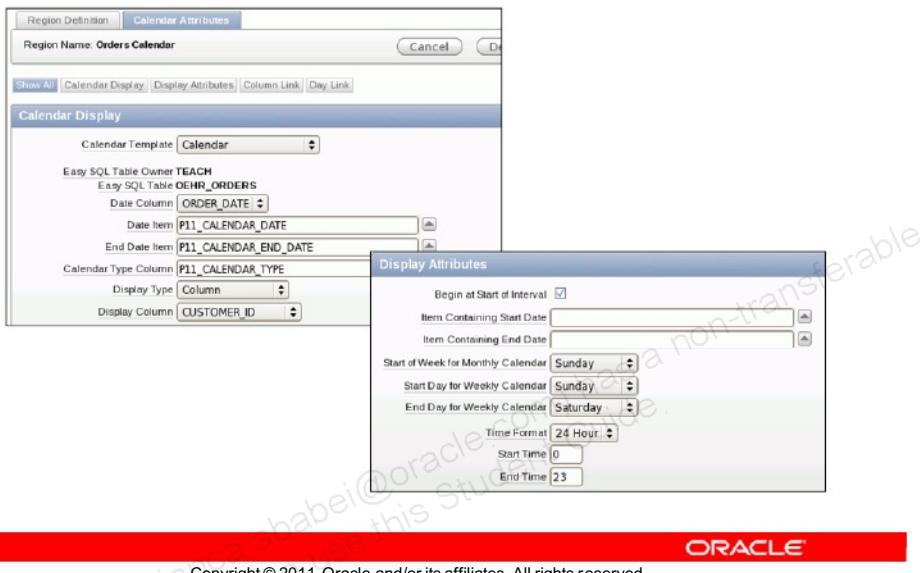
Application	130
Page	33
Page Name	Calendar
Tab Set	T_FORMS
Tab Label	
Region Title	Calendar
Region Template	Reports Region
Display Type	Partial Page Refresh
Table / View Owner	TEACH
Table / View Name	OEHR_EMPLOYEES
Date Column	HIRE_DATE
Label Column	LAST_NAME

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7. Specify the calendar page attributes and click Next. You can specify how the link column target should be.
8. Accept the defaults and click Next.
9. Click Finish.

## Editing Calendar Attributes



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Use Calendar Display attributes to specify a template, date columns, and general calendar formatting. In addition, you can define the interval in which the calendar displays, as well as define links to be placed on a day or a column in the calendar.

To modify the calendar attributes, perform the following links:

1. Navigate to the page definition where your calendar was created.
2. Under Regions, double-click the Calendar link or right-click and select Edit Calendar.

**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).

## Creating a Link from a Calendar to a Form

The screenshot illustrates the creation of a link from a calendar to a form in Oracle Application Express. On the left, the 'Column Link' configuration page shows a target page (14) and a URL target pointing to an 'Orders Calendar' page. A red box highlights the customer\_id value (105) in the calendar cell for July 14, which is linked to the master detail page. On the right, the 'Edit Order Details' page displays the order information for customer\_id 105, including the order date (19-JUL-2010), customer\_id (105), order status (2), and order total (7826). Below this, the 'Order Order Items Detail' section shows five order items with their respective line item IDs, product IDs, unit prices, and quantities.

Line Item Id	Product Id	Unit Price	Quantity
1	1791	226.0	9
2	1792	125.0	4
3	1797	315.0	12
4	1803	55.0	13
5	1808	55.0	14

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From a calendar, you can link to another page in your application. In the slide example, when a user clicks the `customer_id` in the calendar, the master detail page 14 is displayed with the detail about the order.

## Lesson Agenda

- Using Dynamic Actions
- Using Plug-Ins
- Using Charts
- Using Calendars
- Using Trees
  - What Is a Tree?
  - Creating a Tree

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## What Is a Tree?

The screenshot shows a 'Tree' region in Oracle Application Express. On the left, a tree view displays a hierarchy of employees under a manager named 'King'. The nodes are represented by small blue icons. The tree structure is as follows:

- King
  - Cambrault
  - De Haan
  - Errazuriz
  - Fripp
  - Hartstein
  - Kaufling
  - Kochhar
    - Ober
    - Greenberg
      - Chen
      - Faviet
      - Pocci
      - Solomon
      - Urman
        - Higgins
        - Mavris
        - Whalen
    - Mourgos
    - Partners
    - Raphaely
    - Russell
    - Vollman
    - Weiss
    - Zlotkey

At the top of the page, there are 'Collapse All' and 'Expand All' buttons. To the right of the tree, a block of SQL code is displayed:

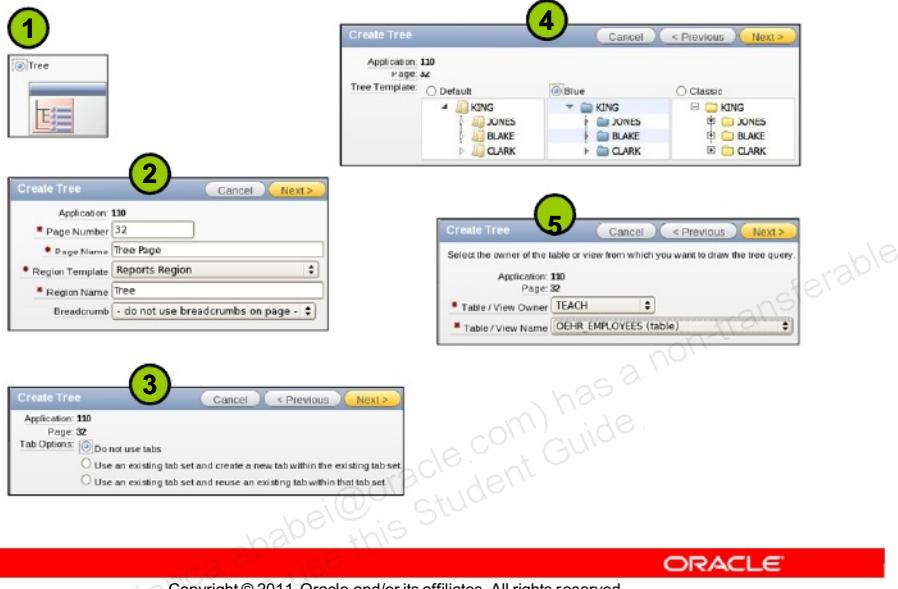
```
select case when connect_by_isleaf = 1 then 0
when level = 1 then 1
else -1
end as status,
level,
"LAST_NAME" as title,
null as icon,
"EMPLOYEE_ID" as value,
null as tooltip,
null as link
from "TEACH"."OEHR_EMPLOYEES"
start with "MANAGER_ID" is null
connect by prior "EMPLOYEE_ID" = "MANAGER_ID"
order siblings by "LAST_NAME"
```

Below the tree, a red bar contains the Oracle logo and the copyright notice: 'Copyright © 2011, Oracle and/or its affiliates. All rights reserved.'

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



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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 tasks:

1. Select Tree and click Next.
2. Enter a Page Name and Region Name, and click Next.
3. Accept the default tab option, and click Next.
4. Select the tree template that you want and click Next.
5. Accept the default schema owner and select the table or view. Click Next.

## Creating a Tree

The screenshot shows the 'Create Tree' wizard interface across four panels:

- Panel 6:** 'Create Tree' dialog. Set to 'Table: OHR\_EMPLOYEES'. Configuration includes:
  - ID:** EMPLOYEE\_ID
  - Parent ID:** MANAGER\_ID
  - Node Text:** LAST\_NAME
  - Start With:** MANAGER\_ID
  - Start Tree:** Value is NULL
- Panel 7:** 'Create Tree' dialog. Configuration includes:
  - Include Buttons:** Collapsible All (checked)
  - Selected Node Page Item:** None
  - Tooltip:** None
  - Link Option:** Nothing (radio button selected)
- Panel 8:** 'Create Tree' dialog. Includes fields for 'Where Clause' (e.g., WHERE ENAME = 'JONES') and 'Order Siblings By' (e.g., ENAME).
- Panel 9:** 'Create Tree' dialog. Summary of settings:
 

Application	130
Page	32
Page Name	Tree Page
Tab Set	T_FORMS
Tab Label	
Region Title	Tree
Region Template	Reports Region

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6. 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.
  - **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.
7. You can specify a Where and an Order By clause and click Next. In addition, you can see the query that was generated by selecting the expand icon for Current Query.  
Note that `connect_by_leaf` 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.
8. 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 tooltip for the nodes of the tree, and whether the tree state should be saved via the Selected Page Node Item, and click Next.
9. Click Finish.

## Quiz

Which of the following components would you use to effectively represent multiple-level data in your application?

- a. Calendars
- b. Lists
- c. Trees
- d. Lists of values

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**Answer: c**

## Summary

In this lesson, you should have learned how to:

- Create and use a simple dynamic action
- Import and use a plug-in
- Create charts by using a wizard
- Create a calendar
- Create a tree



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The lesson showed you how to use dynamic queries to display information based on user input, and how to create charts, calendars, and trees.

## Practice 13: Overview

This practice covers the following topics:

- Creating a Show/Hide dynamic action
- Importing and adding the Star Rating plug-in to your page
- Creating and modifying flash charts
- Creating a calendar
- Creating a tree

## Working with Themes, Templates, and Files

14

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## Objectives

After completing this lesson, you should be able to do the following:

- Define themes and their uses
- Create a new theme from the repository
- Switch to a different theme
- 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
- Using Templates
- Using Files

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## What Is a Theme?

The image displays three separate screenshots of Oracle Application Express interfaces, each representing a different theme:

- Theme 6 - Centered Blue:** This interface has a dark blue header bar with tabs for Home, Customers, Products, Orders, Charts, Admin, and Themes. The main content area shows a table of products with columns for Stock #, Product, Description, Availability, Category, and Price. A sidebar on the right contains a "Comments" section with a text input field and a "Reset" button.
- Theme 17 - Sapphire:** This interface has a light blue header bar with tabs for Home, Customers, Products, Orders, Charts, Themes, and RDS. The main content area shows a table of products with columns for Stock #, Product, Description, Availability, Category, and Price. A sidebar on the right contains a "Comments" section with a date input field and a "Reset" button.
- Theme 21 - Scarlet:** This interface has a white header bar with tabs for Home, Customers, Products, Orders, Charts, Themes, and RDS. The main content area shows a table of products with columns for Stock #, Product, Description, Availability, Category, and Price. A sidebar on the right contains a "Comments" section with a date input field and a "Reset" button.

Below the screenshots, there is a red horizontal bar containing the text "Copyright © 2011, Oracle and/or its affiliates. All rights reserved." and the Oracle logo.

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.

Oracle Application Express provides 23 themes from which you can choose to define an application's interface. Each theme comes with one or more templates for application components like reports, forms, charts, and so on. You can also create a new theme from scratch 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 some themes provided by Oracle Application Express. Each theme defines an application's user interface, including the tabs, reports, buttons, and other controls.

## Accessing the Themes Page

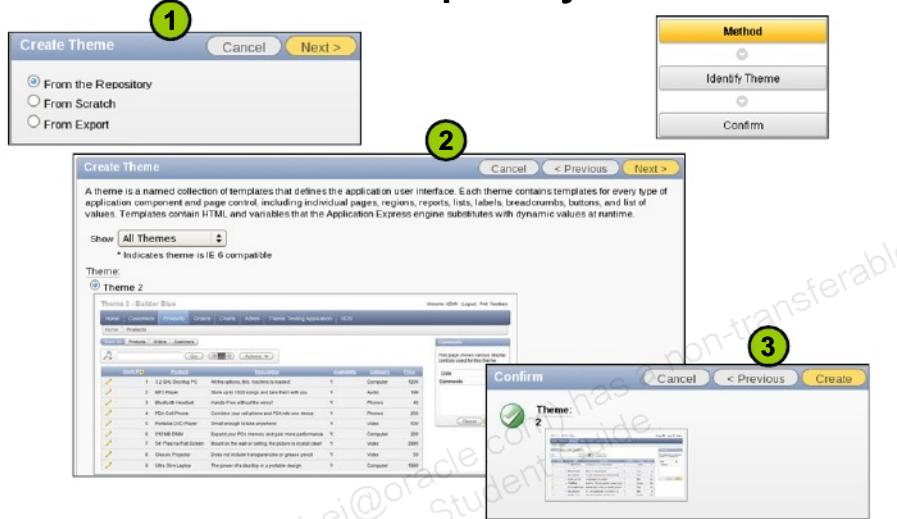
The screenshot shows the Oracle Application Express User Interface. In the top navigation bar, under 'User Interface', there is a link to 'Themes'. The main content area displays the 'Themes' page. At the top of this page are tabs for 'Themes', 'Reports', and 'History', with 'Themes' being the active tab. Below the tabs are buttons for 'Reset', 'Switch Theme', and a yellow 'Create >' button. A search bar with a magnifying glass icon and a 'Go' button is followed by a toolbar with icons for 'Actions' and a dropdown menu. The main content area lists a single theme named 'Simple Red - 1 \*'. To the right of the content area is a sidebar titled 'Themes' containing a brief description: 'A Theme is a named collection of templates used to define the user interface of an application.' Below this is a 'Tasks' section with options: Copy Theme, Delete Theme, Edit Theme, Export Theme, Import Theme, Change Identification Number, and View Templates.

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To access the Themes page for an application, click Shared Components from the applications 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



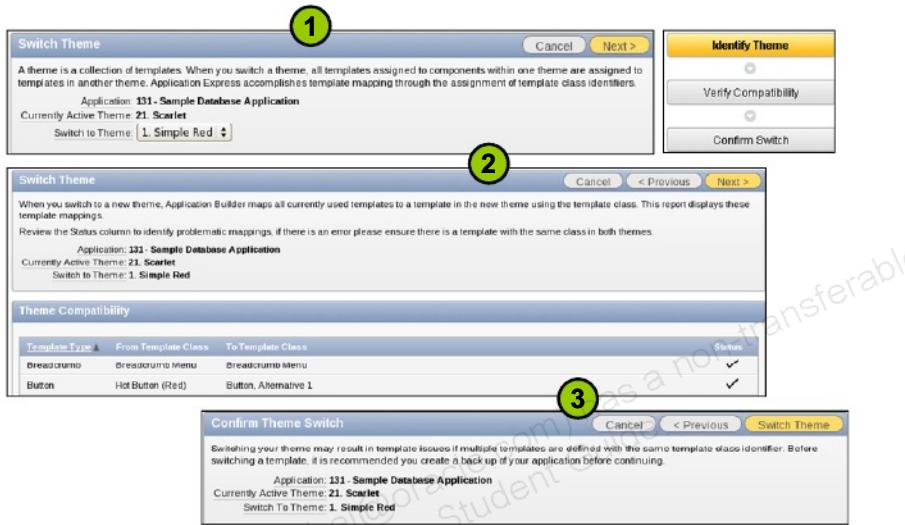
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To create a new theme for your application from the Oracle Application Express repository, click the Create button in the Themes page and perform the following steps:

1. Select "From the Repository" and click Next.
2. Select a theme and click Next.
3. Click Create to create the selected theme for the application.

## Switching Between Themes



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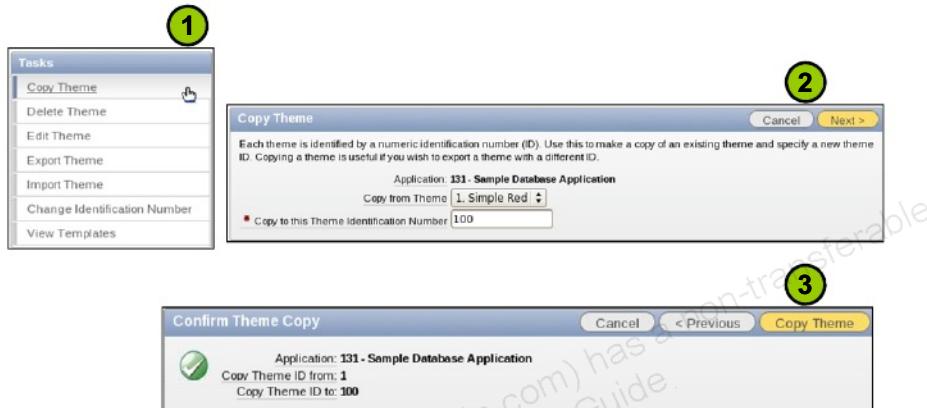
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You can switch between the themes available for an application (that is, those displayed in the Themes page of an application). When you switch to a new theme, all the components that are assigned a template are assigned to a corresponding template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

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

1. Select 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.

## Creating a Copy of an Existing Theme



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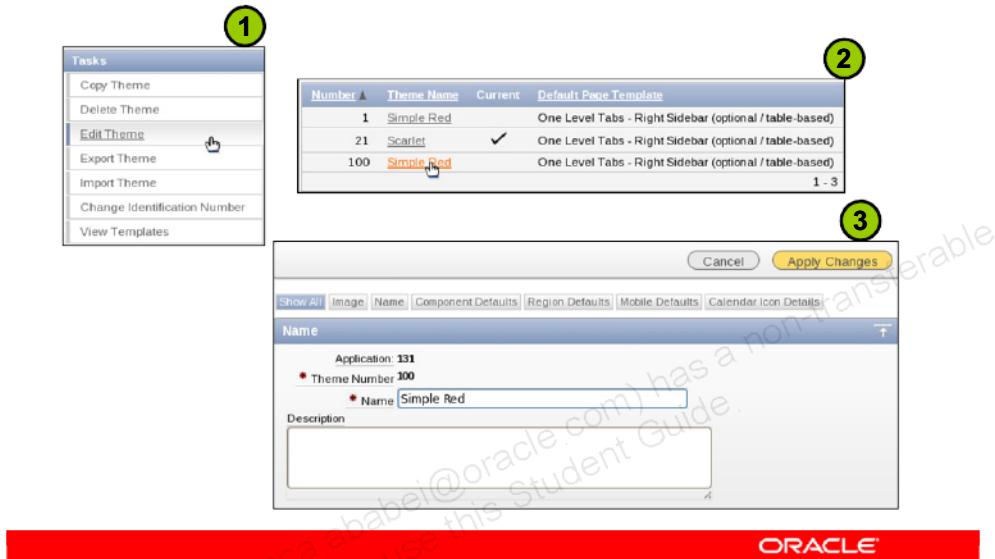
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Instead of creating a theme from scratch, you can choose to copy an existing theme and make changes to it. Navigate to the Themes page and perform the following steps.

1. In the Tasks section, click Copy Theme.
2. Select the theme that you want to copy and enter an identification number 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



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To edit a theme, perform the following steps:

1. From the Tasks section, click Edit Theme.
2. Select the theme that you want to edit.
3. You can change the theme name, component and region defaults, and so on. Click the appropriate tab and make changes. Click Apply Changes to save your modifications.

## Quiz

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

- a. Workspace themes are available to all developers within the workspace.
- b. You can add a custom theme to the theme repository only at the workspace level.
- 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**

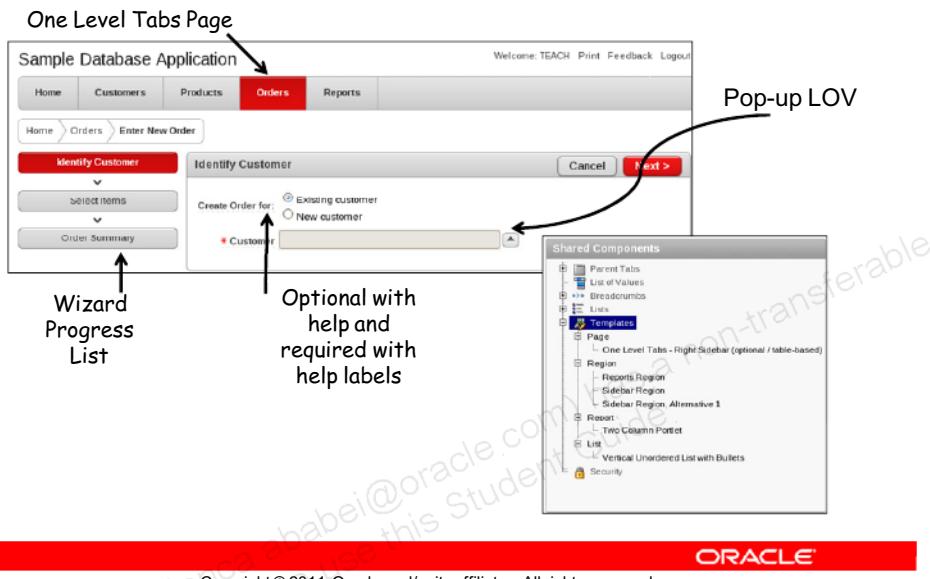
## Lesson Agenda

- 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
  - Changing the Default Templates for a Theme
  - Overriding Application Defaults at the Page Level
  - Using Substitution Strings in Templates
- Working with Files

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## What Are Templates?



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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 applications theme. Alternately, 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).

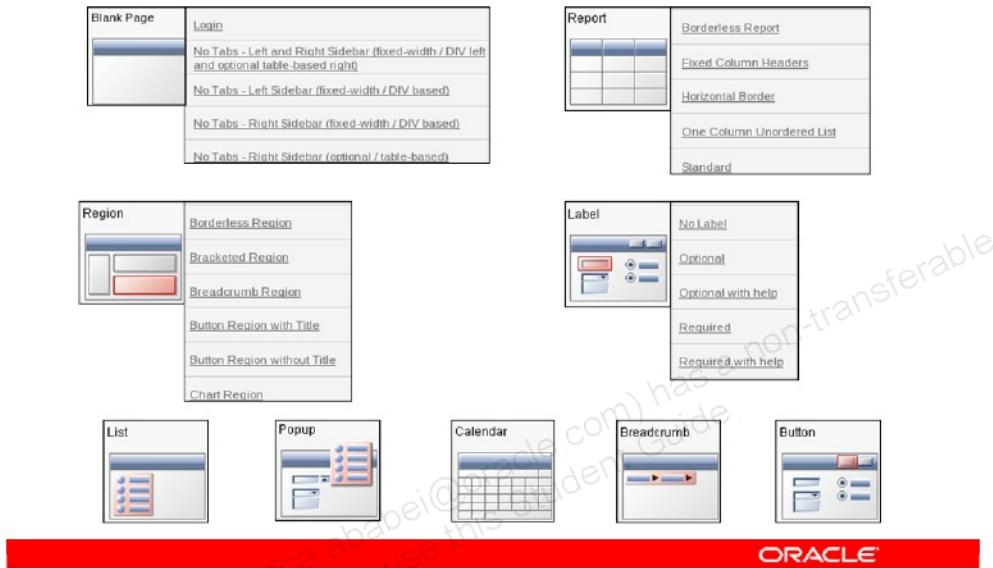
Templates facilitate the separation of business logic from user interface. The developers of your organization can focus on the code for the business logic, whereas the graphic artists can concentrate on the look and feel. The advantages of using templates are as follows:

- 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 in a page can be accessed from the Shared

Components region of the page definition.

## Types of Templates



Oracle Application Express offers nine types of templates. Each theme comes with one or more templates for each type. The slide shows some of the templates available for the Page, Report, Region, and Label types. Page templates control the appearance of the navigation bars, the parent tabs, and the standard tabs. Region templates control the display of region titles, buttons, and so on. Report templates control the format of the displayed report. The Label, List, Popup, Calendar, Breadcrumb, and Button templates specify how those respective components should be displayed.

## Accessing the Templates Page

The screenshot shows the Oracle Application Express User Interface. A green circle labeled '1' highlights the 'Templates' option in the 'User Interface' sidebar. A green circle labeled '2' highlights the main content area, which displays the 'Templates' page. The page has a toolbar with tabs: Templates, Subscription, Publish, Utilization, and History. Below the toolbar are search and filter fields: Template Name, Since, Theme (set to 1. Simple Red), Referenced, Type (set to All), Subscribed, and Go button. A 'Create >' button is also present. The main area lists templates in a table:

Type	Name	References	Updated	Updated By	Subscribed	Default	Theme	Preview	Copy
Breadcrumb	Breadcrumb Menu	0	11 days ago	teach	-	-	1	-	
	Hierarchical Menu	0	11 days ago	teach	-	-	1	-	
Button	Button	0	11 days ago	teach	-	-	1	-	

At the bottom right is the ORACLE logo, and at the bottom center is the copyright notice: Copyright © 2011, Oracle and/or its affiliates. All rights reserved.

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.

Region	Description	Last Modified	Owner	Rows	Columns	Actions
Borderless Region		3 days ago	teach	-	-	100
Bracketed Region		3 days ago	teach	-	-	100
Breadcrumb Region		1 day ago	teach	-	-	100
Button Region with Title		3 days ago	teach	-	-	100
Button Region without Title		3 days ago	teach	-	-	100
Buttons and Titles Customized		89 minutes ago	teach	-	-	100
Chart Region		3 days ago	teach	-	-	100
Form Region		3 days ago	teach	-	-	100
Hide and Show Region		3 days ago	teach	-	-	100
List Region with Icon		3 days ago	teach	-	-	100
Navigation Region		3 days ago	teach	-	-	100
Navigation Region, Alternative 100		3 days ago	teach	-	-	100
Region with Buttons and Titles		65 minutes ago	teach	-	-	100

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If you must 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.

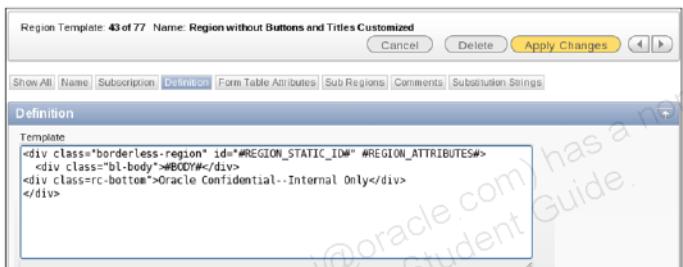
To copy a template, perform the following steps:

1. From 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 Button Region without Titles template.

## Editing a Template



Region	Borderless Region	0	3 days ago	teach	-	-	100		
	Navigation Region	1	3 days ago	teach	-	-	100		
	Navigation Region Alternative 100	0	3 days ago	teach	-	-	100		
	Region without Buttons and Titles	0	65 minutes ago	teach	-	-	100		
	Region without Buttons and Titles Customized	1	35 minutes ago	teach	-	-	100		



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In situations where you want to add some company-specific text or style, you can edit the template.

To edit a template, do the following:

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.

## Applying a Template

The screenshot shows the Oracle Application Express Page Rendering interface. In the top navigation bar, there is a 'Regions' link. The main content area displays a tree structure under the 'Regions' node. The 'Customers' node is expanded, showing its children: 'Before Header', 'After Header', 'Before Regions', and 'Regions'. The 'Regions' node itself has three options: 'Create', 'Edit All' (which is highlighted with a blue background), 'Expand All', and 'Collapse All'. A 'NEW' button is located at the bottom left of the tree. Below the tree, the 'Regions' node is expanded again, showing 'Before Regions', 'Before Footer', 'After Footer', and 'Dynamic Actions'. At the bottom of the page, there is a table listing regions. The first row shows a sequence of 10, a column of 1, a region name of 'Customers', a template of '100. Region without Buttons and Titles Customized', and a type of 'Interactive Report'. There are also buttons for 'Regions', 'Delete Multiple Regions', 'Utilities', and 'History' at the top of the table area. An 'Apply Changes' button is located at the top right of the table area. The page footer contains the ORACLE logo and the copyright notice: 'Copyright © 2011, Oracle and/or its affiliates. All rights reserved.'

To associate a template with a region, navigate to the page definition and right-click the Regions node. Select Edit All. A list of all regions in the page appears. For the region to which you want to apply a new template, select the appropriate template from the drop-down list and click Apply Changes. Run the page to ensure that the template change takes effect.

## Applying a Template: Output

The screenshots illustrate the visual impact of applying a template to an Oracle Application Express page. The 'Before' page shows a standard grid layout with a light gray background. The 'After' page shows the same data but with a red footer bar containing copyright information and the Oracle logo.

**Before**

Customer Name	Address	City	State	ZIP Code
Bradley, Eugene	Schnepphoester Road	Windsor Locks	CT	06096
Dulles, John	45020 Aviation Drive	Sterling	VA	20166
Hartsfield, William	6000 North Terminal Parkway	Atlanta	GA	30320
LaGuardia, Fiorella	Hangar Center, Third Floor	Flushing	NY	11371
Lambert, Alber	10701 Lambert International Blvd.	St. Louis	MO	63145
Logan, Edward	1 HarborSide Drive	East Boston	MA	02128
O'Hare, Edward "Butch"	10000 West O'Hare	Chicago	IL	60666

**After**

Customer Name	Address	City	State	ZIP Code
Bradley, Eugene	Schnepphoester Road	Windsor Locks	CT	06096
Dulles, John	45020 Aviation Drive	Sterling	VA	20166
Hartsfield, William	6000 North Terminal Parkway	Atlanta	GA	30320
LaGuardia, Fiorella	Hangar Center, Third Floor	Flushing	NY	11371
Lambert, Alber	10701 Lambert International Blvd.	St. Louis	MO	63145
Logan, Edward	1 HarborSide Drive	East Boston	MA	02128
O'Hare, Edward "Butch"	10000 West O'Hare	Chicago	IL	60666

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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.



```
<!DOCTYPE html>
<html lang="#&#ROWER_LANGUAGE." xmlns="http://www.w3.org/1999/xhtml"
  xmlns:htmldb="http://htmldb.oracle.com" xmlns:apex="http://apex.oracle.com">
<head>
  <title>#TITLE#</title>
  <link rel="icon" href="#IMAGE_PREFIX#favicon.ico" type="image/x-icon">
  <link rel="shortcut icon" href="#IMAGE_PREFIX#favicon.ico" type="image/x-icon">
  #HEAD#
  <link rel="stylesheet" href="#IMAGE_PREFIX#themes/theme_1/css/theme_4_0.css"
    type="text/css" />
  <!--[if IE]><link rel="stylesheet" href="#IMAGE_PREFIX#themes/theme_1
  /css/theme_4_0_ie.css" type="text/css" /><![endif]-->
  <!--[if !IE 6]><link rel="stylesheet" href="#IMAGE_PREFIX#themes/theme_1
  /css/theme_4_0_ie6.css" type="text/css" /><![endif]-->
  <!--[if IE 7]><link rel="stylesheet" href="#IMAGE_PREFIX#themes/theme_1
```

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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 three panels illustrating the process of changing default templates in a theme:

- Tasks Panel (Left):** Shows a list of tasks including "Edit Theme". A green circle labeled "1" highlights the "Edit Theme" link.
- Theme List (Top Center):** A table showing themes. The row for "Scarlet" is selected (highlighted in yellow), and a green circle labeled "2" highlights the "Edit" link next to it. The table has columns: Number, Theme Name, Current, and Default Page Template.
- Component Defaults (Bottom Center):** A configuration dialog for "Component Defaults". It includes tabs for "Page", "Error Page", "Printer Friendly Page", and "Region Defaults". The "Page" tab is selected. It lists various components with dropdown menus for template selection. A green circle labeled "3" highlights the "Apply Changes" button at the top right.

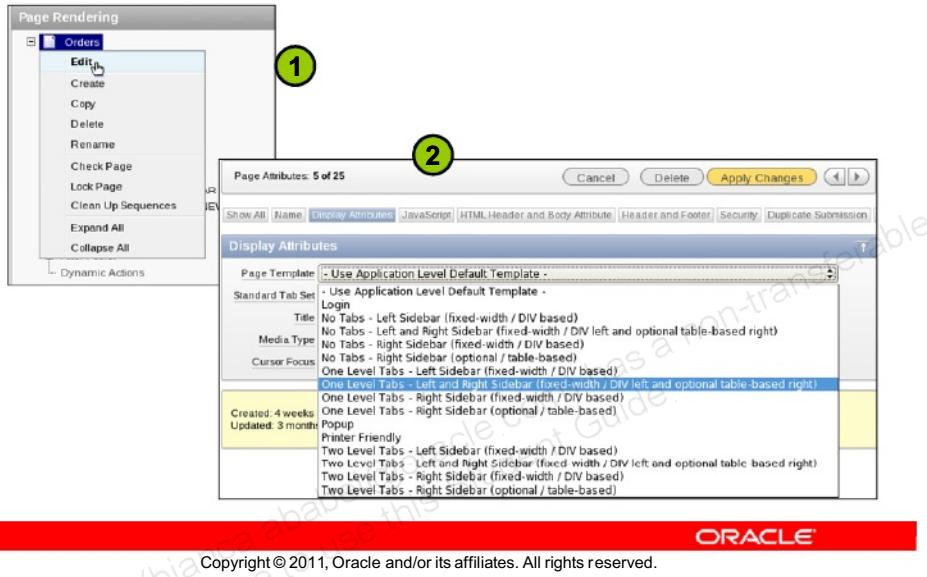
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You can change the default templates for each type of template in a theme. Perform the following steps:

1. From the Tasks section on the Themes page, select Edit Theme.
2. Select the theme 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, but for a particular page you want to use a different template. For example, you can specify a page template default to be "One Level Tabs – Right Sidebar." But for a specific page, you want to use "One Level Tab – Left and Right Sidebar." To specify the page-level template, perform the following steps:

1. Navigate to the page definition and right-click the page node. Select Edit.
2. Click the Display Attributes tab and select the required template for the Page Template field.

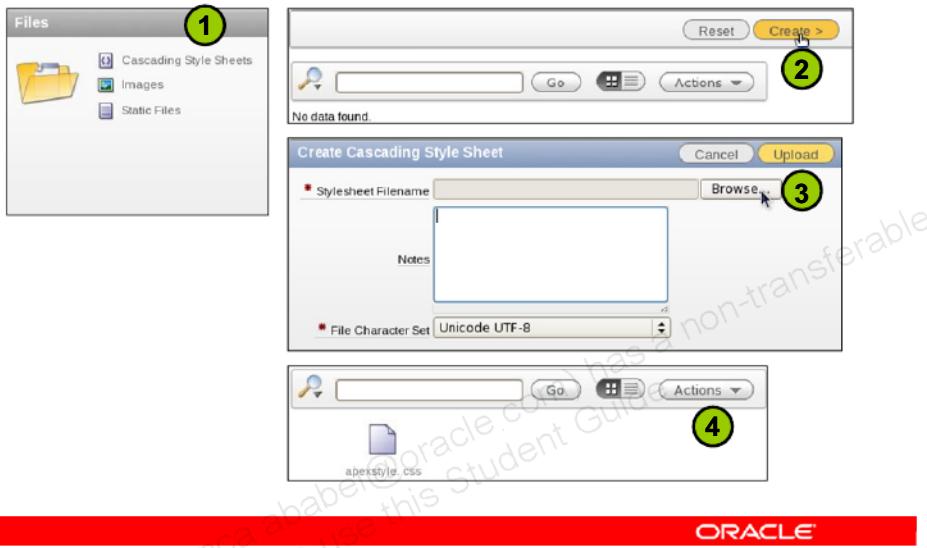
## Lesson Agenda

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

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## Uploading a Cascading Style Sheet



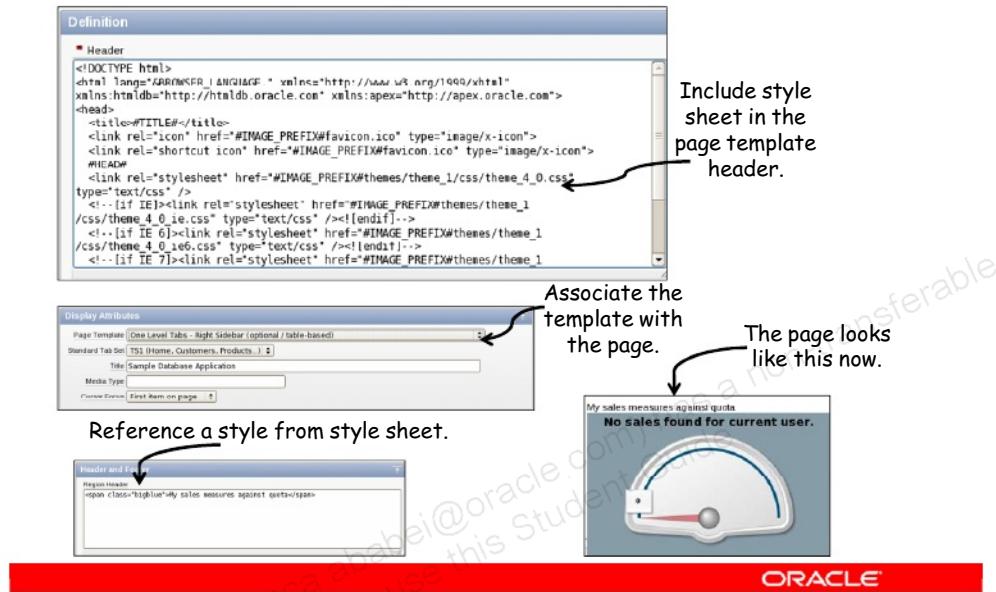
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To upload a CSS, navigate to the Shared Components page of the application and perform the following steps:

1. Under Files, click Cascading Style Sheets.
2. The Cascading Style Sheets page appears. Click the Create button.
3. Browse for the .css file and click Upload.
4. The file is uploaded successfully.

## Referencing a Cascading Style Sheet



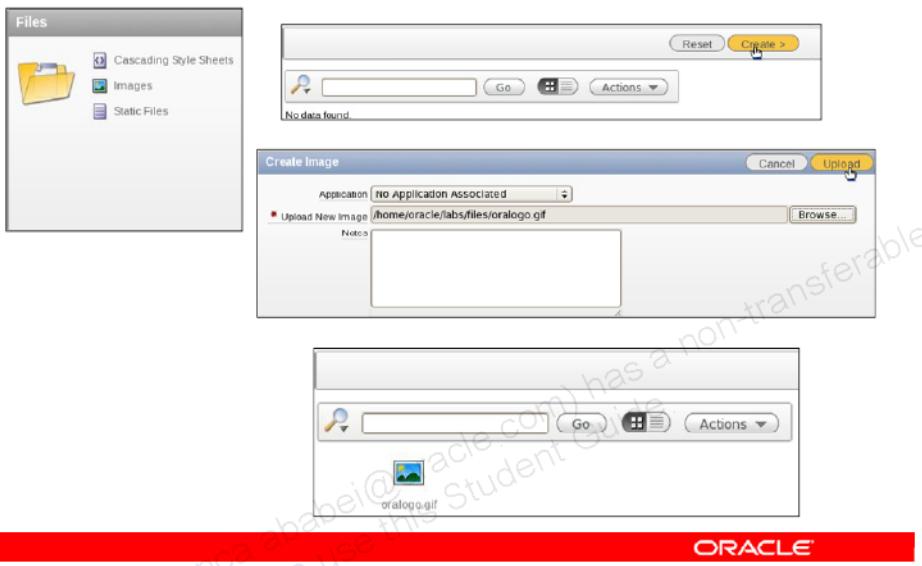
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You can reference an uploaded CSS through the Header section of a page template. You use the Header section to enter the HTML that makes up the `<HEAD>` section of the HTML document. To reference a CSS, perform the following steps:

1. Navigate to the Shared Components page and from the User Interface region, click Templates.
2. Select the page template that you want to edit.
3. Click the Definition tab. Notice that in the header field, the `<link>` tag is used to reference the style sheet. You can include a `<link>` tag to reference your style sheet here. You need to use the `#WORKSPACE_IMAGES#` substitution string to reference files uploaded to the workspace.
4. Click Apply Changes to save the template.
5. Navigate to the page definition of the page where you want to use the style sheet and right-click the page name node. Select Edit and click the Display Attributes tab.
6. From the Page Template drop-down list, select the page template that you modified previously and click Apply Changes.
7. You can now reference the styles in the style sheet in regions in the page. In the slide example, a `bigblue` style is applied to some text and the outcome of the page is also shown.

## Uploading an Image



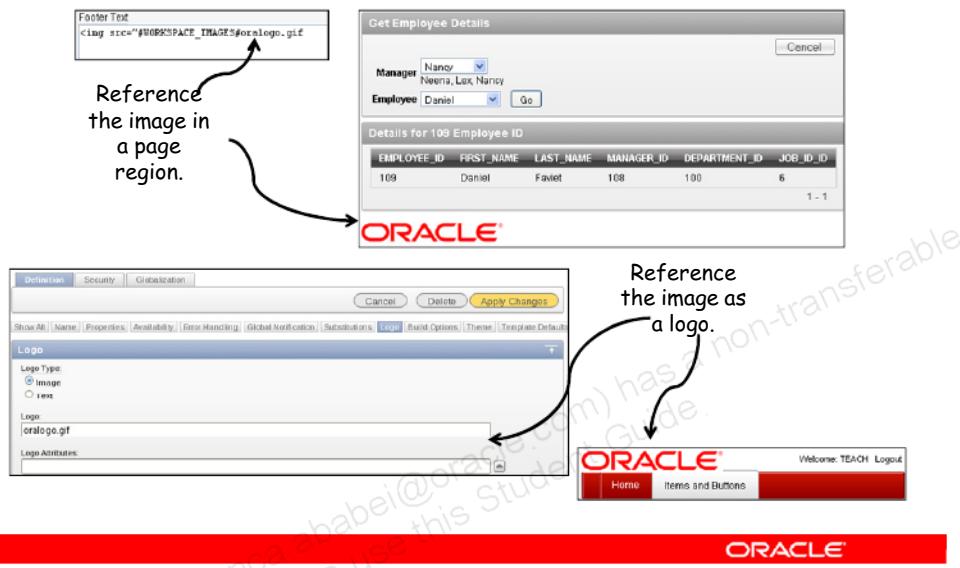
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You can upload images that you want to reference in your application. To upload an image, navigate to the Shared Components page of the application and perform the following steps:

1. Under Files, click Images.
2. The Images page appears. Click the Create button.
3. Browse for the image file and click Upload.
4. The file is uploaded successfully.

## Using an Uploaded Image



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You can reference images uploaded to a workspace in application pages or as a logo for the application. To reference an image in 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. Click the Logo tab and specify the image name in the Logo field.

## Quiz

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

- a. #IMAGE\_PREFIX#
- b. #APP\_IMAGES#
- c. #WORKSPACE\_IMAGES#

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**Answer: c**

## 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
- 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.

## Practice 14: Overview

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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# 15

## Administering Oracle Application Express Workspaces

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## Objectives

After completing this lesson, you should be able to do the following:

- Create a developer and a workspace administrator user
- Request a schema or extra storage
- Monitor the developer activity log
- Monitor workspace activity
- View dashboards



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In this lesson, you learn about the administrative tasks performed in a workspace, such as managing services, managing users, and monitoring workspace activity.

## Lesson Agenda

- Using the Administration Page
  - Review
  - Accessing the Administration Page
  - Access to Administrative Tasks
- Creating Users and Groups
- Managing Services
- Monitoring Activity
- Using Dashboards

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## Review

Is the following statement true or false?

*A workspace is a private database space that is used by a single developer to create Oracle Application Express applications.*

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**Answer: False**

A workspace can be shared by multiple developers to develop web applications.

## Review

Match the roles to their correct descriptions:

Descriptions	Roles
1. I create workspaces and workspace administrators.	a) End User 
2. I manage a workspace and create developers and users for the workspace.	b) Developer 
3. I create and modify applications and database objects.	c) Workspace Administrator 
4. I can only run an application.	d) Instance Administrator 

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### Answer

- 1 – d
- 2 – c
- 3 – b
- 4 – a

## Accessing the Workspace Administration Page



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You can perform administrative tasks from the Administration home page. You can access the Administration home page by doing one of the following:

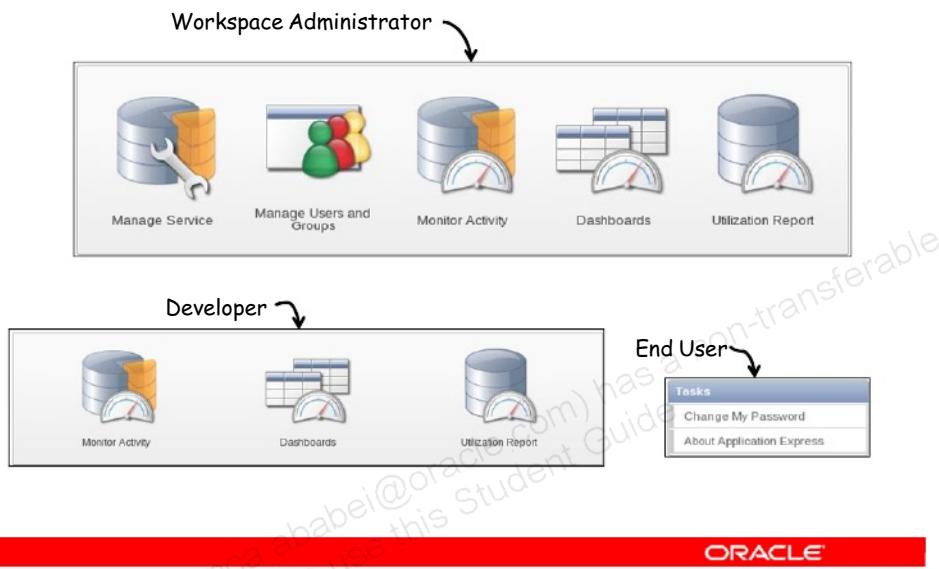
- Clicking the Administration icon from the Oracle Application Express home page
- Clicking the Administration tab

The Administration page provides links to administrative tasks for the specific workspace.

Depending on whether you are an administrator, developer, or end user, you perform one or more of the following:

- Manage services and requests
- Manage Oracle Application Express users and groups
- Monitor workspace activity
- View dashboards
- Report utilization

## Access to Administrative Tasks



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Depending on the type of user, the administrative tasks are:

- **End user:** An end user is capable of changing only his or her password by using the Administration interface.
- **Developer:** A developer can, in addition to what an end user can do, monitor the activity in the workspace and view the dashboards.
- **Workspace administrator:** A workspace administrator can, in addition to what the developer can do, manage the users and services in the workspace.

## Lesson Agenda

- Using the Administration Page
- Creating Users and Groups
  - Creating Oracle Application Express Users
  - Setting Privileges
  - Creating a User Group
- Managing Services
- Monitoring Activity
- Using Dashboards

**Note:** These tasks can be performed only by a workspace administrator.

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## Creating Oracle Application Express Users



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To create Oracle Application Express users, perform the following steps:

1. Click the Manage Users and Groups icon from the Administration page.
2. On the Users page, click the Create User button.
3. Fill in all the details for the user (username, email address, and so on), and click Create User.

The user is successfully created.

The privileges required for the different types of Oracle Application Express users are discussed on the next page.

**Note:** From the Tasks section on the Administration home page, you can click the Create Multiple Users link to quickly create bulk users.

## Setting User Privileges

Set to No to create a workspace administrator.

The screenshot shows the 'Account Privileges' dialog box. It includes fields for 'Default Schema' (set to 'TEACH'), 'Accessible Schemas (null for all)', and several radio button groups for user roles:

- 'User is a workspace administrator': Radio buttons for 'Yes' (unchecked) and 'No' (checked).
- 'User is a developer': Radio buttons for 'Yes' (checked) and 'No' (unchecked).
- 'Application Builder Access': Radio buttons for 'Yes' (checked) and 'No' (unchecked).
- 'SQL Workshop Access': Radio buttons for 'Yes' (checked) and 'No' (unchecked).
- 'Team Development Access': Radio buttons for 'Yes' (checked) and 'No' (unchecked).

Set to Yes to create an end user.

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While creating an Oracle Application Express user, you set the account privileges depending on the type of user that you want to create. For each user, you can set the default schema and enter a list of accessible schemas. The slide screenshot shows the setting required to create a Developer user. You also have the option to deny access to a particular component (such as Application Builder or SQL Workshop) to a user.

## Creating a User Group



In addition to creating users, you can also create a user group and add the users as part of this group.

To create a new user group, navigate to the Users page and perform the following steps:

1. Click the Groups tab.
2. Click the Create User Group button.
3. Enter a group name and click Create Group.

## Assigning a User to a Group

Edit	User	Email	Account Type	Default Schema	Locked	Password Status	Builder	Last Login	Created
	DEV01	dev01@oracle.com	Developer	TEACH	No	Password Valid	-	16 hours ago	



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After creating a user group, you can add users to that group. To add a particular user to a group, navigate to the Users page. Click the Edit icon next to the user that you want to add to a group. Scroll to the bottom of the page, where the available groups are listed in the User Groups section. Select the group and click the > button to assign a group to the user. A user can be part of more than one group. Click Apply Changes.

## Lesson Agenda

- Using the Administration Page
- Creating Users and Groups
- Managing Services
  - Overview
  - Creating a Service Request
  - Setting Workspace Preferences
  - Creating Announcements
  - Viewing Workspace Utilization Reports
- Monitoring Activity
- Using Dashboards

**Note:** These tasks can be performed only by a workspace administrator.

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## Overview

Home > Administration > Manage Service

Make a Service Request   Set Workspace Preferences   Edit Announcement   Workspace Utilization

Manage Meta Data

- Developer Activity and Click
- Count Logs
- Session State
- Application Cache
- Websheet Database Objects
- Application Build Status
- Application Models
- File Utilization
- Interactive Report Settings

Dashboards

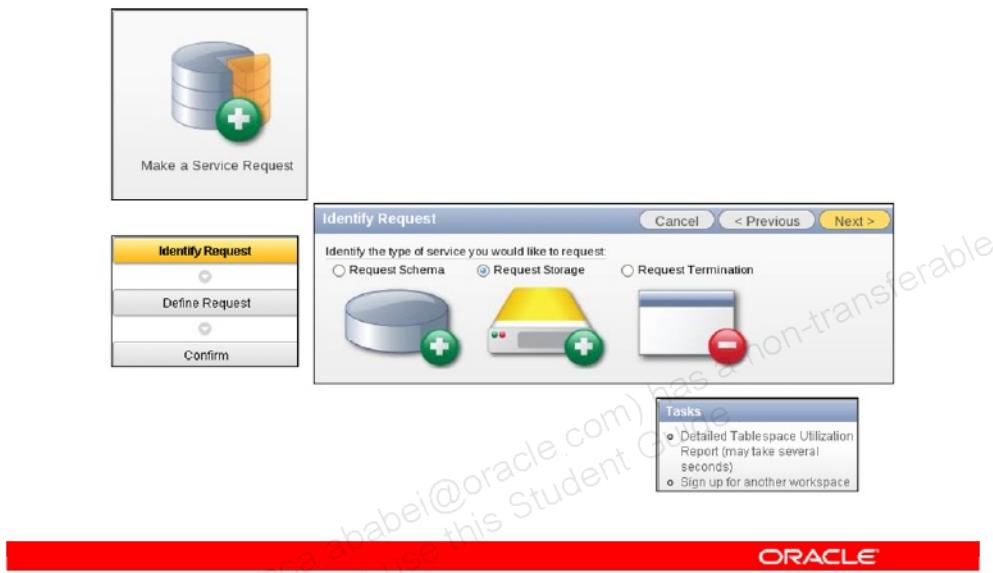
- Workspace
- Users
- Activity
- Developer Activity
- Performance
- Websheets
- Applications
- Database

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You can use the Manage Services page to manage your workspace environment. To access the Manage Services page, click the Manage Services icon on the Administration page. From the Manage Services page, you can create service requests, set preferences for the workspace, create and edit workspace announcements, and view various reports on workspace utilization. The Manage Services page also provides links to view the dashboards and perform tasks such as managing session state, application models, and websheet database objects.

## Creating a Service Request

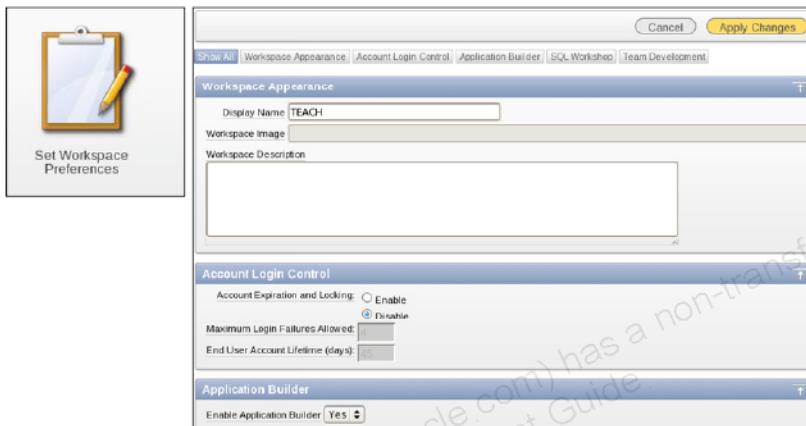


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As a workspace administrator, you can request a new database schema or request more storage for an existing schema. In addition, you can also terminate a service request. To create a service request, click the “Make a Service Request” icon on the Manage Services page. A wizard appears. Select an option depending on the type of service that you want to create and click Next to proceed. Note that the storage capacity list when requesting additional storage is controlled by the Instance Administrator, who can restrict users’ additional storage to less than 50 MB.

Under the Tasks section, you also have links to view a detailed report on workspace utilization and to sign up for a new workspace.

## Setting Workspace Preferences



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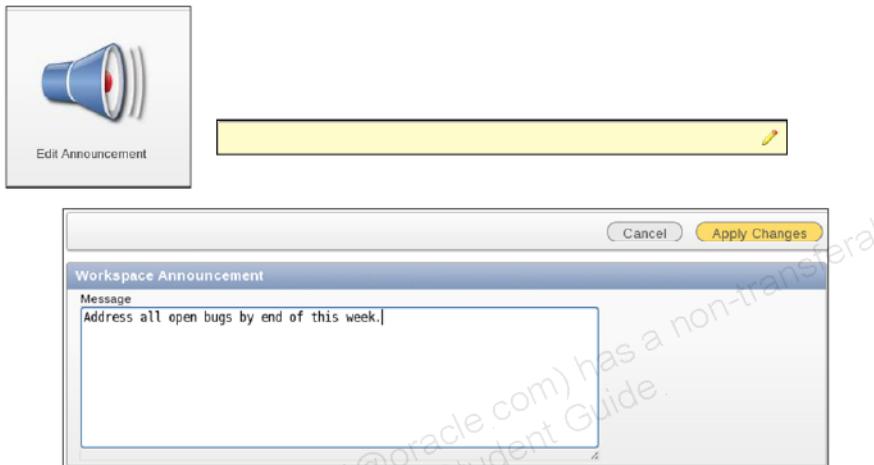
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To set workspace preferences, click the Set Workspace Preferences icon on the Manage Services page. You can set the preferences as described in the following list. Click Apply Changes to save the settings.

- **Account Login Control:** For each workspace, you can enable the following controls:
  - Require end-user account expiration and locking
  - Set up a maximum number of failed login attempts for end-user accounts. If the user exceeds this number, the account is locked. The Workspace Administrator will have to unlock the account.
  - Set the password lifetime for end-user accounts—that is, the number of days an end-user account password can be used before it expires
- **Enable or Disable** the Application Express components
- **PL/SQL Editing:** By default, in SQL Workshop, developers can change and compile PL/SQL source code when browsing database procedures, packages, and functions.

You can select “Do not allow PL/SQL program unit editing” on the Preferences page to disable PL/SQL program unit editing by users.

## Creating Announcements



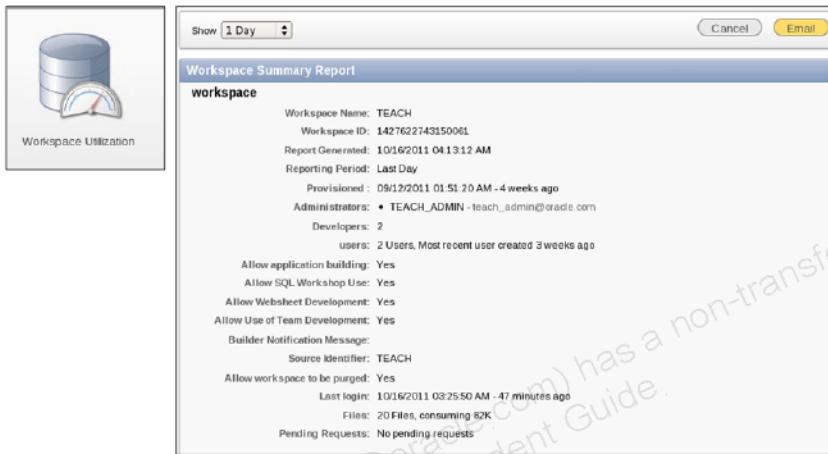
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You can create announcements that can be read by all users in a workspace. To create an announcement, navigate to the Manage Services page and click the Edit Announcement icon. You can also click the Edit icon in the announcement region to create or edit an announcement.

On the Workspace Announcement page, enter the announcement and click Apply Changes. This announcement can now be read by all users when they log in to this workspace.

## Viewing Workspace Utilization Reports



The screenshot shows a workspace utilization report for a workspace named 'TEACH'. The report includes details such as workspace name, ID, generation date, reporting period, provisioning date, administrators, developers, users, application building, SQL workshop use, websheet development, team development, builder notification message, source identifier, workspace purge status, last login, files consumed, and pending requests. Buttons for 'Show' (set to 1 Day), 'Cancel', and 'Email' are visible at the top right.

Setting	Value
Workspace Name	TEACH
Workspace ID	1427622743150061
Report Generated	10/16/2011 04:13:12 AM
Reporting Period	Last Day
Provisioned	09/12/2011 01:51:20 AM - 4 weeks ago
Administrators	• TEACH_ADMIN - teach_admin@oracle.com
Developers	2
Users	2 Users, Most recent user created 3 weeks ago
Allow application building	Yes
Allow SQL Workshop Use	Yes
Allow Websheet Development	Yes
Allow Use of Team Development	Yes
Builder Notification Message	
Source Identifier	TEACH
Allow workspace to be purged	Yes
Last login	10/16/2011 03:25:50 AM - 47 minutes ago
Files	20 Files, consuming 82K
Pending Requests	No pending requests

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If you click the Workspace Utilization icon on the Manage Services page, a workspace summary report is displayed. This report gives a summarized view of all the activity in the workspace and all the contents of the workspace. You can email this report from Oracle Application Express directly by clicking the Email button. On the Email page, enter the recipients' email addresses and a subject for the email. You can also include additional content in the body field. Click Email to send an email with the summary report to the specified recipients.

## Lesson Agenda

- Using the Administration Page
- Creating Users and Groups
- Managing Services
- **Monitoring Activity**
- Using Dashboards

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## Monitoring Real-Time Activity

The screenshot shows the Oracle Application Express Monitor Activity page. The top navigation bar has tabs for 'Real Time Activity' (selected) and 'Archived Activity'. A 'View Dashboard' button is in the top right. The main area is divided into several sections:

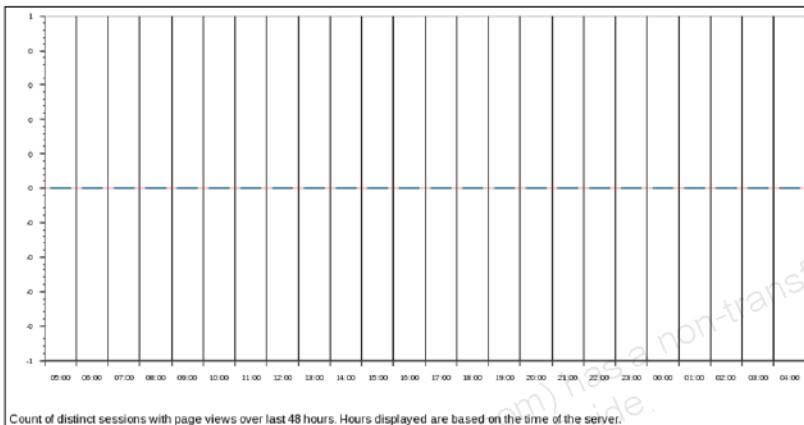
- Page Views:** By View, By User, By Application, By Application and Page, By Day, By Hour, By Interactive Report.
- Developer Activity:** By Developer, By Developer Pie Chart, By Day, By Application, Application Changes, detailed, By Day, Monthly View.
- Page View Analysis:** Most Viewed Pages over All Applications, Monthly Calendar of Page Views by Day, Line Chart of Usage by Day, By Weighted Page Performance, Worksheet Page Views.
- Sessions:** Active Sessions, User Chart of Active sessions by Hour.
- Login Attempts:** Login Attempts, Login Attempts by Authentication Result, Developer Login Summary.
- Environment:** By User Agent, By Browser, By External Click, By Operating System.
- Application Errors:** Application Errors.
- Workspace Schema Reports:** Schema Tablespace Utilization, Database Privileges by Schema, Workspace Schemas, Report Tablespace Utilization (popup).

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From the Monitor Activity page, you can view reports on various activities within the workspace. To access the Monitor Activity page, navigate to the Administration page and click the Monitor Activity icon. On the Monitor Activity page, the reports are grouped into real-time activity and archived activity.

The slide shows the reports available for monitoring real-time activity. Using these reports, you can track page views, developer activity, active sessions in the workspace, login attempts, environment details, application errors, and workspace schema reports. Some examples of using these reports are to identify the slowest pages that are accessed the most, the most active developers in the workspace, and the active sessions running in the workspace.

## Viewing an Activity Report



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The slide shows the “Bar Chart of Active Session by Hour” report.

Each time you log in to an Oracle Application Express application, the Oracle Application Express engine creates a record in a database table, storing a session ID, user credentials, date created, and other information. An active session is a session that has not yet been purged from the sessions database table.

## Monitoring Archived Activity

The screenshot shows the Oracle APEX Monitor Activity page. At the top, there are two tabs: 'Real Time Activity' and 'Archived Activity'. The 'Real Time Activity' tab is selected. Below the tabs, there's a section titled 'Activity Reports' with a magnifying glass icon. Underneath are four report links: 'By Application per Day' (highlighted with a red box), 'By Day', 'By Application', and 'Chart of Page Events by Day for last 90 days'. A red arrow points from the 'By Application per Day' link to a large table below. The table has columns: Log Day, Application, Page Events, Worksheet Views, Rows Fetched, Pages, Users, Sessions, Median Render Time, Total Render Time, and Content. The data in the table spans from October 14, 2011, to October 12, 2011, showing various application logs and their performance metrics.

Log Day	Application	Page Events	Worksheet Views	Rows Fetched	Pages	Users	Sessions	Median Render Time	Total Render Time	Content
10/14/2011	131	16	0	65	5	2	2	0.06	1.17	0
10/14/2011	110	35	0	355	6	2	3	0.04	1.22	0
10/14/2011	4000	1	0	0	1	1	1	0.70	0.70	0
10/14/2011	4500	9	0	26	6	1	2	0.38	3.18	0
10/14/2011	4550	1	0	0	1	1	1	0.04	0.04	0
10/14/2011	4000	394	0	3,353	71	1	3	0.12	56.25	0
10/13/2011	131	20	0	13	6	2	2	0.05	1.53	0
10/13/2011	4550	6	0	0	1	1	6	0.09	0.64	0
10/13/2011	110	13	0	389	4	2	1	0.05	0.86	0
10/13/2011	4500	77	0	65	23	1	7	0.11	13.74	0
10/13/2011	4300	20	0	6	8	1	2	0.09	3.19	0
10/13/2011	4000	207	0	1,568	45	1	6	0.15	76.19	0
10/12/2011	4000	457	0	2,836	89	1	5	0.12	81.23	0
10/12/2011	4550	5	0	0	1	1	5	0.08	0.33	0
10/12/2011	4300	84	0	38	8	1	2	0.09	9.55	0

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From the Monitor Activity page, you can also view reports on archived workspace activity. Click the Archived Activity tab to see the list of reports that you can view.

## Quiz

Which of the following tasks can you perform as a workspace administrator? (Choose all that apply.)

- a. Disallow PL/SQL program unit editing.
- b. Enable account expiration and locking.
- c. Set the maximum log-in failures allowed for an end user.

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**Answer: a, b, c**

## Lesson Agenda

- Using the Administration Page
- Creating Users and Groups
- Managing Services
- Monitoring Activity
- Using Dashboards
  - Viewing the Workspace Dashboard
  - Viewing the Users Dashboard
  - Viewing the Database Dashboard
  - About Other Dashboards

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## Viewing the Workspace Dashboard

The screenshot shows the Oracle Application Express Workspace Dashboard for workspace TEACH. The dashboard has a header with tabs: Workspace, Users, Activity, Developer Activity, Performance, Websheets, Applications, and Database. Below the tabs are buttons for Manage Services, Report Utilization, and Refresh. The main content area is divided into three sections: Service, Available Schemas, and Files. The Service section contains a table with the following data:

Service	Value
Workspace Name	TEACH
Applications	8
Application Pages	77
SQL Scripts	4
Websheets	0
Schemas	1
Open Requests	0

The Available Schemas section shows a single schema named TEACH. The Files section displays statistics for files:

Files	Value
Total File Size	82KB
File Count	20
File Types	9

At the bottom, there is a section for Recent Service Requests with one entry: "Workspace Request - APPROVED - MB" from 4 weeks ago.

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A dashboard provides summarized details about the current workspace. To access the Dashboard page, navigate to the Administration page and click the Dashboards icon. The Workspace dashboard, shown in the slide, summarizes the number of applications in the workspace, the total number of application pages, schemas, SQL scripts, space used by files, status of service requests, and so on.

## Viewing the Users Dashboard

The screenshot shows the Oracle Application Express Users Dashboard. At the top, there is a navigation bar with tabs: Workspace, Users, Activity, Developer Activity, Performance, Websheets, Applications, and Database. Below the navigation bar are two main sections: 'Your Account' and 'Workspace Users'. The 'Your Account' section displays account details for the user 'TEACH\_ADMIN'. The 'Workspace Users' section displays statistics for workspace users, showing 2 total users, 1 workspace administrator, 2 application developers, 0 websheet developers, 0 end users, 0 created last 24 hours, and 0 created last week. To the right of these sections is a 'Tasks' sidebar with various links for managing users and tasks. At the bottom of the dashboard is a red footer bar containing the ORACLE logo and the copyright notice: 'Copyright © 2011, Oracle and/or its affiliates. All rights reserved.'

The Users dashboard displays a summary of the account information of the current logged-in user, other users in the workspace, defined user groups, recently created users, and user status.

The page also contains links to various tasks that you can perform. The Tasks list displays various options depending on your role. The slide shows the tasks available for an administrator role.

## Viewing the Database Dashboard

The screenshot shows the Oracle Database Dashboard interface. At the top, there is a navigation bar with tabs: Workspace, Users, Activity, Developer Activity, Performance, Websheets, Applications, and Database. The Database tab is selected. Below the navigation bar, there is a schema dropdown set to 'TEACH' and a Refresh button. The dashboard is divided into several sections:

- Recently Modified Program Units:** A table showing recently modified PL/SQL code. The data is as follows:

BI_OEHR_PROMOTIONS - trigger	3 days ago
T_OEHR_JOB_ID_LOOKUP - trigger	3 weeks ago
bi_TASK - trigger	3 weeks ago
bi_OEHR_STATES - trigger	4 weeks ago
bi_PROJECTS - trigger	4 weeks ago
OEHR_ADD_JOB_HISTORY - procedure	4 weeks ago
OEHR_UI_PK - trigger	4 weeks ago
- Object Counts:** A table showing the count of various database objects. The data is as follows:

INDEX	74
TABLE	37
TRIGGER	24
SEQUENCE	20
VIEW	9
PROCEDURE	1
FUNCTION	1
- Recently Created Tables:** A table showing recently created tables. The data is as follows:

OEHR_PROMOTIONS	3 days ago
OEHR_LOG	4 days ago
OEHR_JOB_ID_LOOKUP	3 weeks ago
TASK	3 weeks ago
OEHR_STATES	4 weeks ago
PROJECTS	4 weeks ago
OEHR_LOCATIONS	4 weeks ago
- Top Tables by Row Count:** A table showing the top tables ordered by row count. The data is as follows:

OEHR_INVENTORIES	1112
OEHR_ORDER_ITEMS	665
OEHR_CUSTOMERS	319
OEHR_PRODUCT_INFORMATION	288
OEHR_PRODUCT_DESCRIPTIONS	288
OEHR_EMPLOYEES	107
OEHR_ORDERS	105

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The Database dashboard displays a summary of the database objects used by the workspace. You can select the schema for which you want information from the Schema drop-down list. For the selected schema, a summary of the recently edited PL/SQL code, recently created tables, and number of database objects by type is displayed.

## Other Dashboards

Activity	Top Users, Applications, Pages
Developer Activity	Top Developers, Applications, Pages
Performance	The Pages with the Worst Performance
Websheets	Websheet Activity for a Specified Time
Applications	All Applications in the Current Workspace

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Each of the other dashboards provides summarized information about the current workspace.

**Activity** dashboard: Displays the top users, top applications, and top pages accessed, as well as recent logins and errors in the workspace

**Developer Activity** dashboard: Displays the top developers, top applications, and top pages used, as well as recent changes and edits in the workspace

**Performance** dashboard: Displays pages having the worst performance

**Websheets** dashboard: Displays activity in the websheets created in the workspace over a specified time period

**Applications** dashboard: Displays a summary of applications in the current workspace

## Quiz

You want to see reports that track changes to page views and applications. How do you accomplish this?

- a. From the Administration list, select Manage Application Express Users.
- b. From the Administration list, select Manage Services.
- c. From the Administration list, select Monitor Activity.

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**Answer: c**

## Summary

In this lesson, you should have learned how to:

- Create a developer and a workspace administrator user
- Request a schema or extra storage
- Monitor the developer activity log
- Monitor workspace activity
- View dashboards



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In this lesson, you learned how to administer an Oracle Application Express workspace. You also learned about the administrative tasks performed in a workspace, such as managing services, managing users, and monitoring workspace activity.

## Practice 15: Overview

This practice covers the following topics:

- Creating users
- Monitoring a user's activity
- Purging session state information
- Requesting a schema
- Reviewing the workspace summary report



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# 16

## Implementing Security

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## Objectives

After completing this lesson, you should be able to do the following:

- 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.

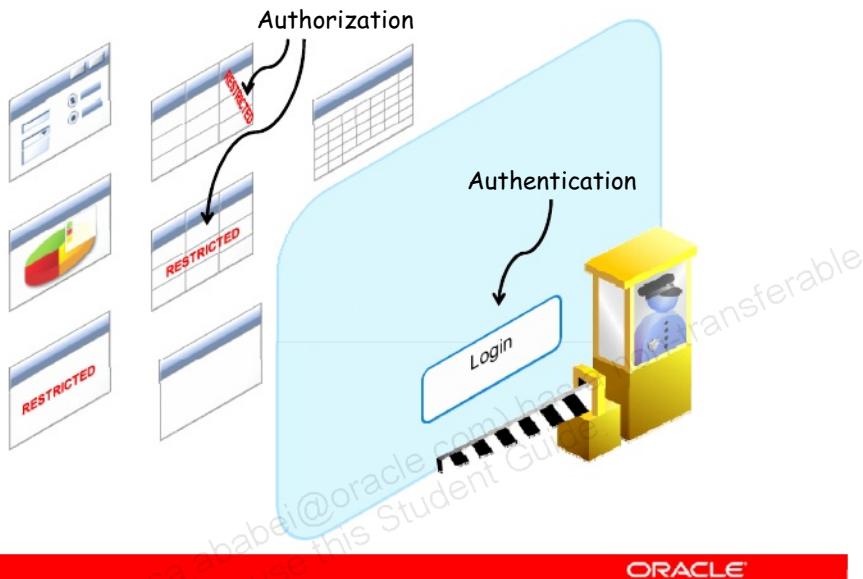
## Lesson Agenda

- 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. Only if the login succeeds can the user view any component of the application.
- **Authorization:** Restricting access to specific pages, components (for example, forms, reports, or items), or to a particular column in a report is called *authorization*. Only privileged users can access these components.
- **Session State Protection:** Preventing users from tampering with the URLs

## Accessing Security Tasks



To create security mechanisms for an application, navigate to the shared components page and select 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



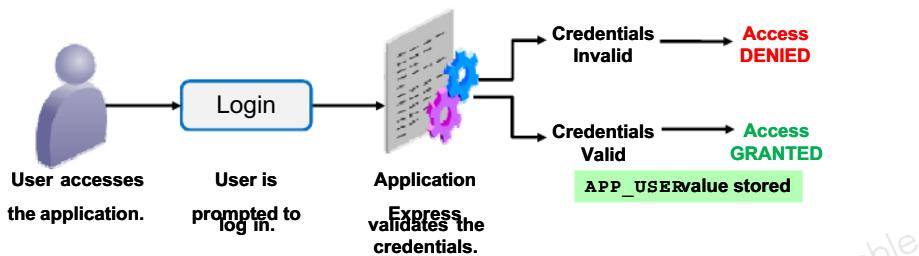
To access the Authentication Schemes page, click the Authentication Schemes link under Security from the Shared Components page of the application.

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

- **Application Express:** Allows 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 Authentication Status link 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 they try 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 is 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:

1. Using one of the pre configured schemes
2. Copying an authentication scheme from the same application or a different application and then modifying the settings as needed

You learn to create authentication by using the preceding two methods in this lesson.

**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 Credentials
- LDAP Directory Credentials



No Authentication

- Using DAD



Oracle Application Server SSO

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



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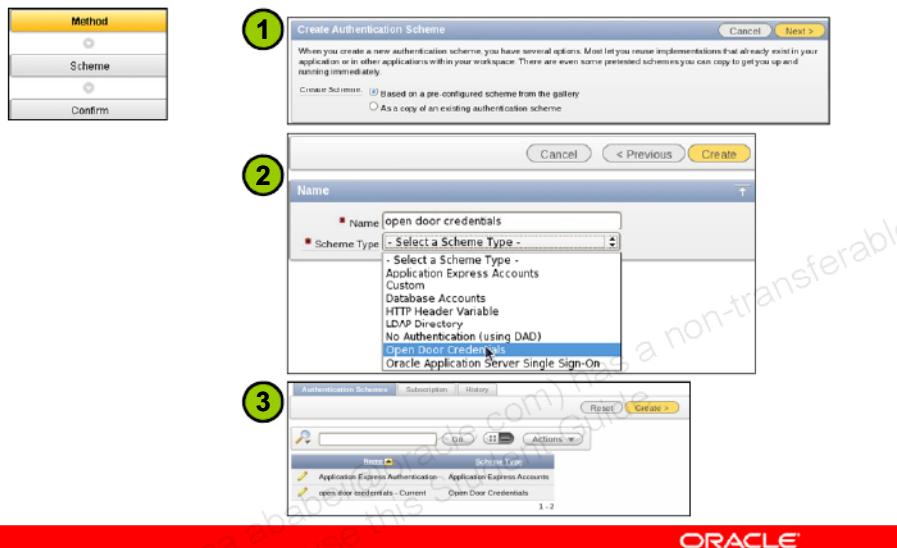
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Oracle Application Express provides some common, pretested authentication schemes that you can choose while creating an authentication scheme. For some of the schemes, you may also have to configure corresponding components.

- **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 in 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 DNS (Domain Name Server) 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



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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 and enter a name for the new authentication scheme and click Create. In this example, Open Door Credentials are used.
3. The authentication scheme is created successfully.

You have successfully created a new authentication scheme. You can click the Change Current tab from the Authentication Schemes page and set the new scheme as the current scheme for an application.

## Copying an Authentication Scheme



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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

**Answer: c**

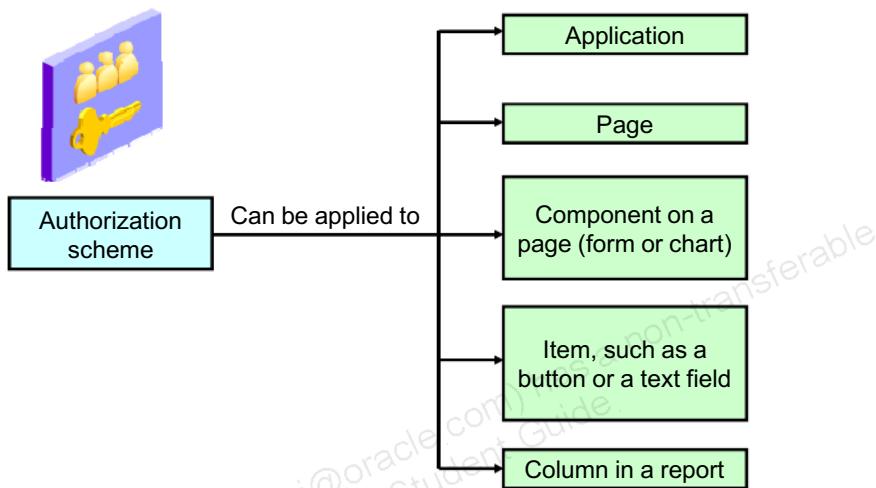
## Lesson Agenda

- Securing an Application
- Using Authentication Schemes
- Using Authorization Schemes
  - Where Can You Implement Authorization?
  - Methods to Implement Authorization
  - Creating an Authorization Scheme from Scratch
  - 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 scratch.
  - 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.

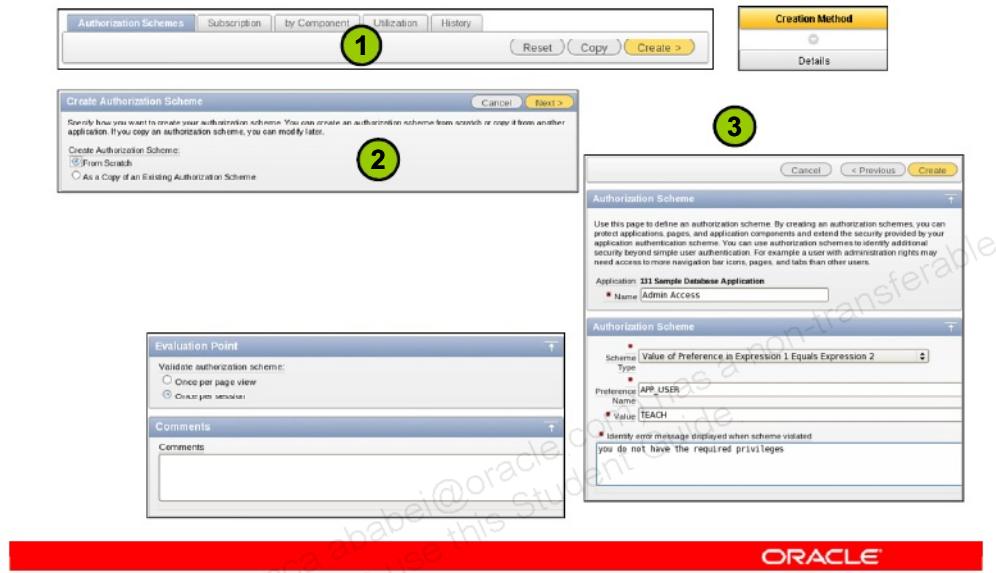


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There are two ways to create and apply an authorization scheme to an application and its components:

- You can create an authorization scheme from scratch 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 Scratch



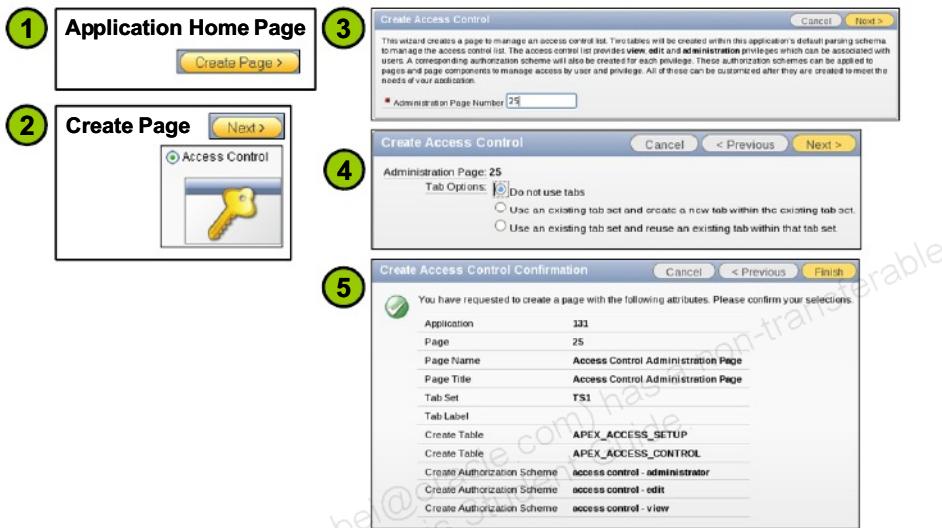
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You can create an authorization scheme from scratch or copy an existing authorization scheme and then customize it. To create a new authorization scheme from scratch, navigate to the Shared Components page and in the Security section, click the Authorization 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.
  - 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 (TEACH). 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



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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 and click Next.
3. Specify a page number or accept the given page number. Then click Next.
4. Choose whether you want a tab for the page.
5. Review the details and click Finish.

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

## Configuring the Access Control Page

The screenshot shows the 'Application Administration' interface with the 'Access Control List' tab selected. At the top, there's a section for 'Application Mode' with four radio button options: 'Full access to all, access control list not used.' (selected), 'Restricted access. Only users defined in the access control list are allowed.', 'Public read only. Edit and administrative privileges controlled by access control list.', and 'Administrative access only.' Below this is a table titled 'Access Control List' with columns: 'Username', 'Privilege', 'Last Changed By', and 'Date'. A single row is visible, showing 'john wreck' as the 'Username', 'Administrator' as the 'Privilege', 'teach' as the 'Last Changed By' user, and 'Now' as the 'Date'. There are 'Delete' and 'Apply Changes' buttons at the top right of the table area, and an 'Add User' button at the bottom right.

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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 the Access Control List, perform the following 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



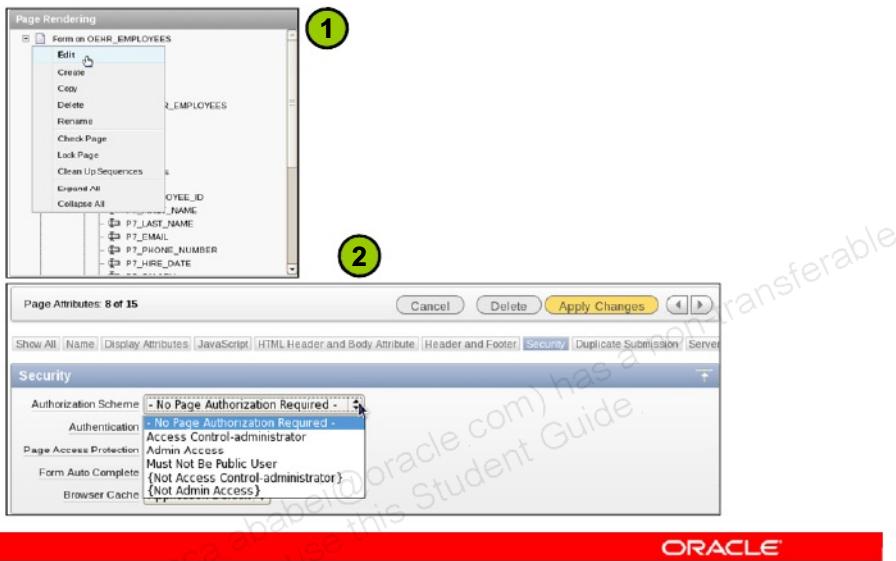
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To apply an authorization scheme to an entire application, navigate to the application home page and perform the following steps:

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

If you apply the Admin Access scheme that you created earlier, only the TEACH user can access the 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 Admin Access scheme, all users except the TEACH user are given access to the application.

## Applying an Authorization Scheme to a Page



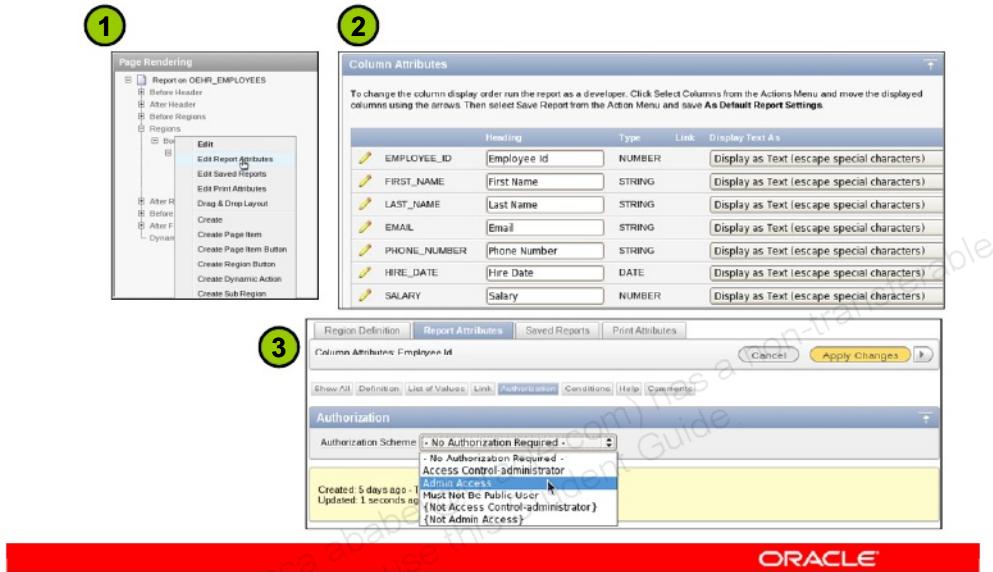
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To apply an authorization scheme to a page, perform the following steps:

1. Navigate to the page definition of the page to which the authorization scheme must be attached. Right-click the page name node and select Edit.
2. Click 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.

## 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. Right-click the report name node and select Edit Report Attributes.
2. Click the Edit icon for the column where you want to apply the authorization scheme.
3. Click the Authorization tab and select a scheme from the Authorization Scheme drop-down list. Click Apply Changes.

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**

## 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
  - Understanding Session Timeout

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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:
  - Enable the feature.
  - 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 generated `f?p=` URLs.

## Enabling Session State Protection from the Edit Application Page



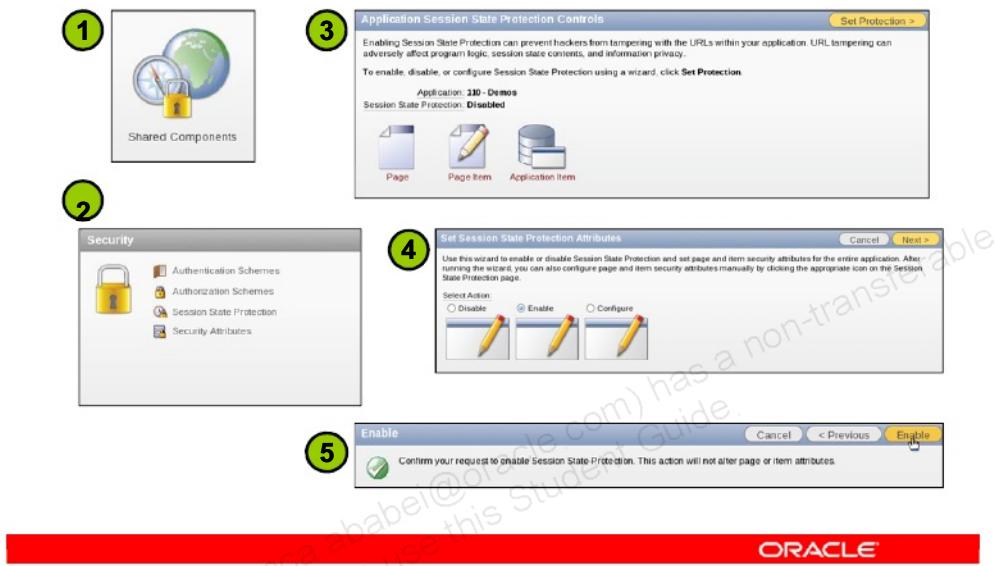
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To enable Session State Protection for an application, perform the following steps:

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. Select Enabled for Session State Protection and click Apply Changes.

**Note:** 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



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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 from 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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You configure security attributes in two ways:

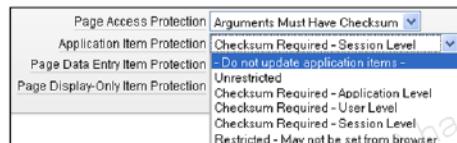
- Using a wizard where you can select a value for a specific attribute category, which is then applied to all pages and items within the application
- Configuring values for individual pages, items, and application items

## Identifying Security Attributes

### Page Attributes



### Item Attributes



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The following attributes are available for pages:

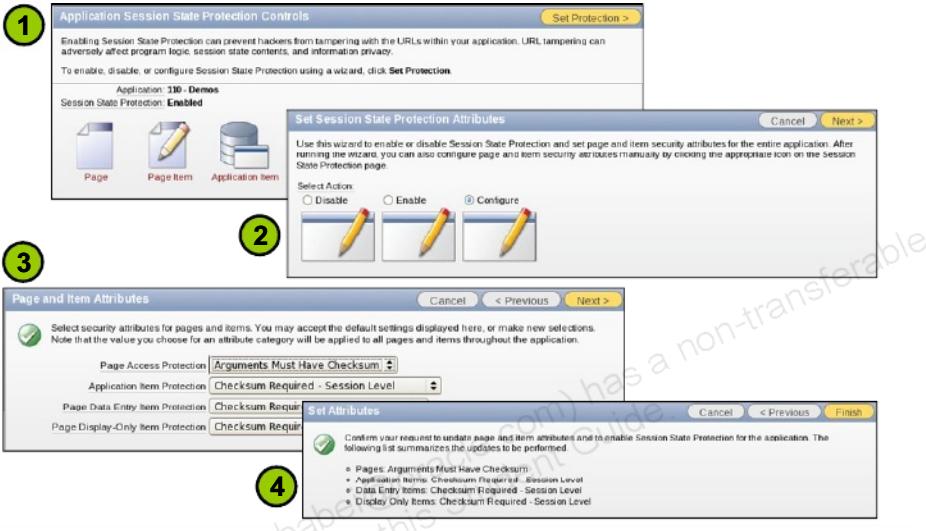
- **Unrestricted:** The URL to request the page may or may not have session state arguments.
- **Arguments Must Have Checksum:** If the session state arguments appear in the URL, a checksum must also be provided.
- **No Arguments Allowed:** The URL used to request the page must not contain session state 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 in this page refer to the Request, Clear Cache, and Name/Value session state arguments.

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

- **Unrestricted:** May be set by passing the item name or value in a URL without any checksum
- **Checksum Required – Application Level:** May be set in a URL if a checksum is also provided that 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 that 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.
- **Restricted:** May not be set from a browser. Use this option when you want to restrict the way that the item value can be set to internal processes, computations, and so on. This attribute is always observed, even if Session State Protection is disabled.

## Configuring Session State Protection by Using a Wizard



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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 Next.

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

## Configuring Session State Protection for Pages and Items

The figure consists of three screenshots of the Oracle Application Express interface:

- Screenshot 1:** Shows the "Application Session State Protection Controls" page. It has three icons: "Page" (highlighted with a green circle), "Page Item", and "Application Item". Below the icons, it says "Session State Protection Enabled".
- Screenshot 2:** Shows a report titled "Page Access Protection" for application 110-Demos. The report lists several pages with their names, protection levels, and item counts. The columns are: Page, Name, Page Access Protection, Page Items, and Page Type. The data is as follows:

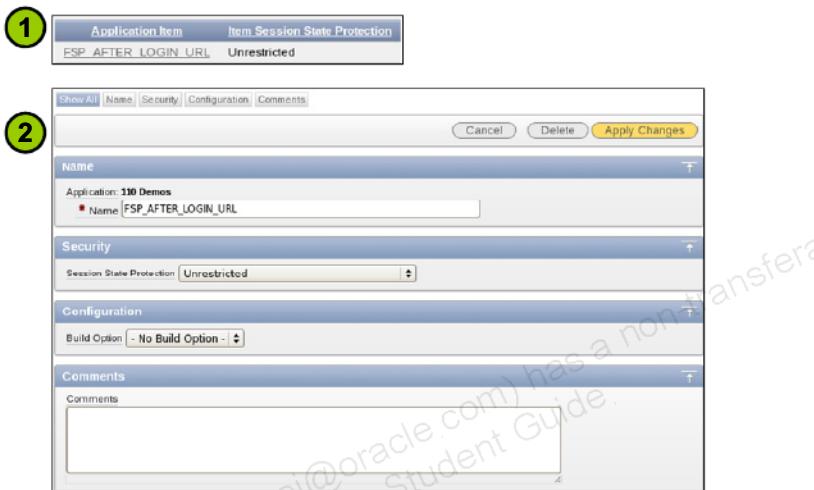
Page	Name	Page Access Protection	Page Items	Page Type
0	Home	Unrestricted	0	Page 0
1	Interactive Report	Unrestricted	0	Interactive Report
2	Classic Report	Unrestricted	0	Report
3	Wizard Report	Unrestricted	0	Report
5	Form on OEHR_EMPLOYEES	Unrestricted	11	DML Form

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

1. Navigate to the Session State Protection page, and click the Page icon.
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



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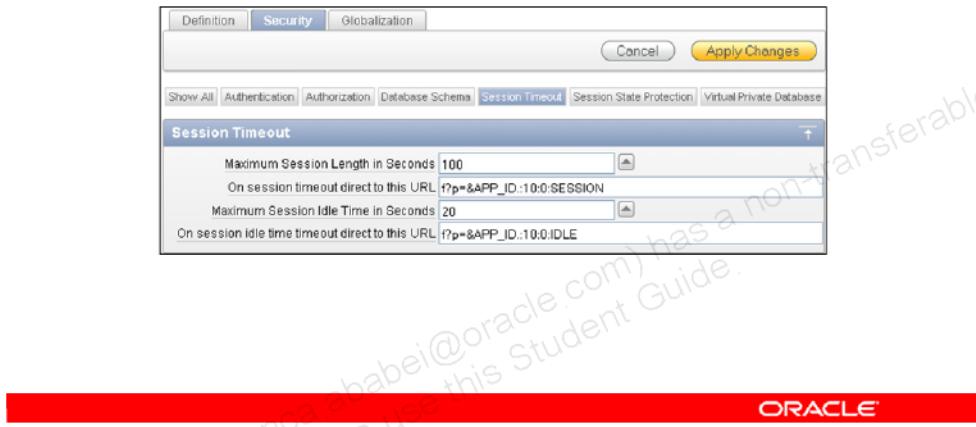
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Application items are named session state variables that are not specific to a particular page. From the Session State Protection page, click the Application Item icon. A report is displayed listing all the application items for the application. To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

1. Click the application item name link.
2. Specify the security attribute for the item and click Apply Changes.

## Setting Session Timeout

By configuring Session Timeout attributes, you can reduce your application's exposure.



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Users often leave their computers unattended for extended periods and do not close applications before departing. Therefore, an unauthorized person can easily assume the user's identity within the application. In Oracle Application Express, you can declaratively specify session timeouts for maximum idle time and maximum session duration. By configuring Session Timeout attributes, users are automatically logged out of their application after the specified timeout. To set the session timeout for an application, click the Edit Application Properties button on the Application home page. Click the Security tab and select the Session Timeout tab. Set the following attributes:

- Maximum session length in seconds
- Session timeout URL
- Maximum session idle time in seconds
- Idle timeout URL

## Summary

In this lesson, you should have learned how to:

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



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

## Practice 16: Overview

This practice covers the following topics:

- Creating an authentication scheme
- Creating an Access Control page
- Adding users to the Access Control list
- Applying your authorization scheme to application components
- Enabling and configuring Session State Protection

# 17

## Deploying an Application

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## Objectives

After completing this lesson, you should be able to do the following:

- Identify the supporting objects for your application
- Export an application and its supporting objects
- Import an application
- Install the supporting objects



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This lesson shows you how to manage supporting objects for your application by defining prerequisites and uploading scripts. You then export the application and import and install it into another Oracle Application Express instance.

## Lesson Agenda

- Overview
  - Steps to Deploy an Application
  - What Is a Packaged Application?
  - What Are Supporting Objects?
- Creating a Packaged Application  
Installing a Packaged Application

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## Steps to Deploy an Application

1. Create a packaged application.
  - Identify the application's supporting objects.
  - Manage the supporting objects definition.
  - Export the application.
2. Import the packaged application.
3. Install the packaged application.
4. Publish the URL.

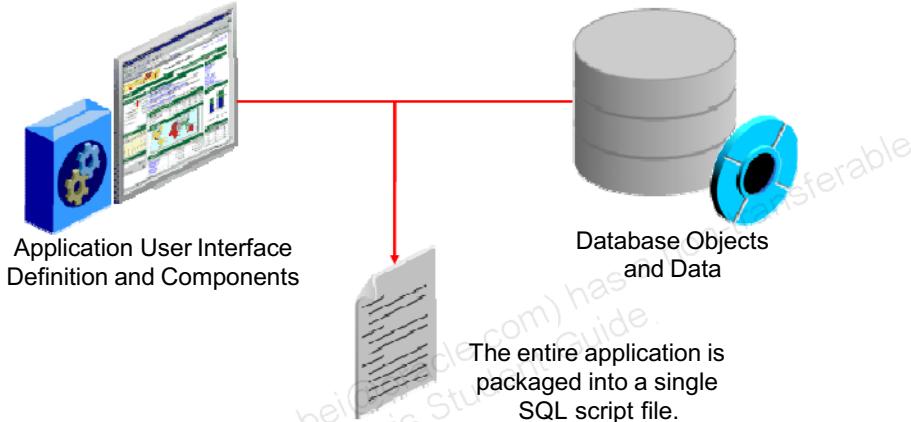
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The steps to deploy an application are listed in the slide.

## What Is a Packaged Application?

A packaged application simplifies the process of deploying an application.



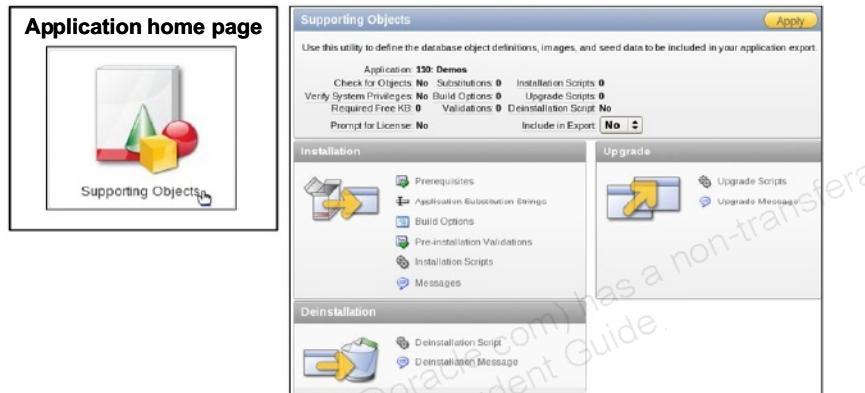
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A packaged application is a single SQL file that contains information about an application and its components, as well as information about the database objects and the data in them. This single SQL file can then be imported and installed into another Oracle Application Express instance.

## What Are Supporting Objects?

Supporting objects are the database objects and data needed to run an application successfully.



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Supporting objects are the database objects needed by an application to run successfully. These include database object definitions, images, and sample data. The instance to which you are trying to deploy your application may already have all the supporting objects. In this case, you do not have to export and install them.

To manage supporting objects for an application, navigate to the application's home page and click the Supporting Objects icon. From the Supporting Objects page, you can create and manage the scripts required to install, upgrade, or deinstall an application.

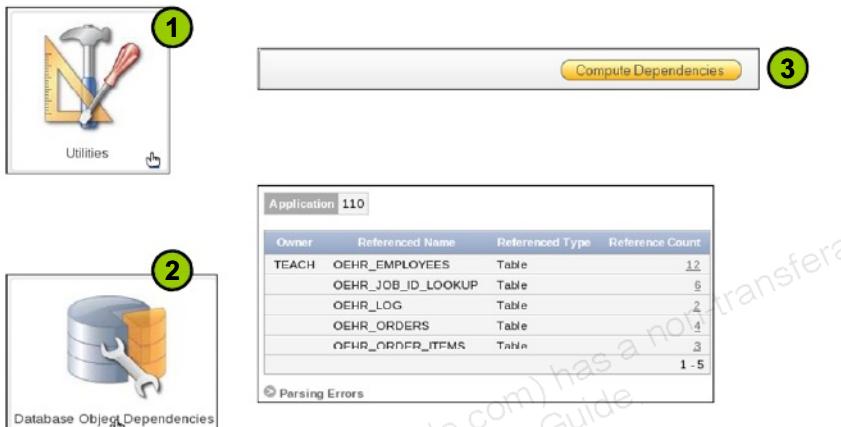
## Lesson Agenda

- Overview
- Creating a Packaged Application
  - Identifying the Supporting Objects for an Application
  - Creating Installation Scripts
    - Specifying Prerequisites and Other Options
    - Creating an Installation Script
    - Creating Upgrade Scripts
    - Creating Deinstallation Scripts
  - Accessing the Export Page
  - Exporting the Application
- Installing a Packaged Application

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## Identifying the Supporting Objects for an Application



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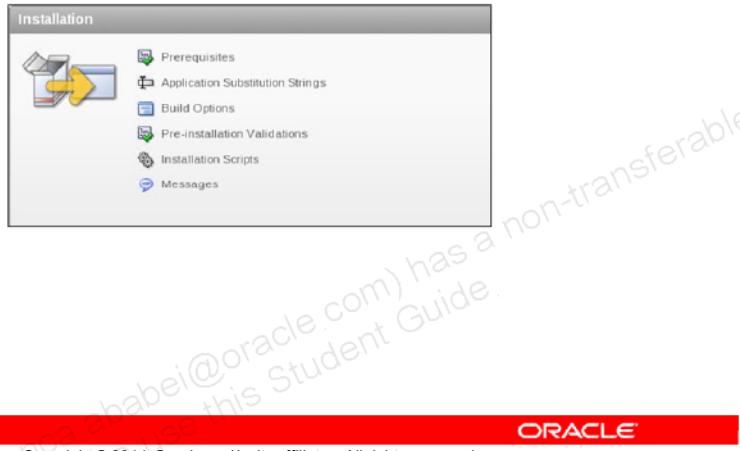
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To identify which database objects an application uses, you can run the Data Object Dependencies report. Perform the following steps:

1. Navigate to the application's home page and click the Utilities icon.
2. Click the Database Object Dependencies icon.
3. Click the Compute Dependencies button.

A report is displayed listing the database objects used by the application. These are the application's supporting objects.

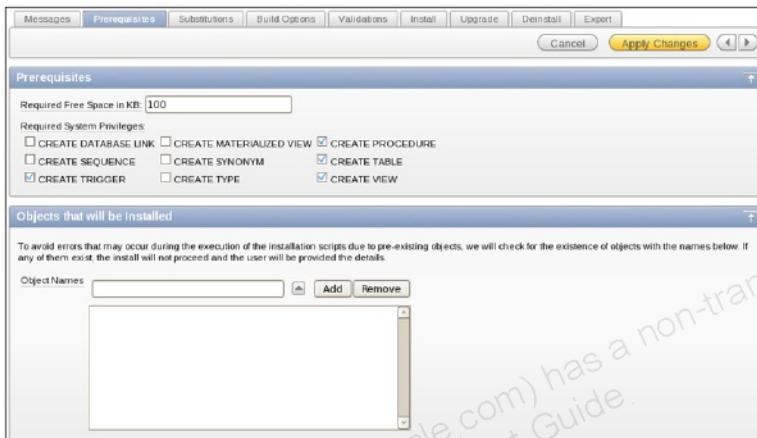
## Creating Installation Scripts



From the Installation pane in the Supporting Objects page, you can:

- Specify any prerequisites for the installation
- Specify substitution strings used in the application
- Specify build option for the application pages
- Verify the validations to be performed before installing the application
- Create the installation scripts
- Enter messages to be displayed during installation. The supported HTML tags include `<b>`, `<i>`, `<u>`, `<p>`, `<br>`, `<hr>`, `<ul>`, `<ol>`, `<li>`, and `<pre>`.

## Specifying Prerequisites and Other Options



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You can check for disk space, sufficient privileges, or existing table names before running the installation scripts. From the Supporting Objects page, click the Prerequisites link. From the **Prerequisites** tab, you can define built-in checks that are performed before installation. If prerequisites are defined, before installation the installer checks whether there is enough space to create all the objects that are needed. It checks that the system privileges are set accordingly and that the list of objects does not exist.

You can use the **Messages** tab to enter the messages that you want to display during installation and deinstallation.

The **Substitutions** tab lists static substitution strings defined for the application. You can specify the substitution strings that a user can define while installing.

The **Validations** tab lists validations defined for the packaged application. These validations prevent a user from installing database objects if the defined conditions are not satisfied. On the **Export** tab, you can specify whether the deployment attributes should be exported with your application by default.

## Specifying Build Options



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The **Build Options** tab lists build options defined for this application. Build options allow you to hide or show specific functionality within an application. You can apply build options to an entire page or specific components of the page.

To create a build option, navigate to the Shared Components page and click the Build Options link under Logic. Click the Create button. Specify a name and select a status for the build option. The available build options are `INCLUDE` and `EXCLUDE`. As the name specifies, you can select an option depending on whether you want to include or exclude a functionality. After creating the build option, you can apply it to a page or component. Edit the page or component and specify the build option (located on the configuration tab).

From the Build Options tab under supporting objects, you can specify the build options that should be included in the export file. These options can be changed by the user while installing the application.

## Creating an Installation Script



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The Install tab enables a developer to define multiple installation scripts that install the supporting application objects. The DDL for these scripts can be created by using the DDL Generator under Utilities. To create the DML script, you can use Oracle SQL Developer (a free downloadable tool from <http://otn.oracle.com>) or you can create it from scratch. To add a script to the list, click the Create button.

- If you select the “Create from Scratch” option, you must enter the SQL code that you want to use for installation. You have an option to use the Script Editor.
- If you select the “Create from File” option, you can browse and select a script file that you want to use for installation.

You also have links to create installation scripts for Access Control tables and other files your application uses.

- If you click the “Create Scripts for Access Control Tables” link, the scripts to install the tables, populate the tables with data, and deinstall the tables can be automatically created. You can review the tables that will be created and click the Create Script button.
- If you click the “Create Scripts to Install Files” link, the files existing in the workspace repository are listed. You can select the files that you want to create the script for and click the Create Script button.

## Creating Upgrade Scripts



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You can use the Upgrade page to define scripts to upgrade database objects, images, and seed data when upgrading an existing application. You specify a query to run to detect whether an existing supporting object exists. If a row is returned, the script is executed. To create the upgrade scripts, click the Create button on the Upgrade tab.

## Creating Deinstallation Scripts



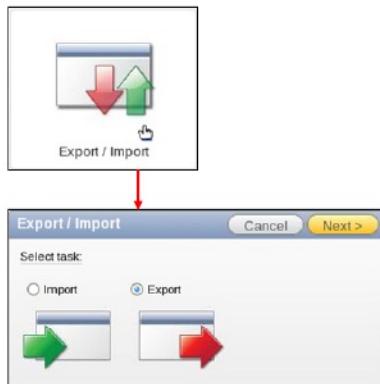
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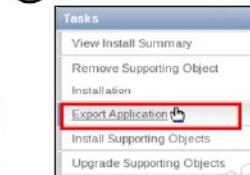
The Deinstall tab enables you to define a deinstallation script that runs when a user clicks the Deinstall option. In this script, you specify the `DROP` commands to drop objects and operations performed in the installation scripts. To create a deinstallation script, click the Create button on the Deinstall tab.

## Accessing the Export Page

- a From the Application home page



- b From the Supporting Object page



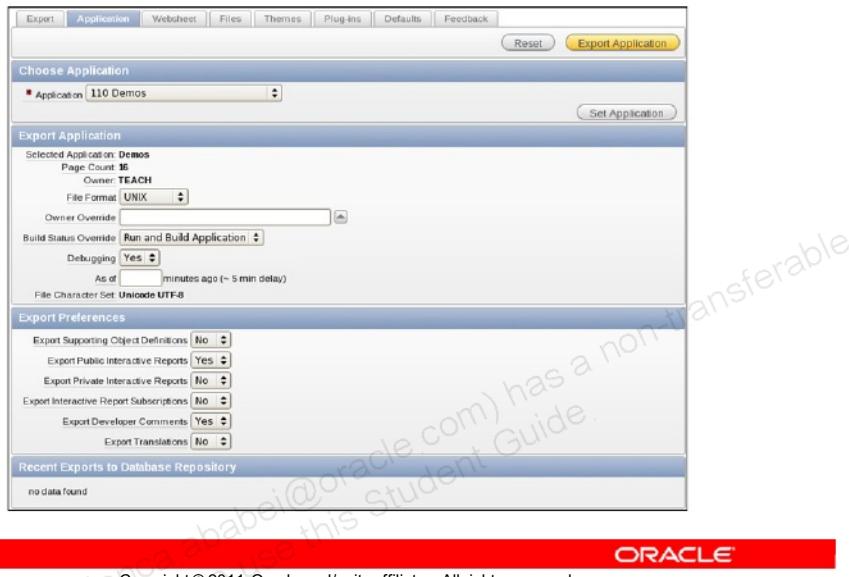
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To move your application from a development instance to a production instance of Oracle Application Express, you can export the application definition and all the supporting objects to a file. You can export your application by performing either of the following actions:

- From the Application home page, click the Export/Import icon. Select Export and click Next.
- From the Manage Supporting Object Definitions page, select Export Application from the Tasks section.

## Exporting an Application



When you export your application, all the application attributes, templates, pages, regions, items, buttons, and supporting objects are exported to a single file.

On the Export Application page, perform the following steps and then click Export Application:

- Make sure that your application is selected in the Application list.
- For File Format, select how the rows in the export file will be formatted. Choose UNIX for a file containing rows delimited by line feeds. Choose DOS for a file containing rows delimited by carriage returns and line feeds. Choose Database to save the file as a normal SQL script with the .sql extension.
- For Owner Override, select an optional overriding owner for this application.
- For Build Status Override, select Run Application Only if you want to run the application in the target instance but want to make it inaccessible to developers. Selecting "Run and Build Application" makes it available to developers.
- For Debugging, select Yes to enable debugging.
- Use "As of" to export your application as it was previously defined.
- Set the export preferences.

In addition to exporting the actual application file, you can also use Export to export other related files, such as cascading style sheets, images, plug-ins, and script files.

## Quiz

Before the application installation can proceed, the installer should check whether there is enough disk space to create all the objects that are needed. Where would you specify the required free space?

- a. Supporting Objects > Build Options
- b. Supporting Objects > Validations
- c. Supporting Objects > Install
- d. Supporting Objects > Prerequisites

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**Answer: d**

## Lesson Agenda

- Overview
- Creating a Packaged Application
- Installing a Packaged Application
  - Importing the Application
  - Installing the Application
  - Publishing the Application URL

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## Importing an Application



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After you export your application and supporting files from the development environment, you can import the file into the target Oracle Application Express workspace, and then install the application in the new environment. To import the application file, perform the following steps:

1. Navigate to the Application Builder page and click the Import button.
2. Browse and locate the file that you have previously exported from Application Express.
3. You get a confirmation message that the file was imported successfully. Click Next to install the file. You may also choose to install the application at a later time by accessing the Export Repository.

## Installing the Application



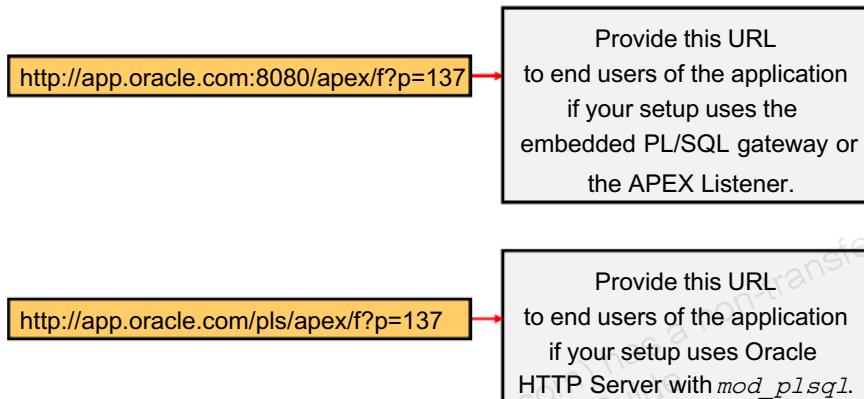
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After you import the packaged application file into the target Oracle Application Express instance, you can install it. To install the imported file, perform the following tasks:

1. Select the Schema where you want to install the application and its supporting objects. Then click Install.
2. The application is installed successfully. You are now prompted to install the supporting objects. Select Yes and click Next.
3. Click Install.
4. The supporting objects are installed successfully. You can click the Install Summary to view the scripts that were run.

These steps continue from the wizard steps discussed in the previous slide. You can also install an imported file by navigating to the Export Repository and clicking the Install link next to the file.

## Publishing the Application URL



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After you have deployed your Application Express application, you can provide its URL to the end users.

A typical Application Express URL looks like the following:

<http://app.oracle.com/pls/apex/f?p=137>

- `http://app.oracle.com` is the URL of the server.
- `pls` is the indicator to use `mod_plsql`.
- `apex` is the DAD name.
- `f?p=` is the prefix used by Application Express.
- `137` is the application number of the application being called.

The application will automatically redirect the user to the appropriate home page (as defined in the application attributes). Also, if the application requires authentication, the user will be redirected to the Login page.

If you want to protect against changing an application ID in the future, you can define an alias for your application and use that in the published URL (for example, `f?p=SALES`). The alias is set on the Application Definition page.

## Quiz

Which of the following can you export by using the Export/Import utility? (Choose all that apply.)

- a. Application
- b. Uploaded cascading style sheets
- c. Uploaded images

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**Answer: a, b, c**

## Summary

In this lesson, you should have learned how to:

- Identify the supporting objects for your application
- Export your application
- Import your application
- Install the supporting objects



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In this lesson, you learned how to manage supporting objects for your application by defining prerequisites and uploading scripts. You also learned how to export the application and import and install it into another Oracle Application Express instance.

## Practice 17: Overview

This practice covers the following topics:

- Managing your supporting objects
- Exporting your application
- Importing your application

# 18

## Creating a Websheet Application

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## Objectives

After completing this lesson, you should be able to:

- Identify the different components of a websheet application
- Create a websheet application
- Create sections on a websheet page
- Annotate pages with files, notes, and tags
- Create and manipulate a data grid



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This lesson introduces you to websheets in Oracle Application Express. You learn what websheets are and how to create them, including how to create a data grid and add sections to a page.

## Lesson Agenda

- Overview
  - What is a Websheet?
  - Websheet Applications Versus Database Application
  - Default Websheet Interface
- ~~Creating and Running a Websheet~~  
~~Working with Pages and Sections~~
- Creating Data Grids
- Manipulating Data Grids

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## What Is a Websheet?

The screenshot shows the Oracle Application Express interface for a Human Resources Management application. It features a navigation sidebar on the left with sections like Overview, Navigation, and Reports. A red arrow points from the 'Reports' link in the navigation to a sub-page titled 'Overview' which contains a table of tasks. The table has columns for PROJECT, TASK\_NAME, START\_DATE, END\_DATE, STATUS, ASSIGNED\_TO, COST, and BUDGET. The data in the table is as follows:

PROJECT	TASK_NAME	START_DATE	END_DATE	STATUS	ASSIGNED_TO	COST	BUDGET
Maintain Support Systems	HIR software upgrades	01-JAN-10	27-FEB-10	Closed	Pam King	8000	7000
Maintain Support Systems	Apply Billing System updates	01-JAN-10	28-FEB-10	Closed	Russ Sanders	5000	7000
Maintain Support Systems	Investigate new Virus Protection software	15-FEB-10	23-MAR-10	Open	Pam King	1700	1500
Maintain Support Systems	Arrange for holiday coverage	10-MAR-10	12-MAR-10	Closed	All Bins	300	500
Email Integration	Complete plan	08-FEB-10	14-FEB-10	Closed	Mark Hale	500	750
Email Integration	Check software licenses	17-FEB-10	14-MAR-10	Closed	Mark Hale	500	900
Email Integration	Get RTPs for new server	19-FEB-10	05-MAY-10	Open	Mark Hale	4000	1000
Email Integration	Purchase failover server	12-MAY-10	07-JUL-10	Pending	All Bins	3200	3000

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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 all can 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 in a page).

Websheets provide the following functionality:

- Create and share content over the web.
- Organize webpages in a hierarchy and 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	Automatically managed	Triggers and sequences
Management Validations	Defined by using runtime UI	Created by using wizards
Report Layout	Defined by using runtime UI	Created by using SQL
List of Values	Defined by using runtime UI	SQL or static
Page Flow	Limited	Controlled by branches
Form Layout	Column groups	Items and regions
Look and Feel	Basic control	Themes and templates

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

Websheet applications simplify the process of creating database objects and providing runtime UI capabilities to define features such as validations and LOVs.

However, websheet applications have limited capabilities (compared to database applications) for UI customization and page control. It is important to understand the differences between websheet applications and database applications, which are outlined in the slide.

## Default Websheet Interface

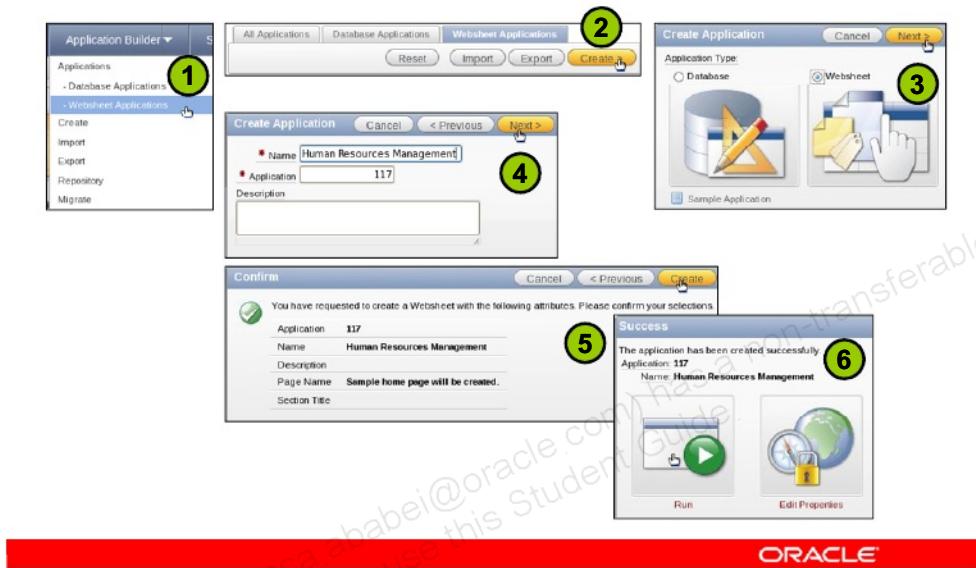


The slide shows the interface that gets created when you use the Create Application wizard to create a websheet application. An empty home page is created by default. The look and feel of all websheet application will be the same. After you have created a websheet application, you can add content to your application by defining pages, sections, 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 on the Application Builder tab and select Websheet Applications. (Alternatively, select Application Builder and click the Websheet Applications tab.)
2. Click Create.
3. Select Websheet as the application type and click Next.
4. Enter a name for the websheet and click Next.
5. Review the details and click Create. The application is created successfully.
6. To run the application, click Run.

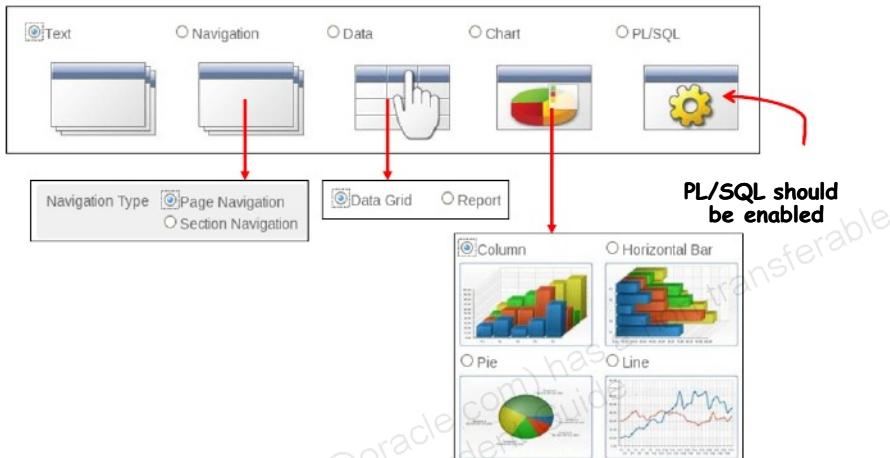
## Lesson Agenda

- Overview
- Working with Pages and Sections
  - Types of Sections
  - Creating a Text Section
  - Adding Annotations to a Page
  - Copying a Page
  - Editing Page Sections
  - Viewing the Page Directory
  - Displaying an Image
  - Using Markup Syntax
- Creating Data Grids
- Manipulating Data Grids

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## Types of Sections



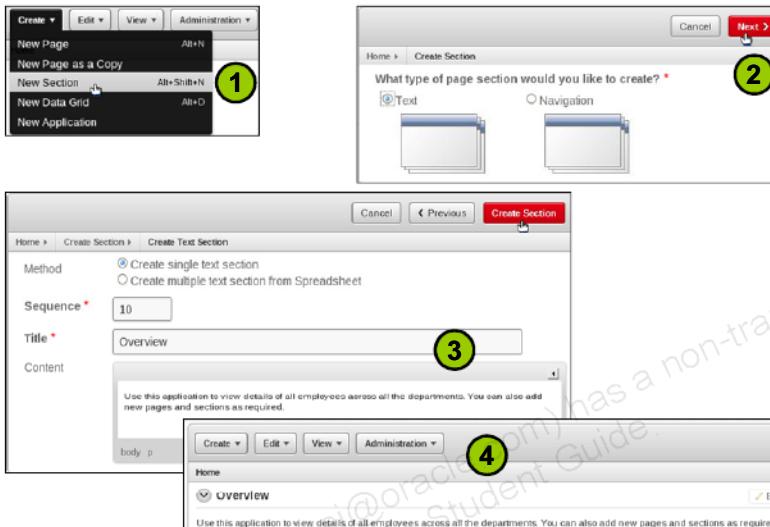
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The different types of sections that you can create are shown in the slide. The Text and Navigation options are available when the websheet is created. The Data and Chart options are available only when either a data grid or a report exists in the websheet. The PL/SQL option is available only when the ability to interact with the database is enabled for the websheet.

Each of these options is discussed in detail in the next few slides.

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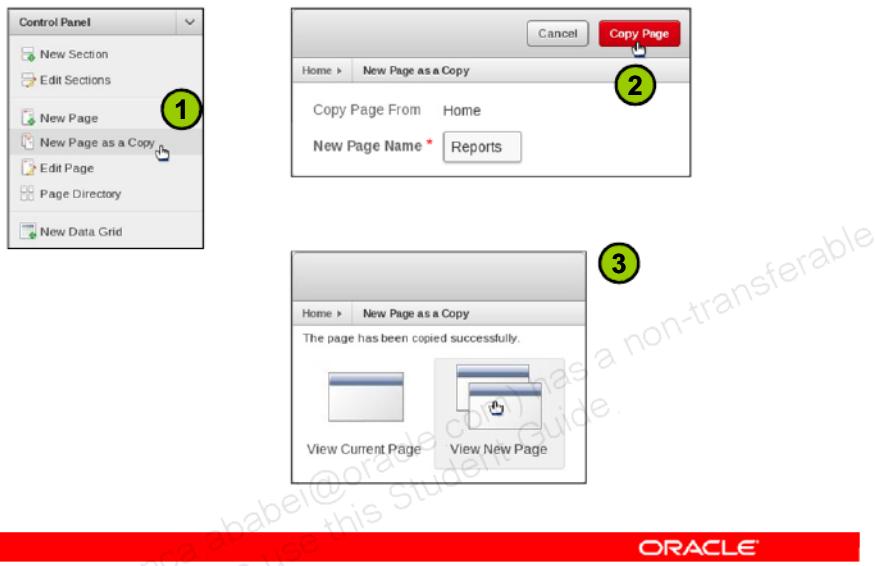
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You can add files, tags, and notes to the websheet pages. These are displayed on the bottom-right side of a page. You can click the plus icon (+) depending on what you want to add to the page. The slide shows an example of annotating a page with an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

Perform the following steps:

1. Click the plus icon (+) in the Files section.
2. Click the Browse button and locate the file you want to add.
3. Click Add File.
4. The file that is added to the page is listed under 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 click "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



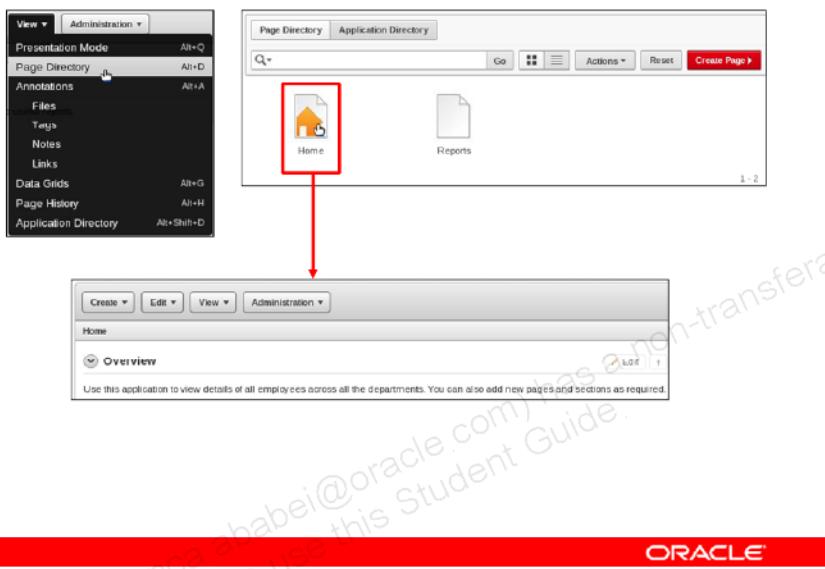
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At any point, you can edit the sections in a page to change its title or contents. To edit a page section, perform the following steps:

1. Click the Edit button for that section.
2. Make your changes and click the Apply Changes button.

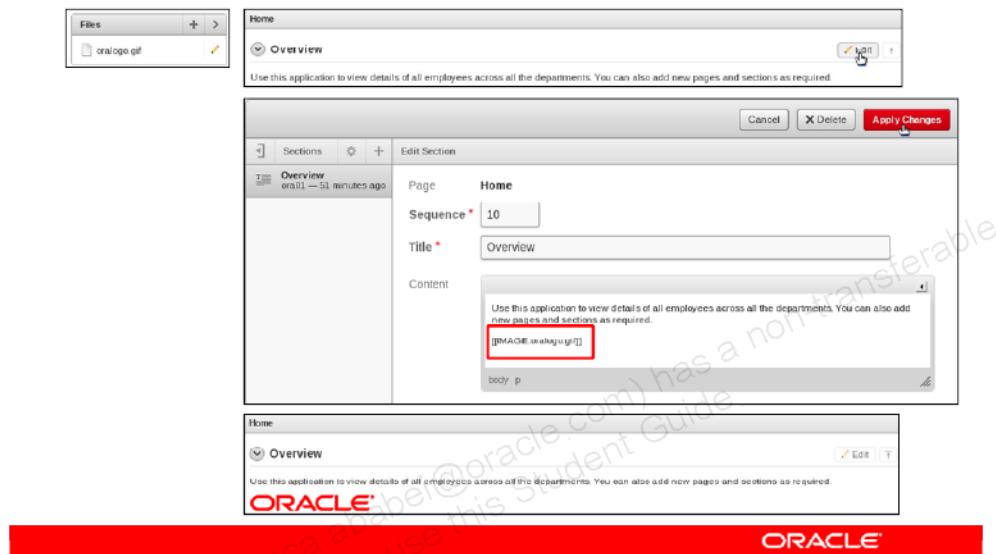
## Viewing the Page Directory



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You can view all the pages in a websheet by using the Page Directory. To access the Page Directory, click the View button 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



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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 slide example, 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 a web application interface for 'Human Resources Management'. At the top, there are links for 'Language', 'Help' (which is highlighted with a red box), 'Builder', 'Teach', and 'Logout'. Below this is a navigation bar with links for 'About', 'Overview', 'Access Control', 'Markup Syntax' (highlighted with a red box), 'SQL, Generator for Data Grids', 'Application Content', and 'FAQ'. A sidebar on the left lists categories: 'Show All', 'Page Linking' (highlighted with a red box), 'Section Linking', 'External URLs', 'Files', 'Images', 'Data Grid Linking', 'SQL', and 'Advanced Data Grid Queries'. The main content area is titled 'Page Linking' with a gear icon. It contains instructions: 'To include links in page sections to other pages in a Websheet, use the syntax described below. Note that the use of the "page:" identifier is optional. If the page exists, a link displays. If the page does not exist, a link to create the page displays.' It shows syntax examples: '[[ page: <page alias> | <link name> ]]' and '[[ <page alias> | <link name> ]]'. It also includes 'Syntax Examples:' with code snippets like '[[page: home]]' and '[[mypage | My Page]]'. An 'In Context Example:' shows the result: 'One of the most colorful fish is the [[ clownfish | Clown fish]].'

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Similar to the markup syntax you saw in the previous slide, you can use other markup syntaxes. The online help provides useful hints on how to use markup syntax to reference objects in your websheet. Click the Help link to see what markup syntaxes are available.

## Quiz

You can use markup text to reference a file or URL.

- a. True
- b. False

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**Answer: b**

## Lesson Agenda

- Overview
- Working with Pages and Sections
- Creating Data Grids
  - What are Data Grids?
  - Creating a Data Grid From Scratch
  - 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_NAME	START_DATE	ASSIGNED_TO	COST	BUDGET
Maintain Support Systems	HR software upgrades	01-JAN-10	Pam King	8000	7000
Maintain Support Systems	Apply Billing System updates	01-JAN-10	Russ Sanders	5000	7000
Maintain Support Systems	Investigate new Virus Protection software	15 FEB 10	Pam King	1700	1600
Maintain Support Systems	Arrange for holiday coverage	10-JAN-10	Al Barnes	300	500
Email Integration	Complete plan	08-FEB-10	Mark Nile	500	750
Email Integration	Check software licenses	12-FEB-10	Mark Nile	200	200

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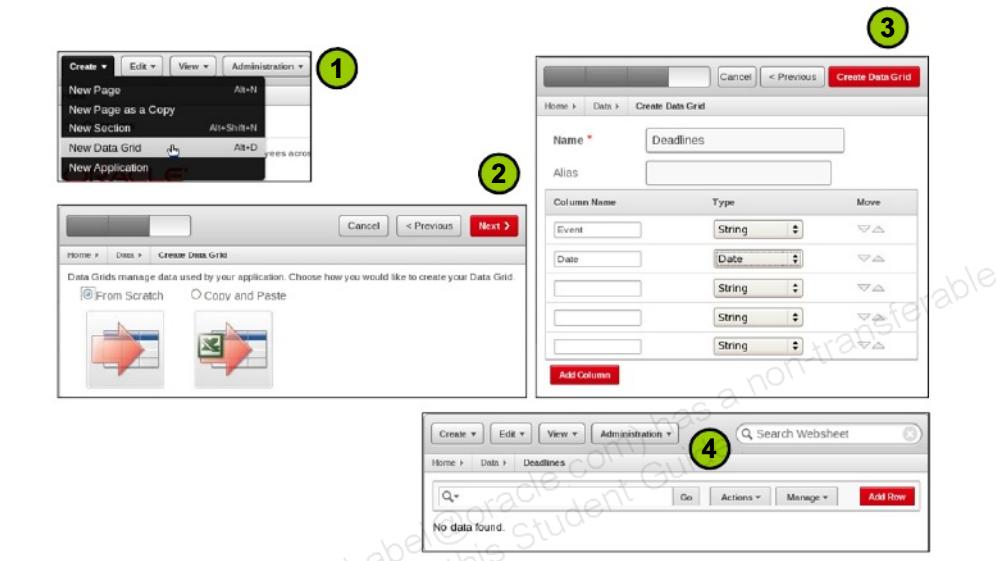
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Data grids are contributor-defined sets of tabular data—a web-based spreadsheet. You can define the structure of a data grid (column names, data types, and basic validations), or you can create a data grid by pasting in spreadsheet data. After it is 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. Aside 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 Scratch

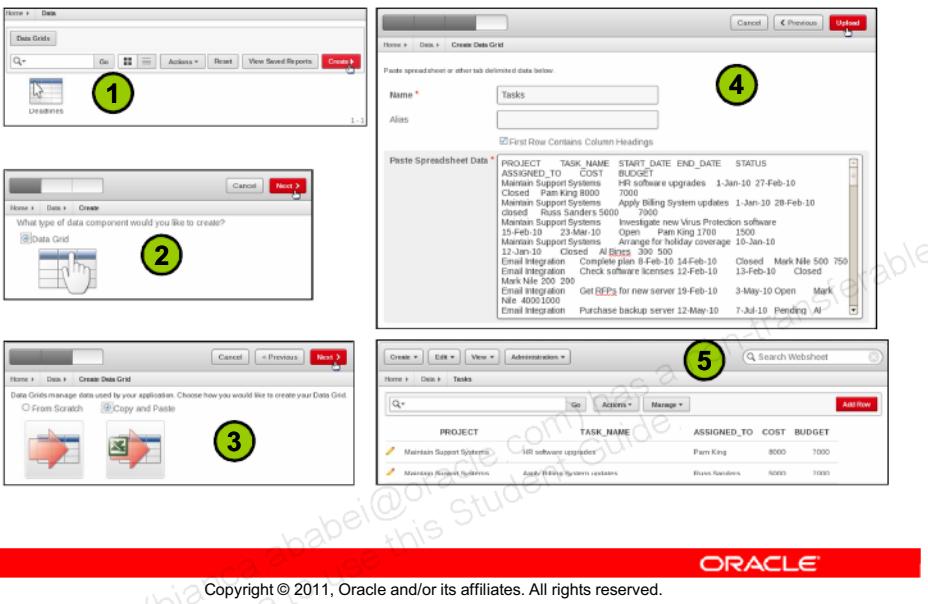


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To create a data grid from scratch, perform the following steps:

1. Click Create 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

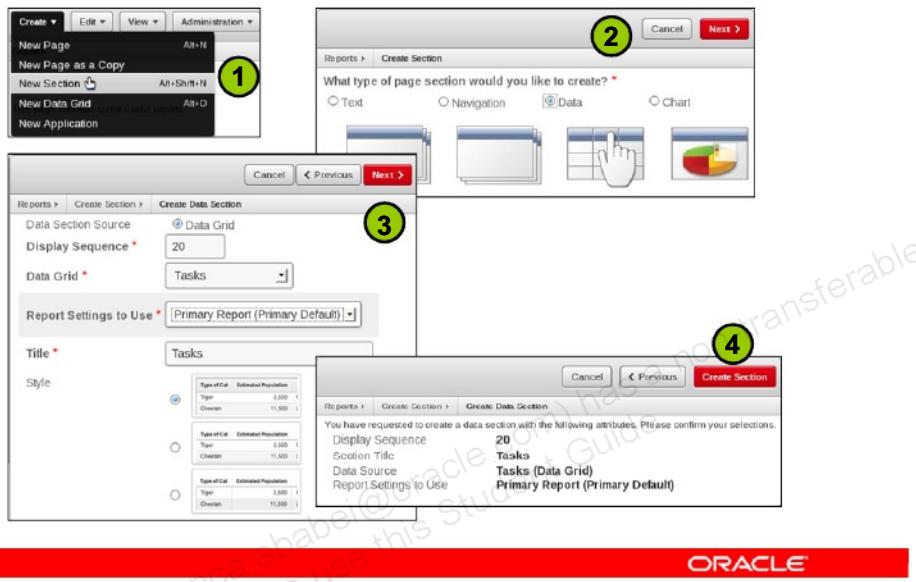


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You can also create a data grid from a spreadsheet. Access the Data page and perform the following steps:

1. Click the Create button.
2. Select Data Grid and click Next.
3. Select Copy and Paste and click Next.
4. 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.
5. The data grid is created.

## Creating a Data Section



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The data grids that you created in the preceding slides are located as data components under the Data section of your websheet. To display data from these data grids on your websheet pages, you now need to create data sections.

To create a data section, perform the following steps:

1. Click Create and select New Section.
2. Select the Data option and click Next.
3. For Data Grid, select a data grid. Select a report setting and style. Also specify the section title. Click Next.
4. Review the details and click Create Section.

## Creating a Data Section

PROJECT	TASK_NAME	START_DATE	ASSIGNED_TO	COST	BUDGET
Maintain Support Systems	HR software upgrades	01-JAN-10	Pam King	8000	7000
Maintain Support Systems	Apply Billing System updates	01-JAN-10	Russ Sanders	5000	7000
Maintain Support Systems	Investigate new Virus Protection software	15-FEB-10	Pam King	1700	1500
Maintain Support Systems	Arrange for holiday coverage	10-JAN-10	Al Bines	300	500
Email Integration	Complete plan	08-FEB-10	Mark Nile	500	750
Email Integration	Check software licenses	12-FEB-10	Mark Nile	200	200
Email Integration	Get RFPs for new server	19-FEB-10	Mark Nile	4000	1000
Email Integration	Purchase backup server	12-MAY-10	Al Bines	3200	3000
APEX Environment Configuration	Identify server requirements	19-FEB-10	John Watson	100	200

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The slides show the data section that is created by following the steps listed on 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



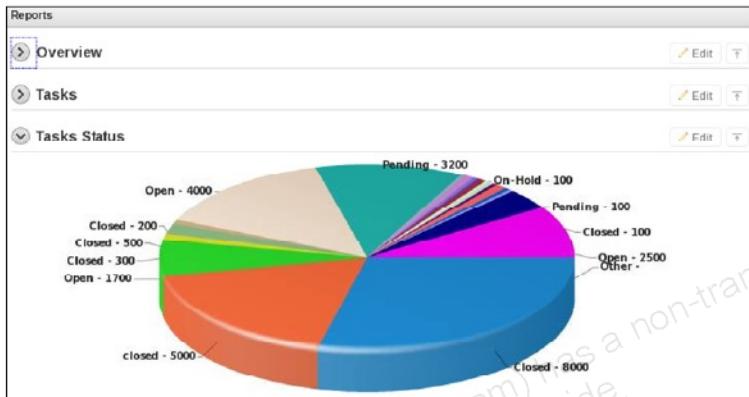
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You saw how you can display data from data grids as reports in the previous slide. You can also display the data in the data grids as charts. For this, you need to create a chart section. Create a new section in a page and select the Chart option. Then perform the following steps:

1. Select the type of chart you want to create and click Next. In the slide example, 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



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The slide shows the chart section that is created by following the steps listed in the previous slide.

## Quiz

Which section types enable you to reference a data grid or report? (Choose all that apply.)

- a. Text section
- b. Navigation section
- c. Data section
- d. Chart section

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**Answer: a, c, d**

## Lesson Agenda

- Overview
- Working with Pages and Sections
- Creating Data Grids
- Manipulating Data Grids
  - Overview
  - Adding a Column
  - Creating List of Values
  - Editing Column Properties
  - Toggling Check Boxes
  - Setting Multiple Columns Values
  - Replacing Values
  - Creating a Validation
  - Adding Annotations

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## Overview

The screenshot shows a data grid with a red box highlighting the 'Add Row' button in the top right corner. Another red box highlights the pencil icon in the first column of the second row. A third red box highlights the text field 'Apply Billing System updates' in the second column of the second row. An arrow points from the text 'Click a text field to change the text.' to the highlighted text field.

PROJECT	TASK_NAME	START_DATE	END_DATE	STATUS	ASSIGNED_TO	COST	BUDGET
Maintain Support Systems	HR software upgrades	01-JAN-10	27-FEB-10	Closed	Pam King	8000	7000
Maintain Support Systems	Apply Billing System updates	01-JAN-10	28-FEB-10	closed	Russ Sanders	5000	7000
Maintain Support Systems	Investigate new Virus Protection software	15-FEB-10	23-MAR-10	Open	Pam King	1700	1500
Maintain Support Systems	Arrange for holiday coverage	10-JAN-10	12-JAN-10	Closed	Al Bines	300	500
Email Integration	Complete plan	08-FEB-10	14-FEB-10	Closed	Mark Nile	500	750
Email Integration	Check software licenses	12-FEB-10	13-FEB-10	Closed	Mark Nile	200	200
Email Integration	Get RFPs for new server	19-FEB-10	03-MAY-10	Open	Mark Nile	4000	1000

Click a text field to change the text.

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A data grid can be manipulated in many ways. There are two menus available 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 "Creating Reports."

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 brings 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 figure consists of four screenshots illustrating the steps to add a column:

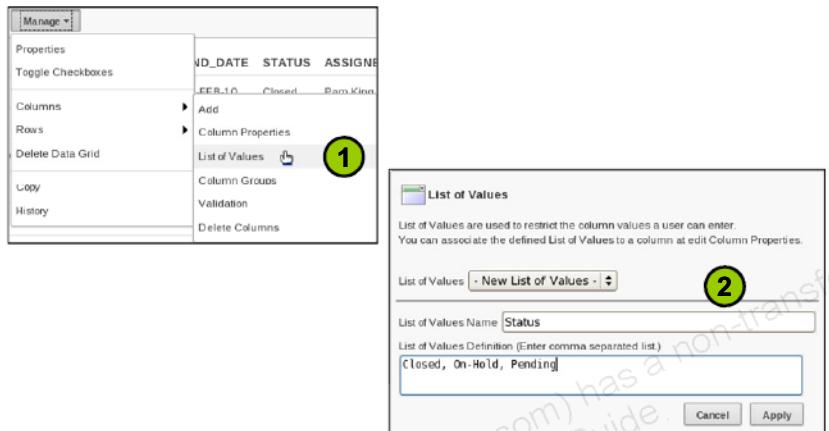
- Screenshot 1:** A screenshot of the 'Manage > Columns' page. The 'Add' button is highlighted with a green circle labeled '1'.
- Screenshot 2:** The 'Add Column' dialog box. It shows 'Column Name: Priority', 'Type: Number', 'Value Required: No', 'Display As: Select List', 'List of Values Name: Priorities', and 'List of Values Definition: 1,2,3,4,5'. The 'Default Type: Text' dropdown is set to 'Text' and the 'Default Text: 3' field contains 'Unknown'. The 'Apply' button is highlighted with a green circle labeled '3'.
- Screenshot 3:** A screenshot of the data grid after the column has been added. The new column 'Priority' is shown at the end of each row. The 'Edit' icon for the first row is highlighted with a green circle labeled '4'.
- Screenshot 4:** A screenshot of the data grid showing the new 'Priority' column. The first three rows have values 3, 3, and 3 respectively. The fourth row's value is currently 'Unknown'.

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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 steps to change a column's display type from a text input to a dropdown list. It shows the 'Manage > Columns' interface, the 'Column Properties' dialog, and the resulting dropdown menu in the data grid.

START_DATE	END_DATE	STATUS
01-JAN-10	06-FEB-10	<b>Closed</b>
01-JAN-10	26-FEB-10	On-Hold
15-FEB-10	23-MAR-10	Pending
		Open

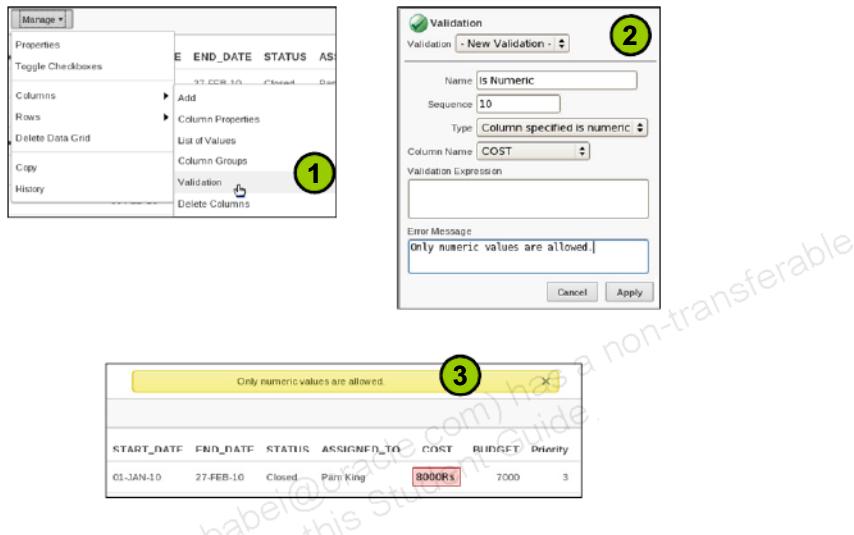
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You may want to control the values that your users enter. In this example, you change the text field to a drop-down list so that users can select only an existing value. Perform the following steps:

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 slide example, the Display As field is changed to Select List.
4. Select a list of value.
5. Click Apply.
6. Click one of the cells for the column that you changed. In the slide example, 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



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

1. Select Manage > Columns > Validation.
2. Specify the validation and click Apply. In this example, a validation is created to ensure that only numeric values are entered in the Cost column.
3. Test the validation by entering a character in the Cost field.

## Toggling Check Boxes

The screenshot shows a sidebar menu with options like 'Manage', 'Properties', 'Toggle Checkboxes' (which is highlighted with a mouse cursor), 'Columns', 'Rows', 'Delete Data Grid', 'Copy', and 'History'. Below the menu is a data grid with four columns: PROJECT, TASK\_NAME, and START\_DATE, plus a header row with a checkbox column. The data grid contains four rows of tasks for the 'Maintain Support Systems' project. A callout bubble points to the first row's checkbox with the text: 'Adding check boxes enables you to perform multirow or multicolumn tasks.'

	PROJECT	TASK_NAME	START_DATE
<input type="checkbox"/>	Maintain Support Systems	HR software upgrades	01-JAN-10
<input type="checkbox"/>	Maintain Support Systems	Apply Billing System updates	01-JAN-10
<input type="checkbox"/>	Maintain Support Systems	Investigate new Virus Protection software	15-FEB-10
<input type="checkbox"/>	Maintain Support Systems	Arrange for holiday coverage	10-JAN-10

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Certain tasks require that you select rows to which to apply the task. In such a case, you must toggle check boxes to turn them on to select the rows.

To toggle check boxes, select Manage > Toggle Checkboxes. Notice that there is a check box for each row. To turn the check boxes off, perform the action to toggle check boxes again. To select all rows, select the check box in the header area.

## Setting Multiple Column Values

**Step 1:** Right-click on a row in the data grid and select "Set Column Values".

**Step 2:** In the "Set Column Values" dialog, select the "Column" dropdown to "COST", enter "450" in the "New Column Value" field, and select "Selected Rows" under "Rows". Click "Apply".

**Step 3:** The data grid shows the "COST" column values have been updated for the selected rows (the second and third rows). The original value "300" is highlighted with a red box, while the new value "450" is shown in the updated cells.

	Maintain Support Systems	Arrange for holiday coverage	10-JAN-10	12-JAN-10	Closed	AI Bines	300	500	3
<input type="checkbox"/>	Email Integration	Complete plan	08-FEB-10	14-FEB-10	Closed	Mark Nile	450	750	3
<input type="checkbox"/>	Email Integration	Check software licenses	12-FEB-10	13-FEB-10	Closed	Mark Nile	450	200	3
<input type="checkbox"/>	Email Integration	Get RFPs for new server	19-FEB-10	03-MAY-10	Open	Mark Nile	4000	1000	3

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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

**1**

**2**

**3**

**4**

PROJECT	TASK NAME	STATUS	ASSIGNED TO					
Maintain Support Systems	Arrange for holiday coverage	10-JAN-10	Closed	All Bines	300	500	3	
Email Integration	Complete plan	08-FEB-10	14-FEB-10	Closed	Mark Nile	450	750	3
Email Integration	Check software licenses	12-FEB-10	13-FEB-10	Closed	Mark Nile	450	200	3
Email Integration	Get RFP's for new server	19-FEB-10	03-MAY-10	Open	Mark Nile	4000	1000	3
Email Integration	Purchase backup server	12-MAY-10	07-JUL-10	Pending	All Bines	3200	3000	3
APEX Environment Configuration	Identify server requirements	19-FEB-10	20-FEB-10	Pending	John Watson	100	200	3
APEX Environment Configuration	Specify security authentication scheme(s)	20-FEB-10	22-FEB-10	Pending	Scott Spencer	200	300	3

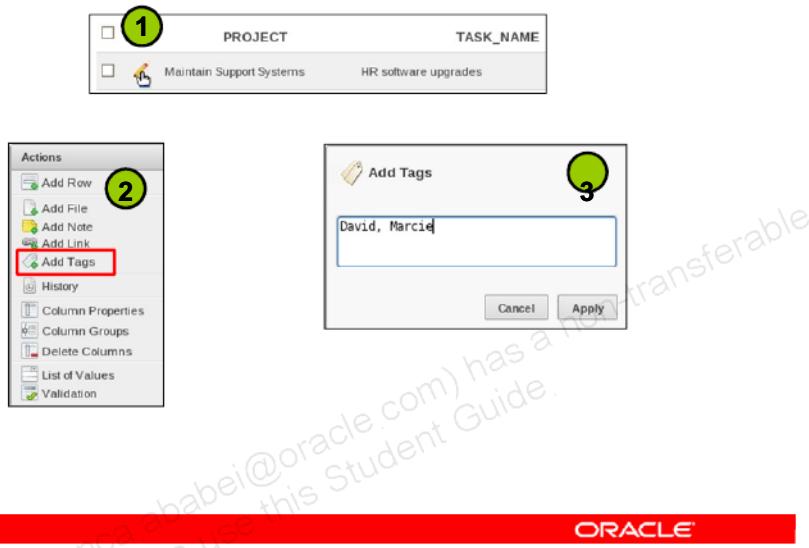
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There may be situations where you want to change a set of values. In the slide example, the On-Hold STATUS value is changed to Pending. Perform the following steps:

1. Select Manage > Rows > Replace.
2. Select the column that you want. In this case, it is the STATUS column.
3. Enter the current 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



Within pages or 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. Select 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.

## Quiz

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

- a. They enable users to update data inline.
- b. They are managed by database tables or views.
- c. New columns can be added to a data grid after it is created.
- d. They are created by using a SQL query.

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**Answer: a, c**

## Summary

In this lesson, you should have learned how to:

- Identify the different components of a websheet application
- Create a websheet application
- Create sections on a websheet page
- Annotate pages with files, notes, and tags
- Create and manipulate a data grid



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## Practice 18: Overview

This practice covers the following topics:

- Creating a websheet application
- Annotating pages
- Creating and Manipulating a Data Grid
- Creating sections



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## Manipulating and Administering a Websheet Application

19

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## Objectives

After completing this lesson, you should be able to:

- Enable a websheet to interact with a database
- Create SQL, PL/SQL, and report sections
- Create navigation sections
- Administer a websheet



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

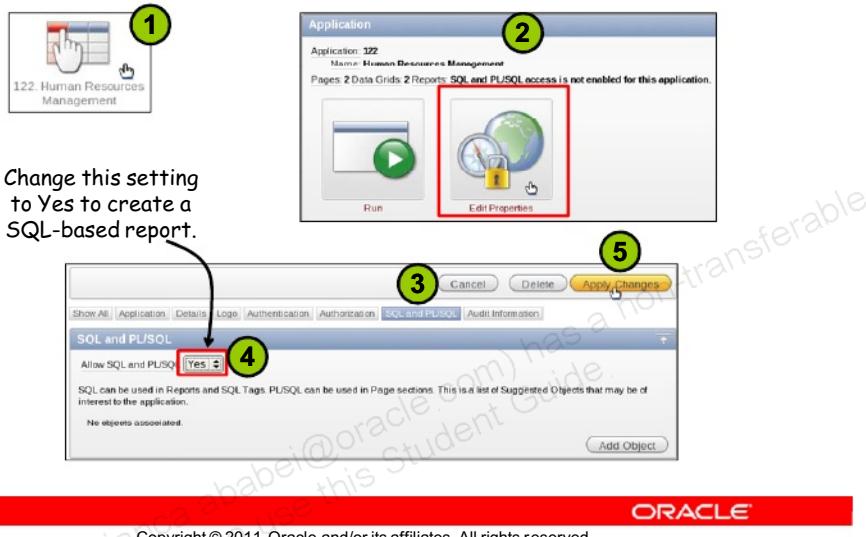
## Lesson Agenda

- Interacting with the Database
  - Editing Websheet Properties
  - Creating a Report
  - Using SQL Markup
- ~~– Creating a PL/SQL Section~~
- Enhancing Websheet Applications
- Administering Websheet Applications

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## Editing Websheet Properties



If you want to interact with the 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 Edit Properties.
3. Click the "SQL and PL/SQL" subtab.
4. Select Yes for "Allow SQL and PL/SQL."
5. Click Apply Changes.

## Reports



Employee Id	First Name	Last Name	Email	Phone Number	Hire Date	Salary	Commission Pct	Manager Id	Department Id	Job Id	Id
198	Donald	O'Connell	DOCONNEL	650.507.9533	21-JUN-99	2600		124	50	17	
199	Douglas	Grant	DGRANT	650.507.9844	13-JAN-00	2600		124	50	17	
200	Jennifer	Whalen	JWHALEN	515.123.4444	17-SEP-87	4400		101	10	3	
201	Michael	Hartstein	MHARTSTE	515.123.5555	17-FEB-96	13000		100	20	10	
202	Pat	Fay	PFAY	603.123.6666	17-AUG-97	6000		201	20	11	
203	Susan	Mavris	SMAVRIS	515.123.7777	07-JUN-94	6500		101	40	8	
204	Ismael	Baer	IIBACR	515.123.8888	07-JUN-04	10000		101	70	12	
205	Shelley	Higgins	SHIGGINS	515.123.8080	07-JUN-94	12000		101	110	2	

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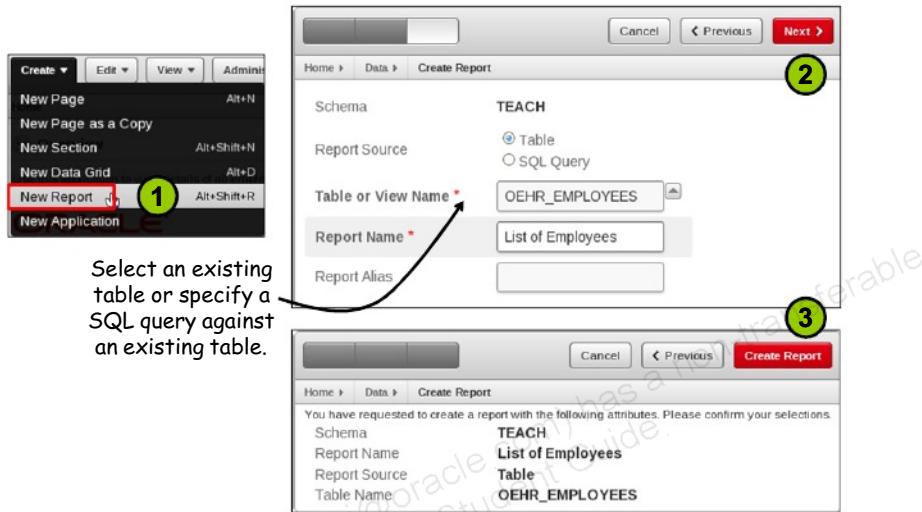
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Reports are queries against the database objects that you have access to. To define a report, you can either simply select a table or view within an available schema, or you can create something more complex by using industry-standard SQL.

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 within any page.

## Creating a Report



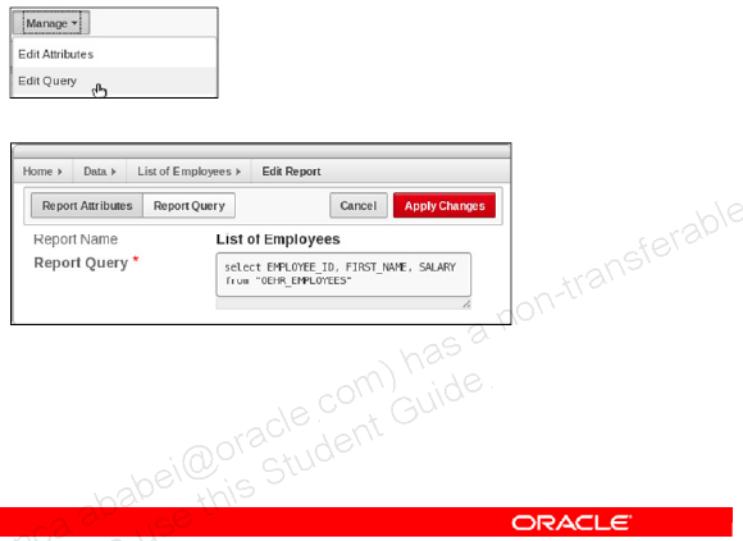
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To create a report, perform the following steps:

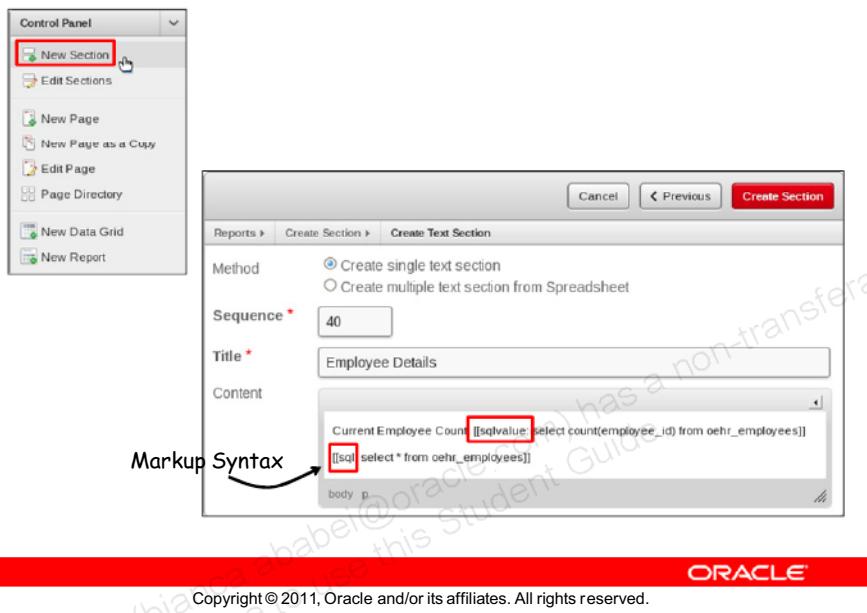
1. Click Create and select New Report.
2. Select Table or SQL Query for the report source, specify the rest of the fields depending on your report source, and click Next. In the slide example, Table was selected for the report source; so you select a table, specify a report name, and click Next.
3. Review the details and click Create Report.

## Editing the Report Query



You can change the query that the report is based on. Select Manage > Edit Query. Alternatively, if you are viewing the report attributes, select 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 that will be made. Click Apply changes again to confirm the changes.

## Using SQL Markup



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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> ]]
```

## Creating a PL/SQL Section

The screenshot shows the 'Create PL/SQL section' dialog and a preview of the generated report. The dialog has fields for 'Sequence' (50), 'Title' ('Emp Bar Chart'), and 'Enter PL/SQL' containing PL/SQL code to generate an employee bar chart. The preview shows a bar chart titled 'Emp Bar Chart' with data for four departments: ACCOUNTING (3), RESEARCH (5), SALES (6), and OPERATIONS (0).

Department	Number of Employees
ACCOUNTING	3
RESEARCH	5
SALES	6
OPERATIONS	0

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Once PL/SQL is enabled for a websheet, you can create PL/SQL sections in a page. Perform the following steps:

1. Click Create and select New Section.
2. Select the PL/SQL option and click Next.
3. Enter a title for the section and enter the PL/SQL code in the text area.
4. Click Create Section.

The slide example uses PL/SQL code to generate an Employee Bar chart report.

## Quiz

You can use markup text to reference a file or URL.

- a. True
- b. False

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**Answer: b**

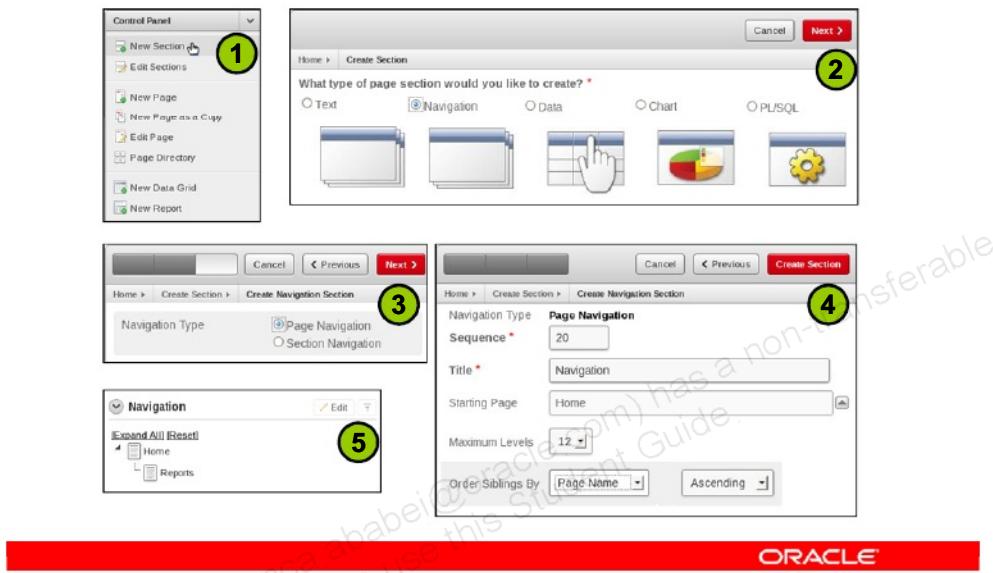
## Lesson Agenda

- Interacting with the Database
- Enhancing Websheet Applications
  - Creating Navigational 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



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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 from the Control Panel.
2. Select Navigation and click Next.
3. Select the navigation type and click Next.
4. Enter a name for the section, and specify the appropriate fields depending on the navigation type. Click Create Section.
5. The navigation section is created.

Notice that if you add a section to a page or add another page to the websheet after you create the navigation section, it is automatically added to the navigation section.

## Linking Pages

Edit Section

Page **Home**

Sequence \* **10**

Title \* **Overview**

Content

Use this application to view details of all [[ Employees | employees ]] across all [[ Departments | departments ]]. You can also add new pages and sections as required.  
[[IMAGE:oralogo.gif]]

body p

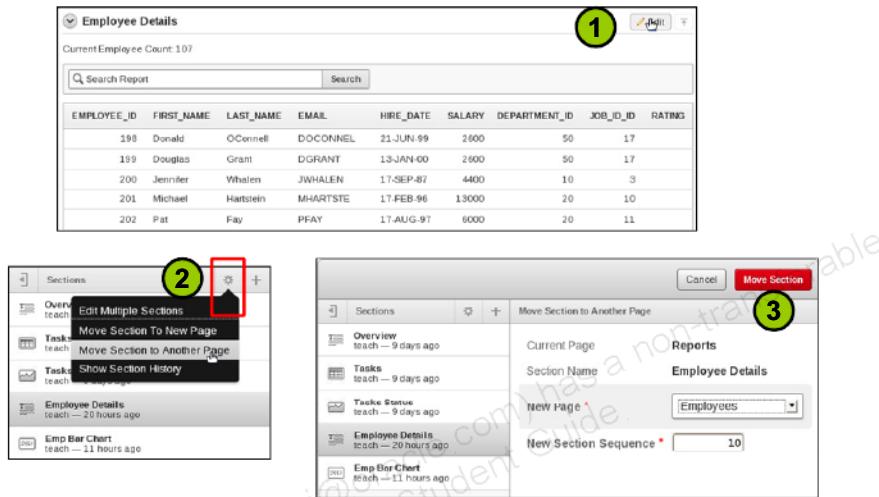


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You can create links in the text section to reference another page in the application. Note the use of the markup syntax in the slide example.

[[ page name | link name ]]

## Moving a Section to a Different Page



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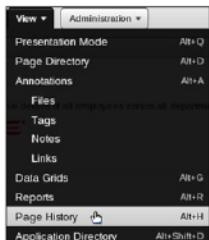
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If you decide that an existing section should be moved, you can move it to another page or create a new page with the section. To move a section, perform the following steps:

1. Select 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 shows the Oracle Application Express navigation bar. The 'Page History' option is highlighted with a red box and a cursor icon, indicating it is selected. Other options like 'Presentation Mode', 'Page Directory', 'Annotations', 'Files', 'Tags', 'Notes', 'Links', 'Data Grids', 'Reports', and 'Application Directory' are also listed.


The screenshot displays a report titled 'Page History' for the 'Home' page. The report lists three changes:

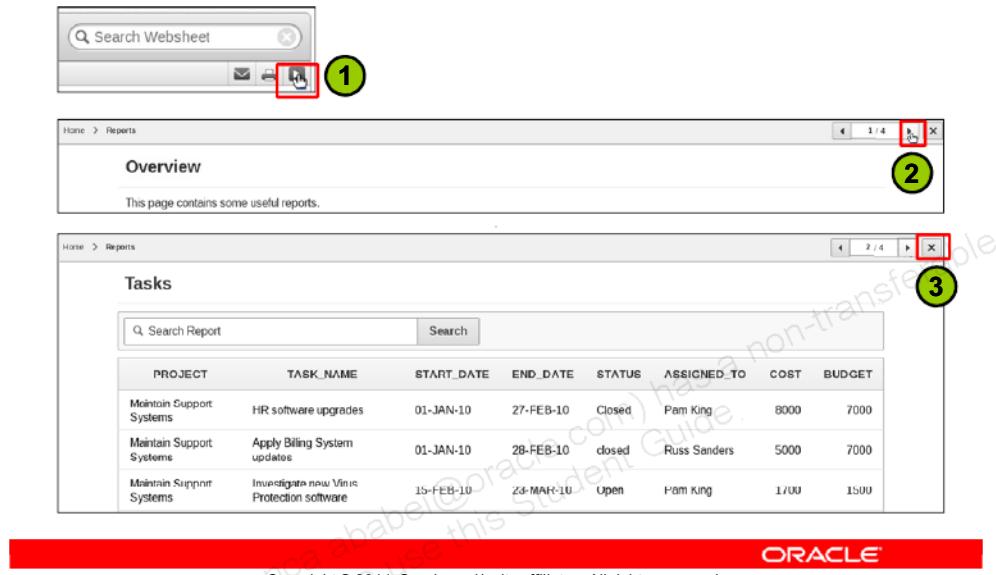
Page	Section	Old Content	New Content	Changed	User
Home	Navigation	-	Section created	9 minutes ago	teach
Home	Overview	Use this application to view details of all employees across all departments. You can also add new pages and sections as required	Use this application to view details of all employees across all departments. You can also add new pages and sections as required [[IMAG1.png]]	8 days ago	teach
Home	Overview	-	Section created	9 days ago	teach
Home	-	-	-	9 days ago	teach

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To view changes made to any pages or sections, select Page > History.

## Viewing a Page in Presentation Mode



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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, perform the following steps:

1. Click the presentation icon from the top-right 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 in the page is displayed . Click the close icon to exit presentation mode.

## Lesson Agenda

- Interacting with the Database
- Enhancing Websheet Applications
- Administering Websheet Applications
  - Viewing the Websheet Dashboard
  - Monitoring Activity in a Websheet
  - Sharing Websheet with Users

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## Viewing the Websheet Dashboard

The screenshot shows the Websheet Dashboard. On the left, there's a navigation menu with options like Dashboard, Monitor Activity, Application Properties, Access Control, and Change My Password. The 'Dashboard' option is selected. At the top right, there's a 'Timeframe' dropdown set to '1 week', which is highlighted with a red box. Below it are sections for 'Application Details', 'Recent Changes', 'Top Users', and 'Top Pages'. The 'Top Users' section lists TEACH (135), nobody (9), and TEACH\_ADMIN (3). The 'Top Pages' section lists Home (46), Reports (26), Employees (2), and Departments (1).

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To see a summary of a websheet application, you can view the Dashboard by selecting Administration > Dashboard. Set the time frame to the number of days that you want, and then click Reset. Various information—such as the number of pages, data grids, reports, and when changes were last made—is displayed.

## Monitoring Activity in a Websheet

The screenshot shows the Oracle Application Express Administration interface. In the top-left corner, there is a navigation menu with the following items:

- Dashboard (Alt+B)
- Monitor Activity (highlighted with a red box) (Alt+M)
- Application Properties (Alt+P)
- Access Control (Alt+X)
- Change My Password

Below the menu, the main content area is titled "Activity". It contains two sections: "Page Views" and "Annotations". Under "Page Views", the "Top Pages" link is highlighted with a red box. The "Annotations" section lists "Top Files", "Top Notes", and "Top Tags".

At the bottom of the interface, there is a table displaying page activity data:

Page Name	Distinct Users	Page Views	Average Text Content	Content Served	Last View
Home	2	46	283.5	13KB	7 minutes ago
Reports	1	26	0	0	8 minutes ago
Employees	1	2	0	0	80 minutes ago
Departments	1	1	0	0	94 minutes ago

At the bottom right of the interface, there is an "ORACLE" logo and a copyright notice: "Copyright © 2011, Oracle and/or its affiliates. All rights reserved."

To monitor activity for a websheet, select Administration > Monitor Activity. Select the link for the activity or annotations that you are interested in. A report is displayed with the corresponding activity information. In the slide example, Top Pages is selected to display a list of the top page views made over the last day.

## Sharing Websheets with Users

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

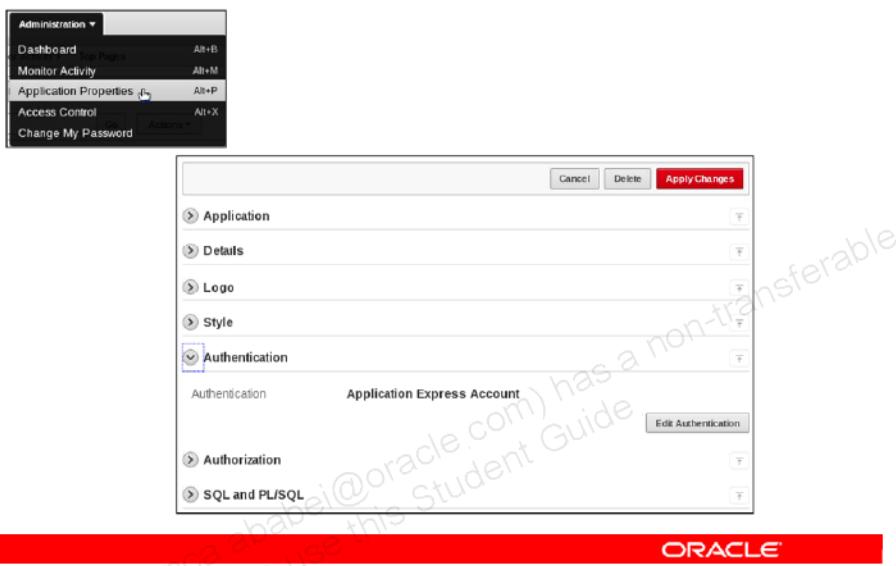
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To share the pages in your websheet with the user community, you must provide them with a username and password to log in. Depending on the username, you can authorize each user to have a particular level of access. The steps in the slide provide an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

We describe each step in more detail in the following slides.

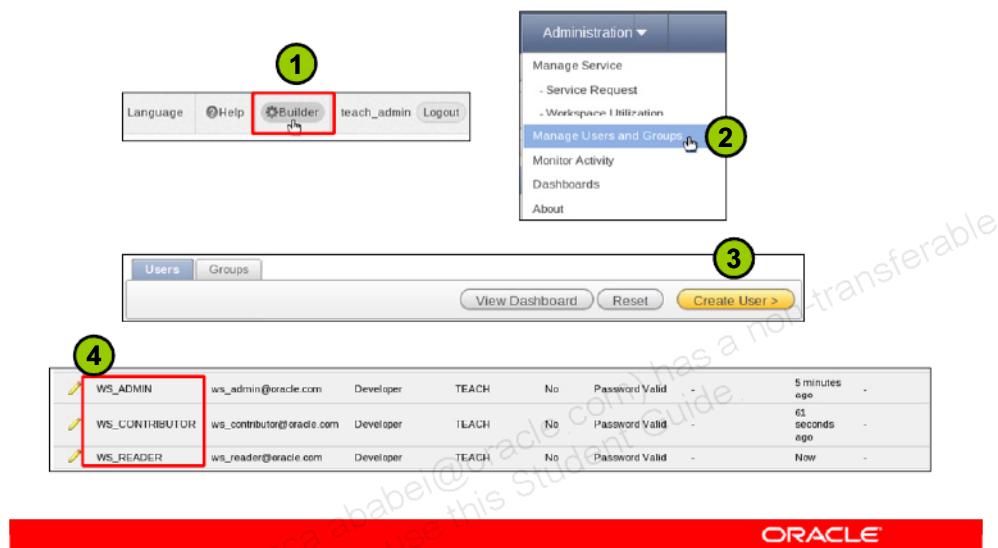
## 1. View the Current Websheet Authentication Method



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Before you set up an ACL, you should review the current authentication method that you are using. Select Administration > Application Properties and expand the Authentication region. In the slide example, you see that the current authentication method is Application Express Account. This means that you must create all the users that you want to have access to this websheet in Application Express, and then you can assign them a particular privilege in the websheet when you create the ACL.

## 2. Create Users in Application Express Administration



To create a user in Application Express Administration, perform the following steps:

1. From your websheet, click the Builder icon.
2. Select Administration > Manage Users and Groups.
3. Click Create Users and create the required users.
4. The users for this example are listed.

### 3. Create an ACL in Your Websheet



After your APEX users are created, you can define an ACL in the websheet to allow the user to be authorized to access the websheet. You can assign the three following privileges to provide different levels of authorization for your websheet:

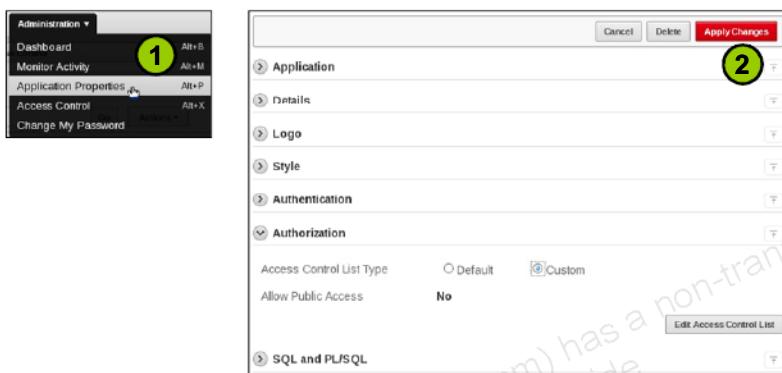
- **Reader:** Read access only; cannot make any changes
- **Contributor:** Can make changes to pages, sections, data grids, and reports, but cannot perform any administration tasks such as define an ACL or change the authentication of the websheet
- **Administrator:** Can perform all functions allowed within a websheet

To create an ACL, log in to the websheet as the user who created it (who is the administrator) and perform the following steps:

1. Select Administration > Access Control.
2. Click Create Entry.
3. Enter the APEX username and select the privilege.
4. Click Create. Alternatively, click Create and Create Another to create another user.

**Note:** You must also add the creator of the websheet as an administrator so that the user can change the ACL type. If that user is not in the ACL, that person will not be able to enable the list (in the next step in the next slide).

## 4. Change Websheet Authorization to Use a Custom ACL



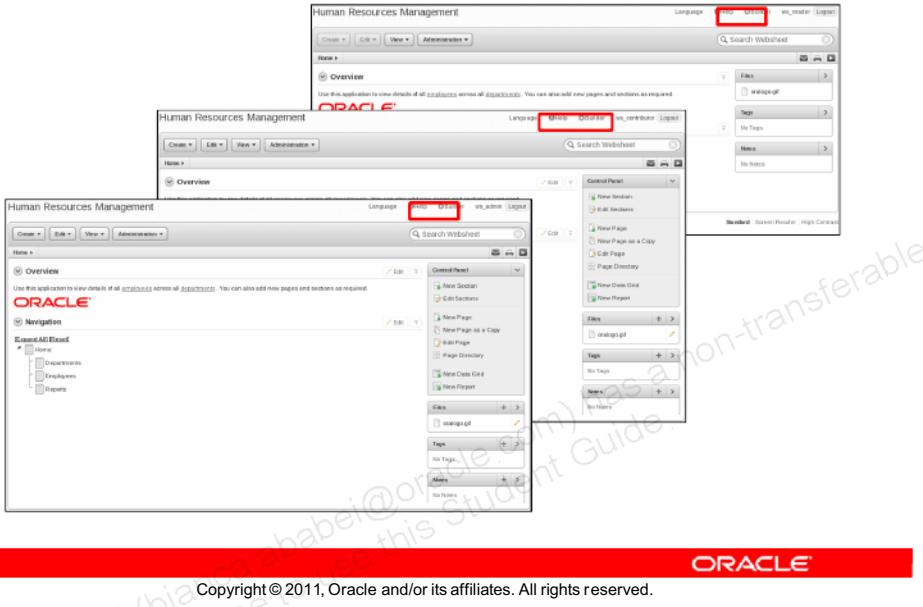
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To enable the ACL that you created in the previous step:

1. Select Administration > Application Properties.
2. Select Custom for the ACL type and 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 slide example, note the following:

- The WS\_READER user cannot create any new objects or edit any existing ones. This user can only view the websheet objects.
- The WS\_CONTRIBUTOR user can create new websheet objects but cannot administer the websheet.
- The WS\_ADMIN user has all privileges—the same privileges that the user who created the websheet has.

## Quiz

A user needs the ability to modify a section on a page but not change the properties of the websheet. Which websheet user privilege is needed?

- a. Administrator
- b. Reader
- c. Contributor
- d. Developer

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**Answer: c**

## Summary

In this lesson, you should have learned how to:

- Enable a websheet to interact with a database
- Create SQL, PL/SQL, and report sections
- Create navigation sections
- Administer a websheet



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## Practice 19: Overview

This practice covers the following topics:

- Enabling PL/SQL for a websheet
- Creating a SQL section
- Creating a PL/SQL section
- Creating a report
- Creating section and page navigation
- Creating an access control list

## Managing and Maintaining the Application Development Process

20

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## Objectives

After completing this lesson, you should be able to do the following:

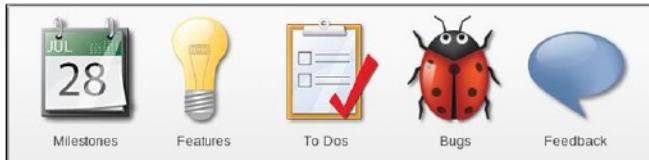
- Track features, milestones, bugs, and to dos
- Manage feedback



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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.

## What Is Team Development?



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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 then can 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

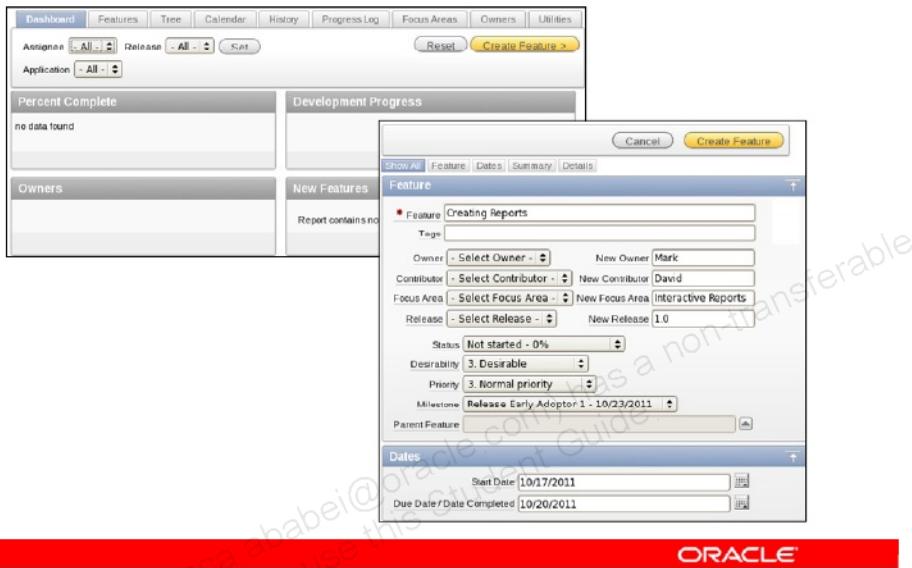
- Create and update features.
- Create and update milestones.
- Create bugs.
- Create and update to dos.
- Manage preferences.
- Review the Team Development dashboard.
- Review the progress of your milestones and features (dashboards).

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The slide lists tasks that you perform to track the progress of your application. They do not need to 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



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Use the Features page to track features from initial concept through implementation. You can organize features by release, assignee, tags, or associated milestones. Click the features tab to view the features created. To show the detail for the list of features, click the View Detail icon. In this view, you see additional information about each feature that you have created and its progress. There are several tabs that you can select for additional information, such as calendar, which will show you a calendar and the date on which the task is due.

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

## Creating Milestones

The screenshot shows the Oracle Application Express Milesstones page. At the top, there's a navigation bar with tabs: Dashboard, Milesstones, Calendar, By Owner, Features by Milestone, and a yellow 'Create Milestone' button. Below the navigation is a search bar with dropdowns for Show (All Events, Release, All), Set, and Reset, followed by a 'Create Milestone' button. The main area has two sections: 'Milestones' and 'Component Counts'. The 'Milestones' section displays a calendar for October and November. In October, there are three milestones: 'Close Bugs for EA Testing' (Due Date: 2 days from now), 'Release Early Adopter 1' (Due Date: 5 days from now), and 'Beta Release' (Due Date: 14 days from now). In November, there is one milestone: 'Production Release' (Due Date: 31 days from now). To the right of the calendar is a large digital clock showing '31' with the text 'Days before final milestone'. Below the clock are statistics: Total milestones: 4 and Future milestones: 3. The 'Component Counts' section provides a breakdown of features, to dos, and bugs associated with milestones. The 'Milestone Owners' section lists Larry (3) and Joe (1) as owners of the milestones. A modal dialog box is open in the center, titled 'Milestone', showing fields for 'Milestone' (Release Early Adopter 1), 'Date' (10/23/2011), 'Type' (Select Type - Release selected), 'Owner' (Select Owner - Larry selected), 'Release' (Select Release - New Release 1.0 selected), and 'Selectable for Features' (Yes selected). The Oracle logo is at the bottom right of the page.

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

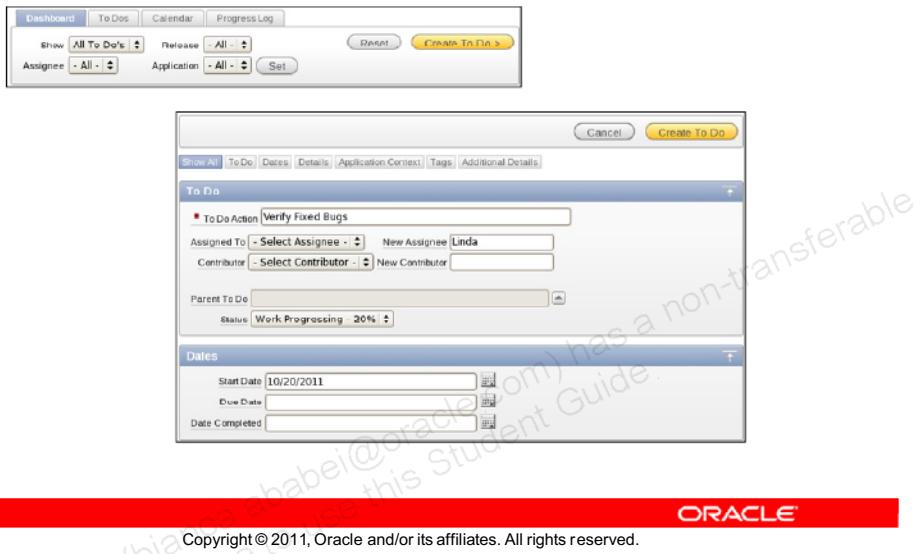
## Creating Bugs

The screenshot shows the Oracle Application Express interface for creating a new bug. At the top, there is a navigation bar with tabs: Dashboard, Bugs, Calendar, By Developer, and By Day. Below the navigation bar are buttons for Show (All, Release), Set, Reset, and Create Bug >. The main area is titled 'Bug' and contains fields for the bug description, status (10. Entered), severity (4. Moderate Impact), and priority (3. By next release). A 'Resolution' section includes fields for assigned to (Select Assignee), fix by release (1.0), target milestone (Release Early Adopter 1 10/23/2011), estimated fix date (10/18/2011), and actual fix date. There is also a 'Duplicate of Bug' link. The bottom right corner features the ORACLE logo.

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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



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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 maynot be associated with a feature or milestone. Tabs provide you additional information, such as a view of a to do progress log.

## Quiz

Which Team Development component would you create to “Add Feedback to Application”?

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

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**Answer: b**

## Quiz

Which Team Development component would you create to “Allow employee to enter status report information”?

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

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**Answer: a**

## Quiz

Which Team Development component would you create to “Correct packing list report error when using IE”?

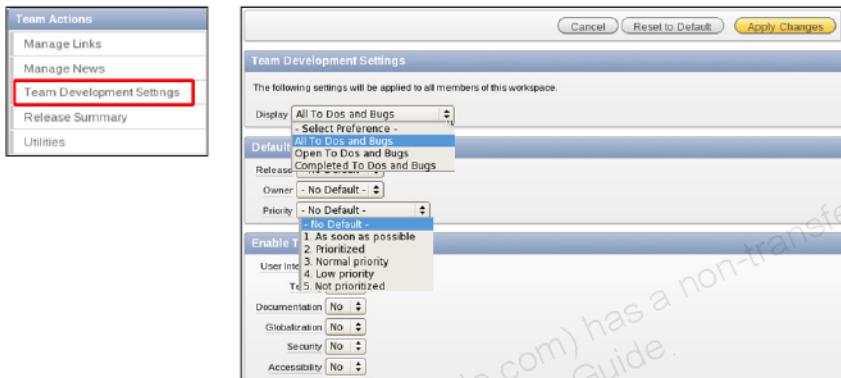
- a. Feature
- b. To do
- c. Milestone
- d. Bug

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**Answer: d**

## Managing Preferences



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Team Development settings enable you specify:

- How to dos and bugs are displayed
- Default values for release, owner, and priority
- The tracking attributes that are enabled for the current workspace

Team Development settings are applied to all users of the current workspace and are not user-specific.

## Managing Links and News

The screenshot shows the Oracle Application Express Team Development interface. On the left, there is a sidebar titled "Team Actions" with options: "Manage Links" (highlighted with a red box), "Manage News", "Team Development Settings", "Release Summary", and "Utilities".

**Links**: This region contains a search bar, a "Create Link >" button, and a table with columns: Link Name, Category, Created By, Created, Updated By, Updated, and Icons. One row is visible: "Oracle University" by "teach" at "Now".

**News**: This region contains a search bar, a "Add News >" button, and a table with columns: Link Name, Category, Created By, Created, Updated By, Updated, and Icons. One news entry is displayed: "New release of Order Management now under development" by "teach" at "Now".

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Use the Links page to share links within Team Development.

Use the News region to communicate with other developers. You can add or view news entries posted by other workspace users. News is displayed on the Application Express home page, Team Development home page, and News page.

## Viewing the Release Summary

The screenshot shows the 'Release Summary' report page. At the top left is a 'Team Actions' sidebar with links: Manage Links, Manage News, Team Development Settings, and Release Summary (which is highlighted with a red box). Below the sidebar is a toolbar with buttons for Developer, Release, Show, Set, Cancel, Reset, and Email. The main area is titled 'Release Summary' and contains three tables:

Release	Developers	Milestones	Features	Open Features	Features 80%	To Do's	Open To Do's	Bugs	Open Bugs
1.0	2	1	1	1	0	0	0	1	1

Release	Component	Opened Last 7 Days	Closed Last 7 Days	Total Opened	Total Closed	Closed
1.0	Bugs	1	0	1	0	0%
1.0	Features	1	0	1	0	0%
Total		2	0	2	0	0%

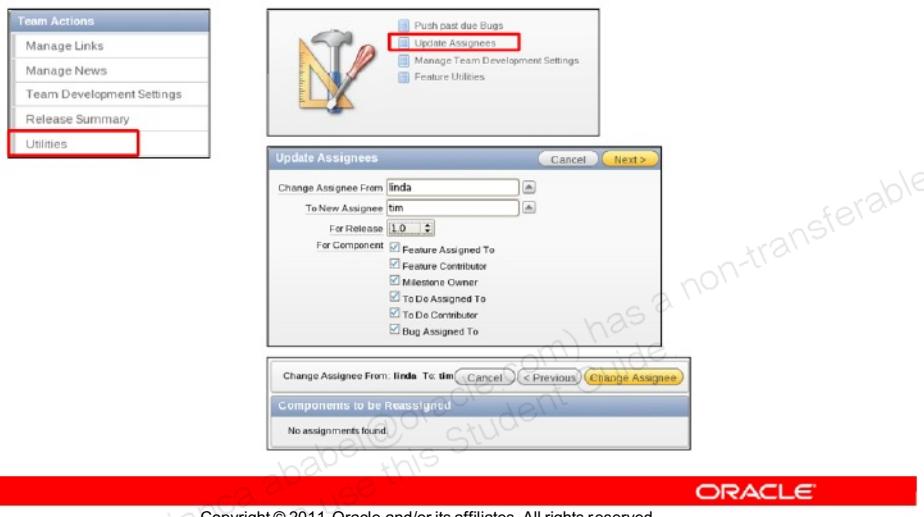
Developer	Features	Features 100%	Features 80%	To Do's	% Closed	Bugs	% Closed
mark	1	0%	0%	0	0%	0	0%
tim	0	0%	0%	0	0%	1	0%
Total	1	0%	0%	0	0%	1	0%

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The Release Summary report enables you to organize features, to dos, and bugs by release. You can email this summary report by clicking Email.

## Using Team Development Utilities



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Use Team Development Utilities to manage Team Development data. These utilities include:

- **Push past due Bugs:** Enables you to extend the estimated fix date of bugs that are not yet complete. You can filter and then select just the bugs that you want to push and then extend for any number of days.
- **Update Assignees:** Enables you to reassign selected components from one user to another user, for all releases or just a selected release. Only incomplete components are reassigned (that is, those components having a status less than 100% or a milestone date in the future).
- **Manage Team Development Settings:** Enables default settings when using Team Development
- **Feature Utilities:** Enables you to update your existing features

In the slide example, you update the assignee for the 1.0 releases from linda to tim.

## Using the Tag Cloud



Number	Component	Name	Owner	Release	Created	Tags
1	Milestone	Release Milestone Beta	larry	1.0	2 days ago	beta

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The Tag Cloud summary on the Team Development home page displays a weighted list of all the tags associated with all the Team Development components. Click the hyperlinks to link to a search page displaying all components with the selected tag. You can use the Tag Cloud summary to better manage Team Development components.

To populate this summary, edit the Tags field for each Team Development component (that is, each feature, to do task, bug, and feedback entry).

## Review the Progress of Your Milestones and Features



There is a dashboard for every Team Development component. In the slide example, the milestone dashboard is displayed. It provides such useful information as a summary of the upcoming milestones and the number of days that are left before the due date.

## Enabling Feedback for an Application

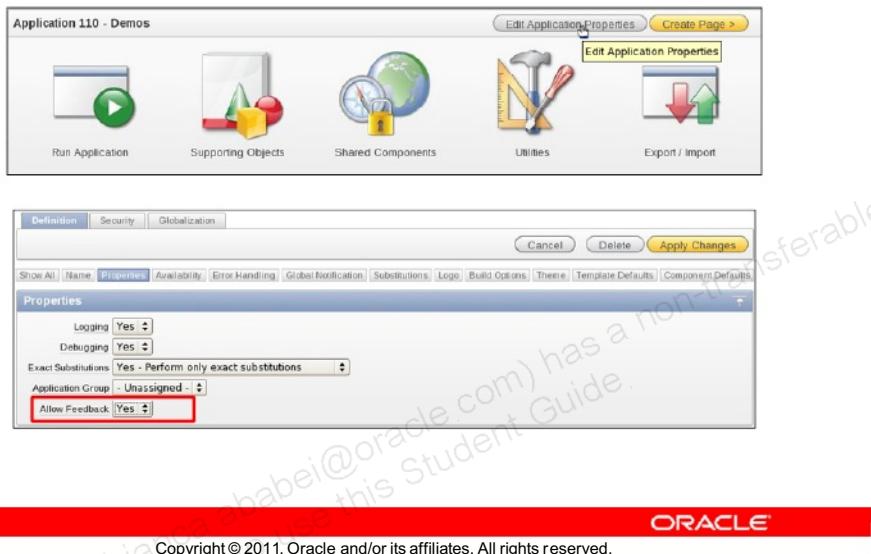
1. Enable feedback in application properties.
2. Create a feedback page.
3. Submit feedback.
4. Access the submitted feedback in Team Development

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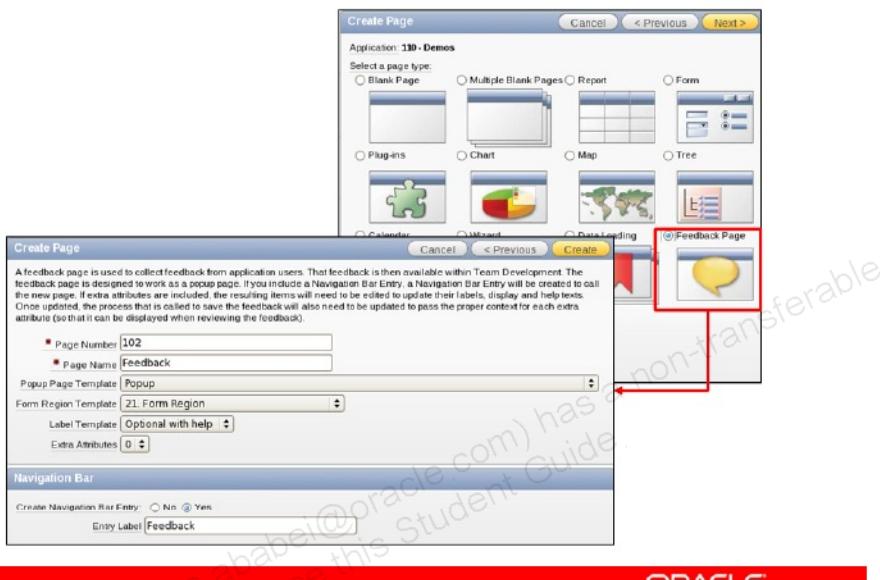
Feedback is the process of gathering real-time comments, enhancement requests, and bugs from your application users. To add a feedback page to an application, you perform the steps listed in the slide. Details about these steps are provided in the following slides.

## Step 1: Enabling Feedback in Application Properties



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

## Step 2: Creating a Feedback Page



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The next step is to create a feedback page that will be displayed when the user selects 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 (could be 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

The screenshot shows a web application interface. At the top, there is a navigation bar with links: Home, Form on Table, Form with Report, Tabular Form, Welcome: TEACH, Help, Feedback (which is highlighted with a red box), and Logout. Below the navigation bar is a modal window titled "Feedback". The modal contains the following information:

- Application: 110. Demos
- Page: 1. Home
- Feedback text area: "Links not working on Home page."
- Feedback Type dropdown: "General comment"
- Buttons: Cancel and Submit Feedback

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

## Step 4: Accessing Submitted Feedback in Team Development

The screenshot shows the Oracle Team Development dashboard. At the top, there are five icons with labels: 'Milestones' (calendar), 'Features' (lightbulb), 'To Dose' (checklist), 'Bugs' (ladybug), and 'Feedback' (speech bubble). Below these are two main sections: 'Percent Closed' and 'Summary'. The 'Percent Closed' section displays 'Feedback percent closed (01)' and '0%' in a large box, with 'General Comments: 0 of 1 closed' below it. The 'Summary' section contains a table of metrics:

Total Entries	1
Entries with Developer Comments	0
Entries with Public Responses	0
Entries with no Public Response	1
Distinct Files	1
Feedback Last 24 Hours	1
Feedback Last Week	1

At the bottom right of the dashboard is the ORACLE logo.

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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 either a bug, to do, or feature, and assign it to someone.

## Quiz

Feedback is enabled for an application automatically.

- a. True
- b. False

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**Answer: b**

## Summary

In this lesson, you should have learned how to:

- Track features, milestones, bugs, and to dos
- Manage feedback



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

## Practice 20: Overview

This practice covers the following topics:

- Tracking features, milestones, bugs, and to dos
- Managing feedback



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## **Additional Resources**



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## Additional Resources

- APEX home page on OTN
- Documentations and tutorials
- Oracle Learning Library
- Blogs
- Forum
- Hosted online help
- Oracle University courses
- Oracle Application Express Developer Certified Expert Examination

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## Application Express OTN Page



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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:
  - **Packaged Applications:** Oracle has developed many real-world application examples that you can download and install by yourself to get ideas on how to accomplish various tasks in Application Express.
  - **Latest Podcasts and Videos:** Useful presentations that you can view and listen to on your iPod
  - **Frequently Used Links:** Useful links to free SaaS instance, APEX forum, documentation, and packaged applications. Hosted Application (free SaaS instance) is a place for you to practice your skills. You can request an account and start creating your application by using the hosted version of Application Express, which is free and fully maintained by Oracle.

- **Downloads:** You can download the latest software.
- **Documentation:** Get access to the documentation and a whole host of How-to tutorials.
- **Community:** Get access to APEX OTN forum, Community How-Tos and list of blogs. Application Express OTN forum is one of the most popular forums on OTN. The forum has a knowledge base of hints and tips, and issues that users have encountered and their resolutions.
- **Learn More:** Get access to education and how-tos, technical information, and white papers.

## Documentation and Tutorials

**Oracle Application Express**  
**Documentation and Tutorials**

<a href="#">Full Library</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">Release Notes</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">Installation Guide</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">2 Day + Developer's Guide</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">Application Builder User's Guide</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">Migration Guide</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">Administration Guide</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">SQL Workshop Guide</a>	<a href="#">HTML</a>	<a href="#">PDF</a>
<a href="#">API Reference</a>	<a href="#">HTML</a>	<a href="#">PDF</a>

For documentation from previous releases please refer to the relevant [Prior Release Archives](#) for specific documentation for that release.

The Advanced Tutorials Guide contains How-Tos for Release 3.2, including:

- [Create a Tabular Form](#)
- [Create a Parameterized Report](#)
- [Create a Drill Down Report](#)
- [Control Form Layout](#)
- [Work with Check Boxes](#)
- [Implement a Web Service](#)
- [Create a Stacked Bar Chart](#)
- [Upload and Download Files in an Application](#)

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OTN has documentation and tutorials to help answer your questions. You can access the "Documentation and Tutorials" page from OTN at the following URL:

<http://www.oracle.com/technetwork/developer-tools/apex/documentation/index.html>

## Oracle Learning Library

The screenshot shows the Oracle Learning Library search interface. At the top, there's a navigation bar with links for Home, Advanced Search, Bookmarks, My Reviews, News, and About. Below the navigation is a search bar with a magnifying glass icon. Underneath the search bar are several filter dropdowns: Product Family (e.g., Click icon to select), Product (e.g., Click icon to select), Sub Product (e.g., Click icon to select), Release (e.g., Click icon to select), Content Type (e.g., Click icon to select), Release Date (e.g., Click icon to select), Tag (e.g., APEX), and Rating (e.g., Click icon to select). There are also buttons for Reset and Query. To the right of the search area are links for Copy Search URL and Email Search URL. The main content area displays a table of search results with columns for Title, Type, Release Date, Duration, Rating, and Tags. The results include various Oracle Application Express (APEX) demos and OBEs, such as "Creating and Using a Manual SOAP Web Service in Your Application" and "Using Advanced Interactive Report Region Techniques in Oracle Application Express 4.1". Each row shows the title, type (Demo or OBE), release date, duration, a five-star rating icon, and a list of tags like APEX, Application Development, OracleLearning, SOA-IP, Web Service, YouTube, REST, RESTful Web Service, and YouTube.

Title	Type	Release Date	Duration	Rating	Tags
Creating and Using a Manual SOAP Web Service in Your Application	Demo	21-Oct-11	3 mins	★★★★★	APEX, Application Development, OracleLearning, SOA-IP, Web Service, YouTube
Creating and Using a RESTful Web Service with an XML Response	Demo	21-Oct-11	3 mins	★★★★★	APEX, Application Development, OracleLearning, REST, RESTful Web Service, YouTube
Creating and Using a RESTful Web Service with an XML Response and a Bind Variable	Demo	21-Oct-11	4 mins	★★★★★	APEX, Application Development, OracleLearning, REST, RESTful Web Service, YouTube
Creating and Using Web Services in Your APEX Application	Demo	21-Oct-11	3 mins	★★★★★	APEX, Application Development, REST, RESTful, SOA-IP, Web Services
Using Advanced Interactive Report Region Techniques in Oracle Application Express 4.1	OBE	29-Aug-11	50 mins	★★★★★	APEX, Application Development, IRR
Using Interactive Report Regions in Application Express 4.1	OBE	26-Aug-11	50 mins	★★★★★	APEX, Application Development, IRR
Building and Customizing an Interactive Report in Application Express 4.1	OBE	26-Aug-11	50 mins	★★★★★	APEX, Application Development, IRR
Building a Worksheet Application in Application Express 4.1	OBE	25-Aug-11	50 mins	★★★★★	APEX, Application Development, Worksheet

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Oracle Learning Library is an application built by using Oracle Application Express. This Learning Library is designed to enable you to search for free online training content (OBEs, Demos, and Tutorials) on OTN.

There are a few ways to search content in the Learning Library. One way is to select the All Content tab and search by a specific set of desired search criteria. Another way is to select the tab for the product area that you are interested in. You will see a default view of the content for that product area. Then you can further narrow your search by using the criteria. When you have found the content that you are looking for, select the title to view the content.

Use the following URL to search for Oracle Application Express OBEs:

<http://apex.oracle.com/pls/apex/f?p=44785:29:3577578608157141::NO:RP::>

## Blogs

APEX Community & Partners		
		Consulting Companies   Hosting Companies
We will keep you up to date with all the Oracle APEX Blogs Users downloaded via OPML file and in your favorite feed reader, such as <a href="#">Google Reader</a> . Alternatively you can simply bookmark the <a href="#">APEX BLOG Aggregator</a> from <a href="#">APEX Evangelist</a> , which also includes some very useful search capabilities, etc.		
 <input type="text"/> Go <input type="button" value="Actions"/>		
Blogger	URL	Blog Name
APEX.obe.pl	<a href="http://apex.obe.pl">http://apex.obe.pl</a>	APEX.obe.pl - Blog o Oracle Application Express
ATOracle	<a href="http://blog.mechanis.com/">http://blog.mechanis.com/</a>	ATOracle
Absedia.com	<a href="http://www.apex09.com/">http://www.apex09.com/</a>	Absedia.com
Andy Tolley	<a href="http://www.andrew.tolley.co.uk/">http://www.andrew.tolley.co.uk/</a>	andrew.tolley.co.uk - SELECT "FROM RANDOM_STUFF WHERE subject IN (Application Express, Oracle, PL/SQL, SQL, Javascript)"
Anthony Rainer	<a href="http://anthonyrainer.blogspot.com/">http://anthonyrainer.blogspot.com/</a>	Let's talk about APEX, with Anthony Rainer
Anton Nielsen	<a href="http://clanton.blogspot.com/">http://clanton.blogspot.com/</a>	Anton Nielsen - Mostly Random experience with Oracle technologies. It is mostly specific solutions to isolated problems.
Austrian Competence Center for Oracle APEX	<a href="http://apex.oracleapexp.at/">http://apex.oracleapexp.at/</a>	Our Oracle experten blog
Ben Burdell	<a href="http://m.mjohan.wordpress.com/">http://m.mjohan.wordpress.com/</a>	Munji's Blog - Yet more APEX musings
Bernard Fischer-Willems	<a href="http://thmbd-dab.blogspot.com/">http://thmbd-dab.blogspot.com/</a>	Rund um Oracle APEX - erstles BLOG in DEUTSCH mit Hauptfokus Oracle Application Express (normal HTML, DB) Erweiterung von Bernhard Fischer-Willems
Bluistic	<a href="http://www.st-e-lekaren.eu/">http://www.st-e-lekaren.eu/</a>	Bluistic
Bradley Brown	<a href="http://www.tussoftware.com/brown">http://www.tussoftware.com/brown</a>	Bradley D. Brown - CTO co-founder of ITUG, a provider of Oracle management and technical consulting. Best-selling author of multiple web development books.
Carl Backstrom	<a href="http://carlback.blospot.com/">http://carlback.blospot.com/</a>	Carl Backstrom's Blog - Where spaghettis is just another word



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Oracle Application Express Blog is a site where people can communicate and interact on various topics. The users can post questions, images, events, and so on. The above slide contains a list of APEX blogs. You can access the “Blogs” page at the following URL:

<http://apex.oracle.com/pls/otn/f?p=24793:12:0>

## Forum: Application Express

The screenshot shows the Oracle Application Express forum page. At the top, there are links for 'Forum Home', 'Database', and 'Application Express'. On the right, there's a 'Welcome, Guest' sidebar with links for 'Sign In / Register', 'Guest Services', 'Search', and 'FAQ'. The main area displays a list of threads with columns for 'Thread', 'Author', 'Replies', and 'Last Post'. A search bar is located at the top right of the list area. To the right of the list, there's a 'Top Users in Forum' section showing a list of users with their names, profile icons, and post counts.

Thread	Author	Replies	Last Post
Oracle Application Express 4.1 is now Production	deebal	18	Nov 4, 2011 1:16 AM Last Post by: deebal
Welcome to the Oracle Application Express Discussion Forum	sherman	2	Nov 4, 2011 1:14 AM Last Post by: sherman
Oracle Application Express Listener now Production --> New APEX Listener Forum now available	sherman	6	Nov 4, 2011 1:04 AM Last Post by: sherman
Edit link in not available under the page in application	Pagein [1,2]	1	Nov 4, 2011 12:57 AM Last Post by: Pagein
Line Break in Select List Label	ubschol	1	Nov 4, 2011 1:14 AM Last Post by: ubschol
show 2 report regions (subregions) side by side	deepak.port	6	Nov 4, 2011 1:04 AM Last Post by: deepak.port
Substitution var in javascript/html Popup used for a region button	Tammy.Cutten	1	Nov 4, 2011 12:57 AM Last Post by: Tammy.Cutten
Build Target URL	mk344	1	Nov 4, 2011 12:54 AM Last Post by: mk344
Need to have Multiple Y axis chart in Apex 3.2	882468	0	Nov 3, 2011 11:51 PM Last Post by: 882468

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Application Express OTN forum is one of the most popular forums on OTN. In this forum, people 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://forums.oracle.com/forums/forum.jspa?forumID=137>

## Hosted Online Help

The screenshot shows a web browser window titled 'Application Builder User's Guide'. The left sidebar contains a table of contents with topics like Preface, What's New, Quick Start, Application Builder Concepts, etc. The main content area displays the 'About the Workspace Home Page' page. It includes a breadcrumb trail ('Home > Quick Start > About the Workspace Home Page'), navigation links ('Back', 'Forward', 'Find'), and a search bar ('initial index creation may take several seconds'). Below the title, there is a brief description of what a workspace is and how it works. A large image titled 'Workspace' shows four icons: Application Builder (two overlapping windows), SQL Workshop (SQL prompt with a gear), Team Development (calendar with a bug and a lightbulb), and Administration (two people). A note below the image says 'Description of the illustration workspace'.

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Within Oracle Application Express, you can get help on any topic, you can get context-sensitive help for the page or field where you are at any given point, and you can search for a particular topic.

## Learn More

The screenshot shows a web-based application interface for Oracle Application Express. At the top, there's a navigation bar with the 'ORACLE' logo, the text 'Application Express', and a 'Next >' button. Below the navigation is a 'Table of Contents' sidebar on the left with various sections like 'Introduction', 'Consolidation', 'Architecture', etc. To the right of the sidebar, there's a main content area. At the top of this area is a 'Show All' button and several tabs: 'About Application Express' (which is selected), 'Application Express Components', and 'Declarative Development'. The 'About Application Express' tab contains text about the software, mentioning it's a 'no-cost' option for Oracle Database 10.2.0.3 and above, including Oracle Database 10g Express Edition (Oracle XE). It also describes Oracle Application Express as part of the seed database installation with Oracle Database 11g, available for free from OTN at <http://otn.oracle.com>. Below this is a 'Browser Based' section with text about developing data-centric applications using a Web browser. Further down is a 'Rapid Application Development (RAD)' section with text about creating reporting and data entry applications using simple wizards and declarative programming. At the bottom of the content area is a 'Application Express Components' section.

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On the workspace home page, click the Learn More tab. This page provides an overview of Oracle Application Express.

## Oracle Application Express Developer Certified Expert

The screenshot shows the Oracle Certification Program website. At the top, there is a navigation bar with links: Home, Certification Paths, Exams, Preparation, Support, Benefits, and News and Community. Below the navigation bar, the title "Oracle Application Express Developer Certified Expert" is displayed. A brief description follows: "As an Oracle Application Express Developer Certified Expert, you should have the skills necessary to develop and deploy your application from beginning to end. The skills that you will gain through your experience and preparing for the exam will also allow you to manage database objects using SQL Workshop, utilize and manage shared components, manage authentication, authorization, and session state within your application, as well as administer Application Express Workspaces." Below this, there is a diagram illustrating the certification path. It starts with a box labeled "EXAM IZ0-450 Oracle Application Express 4: Developing Web Applications" with an arrow pointing to a larger box labeled "ORACLE® Oracle Application Express Developer Certified Expert". Underneath the diagram, there is a section titled "Additional Path Information" containing three bullet points: "To view requirements in detail, click the links in the diagrams", "You should receive your success kit within within 6-8 weeks of meeting all certification requirements", and "View an explanation of certification terms".

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You can access information about the *Oracle Application Express Developer Certified Expert* credential from the Certification Path > 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.

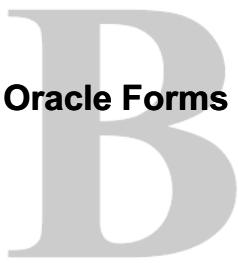
- **Exam number:** IZ0-450
- **Associated certifications:** *Oracle Application Express Developer Certified Expert*

The recommended training and preparation for the Oracle Application Express Developer Certified Expert exam is the *Oracle Application Express: Developing Web Applications* course.

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## Converting Oracle Forms Applications



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license to use this Student Guide.

## Objectives

After completing this lesson, you should be able to do the following:

- Explain the key similarities and differences between Oracle Forms and Oracle Application Express
- List the steps involved in converting your Oracle Forms application
- Create a conversion project
- Edit your conversion project
- Set up your application defaults
- Generate the Oracle Application Express application



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In Oracle Application Express, a utility provides the ability to convert your Oracle Forms application, including menus, reports, PL/SQL libraries, and object libraries to an Oracle Application Express application. This appendix discusses the steps involved in converting your Oracle Forms application.

## Oracle Application Express for Oracle Forms Developers

Feature	OracleForms	OracleApplication Express
4GL Languages	SQL and PL/SQL	SQL and PL/SQL
User Interface	Java	HTML
Page Layout	Windows/Canvases	Page/Regions
Client-side Field Control	Form Triggers	JavaScript and AJAX
Database Connections	Synchronous	Asynchronous
Architecture	Three-tier	Two-tier
Concurrent User Support	Database connectivity maintained by user session	Database connectivity maintained only for the processing of requests



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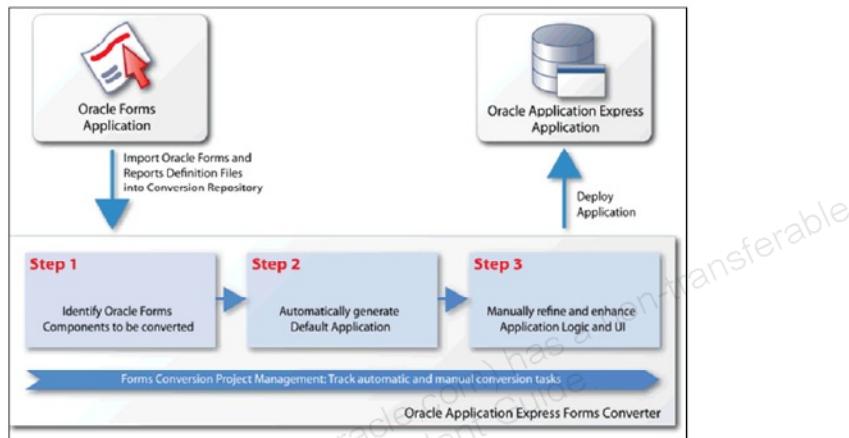
Oracle Forms is a rapid application development environment and is a component of Oracle Developer Suite. Oracle Forms runs a Java applet invoked from a browser, not HTML. Oracle Forms has transitioned from character mode and block mode to client server, and to the Internet with Forms Server. But, if your requirement is to transition to an HTML-based solution, consider using Oracle Application Express. Oracle Forms runs client-side PL/SQL. Oracle Application Express uses server-side PL/SQL.

The following are some of the key differences and similarities between Oracle Forms and Oracle Application Express.

- Oracle Forms renders applications by using metadata stored in an .fmx file. Application Express renders applications by using metadata stored in an Oracle database.
- Oracle Forms runs client-side PL/SQL. Application Express uses server-side PL/SQL.
- Oracle Forms is accessed by using a web browser and its user interface is rendered by using a JVM. Application Express is also invoked from a web browser but its user interface is HTML and JavaScript.
- Oracle Forms uses exact positioning and Application Express uses HTML-relative positioning.

- Both Oracle Forms and Application Express support the calling of Web Services (for example, BPEL).
- Oracle Forms uses BI Beans as its integrated charting engine. Application Express uses Flash charts as its integrated charting engine.
- Oracle Forms supports a range of locking models with the pessimistic locking model as the default. Because of its asynchronous architecture, Application Express uses an optimistic locking model.
- Oracle Forms uses synchronous connections to allow transactions to span multiple screen interactions. Application Express does not transparently allow transactions to span page views. Application Express programmatically supports transactions spanning page views by using collections.
- Each connected user in Oracle Forms maintains a synchronous connection to the Oracle database. Application Express users are asynchronously connected to the Oracle database.
- With Oracle Forms, application logic is processed in the Oracle database, a mid-tier Forms Server, or in the rich client. With Application Express, PL/SQL application logic is processed within the Oracle database. Client-side logic is implemented by using JavaScript. HTTP communications are facilitated by using Apache and Mod/PLSQL.

## Forms Conversion: Overview



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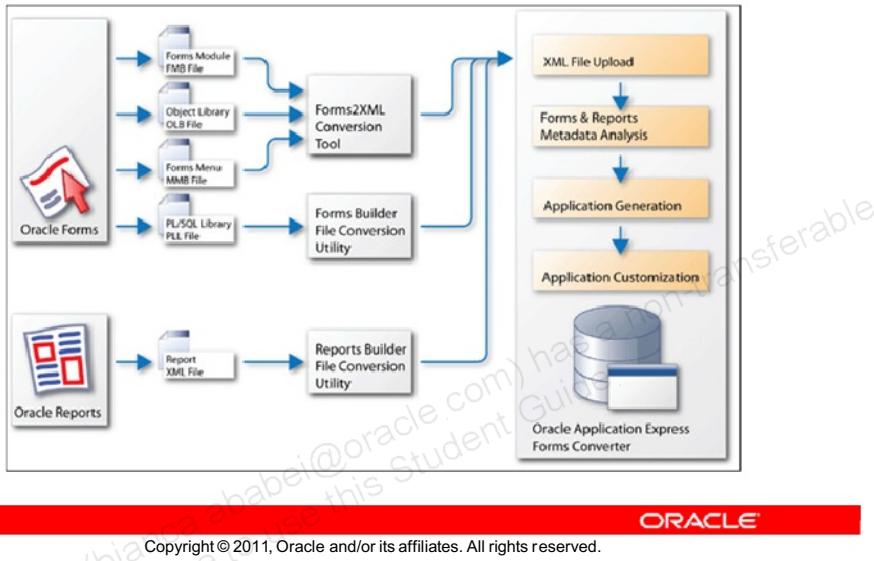
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Oracle Application Express enables you to load your Oracle Forms source into an Oracle Application Express project and generate an initial APEX application. The conversion automatically converts most user interface components but does not convert business logic implemented within triggers, program units, or PL/SQL libraries. Loading Oracle Forms definitions into the Oracle Application Express project provides analysis and tracking of the conversion project. After the initial design has been generated, the rapid application development capabilities inherent within Oracle Application Express can be used to enhance and expand the generated application. After the application is generated, the business logic within Oracle Forms can be reimplemented. New screens that take advantage of Web 2.0 capabilities, such as interactive reports and Flash charts, can be added by using the wizards built into the Oracle Application Express builder.

To learn more about converting your Oracle Forms applications (including menus and reports) to Oracle Application Express, see the Oracle By Example titled *Converting Your Oracle Forms Applications to Application Express* at: <http://st-curriculum.oracle.com/obe/db/11g/r2/prod/appdev/apex/apexformmigr/apexformmigr.htm>

For more information about Oracle Application Express Forms Conversion, review the *Oracle Application Express Application Migration Guide*.

## Converting Your Oracle Forms Application



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The graphic in the slide demonstrates the entire process of converting an Oracle Forms application to Oracle Application Express.

To get started with converting your Oracle Forms application, you must have at least one installation of Oracle Forms 9*i* or 10*g*. These two versions include the Forms2XML utility required to create XML files from Forms source files (FMBs, MMBs, and so on).

After you have created the XML files, you must go to Application Migration from the APEX Builder Home page and create a project. You must also build the referenced tables and views within your workspace. After loading up the XML files, you can start conversion and perform the required manual postgeneration enhancements.

## Converting Your Oracle Forms Application

1. Convert Oracle Forms to XML.
2. Convert DLLs to PLD text.
3. Convert Reports to XML.
4. Create an Oracle Application Express workspace.
5. Create a conversion project.
6. Analyze the Oracle Forms application.
7. Generate the Oracle Application Express application.
8. Customize your Oracle Application Express application.

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To convert your Oracle Forms application, perform the following steps:

1. **Convert Oracle Forms to XML:** Run the Forms to XML Conversion tool, Forms2XML, to convert the Forms FormModules in your application. In addition, this tool will convert OLBS (object libraries) and MMBs (menus). This creates XML output files.
2. **Convert DLLs to PLD Text:** Run the Convert utility in Forms Builder to convert DLLs to PLD text format.
3. **Convert Reports to XML:** Run the Convert utility in Reports Builder to convert your Reports to XML format.
4. **Create an Oracle Application Express workspace:** Run Oracle Application Express and create a workspace. Associate the workspace with the Oracle Forms application schema.
5. **Create a conversion project:** Log in to the workspace created in step 2 and navigate to Application Migrations from the Migrations Tasks region. Create a conversion project and load the application metadata from step 1.

6. **Analyze the Oracle Forms application:** From the Application Migration Workshop, verify and adjust the Forms application metadata. Refine the scope of conversion.
7. **Generate the Oracle Application Express application:** Create an application based on the selected Forms objects.
8. **Customize your Application Express application:** Open your application in the Application Builder part of Application Express, and customize your converted application. You can change application attributes or add new pages to the application.

## Converting Oracle Forms to XML

- Use the Forms to XML conversion tool (Forms2XML) to convert Oracle Forms FormModule, MenuModule, and ObjectLibrary files to XML.
- Forms2XML produces an XML file that has the same base name as the Forms file with an .xml extension.
- Use the File > Convert option in Oracle Forms Builder to convert PL/SQL library .PLL files to .PLD text files.
- Use the file conversion option in Reports Builder to convert binary (.RDF), ASCII (.REX), and .JSP reports to XML format.

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Forms2XML produces an XML file that has the same base name as the Forms file with an .xml extension. The extension \_fmb, \_mmb, or \_olb is added to the base file name to indicate whether the original file was FormModule, a MenuModule, or an Object Library. For example, myForm.fmb will have the file name myForm\_fmb.xml after conversion.

You can use the Forms2XML conversion tool either from a command line or in a Java program.

To convert 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 convert an Oracle report, use the File Conversion option in Reports Builder to convert binary (.RDF), ASCII (.REX), and .JSP reports to XML format.

**Note:** The Forms2XML utility must generate an XML file in English only. If the generated XML tags are not in English, the file will fail to load.

## Creating a Workspace and Adding Oracle Application Express Users



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To create an Oracle Application Express workspace, perform the following steps:

1. Log in to Oracle Application Express Administration Services and click Manage Workspaces.
2. Click Create Workspace. The Create Workspace Wizard appears.
3. For Identify Schema, select the Oracle Forms application schema. If the Oracle Forms application schema exists in the current database, select it. If it does not exist in the current database, follow the steps outlined in the next slide (titled “Uploading Database Objects”).
  - For “Re-use existing schema,” select Yes.
  - Select a schema from the list.
  - Click Next.
4. For Identify Administrator, enter the Workspace administrator information and click Next.
5. Confirm your selections and click Create.

To create an Oracle Application Express user account, perform the following steps:

1. Log in to Oracle Application Express Administration Services and click Manage Workspaces.
2. Click "Manage Developers and Users." The "Manage Developers and Users" page appears.
3. Click Create. The Create/Edit User page appears.
4. Under User Attributes, enter the appropriate information. Fields marked with an asterisk are required.
5. Under Password, enter a case-sensitive password for this account.
6. Under Developer Privileges, select the appropriate privileges:
  - **User is a developer:** To add this user as a developer, select Yes. For end users, select No.
  - **User is a workspace administrator:** To add this user as a Workspace administrator, select Yes. For developers or end users, select No.
7. Under Account Control, specify the following:
  - **Account Availability:** Select Unlocked to enable a user to log in to this account
  - **"Require Change of Password on First Use":** Select Yes to require the user to change the password immediately after logging in with the current, temporary password. Otherwise, select No.
8. Click Create User or "Create and Create Another."

You learned how to create Application Express users in the lesson titled "Administering Oracle Application Express Workspaces."

## Uploading Database Objects

- To start the conversion process, the database objects associated with your Oracle Forms application must reside in the same database as Oracle Application Express.
- To upload database objects associated with your workspace, perform the following steps:
  1. Create a DDL script.
  2. Upload the DDL script to the Script repository and run it.



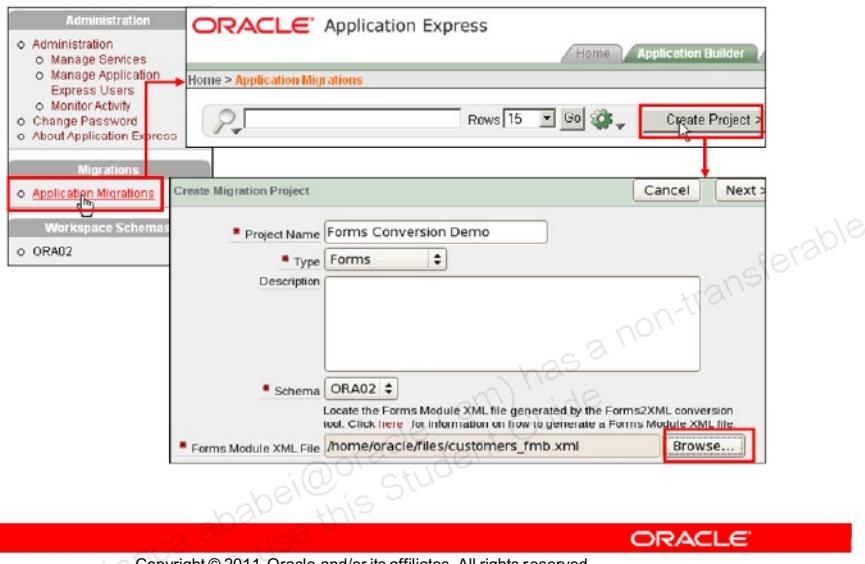
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To start the conversion process, the database objects associated with your Oracle Forms application must reside in the same database as Oracle Application Express.

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, perform the two steps that are mentioned in the slide.

## Creating a Conversion Project



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To create a conversion project, perform the following steps:

1. On the Workspace home page, in the **Migrations** region, click **Application Migrations**.
2. Click **Create Project**.
3. Enter the project details:
  - **Project Name:** Enter a unique name. The project name must be unique to your current workspace and should not contain any white spaces.
  - **Type:** Select Forms.
  - **Description:** Enter a meaningful description for this project.
  - **Schema:** Select the schema that contains the database schema objects associated with the Oracle Forms application you want to convert. The default schema is the schema associated with your workspace.
  - **Forms Module XML File:** Click **Browse** and locate the XML file that contains the information about your converted Oracle FormModule (for example, `customers_fmb.xml`). Note that you must upload the converted Oracle FormModule file first. The Confirm page appears.
  - To add more files, click **Upload Another File**.

## Creating a Conversion Project

The screenshot shows the 'Create Migration Project' dialog and the resulting project summary page. The dialog displays file details and a 'Finish' button. An arrow points from the 'Finish' button to the project summary page, which lists components and their statistics.

Type	File Name	Blocks	DB Blocks	Items	Triggers	Record Groups
FMB	customers_fmb.xml	5	4	30	23	1
FMB	orders_fmb.xml	4	3	24	45	1
PLL	wizard.pld	0	0	0	0	0

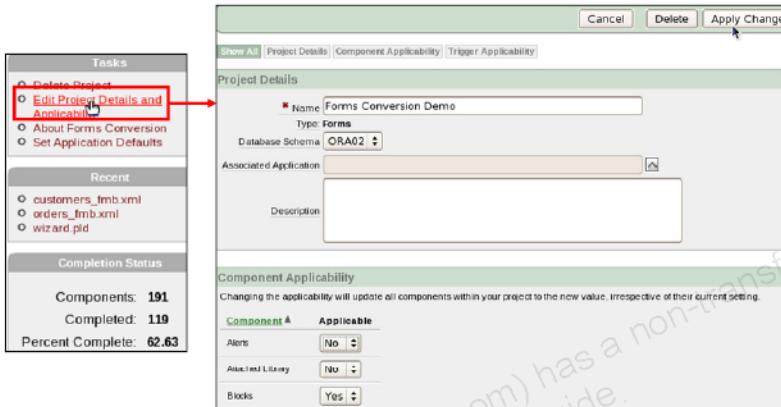
Lists of Values	Alerts	Program Units	Component Count	Completed Components	Percent Complete
1	2	2	84	64	76.19
1	2	5	106	55	51.99
0	0	0	1	0	0.00

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4. Make sure that you upload all the required files. To upload a file, specify the appropriate file type.  
Options include the following:
  - **Forms Module:** Upload a FormModule in XML format (`customers_fmb.xml`).
  - **PL/SQL Library:** Upload a PL/SQL Library associated with your Oracle Forms application (`wizard.pld`).
  - **Oracle Report:** Upload an Oracle Report in XML format.
  - **Object Library:** Upload an Object Library in XML format.
  - **Forms Menu:** Upload an Oracle Form Menu in XML format.
5. Review the project details and click **Finish**. The project page appears.

## Editing Your Conversion Project



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You may want to set certain defaults for your conversion project. To edit your conversion project, in the Tasks region, click "Edit Project Details and Applicability."

On the Project Details page, you can change the schema associated with the project. You can also associate a different Application Express application (ID) that has already been generated. You can change this by using the popup LOV. In the Component Applicability region, you determine whether a particular category is relevant to the conversion process. In the example in the slide, you do not want alerts to be applicable for this conversion project. Therefore, No is selected for Alerts.

The Trigger Applicability region is similar to Component Applicability but it is specific to triggers. Based on the trigger name and where the trigger was implemented within Oracle Forms, the table determines the applicability assigned to that trigger within the project. After editing your conversion project, click Apply Changes.

## Reviewing and Editing Forms Metadata

Edit	Type	File Name	Blocks	DB Blocks	Items	Triggers	Record Groups
	FMB	customers.fmb.xml	5	4	30	23	1
	FMB	orders.fmb.xml	4	63	34	45	1
	PLL	wizard.pld	0	0	0	0	0

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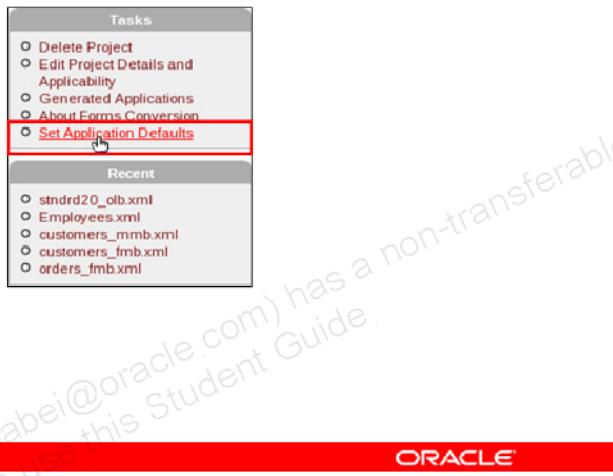
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The Project page shows a high-level overview of your Oracle Forms conversion project. You can review Forms attributes and track manual conversion by clicking the links on the Project page. With the exception of the File Name column, most of the information on the Project page applies only to FormModule XML files (for example, Blocks, Triggers, and Program Units columns).

To review object metadata, perform the following steps:

1. On the Project page, click the number in the column for the appropriate object type. Alternatively, you can click the file name to view a report describing the component. Clicking a number displays a listing of the object type.
2. To include blocks, items, and LOVs, select the **Include** check box adjacent to the object name and click **Apply Changes**.
3. To view details about a specific object, click the object name or the **Edit** icon.

## Setting Up Application Defaults



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After you have reviewed and updated the Oracle Forms metadata within your conversion project, you must generate the application in Oracle Application Express.

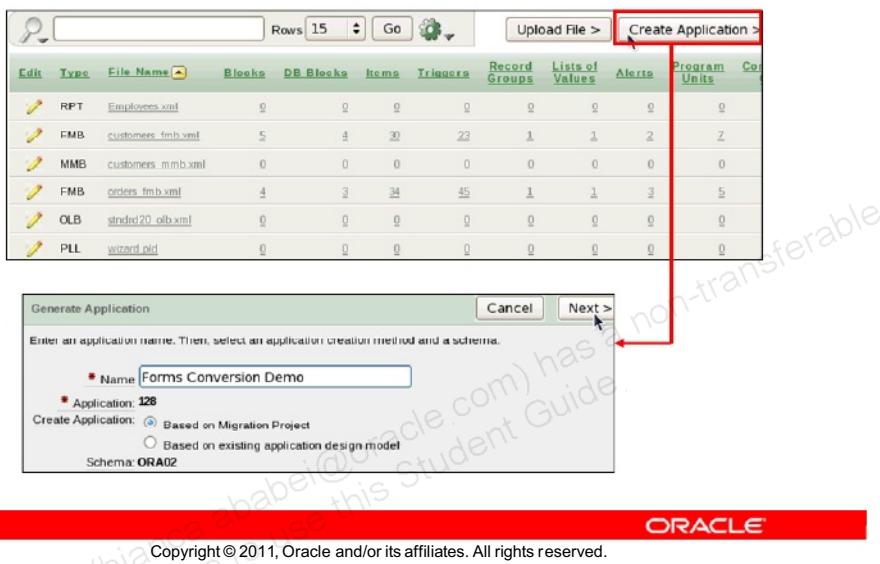
When creating an application, a home page is defined by default. You have the option to create additional blank pages so that you can include blank pages or reports and forms on other tables as part of your application. You can then choose which user interface theme your application should be based on. By default, the application uses one level of tabs.

As a shortcut, you can also set up some application defaults. These defaults are used whenever you create new applications.

To set up application defaults, perform the following steps:

1. At the right of the project page, click Set Application Defaults in the Tasks list.
2. Select the options that you want to use as defaults. You can set the tabs, authentication, and theme that will be used when the application is created.
3. Click Apply Changes. The project page appears.

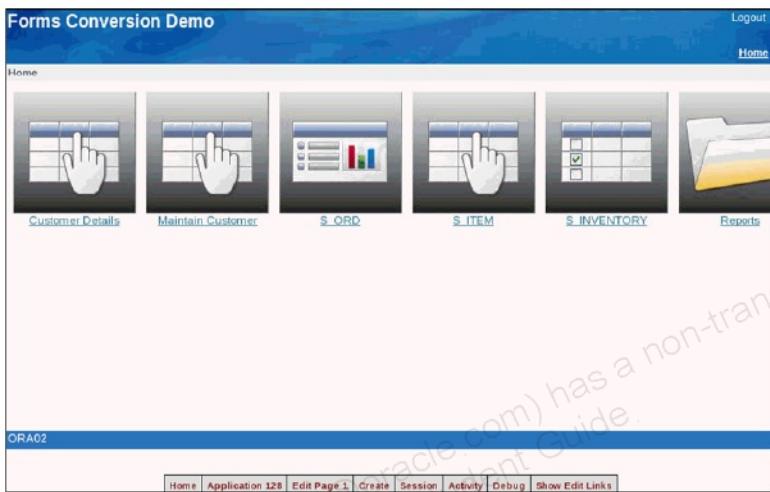
## Generating Your Application Express Application



To create an application, perform the following steps:

1. On the project page, click **Create Application**.
2. Specify the name for your application and choose "Based on Migration Project" for Create Application. Click Next.
3. In the Selected Application Objects section, you can customize specific pages. For example, you can rename a page or select home page navigation.
4. To add additional pages to the application, scroll down to the Add page section. Select a page type and click Add Page. Click Next.
5. Select a theme for the application and click Next.
6. Confirm your selections and click Create.

## Reviewing Your Application



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To review the application, click Run Application. Then log in using your Oracle Application Express workspace credentials. Your application now appears as a separate application in Oracle Application Express.

## Summary

In this lesson, you should have learned how to:

- Explain the key similarities and differences between Oracle Forms and Oracle Application Express
- List the steps involved in converting your Oracle Forms application
  - Create a conversion project
  - Edit your conversion project
  - Set up your application defaults
  - Generate the Oracle Application Express application



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