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# Oracle Application Express Workshop I

Student Guide – Volume I

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## Contents

### **1 Course Overview**

- Objectives 1-2
- Course Goals 1-3
- Course Road Map 1-4
- Course Environment 1-8
- Workspace Details 1-9
- Accessing the labs Directory 1-10
- Meet Course Persona: Jill 1-11
- Meet Course Persona: Jack 1-12
- Introducing Demo Application: Project Tracking System 1-13
- Project Tracking System: Basic Reports 1-14
- Project Tracking System: Supporting Reports 1-17
- Snapshot View of Project Tracking System 1-18
- Introducing Practice Application: GlobalMart Management Tool 1-19
- Additional Resources – Oracle Application Express 5.0 1-20
- Summary 1-21

### **I Unit I: Getting Started with Application Express**

- Jill Expresses Her Concern: Driving Factor Behind PTS I-2
- Unit I Road Map I-3

### **2 Introducing Oracle Application Express**

- Jack Decides to Explore Oracle Application Express 2-2
- You Are Here in This Course 2-3
- Objectives 2-4
- Lesson Agenda 2-5
- What Is Oracle Application Express? 2-6
- Why Use Oracle Application Express? 2-7
- Types of Applications 2-8
- Applications Developed by Using Oracle Application Express 2-9
- High-Level Architecture 2-10
- Types of Installations 2-12
- Quiz 2-13
- Lesson Agenda 2-14
- What Is a Workspace? 2-15

What Is an Internal Workspace?	2-16
Defining Roles	2-17
Quiz	2-19
Lesson Agenda	2-20
Logging In to a Workspace	2-21
Creating a Developer User	2-22
Practice 2-1 Overview: Using Oracle Application Express as a Workspace Administrator	2-23
Workspace Home Page	2-24
What Is SQL Workshop?	2-25
Accessing SQL Workshop	2-26
Running SQL Commands	2-27
Importing and Running a SQL Script	2-28
What Is Application Builder?	2-29
Types of Applications	2-30
Accessing a Packaged Application	2-32
Selecting a Packaged Application	2-33
Installing a Packaged Application	2-34
Running an Installed Packaged Application	2-35
Unlocking an Installed Productivity Application	2-36
Exporting an Application	2-37
Importing an Application	2-38
Practice 2-2 Overview: Using Oracle Application Express as a Developer	2-40
Lesson Agenda	2-41
Oracle Database Cloud Service	2-42
Using Oracle Application Express in Oracle Database Cloud Service	2-44
Summary	2-45

### **3 Creating a Database Application**

Jack Thinks of Developing PTS for Different Interfaces	3-2
You Are Here in This Course	3-3
Objectives	3-4
Lesson Agenda	3-5
Accessing Application Builder	3-6
Application Builder Home Page	3-7
Lesson Agenda	3-9
Database Application Home Page	3-10
Database Application User Interfaces	3-12
Themes	3-13
Components of a Database Application	3-15
Page Designer: The World's Most Advanced IDE	3-16

Page Designer: Drag 'n' Drop from Gallery	3-17
Page Definition: Overview	3-18
Different Views of a Page	3-19
Switching Between Pages and View Types	3-20
Quiz	3-21
Lesson Agenda	3-23
Create Application Wizard	3-24
Accessing the Create Application Wizard	3-25
Different Ways of Creating a Database Application	3-26
Creating a Desktop Database Application	3-27
Page Wizard for Desktop User Interface	3-28
Page Wizard for Mobile User Interface	3-29
Creating a Database Application from a Spreadsheet	3-30
Running an Application	3-31
Using the Developer Toolbar	3-32
Practice 3 Overview: Creating Database Applications	3-34
Summary	3-35

#### **4 Working with Reports for Desktop Applications**

Jack Designs Reports for Tracking Projects	4-2
You Are Here in This Course	4-3
Objectives	4-4
Lesson Agenda	4-5
Different Ways of Creating a Report	4-6
Types of Reports	4-7
Selecting the Appropriate Report Type	4-8
Quiz	4-10
Lesson Agenda	4-11
Classic (SQL) Report	4-12
Creating a Classic (SQL) Report	4-13
Practice 4-1 Overview: Creating Classic Reports	4-14
Lesson Agenda	4-15
Creating an Interactive Report	4-16
Interactive Report Components	4-17
Searching for Information	4-18
Selecting Columns	4-19
Adding a Column Filter	4-20
Adding a Row Filter	4-21
Sorting Columns	4-22
Creating Control Breaks	4-23
Highlighting a Row or Cell	4-24

Adding Computed Columns	4-25
Aggregating Columns	4-26
Creating a Chart	4-27
Creating a Group By Report	4-28
Creating a Group By Sort Order	4-29
Quiz	4-30
Performing a Flashback Query	4-31
Saving a Report	4-32
Resetting Reports	4-33
Downloading Reports	4-34
Manipulating the Interactive Report by Using a Column Header	4-35
Quiz	4-36
Practice 4-2 Overview: Building and Manipulating an Interactive Report	4-37
Lesson Agenda	4-38
Accessing the Report Attributes	4-39
Editing Report Attributes	4-40
Customizing the Search Bar and Actions Menu	4-41
Specifying the Download Formats	4-42
Icon and Detail Views	4-43
Using the Link Column	4-44
Modifying the Interactive Report Query	4-45
Quiz	4-46
Practice 4-3 Overview: Customizing an Interactive Report	4-48
Summary	4-49

## 5 Working with Reports for Mobile Applications

Jack Extends PTS Reports to Mobile Interface	5-2
You Are Here in This Course	5-3
Objectives	5-4
Lesson Agenda	5-5
Types of Reports Supported for Mobile Interface	5-6
Lesson Agenda	5-7
Creating a List View	5-8
Modifying a List View	5-10
Practice 5-1 Overview: Creating a List View Report	5-11
Lesson Agenda	5-12
What Is a Column Toggle Report?	5-13
Creating a Column Toggle Report	5-14
Practice 5-2 Overview: Creating a Column Toggle Report	5-15
Lesson Agenda	5-16
What Is a Reflow Report?	5-17

Creating a Reflow Report 5-18  
Practice 5-3 Overview: Creating a Reflow Report 5-19  
Summary 5-20

**I Unit I: Getting Started with Application Express**

Unit I Road Map I-2

**II Unit II: Building Rich, User-Friendly Web Applications**

Jack Explores Oracle Application Express Further II-2  
Unit II Road Map II-3

**6 Creating Forms**

Jack Gets into Next Step: Data Entry Through Forms 6-2  
You Are Here in The Course 6-3  
Objectives 6-4  
Lesson Agenda 6-5  
Introducing Forms 6-6  
Types of Forms 6-7  
Accessing the Create Form Wizards 6-9  
ROWID Versus Primary Key 6-10  
Lesson Agenda 6-11  
Example: Form on a Table 6-12  
Creating a Form on a Table 6-13  
Linking a Report to a Form 6-14  
Practice 6-1 Overview: Creating a Form on a Table 6-16  
Example: Form on a Table with Report 6-17  
Creating a Form on a Table with a Report 6-18  
Example: Master Detail Form 6-19  
Creating a Master Detail Form 6-20  
Practice 6-2 Overview: Creating a Master Detail Form 6-21  
Example: Tabular Form 6-22  
Creating a Tabular Form 6-23  
Quiz 6-24  
Practice 6-3 Overview: Creating a Tabular Form 6-26  
Lesson Agenda 6-27  
Using Quick Edit 6-28  
Reordering Items 6-29  
Changing Item Display Type 6-30  
Customizing Forms 6-31  
Quiz 6-32  
Lesson Agenda 6-33

Form on a Table with List View	6-34
Creating a Form on a Table with List View	6-35
Practice 6-4 Overview: Creating a Form on a Table with List View for Mobile Applications	6-36
Creating a Form on a Table	6-37
Linking to a Form on a Table from an Existing List View	6-38
Summary	6-39

## 7 Working with Pages and Regions

Jack Works with Pages and Regions	7-2
You Are Here in This Course	7-3
Objectives	7-4
Lesson Agenda	7-5
What Is a Page?	7-6
Page Modes: Normal, Modal, and Nonmodal	7-7
About the Page Designer Window	7-8
Understanding Page Designer UI Elements	7-9
Understanding Page Designer UI Elements: Page Designer Toolbar	7-10
Understanding Page Designer UI Elements: Tree Pane	7-13
Understanding Page Designer UI Elements: Central Pane	7-15
Understanding Page Designer UI Elements: Central Pane: Grid Layout	7-16
Understanding Page Designer UI Elements: Central Pane: Gallery	7-17
Understanding Page Designer UI Elements: Central Pane: Messages	7-18
Understanding Page Designer UI Elements: Central Pane: Page Search	7-19
Understanding Page Designer UI Elements: Central Pane: Help	7-20
Understanding Page Designer UI Elements: Property Editor	7-21
Understanding Page Designer UI Elements: Property Editor: Code Editor	7-22
Accessing Page Definition	7-23
Editing Page Attributes	7-24
Running a Page	7-25
Runtime Developer Toolbar	7-26
Copying a Database Application Page	7-28
Deleting a Page	7-29
Lesson Agenda	7-30
Adding a Region: From the Rendering Tree	7-31
Adding a Region: From the Gallery	7-32
About Region Types	7-33
Positioning the Region	7-35
Conditional Display of Regions	7-36
Editing a Region	7-37
Specifying a Region Header and Footer	7-38

Creating a Region Display Selector	7-39
Copying Regions	7-40
Creating a Subregion	7-41
Practice 7-1 Overview: Creating and Modifying Pages and Regions	7-42
Lesson Agenda	7-43
Global Page	7-44
Creating a Global Page	7-45
Practice 7-2 Overview: Working with Global Pages	7-46
Common Pages for Different User Interfaces	7-47
Autodetection of Application Pages	7-48
Viewing Mobile Pages	7-49
Practice 7-3 Overview: Modifying the Mobile Home Page	7-50
Creating a Page Group	7-51
Copying a Page	7-52
Quiz	7-53
Summary	7-55

## 8 Adding Items and Buttons

Jack Adds Items and Buttons to Pages	8-2
You Are Here in This Course	8-3
Objectives	8-4
Lesson Agenda	8-5
Items	8-6
Page Items: Examples	8-7
What Are Application Items?	8-8
Creating a Page Item	8-9
Types of Page Items	8-10
Lesson Agenda	8-12
Creating a Date Picker Item	8-13
Editing an Item	8-15
Creating Quick Picks	8-16
Adding Subtypes on Mobile Item Types	8-17
Quiz	8-18
Lesson Agenda	8-19
What Is an LOV?	8-20
Accessing the “Lists of Values” Page	8-21
Creating a Static LOV	8-22
Creating a Dynamic LOV	8-23
Associating an LOV with an Item	8-24
Creating a Select List Item	8-25
Creating a Cascading LOV	8-26

Lesson Agenda	8-27
What Is a Button?	8-28
Creating a Button	8-29
Editing Button Attributes	8-30
Modifying a Button to Redirect to a URL	8-31
Quiz	8-32
Practice 8-1 Overview: Adding Items and Buttons	8-33
Practice 8-2 Overview: Manipulating Items	8-34
Summary	8-35

## **9 Understanding Session State**

Jack Understands Session State	9-2
You Are Here in This Course	9-3
Objectives	9-4
Lesson Agenda	9-5
What Is a Session State?	9-6
Session ID	9-7
Session Timeout	9-8
Setting Session Timeout	9-9
How Does Oracle Application Express Implement Session State?	9-10
Identifying the Parts of an Oracle Application Express URL	9-12
Quiz	9-14
Lesson Agenda	9-15
Viewing Session State	9-16
Referencing Session State	9-17
Referencing Session State by Using Bind Variables: Example	9-18
Referencing Session State in Static Text: Example	9-19
Clearing the Cache	9-20
Quiz	9-21
Practice 9-1 Overview: Understanding Session State	9-22
Summary	9-23

## **10 Adding Page Processing**

Jack Includes Page Processing in the Application	10-2
You Are Here in This Course	10-3
Objectives	10-4
Lesson Agenda	10-5
Page Rendering Versus Page Processing	10-6
Types of Logic	10-7
Scenario 1: Page Rendering	10-8
Scenario 2: Page Processes	10-9

Scenario 3: Page Processes	10-10
Scenario 4: Page Validation	10-11
Lesson Agenda	10-12
What Is a Computation?	10-13
Computation Examples	10-14
Creating Computations	10-15
Creating a Page-Rendering Computation	10-16
Creating a Page-Processing Computation	10-17
Quiz	10-18
Lesson Agenda	10-19
What Is a Page Process?	10-20
Automatic Processing Processes	10-21
Reviewing an Automated Row Fetch Process	10-22
Reviewing an Automatic Row (DML) Processing Process	10-23
Creating an On Submit Process	10-24
Creating an On Load Process	10-25
Options to Populate Items in a Form	10-26
Lesson Agenda	10-27
What Are Validations?	10-28
Using the Create Validation Feature	10-29
SQL Validation: Example	10-30
Creating a SQL Validation	10-31
PL/SQL Validation: Example	10-32
Creating a PL/SQL Validation	10-33
Item String Comparison Validation: Example	10-34
Creating an Item String Comparison Validation	10-35
Regular Expression Validation: Example	10-36
Creating a Regular Expression Validation	10-37
Tabular Form Validation: Example	10-38
Creating a Tabular Form Validation	10-39
Quiz	10-40
Lesson Agenda	10-41
What Is Branching?	10-42
Creating a Branch	10-43
Practice 10-1 Overview: Creating and Manipulating Computations, Processes, and Validations	10-45
Summary	10-46

## 11 Validating and Debugging Your Application

Jack Validates and Debugs the Application	11-2
You Are Here in This Course	11-3

Objectives	11-4
Lesson Agenda	11-5
Using the Advisor	11-6
Resolving Advisor Errors/Warnings	11-8
Quiz	11-9
Practice 11-1 Overview: Using the Advisor	11-10
Lesson Agenda	11-11
Managing Your Attribute Dictionary	11-12
Reviewing Items and Report Columns	11-13
Modifying Attributes in the Dictionary	11-14
Practice 11-2 Overview: Modifying the Attribute Dictionary	11-16
Lesson Agenda	11-17
What Is the Debug Option?	11-18
Enabling and Disabling Debug Mode	11-19
Debugging an Application	11-20
Viewing the Debug Messages: SHOW Application	11-21
Viewing the Debug Messages: ACCEPT Request	11-22
Summary	11-23

## **II Unit II: Building Rich, User-Friendly Web Applications**

Unit II Road Map II-2

## **III Unit III: Customizing Your Web Application**

Jack Designs Application Navigation III-2

Unit III Road Map III-3

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

Jack Builds a Navigation System into PTS 12-2

You Are Here in This Course 12-3

Objectives 12-4

Lesson Agenda 12-5

What Are Shared Components? 12-6

Navigational Shared Components 12-7

Lesson Agenda 12-9

Accessing Navigation Menu Page 12-10

Creating Navigation Menu Entries 12-11

Lesson Agenda 12-12

Accessing the Lists Page 12-13

Creating a Static List 12-14

Creating List Entries 12-15

Creating a Dynamic List 12-16

Creating a List Region	12-17
Creating a List Region on Global Page	12-18
Lesson Agenda	12-19
Viewing a Breadcrumb	12-20
Creating Breadcrumb Entries	12-21
Reparenting Breadcrumbs	12-22
Creating a Breadcrumb Region	12-23
Lesson Agenda	12-24
Accessing the Navigation Bar Entries Page	12-25
Creating a Help Page	12-26
Creating a Navigation Bar Entry	12-27
Quiz	12-28
Lesson Agenda	12-29
Understanding Tabs in Oracle Application Express	12-30
Practice12 Overview: Adding Shared Components That Aid Navigation	12-31
Summary	12-32

## **13 Working with Themes, Templates, and Files**

Jack Works with Application User Interface	13-2
You Are Here in This Course	13-3
Objectives	13-4
Lesson Agenda	13-5
What Is a Theme?	13-6
Accessing the Themes Page	13-8
Creating a New Theme from the Repository	13-9
Switching Between Themes	13-10
Creating a Copy of an Existing Theme	13-11
Editing a Theme	13-12
Universal Theme and Theme Roller	13-13
Quiz	13-15
Lesson Agenda	13-16
What Are Templates?	13-17
Types of Templates	13-18
Accessing the Templates Page	13-19
Copying a Template	13-20
Editing a Template	13-21
Applying a Template	13-22
Applying a Template: Output	13-23
Using Substitution Strings in Templates	13-24
Changing Default Templates in a Theme	13-25
Overriding Application Defaults at the Page Level	13-26

Lesson Agenda	13-27
Uploading a Cascading Style Sheet	13-28
Referencing a Cascading Style Sheet	13-29
Uploading an Image	13-30
Using an Uploaded Image	13-31
Quiz	13-32
Practice 13 Overview: Working with Themes, Templates, and Files	13-33
Summary	13-34

## 14 Implementing Security

Jack Implements Security in the Application	14-2
You Are Here in This Course	14-3
Objectives	14-4
Lesson Agenda	14-5
Securing an Application: Overview	14-6
Accessing Security Tasks	14-7
Lesson Agenda	14-8
Authentication Schemes Page	14-9
Implementing Authentication	14-10
Preconfigured Authentication Schemes	14-11
Creating Authentication Based on Preconfigured Schemes	14-13
Copying an Authentication Scheme	14-14
Quiz	14-15
Practice 14-1 Overview: Creating an Authentication Scheme	14-16
Lesson Agenda	14-17
Where Can You Implement Authorization?	14-18
Methods to Implement Authorization	14-19
Creating an Authorization Scheme from the Beginning	14-20
Creating an Access Control Page	14-21
Configuring the Access Control Page	14-22
Applying an Authorization Scheme to an Application	14-23
Applying an Authorization Scheme to a Page	14-24
Applying an Authorization Scheme to a Column in a Report	14-25
Quiz	14-26
Practice 14-2 Overview: Restricting Users By Using Access Control	14-27
Lesson Agenda	14-28
What Is Session State Protection?	14-29
Enabling Session State Protection from the Edit Application Page	14-30
Enabling Session State Protection from the Session State Protection Page	14-31
Configuring Session State Protection	14-32
Identifying Security Attributes	14-33

Configuring Session State Protection by Using a Wizard	14-35
Configuring Session State Protection for Pages and Items	14-36
Configuring Session State Protection for Application Items	14-37
Practice 14-3 Overview: Enabling Session State Protection	14-38
Summary	14-39

## **15 Managing Application Navigation**

Jack Tries to Improve Application Navigation	15-2
Objectives	15-3
You Are Here in This Course	15-4
Lesson Agenda	15-5
Building a Hierarchical List with Images (Font Awesome Icons)	15-6
Building a Hierarchical List with Images	15-7
Practice 15-1 Overview: Building a Hierarchical List with Images	15-12
Lesson Agenda	15-13
Building a Database-Driven Navigation Report	15-14
Quiz	15-17
Practice 15-2 Overview: Building a Database-Driven Report	15-18
Lesson Agenda	15-19
Building a Site Map	15-20
Adding a Navigation Bar Entry	15-25
Quiz	15-26
Practice 15-3 Overview: Building a Site Map	15-27
Lesson Agenda	15-28
Enforcing Authorization on Your Site Map	15-29
Practice 15-4 Overview: Enforcing Authorization on the Site Map	15-30
Summary	15-31

## **III Unit III: Customizing Your Web Application**

Unit III Road Map	III-2
-------------------	-------

## **IV Unit IV: Enhancing Your Web Application**

Jack Enhances Project Tracking System	IV-2
Unit IV Road Map	IV-3

## **16 Extending Your Application**

Jack Extends the Application	16-2
You Are Here in This Course	16-3
Objectives	16-4
Lesson Agenda	16-5
Data Load Wizard	16-6

Creating Data Load Wizard Pages	16-7
Data Load Wizard Pages	16-8
Practice 16-1 Overview: Creating Data Load Wizard Pages	16-9
Lesson Agenda	16-10
Creating an Upload and Download Page	16-11
Practice 16-2 Overview: Adding an Upload and Download Page	16-12
Lesson Agenda	16-13
Adding BLOB Data to an Existing Application	16-14
Adding BLOB Data	16-15
Example: Creating a Form with a Report	16-16
SQL Query for BLOB Data in Report	16-17
Modifying the BLOB Format in the Form	16-18
Adding a Delete Image Region	16-19
Adding a Delete Image Region: Creating an Item	16-20
Adding a Delete Image Region: Creating a Process	16-21
Quiz	16-22
Practice 16-3 Overview: Adding BLOB Data to Your Report and Form	16-23
Lesson Agenda	16-24
Contact Us Page	16-25
Creating a Send E-Mail Process	16-26
Summary	16-27

## 17 Creating and Editing Charts

Introducing Visual Aids for Representing Data	17-2
Objectives	17-3
You Are Here in This Course	17-4
Lesson Agenda	17-5
Building Charts	17-6
Creating SQL Queries for Charts	17-7
Creating a Flash Chart	17-8
Viewing and Editing Chart Attributes	17-10
Practice17-1 Overview: Creating and Editing Charts	17-11
Creating an HTML5 Chart for Mobile Applications	17-12
Practice 17-2 Overview: Creating an HTML5 Chart for Mobile Applications	17-13
Lesson Agenda	17-14
Creating a Combined Chart	17-15
Quiz	17-18
Creating a Project Gantt	17-19
Quiz	17-22
Creating a Circular Gauge Chart	17-23

Practice17-3 Overview: Enhanced Charting Examples 17-25  
Summary 17-26

## 18 Adding Calendars and Trees

Explores Tools to Organize Project Activities 18-2  
Objectives 18-3  
You Are Here in This Course 18-4  
Lesson Agenda 18-5  
Creating a Calendar 18-6  
Editing Calendar Attributes 18-9  
Dragging and Dropping Calendar Entries 18-11  
Linking to the Calendar from a Button 18-13  
Practice 18-1 Overview: Creating a Calendar 18-15  
Calendars for Mobile Applications 18-16  
Creating a Calendar for Mobile Applications 18-17  
Practice18-2 Overview: Adding a Calendar to a Mobile Application 18-19  
Lesson Agenda 18-20  
What Is a Tree? 18-21  
Creating a Tree 18-22  
Manipulating a Tree 18-25  
Practice18-3 Overview: Creating a Tree Whose Nodes Link to a Different Page 18-27  
Summary 18-28

## 19 Using Dynamic Actions and Plug-Ins

Jack Uses Dynamic Actions and Plug-ins 19-2  
You Are Here in This Course 19-3  
Objectives 19-4  
Lesson Agenda 19-5  
What Is a Dynamic Action? 19-6  
General Steps to Create a Dynamic Action 19-7  
Enabling and Disabling an Item: Overview 19-9  
Creating and Using Dynamic Actions: Examples 19-10  
Setting the Value of an Item When Another Item Changes 19-11  
Clearing All Items When a Button Is Clicked 19-13  
Disabling the Button and Submitting the Page When Button Is Clicked 19-15  
Disabling a Button When Clicked: Overview 19-16  
Refreshing the Data in a Report Using Custom Filters 19-17  
Refreshing the Data in a Report Using Custom Filters: Overview 19-18  
Refreshing the Data in a Report Using Custom Filters 19-19  
Refreshing the Data in a Report Using Custom Filters: Overview 19-20  
Quiz 19-22

Practice 19-1 Overview: Creating and Using Dynamic Actions	19-24
Lesson Agenda	19-25
What Is a Plug-In?	19-26
Steps to Use a Plug-in in Your Application	19-27
Accessing the Plug-in Repository	19-28
Importing a Plug-In	19-29
Installing a Plug-In	19-30
Reviewing a Plug-in Definition	19-31
Using an Item Plug-in on a Page	19-33
Quiz	19-34
Additional Plug-in Examples	19-35
Adding a Simple Checkbox Item	19-36
Displaying a Notification Message When an Item is Clicked	19-37
Changing and Highlighting an Item When Another Item Changes	19-38
Changing and Highlighting an Item When Another Item Changes: Overview	19-39
Creating a Dynamic Action that Uses the Highlight Plug-In	19-40
Setting the Value of an Item When Other Item(s) Change	19-41
Setting the Value of an Item When Another Item Changes: Overview	19-42
Practice19-2 Overview: Importing and Using Plug-Ins	19-43
Summary	19-44

## 20 Utilizing Application Express Printing

Jack Uses Application Express Printing Features	20-2
You Are Here in This Course	20-3
Objectives	20-4
Lesson Agenda	20-5
Report-Printing Configuration Options	20-6
Producing Reports in Oracle Application Express	20-7
Lesson Agenda	20-8
Standard Report, Print Enabled	20-9
Standard Report, with Derived Output	20-10
Quiz	20-11
Practice 20-1 Overview: Printing a Standard Report with Derived Output	20-12
Lesson Agenda	20-13
Report Queries	20-14
Report Layouts	20-15
Creating a Report for Download	20-17
Creating a Report Query	20-18
Creating the Report Layout	20-19
Linking the Report to Your Application	20-20

Practice 20-2 Overview: Creating a PDF Report with Multiple Queries 20-21  
Summary 20-22

## 21 Managing Application Feedback

Introducing Visual Aids for Representing Data 21-2  
Objectives 21-3  
You Are Here in This Course 21-4  
Lesson Agenda 21-5  
What Is Team Development? 21-6  
Tracking the Progress of Your Application Development Project 21-7  
Creating Features 21-8  
Creating Milestones 21-9  
Creating Bugs 21-10  
Creating To Dos 21-11  
Quiz 21-12  
Lesson Agenda 21-15  
Review the Progress of Your Milestones and Features 21-16  
Enabling Feedback for an Application 21-17  
Step 1: Enabling Feedback in Application Properties 21-18  
Step 2: Creating a Feedback Page 21-19  
Step 3: Submitting Feedback 21-20  
Step 4: Accessing Submitted Feedback in Team Development 21-21  
Quiz 21-22  
Summary 21-23  
Practice 21 Overview: Adding and Monitoring Feedback in Your Application 21-24

## IV Unit IV: Enhancing Your Web Application

Unit IV Road Map IV-2

### A Additional Resources

Additional Resources A-2  
Application Express Page on OTN A-3  
Documentation and Tutorials A-4  
Oracle Learning Library A-5  
Blogs A-6  
Forum: Application Express A-7  
Hosted Online Help Center A-8  
Learn More A-9  
Oracle Application Express Developer Certified Expert Examination A-10

## B More Information About Application Development

Lessons B-2

Create a Websheet Application B-3

Objectives B-4

Lesson Agenda: Create a Websheet Application B-5

What Is a Websheet? B-6

Websheets Versus Database Applications B-7

Default Websheet Interface B-8

Creating and Running a Websheet B-9

Lesson Agenda: Create a Websheet Application B-10

Types of Sections B-11

Creating a Text Section B-12

Adding Annotations to a Page B-13

Copying a Page B-14

Editing Page Sections B-15

Viewing the Page Directory B-16

Displaying an Image B-17

Using Markup Syntax B-18

Quiz B-19

Lesson Agenda: Create a Websheet Application B-20

What Are Data Grids? B-21

Creating a Data Grid from the Beginning B-22

Creating a Data Grid from a Spreadsheet B-23

Creating a Data Section B-24

Creating a Chart Section B-26

Quiz B-28

Lesson Agenda: Create a Websheet Application B-29

Overview B-30

Adding a Column B-31

Creating a List of Values B-32

Editing Column Properties B-33

Creating a Validation B-34

Toggling Check Boxes B-35

Setting Multiple Column Values B-36

Replacing Values B-37

Adding Annotations to a Data Grid B-38

Summary B-39

Manipulate and Administer a Websheet Application B-40

Objectives B-41

Lesson Agenda: Manipulate and Administer a Websheet Application B-42

Editing Websheet Properties B-43

Reports	B-44
Creating a Report	B-45
Editing the Report Query	B-46
Using SQL Markup	B-47
Quiz	B-48
Lesson Agenda: Manipulate and Administer a Websheet Application	B-49
Creating Navigation Sections	B-50
Linking Pages	B-51
Moving a Section to a Different Page	B-52
Viewing Page History	B-53
Viewing a Page in Presentation Mode	B-54
Lesson Agenda: Manipulate and Administer a Websheet Application	B-55
Sharing Websheets with Users	B-56
1. View the Current Websheet Authentication Method	B-57
2. Create Users in Application Express Administration	B-58
3. Create an ACL in Your Websheet	B-59
4. Change Websheet Authorization to Use a Custom ACL	B-61
5. Test User Access to the Websheet	B-62
Quiz	B-63
Websheet Application Development: Additional References	B-64
Summary	B-65

## **C Developing Applications in Oracle Application Express for Oracle Database**

### **Cloud Service**

Objectives C-2

Lesson Agenda C-3

What Is Oracle Cloud? C-4

Oracle Cloud: Products and Services C-5

Oracle Cloud Terminology C-6

Oracle Cloud Roles C-8

Lesson Agenda C-9

Types of Services C-10

Lesson Agenda C-11

Creating a Database Cloud Trial Service (Schema) C-12

Lesson Agenda C-14

About the My Services Page C-15

Accessing the My Services Page C-16

Launching a Database Cloud Service (Schema) C-17

Lesson Agenda C-18

Creating a Database Application C-19

Lesson Agenda C-20

Administering a Database Cloud Service	C-21
Oracle Cloud Service (Schema): Additional References	C-22
Summary	C-23

## **D Converting Oracle Forms Application**

Objectives	D-2
Why Migrate to Oracle Application Express?	D-3
Prerequisite for Converting Oracle Forms Applications	D-4
Forms Conversion: Overview	D-5
Forms Conversion: Diagram	D-6
1. Converting Oracle Forms	D-7
2. Creating a Workspace and Adding Oracle Application Express Users	D-8
3. Uploading Database Objects into the Schema Associated with Your Workspace	D-9
4. Creating a Conversion Project	D-10
5. Reviewing and Editing the Application Metadata	D-11
6. Setting Up Application Defaults	D-12
7. Generating an Oracle Application Express Application	D-13
Summary	D-14

1

# Course Overview



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# Objectives

After completing this lesson, you should be able to describe:

- Course goals
- Course Road Map
- Course environment
- Course persona: Jack and Jill
- Project Tracking System (PTS): Demo Application
- GlobalMart Management Tool (GMT): Practice Application



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This slide gives an overview of this lesson's objectives. This course is developed considering the target audience have general understanding of relational database concepts and an understanding of the Linux Operating System under which they will run the Oracle Application Express 5.0.

## Course Goals

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

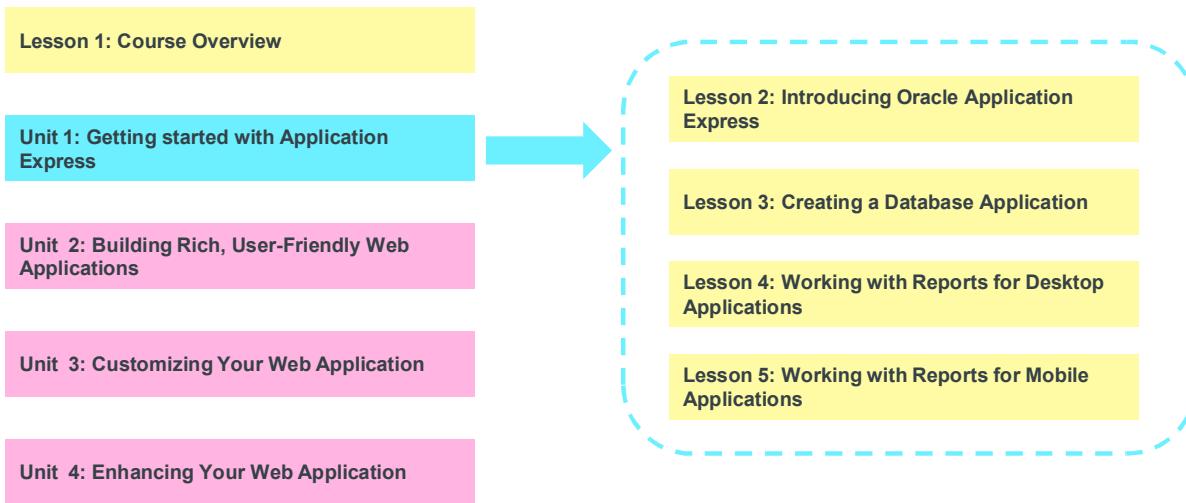
- Create a database application for desktop and mobile interfaces
- Develop and manage application components in a database application
- Create processes and validations within an application
- Use and manage shared components
- Implement security in an application
- Navigate within an application
- Extend and enhance your application by using some built-in wizards



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This course introduces you to Oracle Application Express, a rapid web application development tool for the Oracle database. In this course, you learn about its features and benefits, and you also learn how to log in and use its various components to build complete and secure web applications.

# Course Road Map



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This slide provides a graphical representation of the overall course structure.

In Unit 1, you learn to create database applications using Oracle Application Express 5.0 (Oracle APEX 5.0) and you create reports for both desktop and mobile application interfaces.

# Course Road Map

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building Rich, User-Friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 6: Creating Forms

Lesson 7: Working with Pages and Regions

Lesson 8: Adding Items and Buttons

Lesson 9: Understanding Session State

Lesson 10: Including Page Processing

Lesson 11: Validating and Debugging Your Application



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In Unit 2, you learn to build a user-friendly interface to your application with the help of forms, pages, and regions. You also learn to add items, buttons, and processing to your pages to support validations and computations.

# Course Road Map



Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building Rich, User-Friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 12: Adding Shared Components that Aid Navigation

Lesson 13: Working with Themes, Templates and Files

Lesson 14: Implementing Security

Lesson 15 : Managing Application Navigation

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

# Course Road Map

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building Rich, User-Friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

Lesson 16: Extending Your Application

Lesson 17: Creating and Editing Charts

Lesson 18: Adding Calendars and Trees

Lesson 19 : Using Dynamic Actions and Plug-Ins

Lesson 20 : Utilizing Application Express Printing

Lesson 21 : Managing Application Feedback

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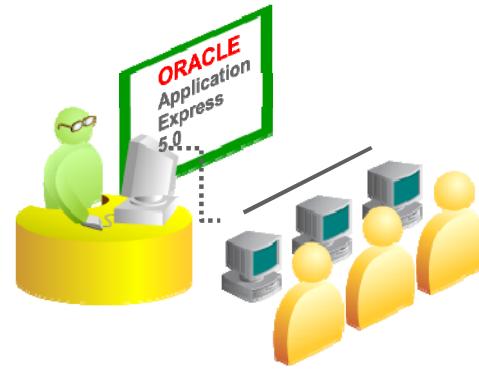
In Unit 4, you add advanced features to your application by creating dynamic actions, calendars, trees, charts and application feedback.

## Course Environment

- Operating system: Linux x64
- Installed products:
  - Oracle Database 12c Release1
  - Oracle Application Express 5.0
  - Oracle Rest Data Services
  - Java Platform (JDK)
  - Internet Browser (Mozilla Firefox / Internet Explorer)



ORACLE Application Express



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The classroom setup uses a client/server architecture. The instructor machine is set up with Oracle Database and the required software to run Oracle Application Express. You will log on to the student machine that is assigned to you. From the student machine, you access the Oracle Application Express workspace that is assigned to you by using a web browser.

## Workspace Details

- An Oracle Application Express workspace is assigned to you.
  - Workspace name: apex
  - Username: apex\_admin
  - Password: apex
- Log in to your workspace to complete the practice tasks in the Activity Guide.



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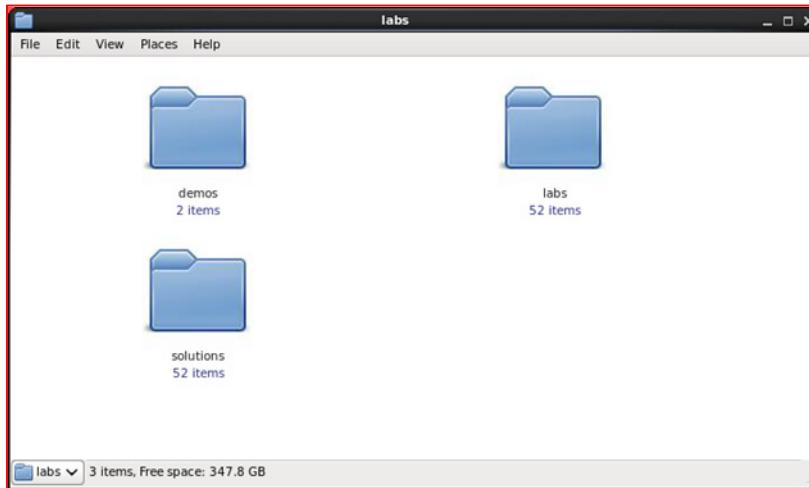
Your instructor assigns a workspace to you. The workspace name, username, and password details are listed in the slide. You need to log in to this workspace to complete all the practices in the Activity Guide for this course.

To access the Oracle Application Express development instance, open a web browser and enter the following URL in the address bar:

`http://<hostname>:8080/apex`

hostname is the IP address of the instructor machine.

## Accessing the labs Directory



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All the files that are required to complete the practices are available in the labs directory. To access the labs directory, from the Applications menu, select System Tools > File Browser. From the oracle directory, open the labs directory. You will see four folders:

- **labs:** All the files required to perform the practices given in the Activity Guide. You can use this location to save the files while performing the practices, if required.
- **solutions:** The solution scripts for the practices given in the Activity Guide. They can be used as the catch-up applications that you can import in case you were not able to complete any practice.
- **demos/files:** All the files required to perform the demonstrations referenced in the lessons
- **demos/catchup:** Catch-up applications that the instructor can use

## Meet Course Persona: Jill

Name Jill

Designation Project Manager



Jill is working as a Project Manager with XWHYZEE technologies for the last few years. XWHYZEE technologies is a startup software company, which was established two years back and Jill has been associated with it since its inception.

### Case Scenario :

Over the last few years, the company's credibility with its clients has been improving constantly and also the number of projects at their hand kept rising. In this situation, Jill is foreseeing a rapid expansion of their operations with quite a big number of projects to be delivered in the coming future. Jill thinks that having a project management tool in place will improve the company's performance.

### Project Requirements:

Jill proposed a tool that can help the project managers manage and track various aspects of the projects with ease and clarity.

It should facilitate the project managers to track multiple projects in terms of:

1. Managing employees
2. Scheduling and planning projects
3. Project allocations
4. Action Items and Milestones
5. Reporting

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# Meet Course Persona: Jack

Persona 1 Name **Jack**

Designation **Application Developer**



**Jack** is working as an application developer in 'XWHYZEE Technologies' and reports to Jill. When Jill expresses her concern over increasing number of projects and her idea of having a tool to help project managers, Jack volunteers himself in getting it to shape. After doing some research around this, Jack decides to develop this new tool using Oracle's rapid application development tool called Application Express (APEX) and names it "Project Tracking System" (PTS).

**Career Profile :** Jack is working as an application developer for the last two years. He has good experience in using SQL and PL/SQL while working with database applications. His strengths are around understanding and adapting to new tools easily so as to accelerate application development.

**Training Requirement :** To develop PTS using Oracle APEX, Jack should have a basic understanding of Oracle Application Express and should be able to:

- Create new applications with interactive and classic reports using APEX
- Build rich, user-friendly applications in APEX with the help of Forms
- Customize and enhance web application using APEX

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## Introducing Demo Application: Project Tracking System

Project Tracking System (PTS) is a web application developed as part of APEX 5.0 Workshop I training.



PTS provides **User Interface** to create new projects, update the existing projects, add/remove team members to/from projects, create/update action-items under a project and so on.

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## Project Tracking System: Basic Reports

PTS provides following **reports** to help in managing the projects:

### Projects Master Report:

This report provides complete details of all the projects being managed by PTS. Using this report, the end user will be able to customize the results by searching, filtering, and sorting based on selected fields.



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# Project Tracking System: Basic Reports

## Projects Status Report:

This report provides list of completed and pending tasks of that project as of a given day. It will also give an insight into upcoming milestones for better tracking.

This will be a classic report without any end-user customization.



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## Project Tracking System: Basic Reports

### Projects Milestones Report:

This report will give a complete list of milestones achieved, planned, and pending for all projects. Using this report, an end user will be able to customize the results by searching, filtering, and sorting based on selected fields.



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# Project Tracking System: Supporting Reports

## Projects by Status:

This report lists all the projects categorized by project status. This will be a user-customized report that uses Projects Master Report as its base.



Projects by Status

## Projects by Managers:

This report lists all the projects grouped by project managers who are managing those projects. This will be a user-customized report that uses Projects Master Report as its base.



Projects by Managers

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# Snapshot View of Project Tracking System

The screenshot displays the Project Tracking System interface. On the left is a sidebar with navigation links: Home, Create Employees, Modify Employee Details, Manage Projects, Manage Project Action Items, Manage Project Allocations, Project Documents, and PTS Admin. The main content area shows a 'Home' page with a 'Last login' timestamp (30-APR-15 04:53:37.587921 AM), a 'Quick Links' section with buttons for 'View Projects', 'Project Status Report', 'View Employees', 'View Action Items', and 'View Project Allocations'. Below this is a 'In the NEWS' section and a 'News and Events' section with a link to Oracle's website. A red box highlights the 'Home Page'.

**Sample Form:** A modal window titled 'Manage Action Items' contains fields for: Project (dropdown), Actionitem Created By (dropdown), Actionitem Assigned To (dropdown), Actionitem Name (dropdown), Actionitem Description (text area), Actionitem Status (dropdown), Milestone Yn (radio buttons: No, Yes), Milestone Date (date picker), and Actionitem Created On (date picker). A 'Cancel' button is at the bottom. A red box highlights this window.

**Sample Report:** A modal window titled 'PROJECT\_DOCUMENTS Master' shows a table of documents. The table has columns: Project, Document Name, Document Url, Document Created On, and Document Created By. It lists three rows: 601 (SQL scripts, url: https://stbeehive, created on 25-JAN-2015 by 502); 603 (Pre-Definition Do..., url: https://stbeehive, created on 23-APR-2015 by 520); and 607 (Test Results, url: https://stbeehive, created on 10-MAR-2015 by 502). A red box highlights this window.

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- In this course, you create a Project Tracking System (PTS) application as part of lessons' demonstrations. This will help students to get a clear idea on the practical application of each concept in the process of building a database application.
- PTS is a simple application designed with the intention of automating project management activities, thus providing clarity and ease in managing multiple projects simultaneously.
- As part of the practices, the students will develop a GlobalMart Management Tool (GMT), which is an Order Management application.

## Introducing Practice Application: GlobalMart Management Tool

**Application Name GlobalMart Management Tool**

- GlobalMart is a company that sells several products, such as computer hardware and software, music, clothing, and tools worldwide. The company maintains information about its employees, products, suppliers, inventories, warehouses and so on using Oracle Database.
- Currently, the company maintains the database using primitive tools and scripts. As part of practices, you will develop an end-to-end web-based application that helps them handle day-to-day employee and order management tasks with ease.



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## Additional Resources – Oracle Application Express 5.0

- Documentation:
  - [http://docs.oracle.com/cd/E59726\\_01/index.html](http://docs.oracle.com/cd/E59726_01/index.html)
- Getting Started OTN Resources:
  - <http://www.oracle.com/technetwork/developer-tools/apex/application-express/apex-getting-started-1863613.html>
- Building a Mobile Web Application:
  - [http://www.oracle.com/webfolder/technetwork/tutorials/obe/db/apex/r50/CreMobileApp\\_apex50EA/CreMobileApp\\_apex50EA.html](http://www.oracle.com/webfolder/technetwork/tutorials/obe/db/apex/r50/CreMobileApp_apex50EA/CreMobileApp_apex50EA.html)
- Deploying and Developing Application Express with Oracle Database 12c
  - <http://www.oracle.com/technetwork/developer-tools/apex/learnmore/apex-in-12c-white-paper-2046726.pdf>



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## Summary

In this lesson, you should have learned to describe:

- Course Goals
- Course Road Map
- Course Environment
- Course Persona: Jack and Jill
- Project Tracking System (PTS): Demo Application
- GlobalMart Management Tool (GMT): Practice Application



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# Unit I: Getting Started with Application Express

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## Jill Expresses Her Concern: Driving Factor Behind PTS



Over the last few years, we saw a sharp rise in our company's services.

Yes Jill, that is true. I think, the projects you handle have also increased sharply in the recent time.

I feel it will be helpful if we have a project management tool in place, Jack.

I heard about Oracle Application Express recently, using which applications can be developed very quickly.

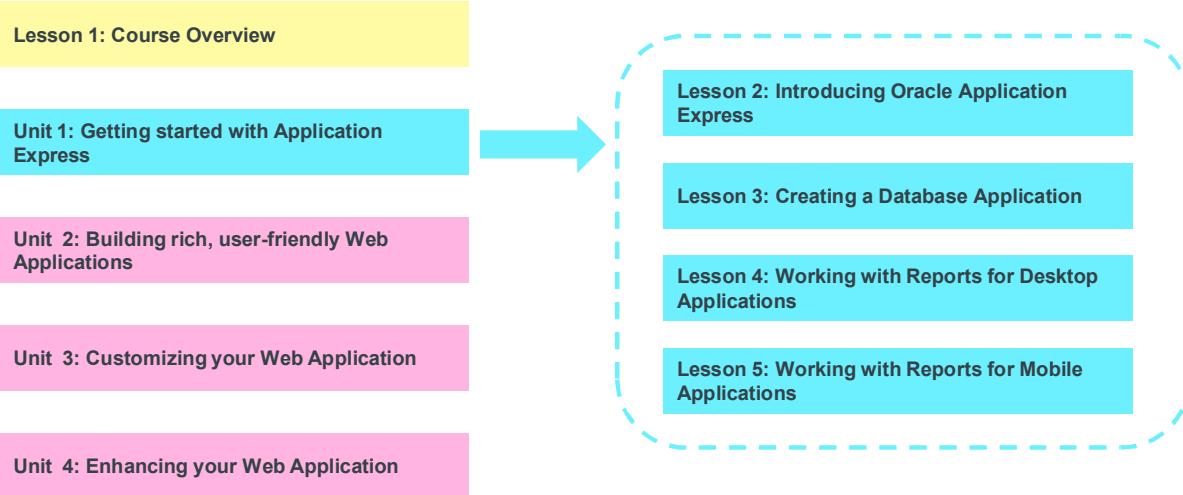
I will come up with a project management tool using Oracle APEX. Let me explore it further.

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Jill expresses her concern about the need for a project management tool in their company. Jack thinks of leveraging Oracle's Application Express tool to build a Project Tracking System (PTS) in a short span of time. Jack decides to explore Oracle APEX's basic features and components.

# Unit I Road Map



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In Unit 1, you learn how to create database applications using Oracle Application Express 5.0 (Oracle APEX 5.0) and you create reports for both desktop and mobile application interfaces.

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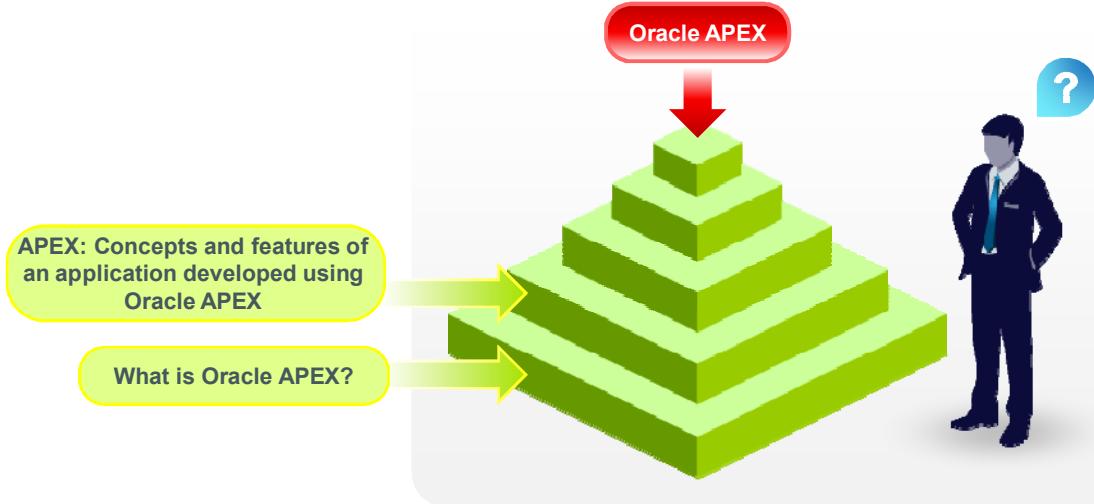
2

# Introducing Oracle Application Express

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# Jack Decides to Explore Oracle Application Express

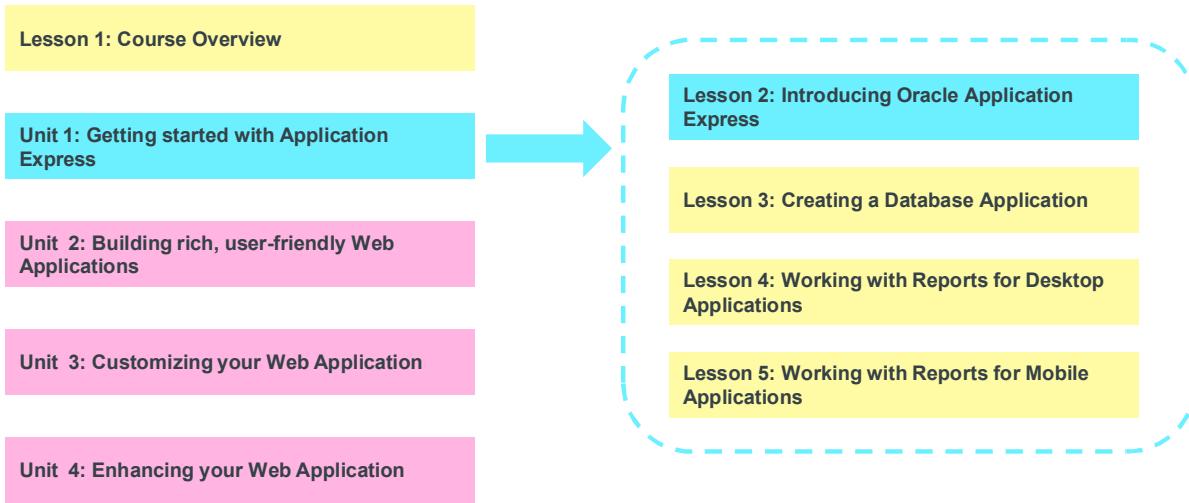


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Jack decides on using Oracle APEX for developing the new application, Project Tracking System (PTS). Because he never worked on Oracle APEX earlier, he decides to research more about it and understand how to develop an application using Oracle APEX.

# You Are Here in This Course



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

# Objectives

After completing this lesson, you should be able to:

- Describe Oracle Application Express
- Explain Oracle Application Express concepts
- Identify the components of Oracle Application Express
- Run a sample application
- Install a packaged application
- Export and import applications
- Use Oracle Application Express in Oracle Database Cloud Service



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This lesson introduces you to Oracle Application Express. You identify the key features, benefits, and components of Oracle Application Express. You understand how Oracle Application Express works by learning about its architecture. You get started with Oracle Application Express by setting up the users and the environment used in this course. You are also introduced to Oracle Database Cloud Service that uses Oracle Application Express.

## Lesson Agenda

- Oracle Application Express Overview
  - What Is It?
  - Why Use It?
  - Types of Applications
  - Examples
  - High-Level Architecture
  - Types of Installation
- Oracle Application Express Concepts
- Using Oracle Application Express
- Using Oracle Application Express in Oracle Database Cloud Service

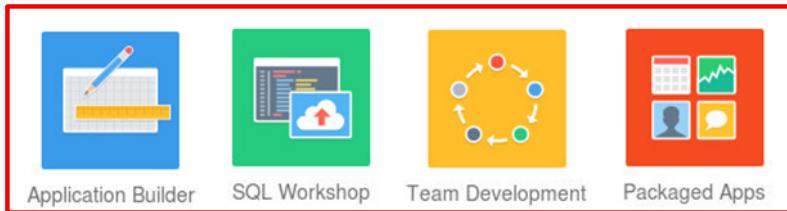


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# What Is Oracle Application Express?

Oracle Application Express is a web application development, deployment, and maintenance tool.

Oracle Application Express Home Page



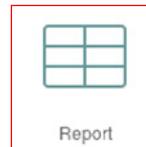
Application Builder

SQL Workshop

Team Development

Packaged Apps

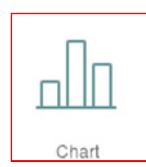
Key Features



Report



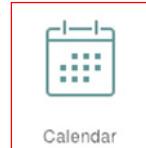
Form



Chart



Data Loading



Calendar



Plug-ins



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Oracle Application Express is a web-based development and deployment tool that is available with the Oracle database. It enables you to create database-centric web applications that are reliable, scalable, and secure. It has several built-in features and wizards that quicken your development process. Some of the key features are listed in the slide.

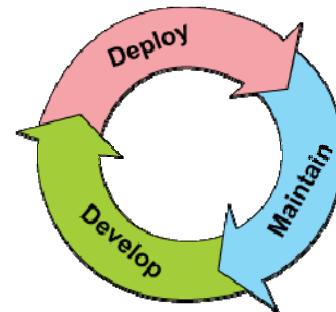
The tool has a user-friendly graphical interface. Using Oracle Application Express requires minimal programming knowledge.

The application definition is stored as metadata in the Oracle database tables. When you run your application, the Oracle Application Express engine assembles the pages from the database and displays them in your browser.

Oracle Application Express was first released in 2004 and was then called HTML DB.

# Why Use Oracle Application Express?

- Enables rapid application development
- Creates applications that are reliable, secure, and scalable
- Offers a user-friendly development environment
- Provides flexible look-and-feel options by using themes and templates
- Uses declarative programming
- Features a simple, self-contained architecture
- Provides a platform-independent environment
- Offers individual or shared workspaces for developers



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Using Oracle Application Express, you can develop web-based, database-centric applications that are reliable and fast, as well as secure and scalable. It has a user-friendly interface, which enables you to create and deploy applications in a short span of time. You can use the available themes and templates to provide a consistent look-and-feel across your web pages.

Oracle Application Express uses a declarative framework for web application development. This means that you specify what to do rather than how to do it. No code is generated or compiled. You interact with wizards and property sheets to define your application.

Oracle Application Express enables organizations to capitalize on their existing investment in SQL and PL/SQL skills. Few programming skills are required, and anyone can quickly learn to develop applications. With Oracle Application Express, applications are built faster, with fewer developers.

Oracle Application Express can be installed on a single workstation, or on a server that can support multiple developers. An administrator centrally manages and administers the development environment and creates a shared workspace in a single installation. The definition of an entire application can be easily packaged and exported for deployment and installation into another Oracle Application Express instance.

# Types of Applications



Enterprise-wide



Tracking



Websheet



Lookup



Business Intelligence



Survey and Feedback



Text Index/Search



Mobile applications

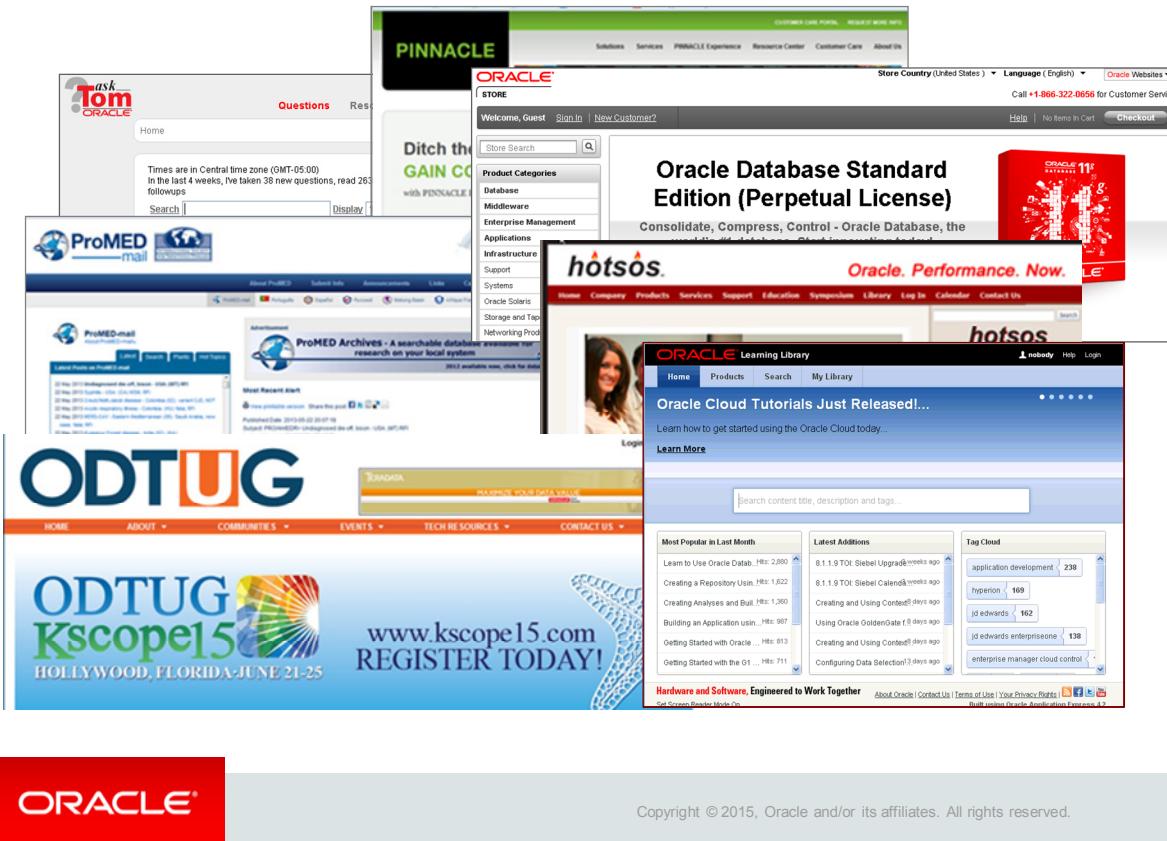


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Examples of the types of applications that are developed by using Oracle Application Express are as follows:

- Enterprise-wide applications
- Web-based applications to track projects, contacts, customers, leads, and assets
- Websheet applications that enable end users to manage structured and unstructured data without developer assistance
- Applications to look up people and catalog items
- Lightweight business intelligence (BI) applications with reports, bar charts, line charts, and pie charts. These applications may be based on summarized data copied from a live database, or operate on live transaction data. The charts and reports enable drilling down and cross-referencing of information.
- Web-based applications that use the text indexing and search capability of the Oracle database
- Applications that must be built in a very short span of time (usually a week)
- Mobile applications

# Applications Developed by Using Oracle Application Express

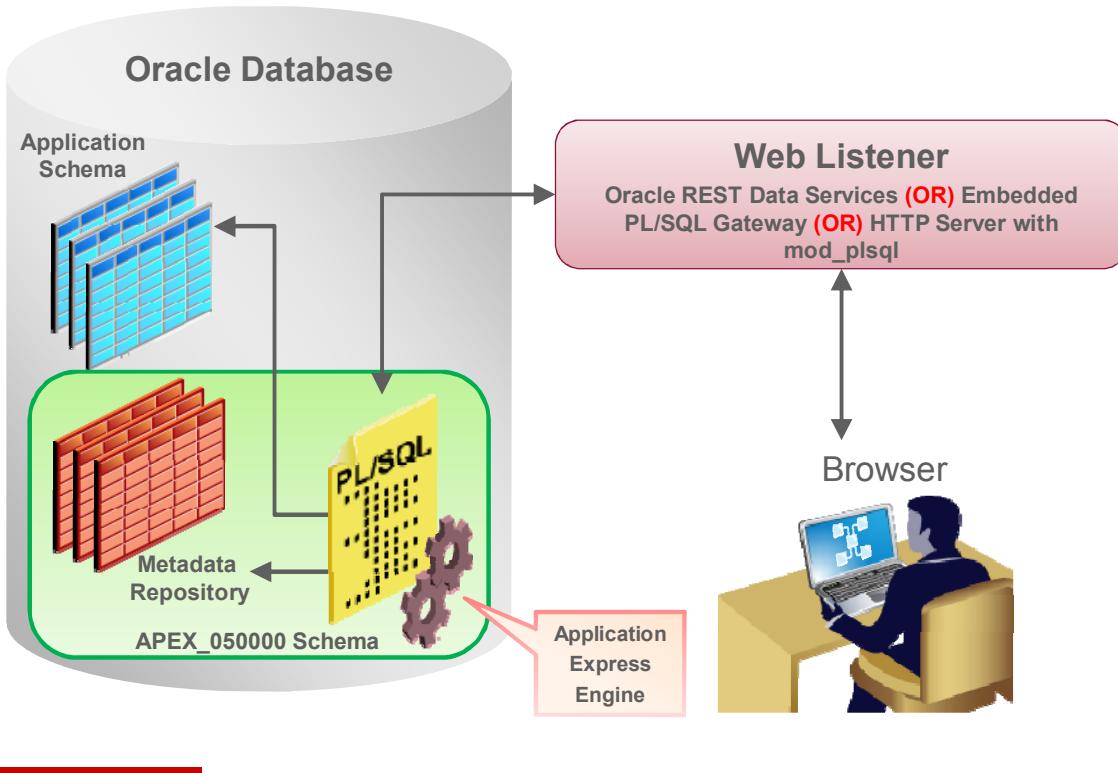


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This slide shows a variety of applications that have been developed by using Oracle Application Express.

**Note:** The user interface of the tool Oracle Application Express is developed using the same tool.

# High-Level Architecture



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## High-Level Architecture

When you install Oracle Application Express 5.0, it resides in your Oracle database as a separate schema named APEX\_050000. This schema houses Oracle APEX that consists of:

- Metadata stored in database tables
- The Application Express engine, which is written by using PL/SQL code

When you create an application, its definition is stored in the metadata repository. At every stage of application development, metadata is created or modified and stored in the repository tables. The Application Express engine assembles the application pages by accessing the metadata repository.

When you run your application from the browser, calls are made to the Application Express engine. The engine then processes and renders the application components in real time, based on the data in the metadata repository and the schema against which the application is running.

To enable your web browser to interact with the Application Express engine, you need a Web Listener. A Web Listener acts as a communication facilitator between the web browser and Oracle APEX. Its duty is to map browser requests into database stored procedure calls.

With Oracle APEX 5.0, you have three choices for Web Listener:

- Oracle REST Data Services (formerly known as APEX Listener)
- Embedded PL/SQL gateway
- HTTP Server (Apache) with `mod_plsql` plugin

**Oracle REST Data Services**, also known as ORDS, is a Java-based web listener, which is compatible with any J2EE-compliant web server. This is the most recommended web listener option from Oracle. It not only acts as a web listener but also helps in integrating your applications with Web Services.

The **Embedded PL/SQL Gateway** (EPG) runs in the Oracle XML DB Protocol Server within the Oracle database and includes the core features of `mod_plsql`, which is an Oracle HTTP Server plug-in that enables the web browser to communicate with the database. It maps browser requests to procedure calls, which are stored in the database, over an Oracle Net Services connection.

Starting with Oracle Database 11g Release 1, you can use the embedded PL/SQL gateway. The embedded PL/SQL gateway installs with Oracle Database 11g and does not require the Oracle HTTP Server. It provides the Oracle database with a web server and the necessary infrastructure to create dynamic applications. The embedded PL/SQL gateway runs in the Oracle XML DB HTTP server in the Oracle database.

The **Oracle HTTP Server with `mod_plsql` plugin** is an HTTP-compliant web server having `mod_plsql` plugged in to enable the web browser to communicate with the database. It is generally indicated by a `/pls` virtual path. When you access a page in the application, the browser sends a URL request to Apache with `mod_plsql`. Apache then translates the URL to the appropriate PL/SQL stored procedure call in the Application Express engine. The engine processes the request and renders the page that you requested.

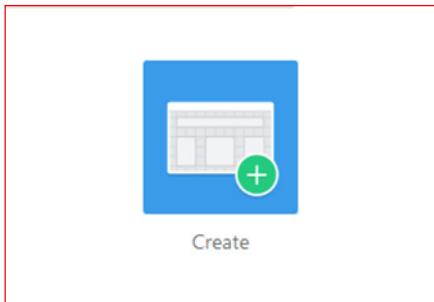
Please note that `mod_plsql` is deprecated as of Oracle HTTP Server 12c (12.1.3).

The practice environment for this course uses the Oracle REST Data Services as the web listener.

# Types of Installations

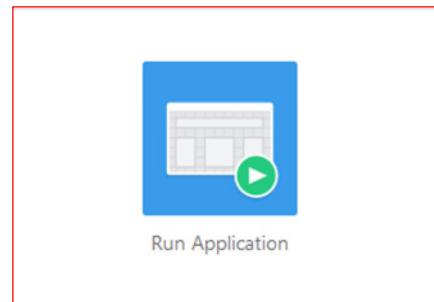
Oracle Application Express supports two types of installations:

Full Development Environment



Complete access to develop applications

Runtime Environment



Access only to run production applications

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Based on your requirements, you can install Oracle Application Express in one of the following ways:

- **Full development environment:** This installation provides complete access to the Application Builder environment to develop applications.
- **Runtime environment:** This installation is an appropriate choice for production implementations in which you want to run applications that cannot be modified.

An Oracle Application Express runtime environment enables you to run production applications. But it does not provide a web interface for administration. The runtime environment installation option minimizes the installed footprint and privileges. In a runtime instance, developers cannot inadvertently update a production application. Therefore, the runtime environment improves application security.

## Quiz



Which of the following is responsible for processing and rendering the web application pages?

- a. Oracle database
- b. Metadata repository
- c. Application Express engine
- d. PL/SQL gateway

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**Answer: c**

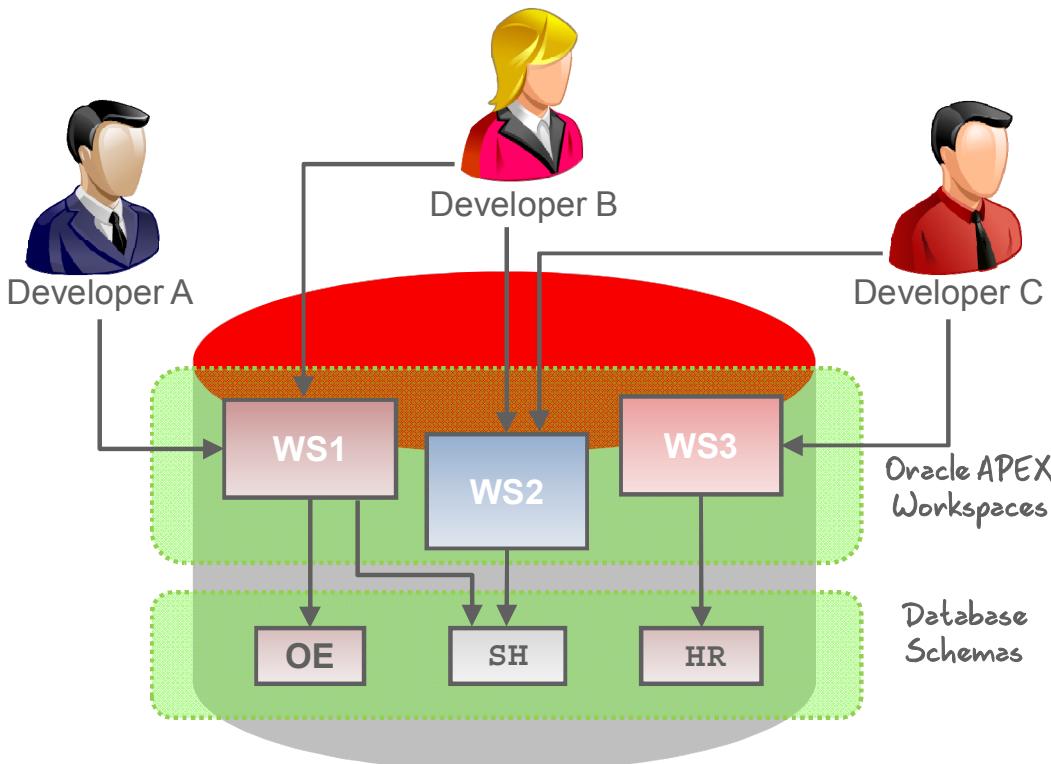
## Lesson Agenda

- Oracle Application Express Overview
- Oracle Application Express Concepts
  - Workspace
  - Internal Workspace
  - Roles
  - Components
- Using Oracle Application Express
- Using Oracle Application Express in Oracle Database Cloud Service



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## What Is a Workspace?



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A workspace is an area within Oracle Application Express where you create your applications. To create an application, you must first create or have access to a workspace. Each workspace is associated with one or more schemas. By associating a workspace with a schema, you can:

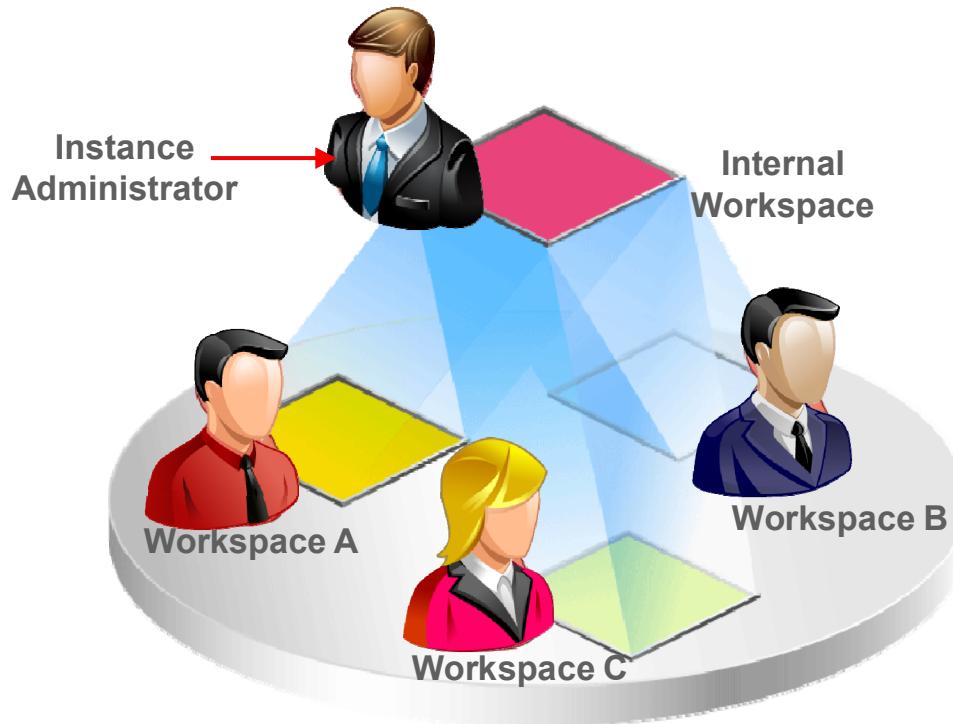
- Build applications that interact with the database objects in that schema
- Create new database objects in that schema

One or more developers or end users can access a workspace.

As shown in the graphic in the slide, a single Oracle database can contain multiple Oracle Application Express workspaces. In this example, you see three developers (A, B, and C) and three different workspaces (WS1, WS2, and WS3). A and B have access to WS1. In addition, B also has access to WS2. C has access to WS2 and WS3. Each workspace has access to one or more database schemas. For example, WS1 has access to OE and SH schemas, WS2 has access to SH, and WS3 has access to HR. Multiple developers can work by using the same database instance from different workspaces or the same workspace with access to the same or different schema.

Thus, Oracle Application Express turns a single Oracle database into a shared workgroup database service. This service can be accessed through a browser with no installation required on the desktop for the developer and the end user.

# What Is an Internal Workspace?



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An Internal workspace is:

- A special workspace that is created by default when Oracle Application Express is installed
- Accessible only to instance administrators
- Used to create and manage workspaces in the Oracle Application Express instance

To log in to the Internal workspace, enter the following URL in the address bar:

`http://<hostname>:<port>/apex/apex_admin`

The login page appears. Enter `Admin` for Username, and for Password enter the password that was set during installation.

You can learn more about how to perform administration tasks by using the Internal workspace in the *Oracle Application Express: Administration* course.

# Defining Roles

Instance Administrator	Workspace Administrator	Developer	End User
			
Creates workspace and workspace administrator	Creates developers and users	Creates and modifies applications and database objects	Runs the application
Manages services and session state	Views workspace usage reports	Performs all tasks of developer	

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Four roles are defined in Oracle Application Express.

- Instance administrator
- Workspace administrator
- Developer
- End user

## Instance Administrator

An instance administrator manages the entire Oracle Application Express instance, including service administration and workspace administration. The instance administrator manages the workspaces of all the users, and is also responsible for managing session state and monitoring usage as a whole. The default Oracle Application Express administration privileged user is `admin`.

The instance administrator performs the following tasks:

1. Logs in to Oracle Application Express Administration
2. Creates a workspace and a workspace administrator. Both can be done at the same time by using the Create Workspace Wizard.

## Workspace Administrator

When a user is assigned administrative privileges for a workspace, that user becomes the workspace administrator. The workspace administrator can add new users to the workspace, create new user groups, and view usage reports of the workspace.

The workspace administrator performs the following tasks:

1. Logs in to Oracle Application Express by using the workspace that has been assigned by the instance administrator
2. Creates developer users for the workspace so that development can occur
3. Installs sample applications
4. Installs a packaged application with supporting objects

## Developer

Multiple users can log in to the same Oracle Application Express instance to develop and edit applications. Each of these users is called a *developer*.

Developers have access to a workspace through which they can access their own database objects. In addition to having private workspaces, users can also share a workspace to develop applications.

## End User

The end user is a user without development and administration privileges. This user has only the basic privileges needed to run an application.

## Quiz



Which of the following statements are true about Oracle Application Express workspaces? (Choose all that apply.)

- a. It is a private database shipped with the Oracle database.
- b. It enables multiple developers to create multiple applications simultaneously.
- c. It can be created by any Application Express user.
- d. It can access more than one database schema.

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**Answer: b, d**

## Lesson Agenda

- Oracle Application Express Overview
- Oracle Application Express Concepts
- Using Oracle Application Express
  - Logging In to a Workspace
  - Creating Users
  - About Workspace Home Page
    - SQL Workshop
    - Application Builder
      - Types of Applications
  - Installing and Using a Packaged Application
  - Exporting and Importing Applications
- Using Oracle Application Express in Oracle Database Cloud Service

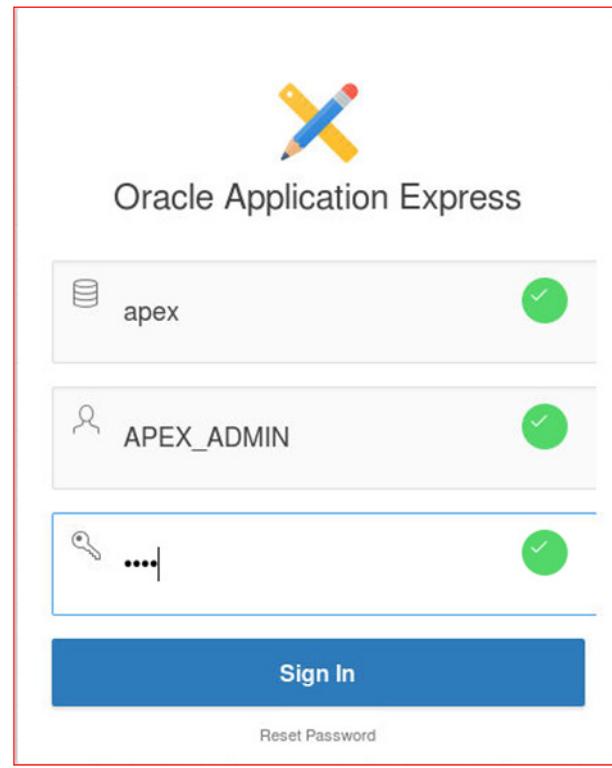


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## Logging In to a Workspace

To log in to an Oracle Application Express workspace:

1. Enter the correct URL in your browser address bar.
2. Enter the workspace name.
3. Enter the username and password. Then click Sign In.



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To log in to Oracle Application Express, you need a workspace name and the username and password created for that workspace. You can log in to Oracle Application Express as a workspace administrator or as a developer. You can access the Oracle Application Express application with the following URL:

`http://<hostname>:<port>/apex`

The login page appears. Enter the workspace name, username, and password. Click Sign In. You may be prompted to change your workspace password the first time you log in. This option is set when your username and password are created by the Oracle Application Express administrator. You can set your new password to be the same as your old password.

### Note

If your setup uses Oracle HTTP Server with mod\_plsql, use:

`http://<hostname>:<port>/pls/apex`

If your setup uses embedded PL/SQL gateway or Apex Listener, use:

`http://<hostname>:<port>/apex`

## Creating a Developer User

To create a developer user, perform the following steps:

1. On the Oracle Application Express home page, click the down arrow on the Administration tab.
2. Select “Manage Users and Groups” from the drop-down menu.
3. Click the Create User button.
4. Enter the username and email address for the user.
5. Review the account privileges for the user.
6. Enter the password for the user.
7. Click the Create User button.



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Workspace administrators create the developer users who build applications. You can access the Create User button by performing one of the following:

- Select “Manage Users and Groups” from the Administration tab drop-down menu.
- Click the “Manage Users and Groups” icon on the Administration page.
- From the Tasks menu on the Administration page, select Create User.

On the Create User page, enter the details for the user. In the Account Privileges section, you can set the default schema for the user. You can restrict access to a specific set of schemas in a workspace or allow access to all schemas. You have an option to give the developer administrator privileges. You can also restrict access to the components of Oracle Application Express. The slide provides an overview of the steps to create a developer user. You can view a demonstration of this task by opening the

`/home/oracle/labs/demos/les02_create_user.html` file.

## Practice 2-1 Overview: Using Oracle Application Express as a Workspace Administrator

The practices for this lesson cover the following topics:

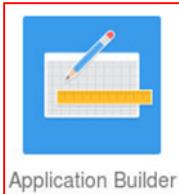
- Logging in to a workspace
- Creating a developer user



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# Workspace Home Page

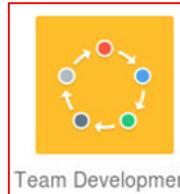
Oracle Application Express consists of the following components:



Application Builder



SQL Workshop



Team Development



Packaged Apps

Create database applications for desktop and mobile interfaces and websheet applications.

Browse and create database objects.  
Execute SQL commands and scripts.

Track new features, bugs, milestones, to-do tasks, and feedback.

Packaged App Gallery  
Install Packaged Apps  
Packaged App Administration

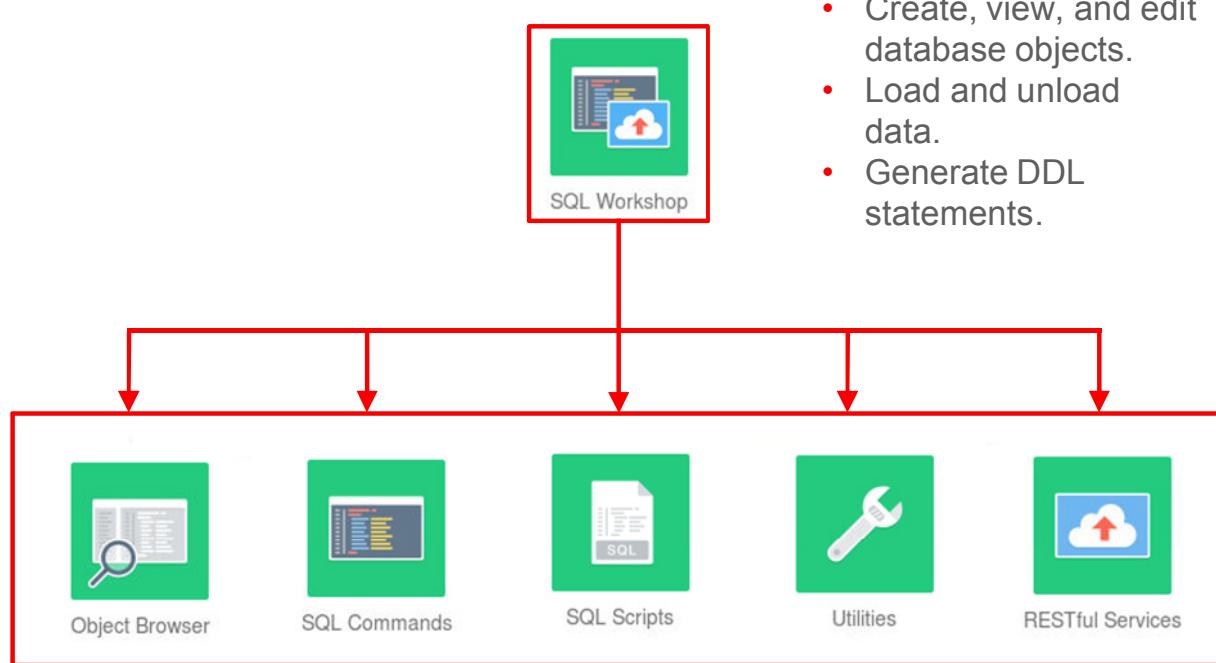
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When you log in to Oracle Application Express, the Workspace home page appears. The Oracle Application Express development environment consists of four components:

- **Application Builder:** Is used to create an application, composed of a set of HTML pages, based on database objects. You can create application pages and use the built-in features to add reports, forms, charts, calendars, and so on to an application. Using Application Builder, you can build database applications and websheet applications. You learn to create a database application in the lesson titled “Creating a Database Application.”
- **SQL Workshop:** Is used to access and manage database objects of an application. You can browse the objects in your application schema. You can create database objects, such as tables, views, sequences, and so on. You can execute SQL commands and run SQL scripts.
- **Team Development:** Provides a development management tool that enables you to track new features, bugs, milestones, to-do tasks, and feedbacks
- **Packaged Apps:** Is used to install and unlock Packaged Apps. It provides a gallery of Packaged Apps that can be used in real time with minimum modification along with Sample Apps to give overview of Oracle APEX 5.0 features.

# What Is SQL Workshop?



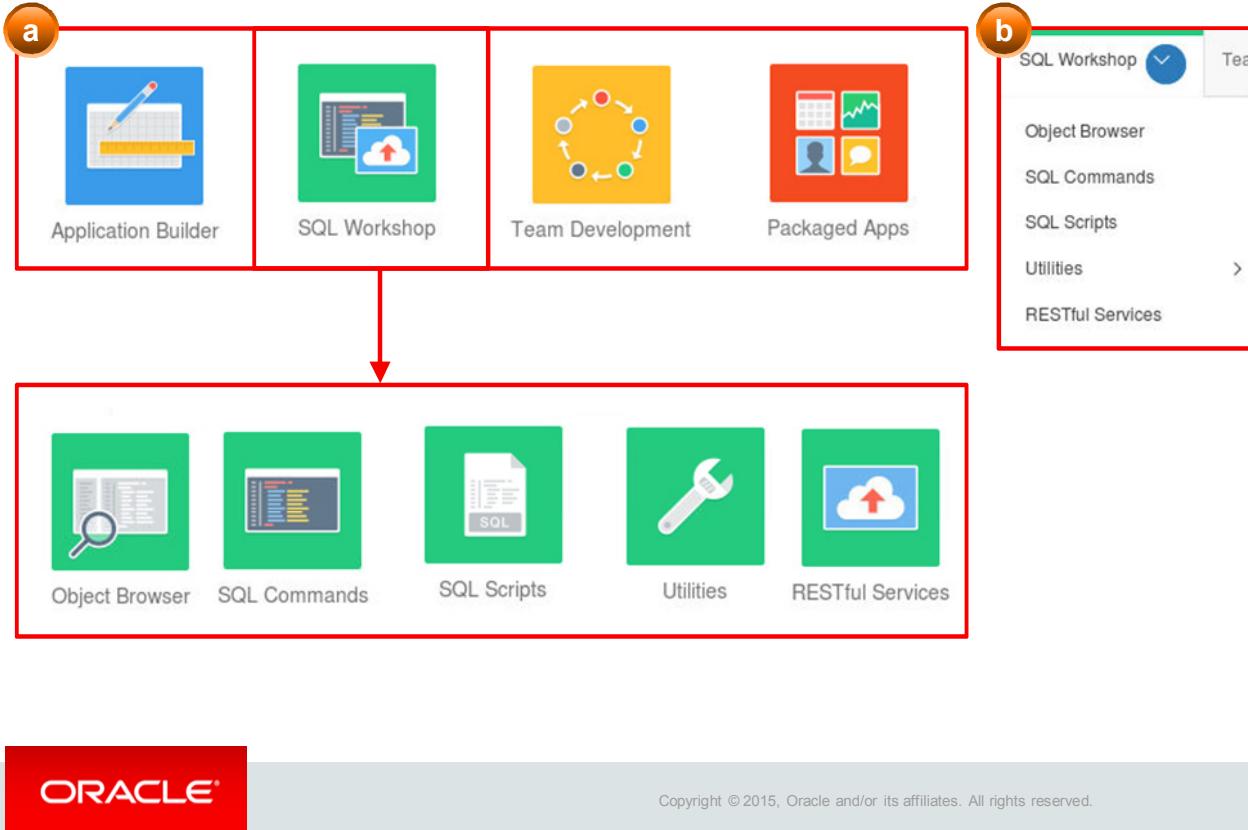
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SQL Workshop is a tool in Application Express that you use to interact with the database objects. You can create, view, and edit database objects. You can also perform tasks, such as loading and unloading data to and from database tables, generating data definition language (DDL) statements, and viewing reports. SQL Workshop consists of five components:

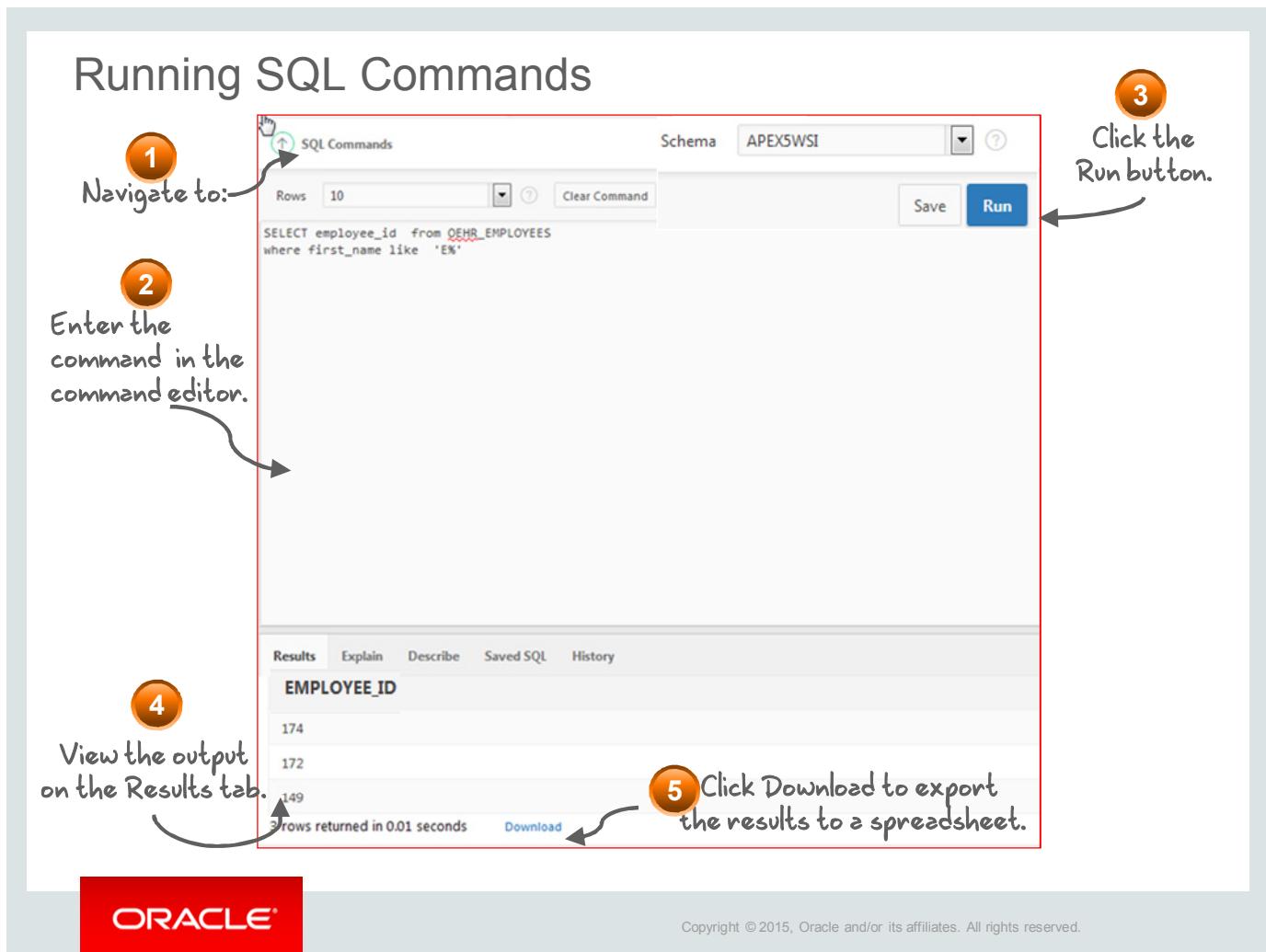
- **Object Browser:** Enables you to browse, create, and edit objects in a database
- **SQL Commands:** Enables you to create, edit, view, run, and delete database objects
- **SQL Scripts:** Is a set of SQL commands saved as a file in SQL Scripts. A SQL script can contain one or more SQL statements or PL/SQL blocks. You can use SQL Scripts to create, edit, view, run, and delete database objects.
- **Utilities:** Enables you to build SQL queries, load and unload data from an Oracle database, generate DDL, view object reports, manage User Interface defaults, restore dropped database objects, compare schemas, monitor the database, and view database details
- **RESTful Services:** Enables the declarative specification of RESTful Web Services used to access the database. These services work in conjunction with the Oracle Application Express Listener to enable the consumption of these services.

## Accessing SQL Workshop



From the Oracle Application Express home page, you can access the SQL Workshop tool in two ways:

- Click the SQL Workshop icon or the SQL Workshop tab, and then select the component that you want to access.
- Click the down arrow on the SQL Workshop tab, and then select the component that you want to access from the drop-down menu.



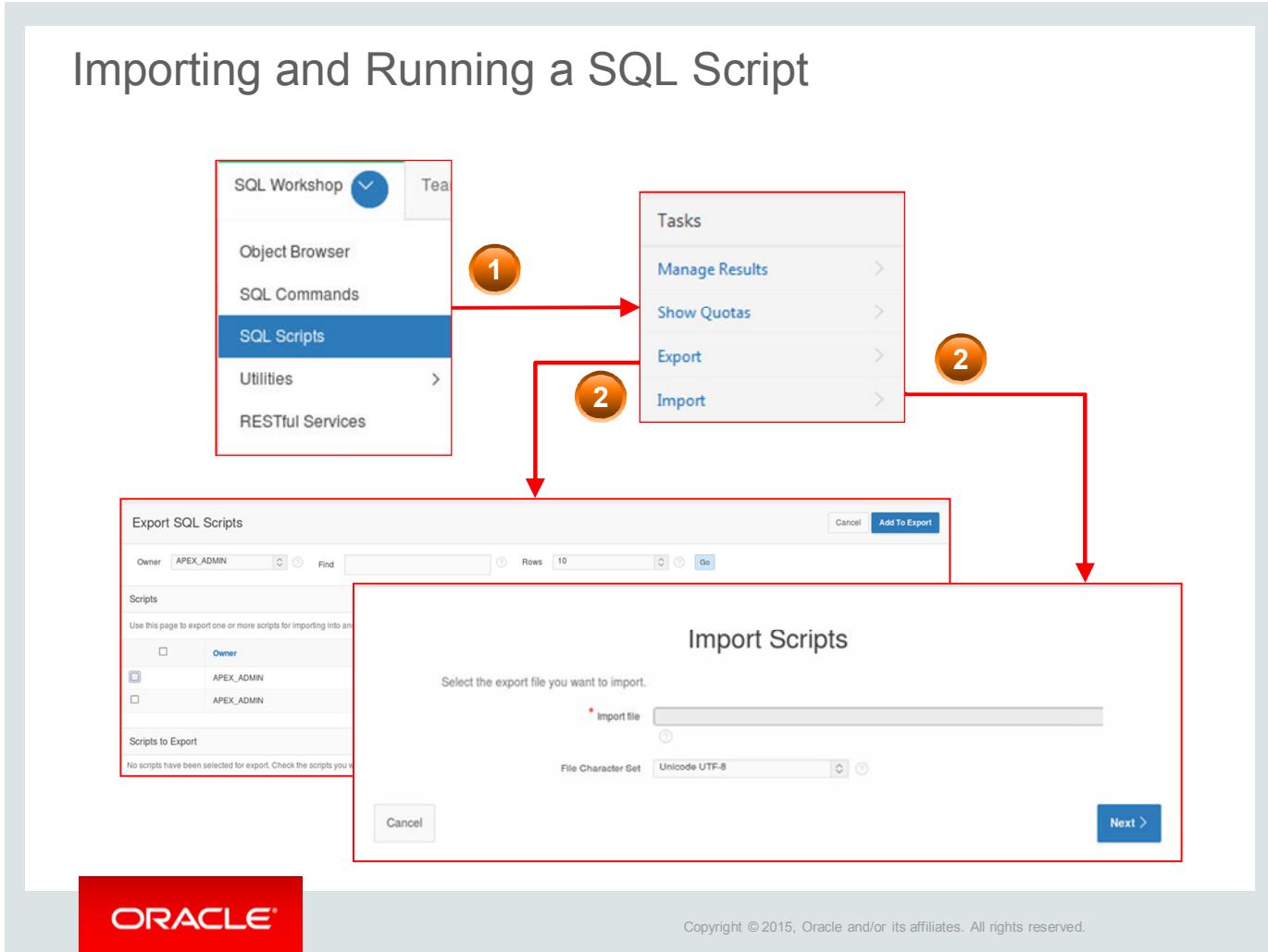
To execute SQL code with SQL Commands, perform the following steps:

1. Navigate to the SQL Commands page by selecting **SQL Commands** from the drop-down menu on the SQL Workshop tab.
2. Enter the SQL or PL/SQL statement in the command editor.
3. Click the **Run** button.
4. View the output on the Results tab of the display pane.
5. (Optional) Click the **Download** link to export the results of the query to a spreadsheet in Microsoft Excel.

#### Note

- If you have multiple commands in the command editor, you can run only one command at a time. Select the command and click Run. Only the command that was selected is executed.
- SQL commands that are created and saved by using Query Builder can be executed from the SQL Commands page.

# Importing and Running a SQL Script



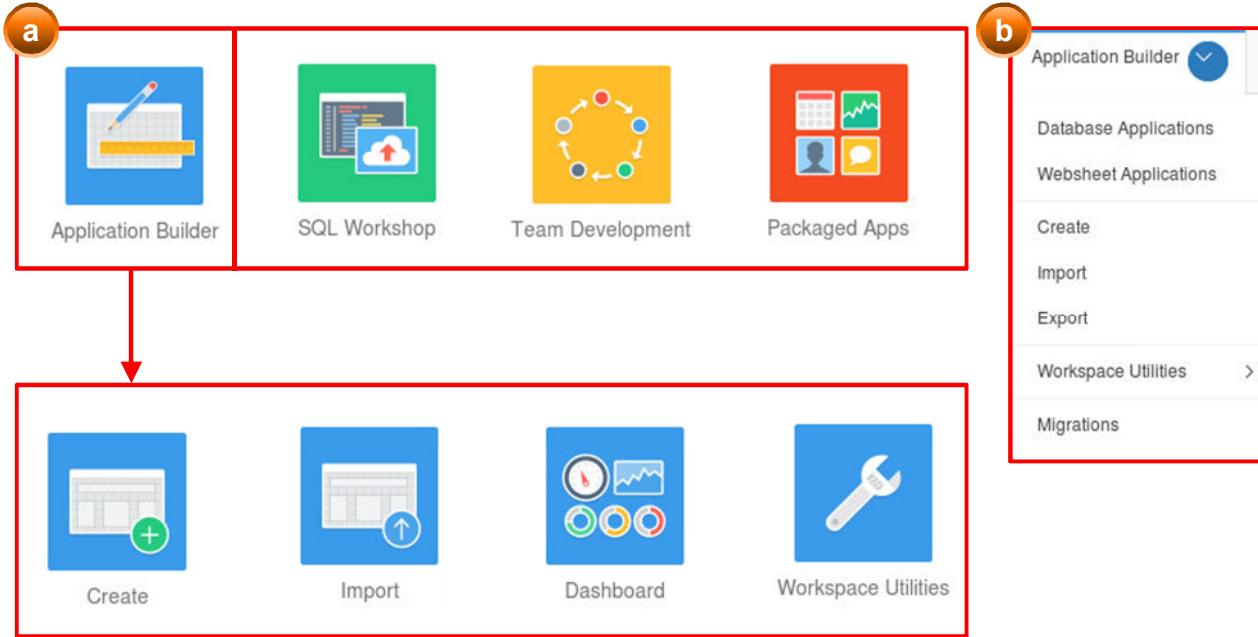
The Export and Import tasks enable you to transfer scripts between workspaces.

Using Export, you can export multiple scripts from your current workspace to another workspace. All the scripts that you select to export are encoded into a single script file. You can save this file to your local file system and import it to another workspace.

To export scripts, click the Export link. The scripts available in the script repository are listed in the Scripts pane. Select the scripts that you want to export and click the Add To Export button. The selected scripts are listed in the “Scripts to Export” pane. You can finalize the scripts that you want to export by removing or adding scripts. To export all the scripts, click the Export All button. The scripts are exported as a single export file, which you can save to your local file system.

Using Import, you can import a script file exported from a different workspace into your current workspace. To import a script file, click the Import link. Click the Browse button and locate the file to import from your local file system. Click Next and click Import Scripts to confirm. Only script files exported from the scripts repository can be imported. If you try to import any other script, you get a “script not compatible” error.

# What Is Application Builder?



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An Oracle Application Express application enables you to manage and display data from an Oracle database. You build an application using Application Builder. From the Oracle Application Express home page, you can access the Application Builder tool in two ways:

- Click the Application Builder icon or the Application Builder tab, and then select the component that you want to access.
- Click the down arrow on the Application Builder tab, and then select the component that you want to access from the drop-down menu.

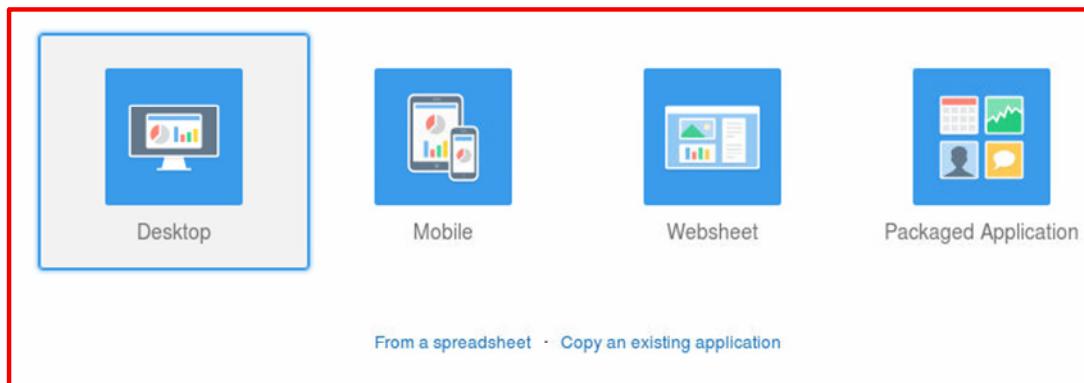
Application Builder consists of four components:

- **Create:** Enables you to create database applications or websheet applications. It also allows you to install any packaged application into your workspace.
- **Import:** Enables you to import an applications, Plug-Ins, Themes, User Interface Defaults, and Team Development Feedback into the workspace
- **Dashboard:** Provides details of all the applications present in this workspace
- **Workspace Utilities:** Enables you to manage various attributes of the workspace

**Note:** When you log in to Oracle Application Express and select Application Builder, you will find that a Sample Database Application, which is a packaged application, is already installed for you.

# Types of Applications

- Database
  - Desktop
  - Mobile
- Websheet
- Packaged Application



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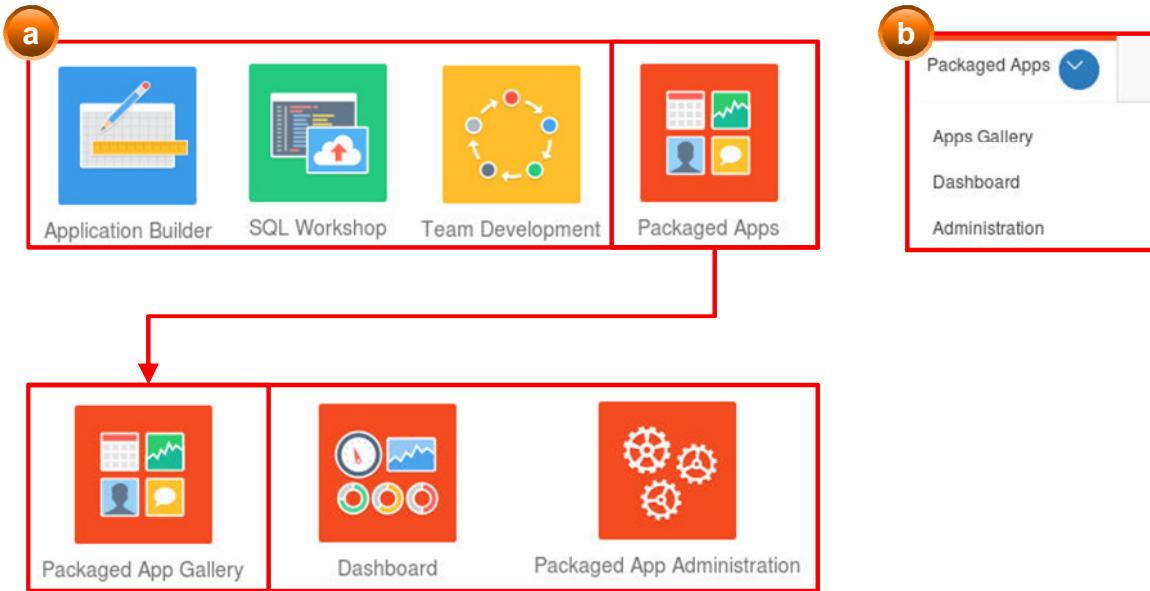
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When you run the Create Application Wizard, the wizard prompts you to choose the type of application that you want to create. The options include:

- **Database:** A database application is a collection of pages that share a common session state and authentication. Database applications enable developers to have full control on all aspects of the development process. With database applications, developers can directly leverage their SQL and PL/SQL programming skills. You can manually add and customize components (reports, charts, or forms), page controls (buttons, items, or lists of values), and shared components (breadcrumbs, lists, or tabs). You can create two types of database applications:
  - **Desktop:** Applications created from this option can be accessed from a desktop interface. If a responsive theme is used, this application can be accessed from both desktop or mobile interface. Alternatively, you can add an additional user interface to make this application accessible from a mobile interface also.
  - **Mobile:** Applications created from this option can be accessed only from a mobile interface.

- **Websheet:** A websheet application is geared toward the business user and requires no prior development experience. Each websheet application is a collection of pages designed for web-based data entry and reporting. Websheet applications are simplified and support pages, data grids, and reports. When you create a websheet application, Application Builder automatically handles the creation of tables, triggers, and sequences. Websheets offer an easy, declarative approach to report and form layout, as well as to the creation of lists of values and validations. For more details on websheet applications, see “Appendix B: More Information on Application Development.”
- **Packaged Application:** Packaged applications are fully functional applications that have been designed to address a specific business need. You can install, run, and use packaged applications as they are, or unlock productivity applications to customize the solution provided or analyze them to better understand how to use Application Builder to build specific types of functionality.

## Accessing a Packaged Application



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To access the Packaged Applications page:

- Log in to Oracle Application Express. The Workspace home page appears.
- Click the Packaged Apps icon or Packaged Apps tab.
- Click Apps Gallery.

# Selecting a Packaged Application

The screenshot shows the Oracle Application Express interface with the 'Packaged Apps' tab selected. The 'Packaged Apps Gallery' page displays a grid of application cards. A red box on the left groups the first six applications as 'Productivity applications': APEX Application Archive, Bug Tracking, Customer Tracker, Expertise Tracker, Group Calendar, and Meeting Minutes. A red box on the right highlights the 'Brookstrut Sample Application'. Handwritten annotations include a 'Search Bar' arrow pointing to the search input field at the top, and a 'Sample application' arrow pointing to the highlighted card.

Application Name	Description
APEX Application Archive	Software Development
Bug Tracking	Software Development, Tracking
Customer Tracker	Tracking, Marketing
Expertise Tracker	Tracking, Knowledge Management
Group Calendar	Team Productivity
Meeting Minutes	Tracking, Team Productivity
Application Standards Tracker	Tracking, Knowledge Management
Checklist Manager	Tracking, Team Productivity
Data Reporter	Knowledge Management, Tracking, Project Management
Feedback	Software Development
Incident Tracking	Software Development, IT Management
Opportunity Tracker	Tracking, Team Productivity
Brookstrut Sample Application	Sample Application
Community Requests	Software Development, Community
Decision Manager	Team Productivity, Tracking
Go Live Checklist	Project Management
Live Poll	Marketing, Tracking
P-Track	Project Management, Team Productivity, Tracking

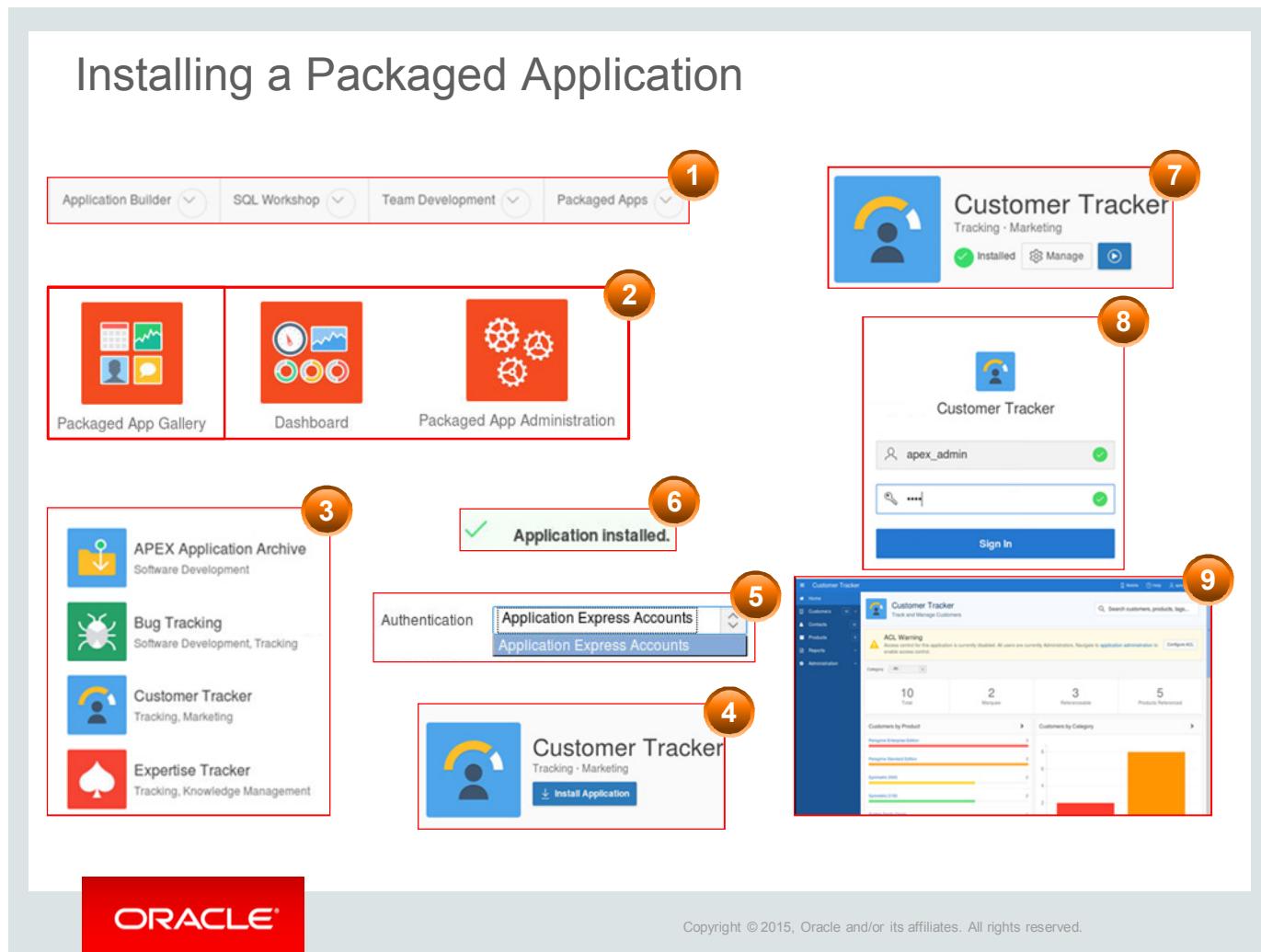
Oracle Application Express includes two types of packaged applications:

- Sample applications
- Productivity applications

Both sample and productivity applications are fully functional applications that have been designed to address a specific business need. You can install, run, and use packaged applications as they are, or analyze them to better understand how to use Application Builder to build specific types of functionality.

The main difference between a sample application and a productivity application is the level of support. By default, sample applications are fully editable. In contrast, you must unlock productivity applications before you can edit them. Unlocking a productivity application makes it ineligible for future upgrades or support by Oracle support.

You can search any packaged application by typing a part of the packaged application's name in the search bar provided in this page.



To install a packaged application:

1. On the Application Builder Home Page, click the Packaged Apps tab. The Packaged Apps page appears.
2. Select Packaged App Gallery.
3. Locate the application to be installed. In the example in the slide, the Customer Tracker application is selected.
4. Click the application image. A summary page appears. Click Install Application.
5. Select an Authentication scheme and click Next.
6. Click Install Application again. A success message appears.
7. To run the application, click the Run Application icon.
8. Enter the appropriate login credentials and click Sign In.
9. The application is installed.

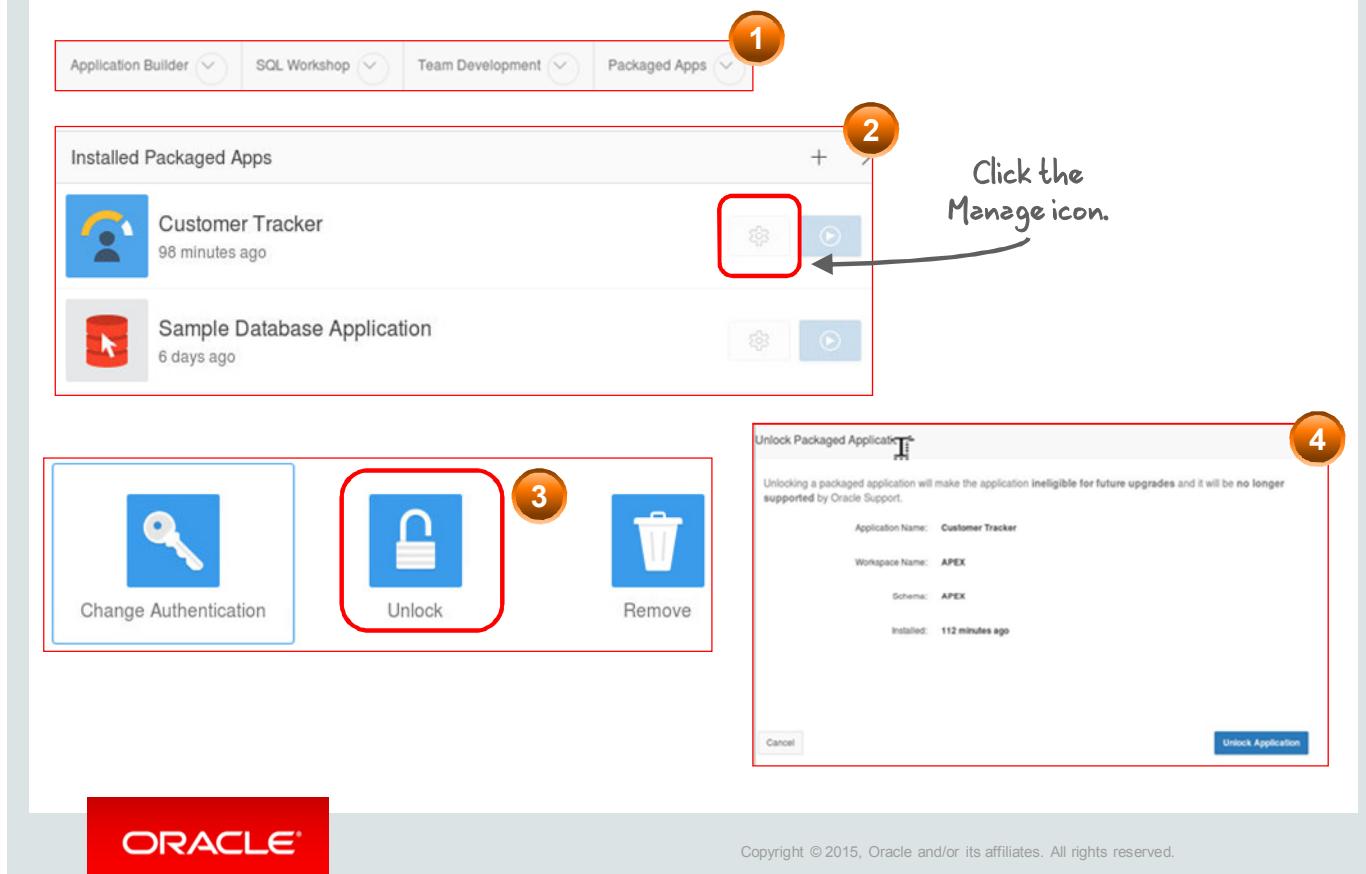
# Running an Installed Packaged Application

The screenshot illustrates the process of running an installed packaged application. It starts with the 'Installed Packaged Apps' page, where the 'Customer Tracker' application is selected. A callout labeled '1 Click the Run icon.' points to the play button in the toolbar. The application's home page is then displayed, with a callout labeled '2 Application Home Page' pointing to the main content area. The home page shows an 'ACL Warning' message and two charts: 'Customers by Product' and 'Customers by Category'. The Oracle logo is visible at the bottom left, and copyright information is at the bottom right.

To run an installed packaged application:

1. Click the Packaged Apps tab. The Packaged Apps page appears.
2. Locate the application.
  - a. Click the application image.
  - b. Click Run.
3. Enter the appropriate login credentials to view the application.

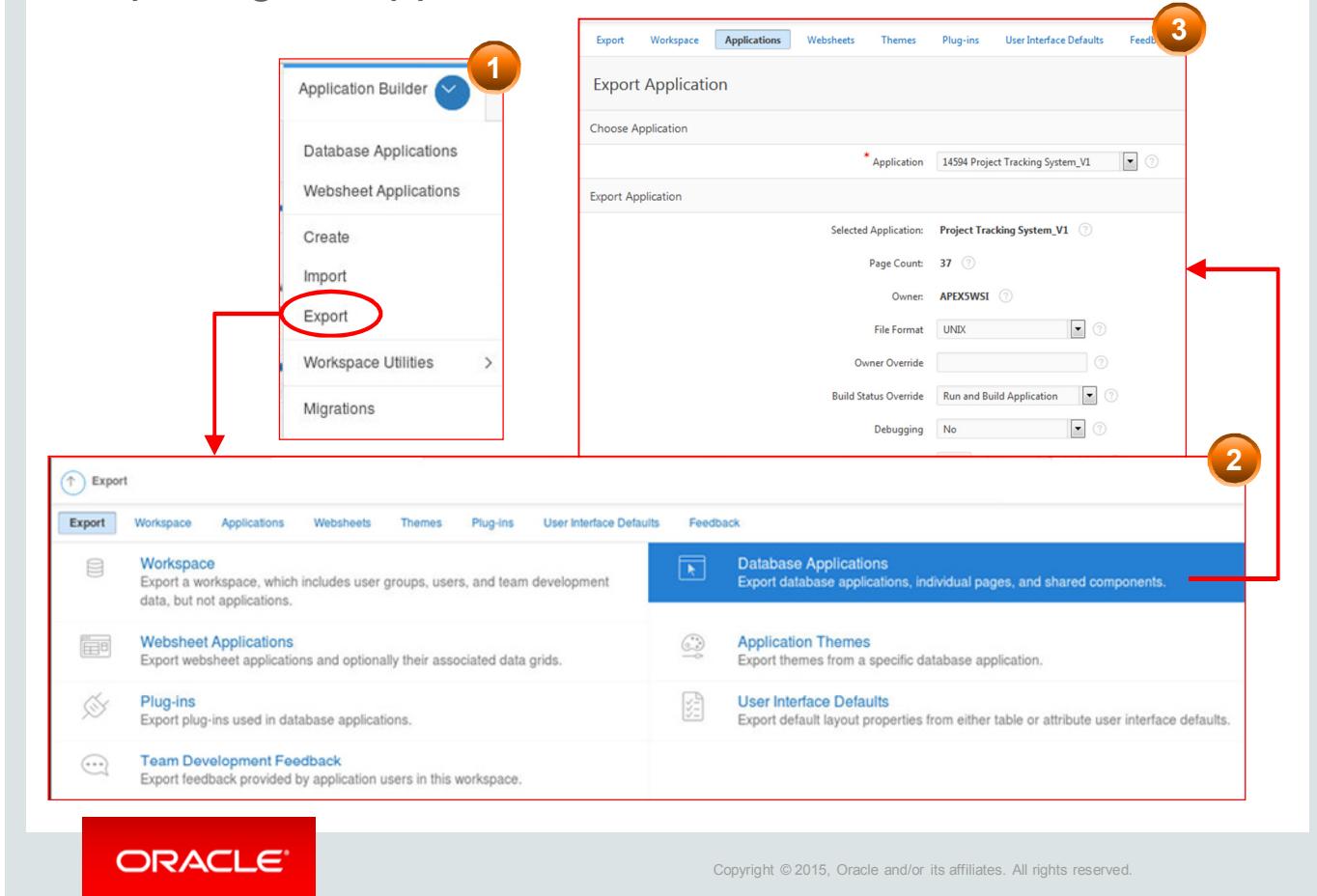
# Unlocking an Installed Productivity Application



After a productivity application is installed, you must unlock it before you can edit it. To unlock an installed productivity application:

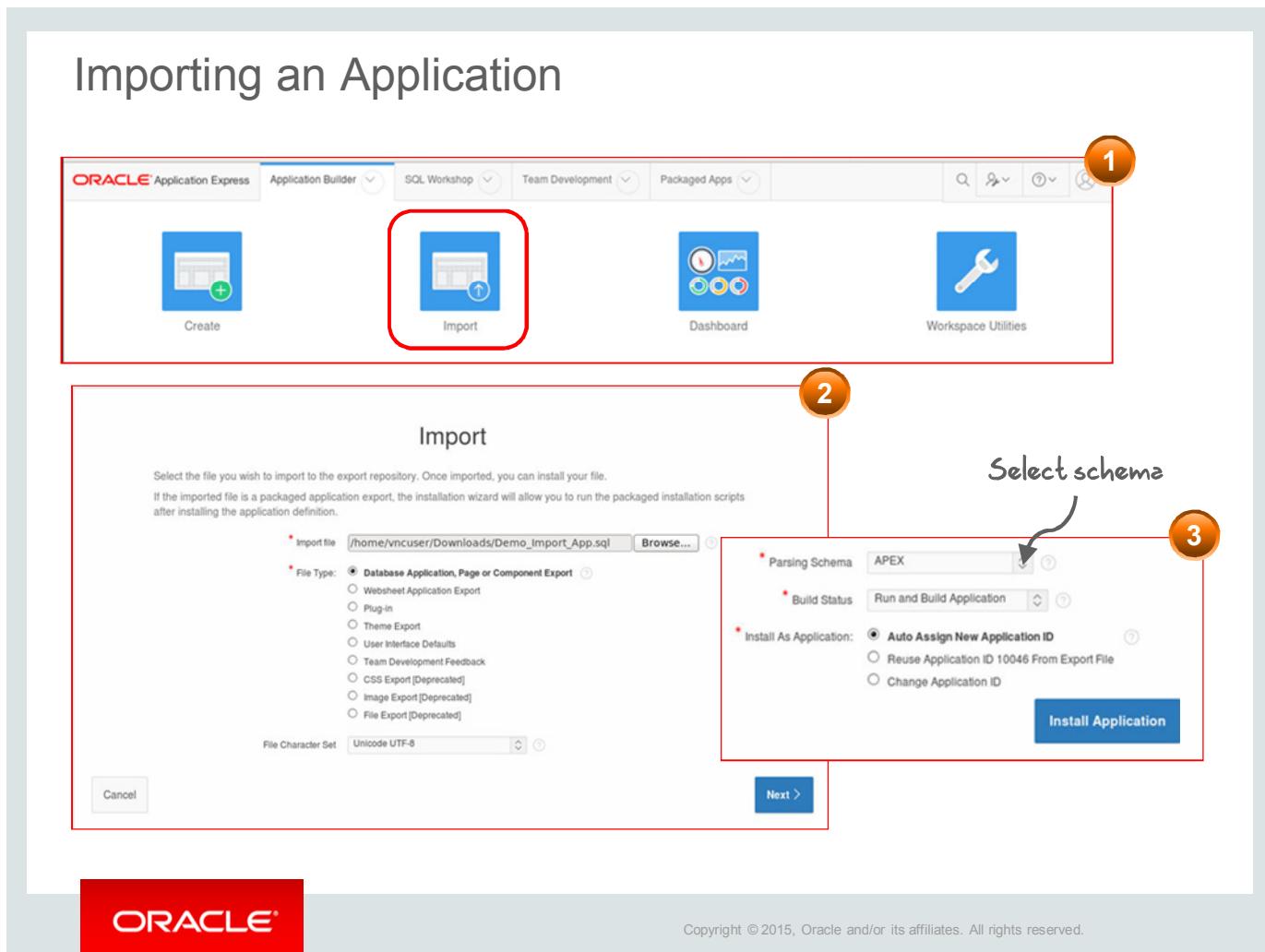
1. Click the Packaged Apps tab. The Packaged Apps page appears.
2. Locate the application to be unlocked and click the Manage icon.
3. Select Unlock and click Next.
4. When prompted, click Unlock Application.

# Exporting an Application



Sometimes you may want to take a back up of your application or move it to a different workspace. You can do this by exporting your application. You export application definitions and all associated files using the various tabs located at the top of the Export page. For example, from the Workspace tab, you will be able to export entire workspace including user groups, users, and team development data but cannot export any applications. Whereas, from the Applications tab, you will be able to export database applications along with its shared components.

Figure 3 shows the form when the Applications tab is clicked. You choose appropriate options and enter required details and click “Export” to export an application.



After you export an application and any related files, you may import them into the target Oracle Application Express instance, and then install them. As a general rule, always import the application first and then the related files. To import an Application, Page, or Component Export into a target Oracle Application Express instance:

1. Navigate to the Import page by clicking the Application Builder icon on the Workspace home page. Click Import on the Application Builder home page.
2. To specify the file, navigate to the file and select the file type. Verify that the File Character Set is correct and click Next. After you import a file, you have the option to install it.
3. Click Next to install the file. The Install Database Application Wizard appears.
4. On the Install page, select the schema and select the build status of the application. You can select Run Application Only or Run and Build Application. In the Run Application Only status, users can only run an application, whereas in the Run and Build Application status, users can run an application and developers can both run and edit an application.
5. Click Install Application to install the application.

In case you import an application that is already existing in the workspace, it gets imported as a new application altogether with a different application ID. Importing or exporting an application does not impact the underlying data in any way.

## Practice 2-2 Overview: Using Oracle Application Express as a Developer

The practices for this lesson cover the following topics:

- Log in to Oracle Application Express as a Developer
- Run the sample database application
- Install a packaged application and use it



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## Lesson Agenda

- Oracle Application Express Overview
- Oracle Application Express Concepts
- Using Oracle Application Express
- Using Oracle Application Express in Oracle Database Cloud Service



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# Oracle Database Cloud Service

- Is built on Oracle Database technology running on the Oracle Exadata Database machine
- Is accessible from any supported browser on any platform
- Includes a wide variety of tools and utilities



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The Database Cloud Service is built on Oracle Database technology, running on the Oracle Exadata Database machine. The Database Cloud Service has four main components:

- Oracle Database 11g R2 Enterprise Edition
- Oracle Application Express, which is used to create and deploy all varieties of applications in a browser-based environment
- RESTful Web Services, which allows access to the data in your Database Cloud Service through simple URIs
- Packaged Applications and Sample Code, which is a set of business productivity applications that are installed easily

The Oracle Database Cloud Service delivers the following advantages:

- You can access your Database Cloud Service from any supported browser on any platform.
- It comes in several sizes, based on a simple storage and transfer metrics.
- It has a simple monthly subscription cost, which includes all standard maintenance operations and Oracle Support.

- You can provision a complete Database Cloud Service environment in a few minutes and immediately start to be productive. The Database Cloud Service includes simple administrative tools that enable you to monitor usage, and add and drop user access. The Oracle Store allows you to modify your subscription package with a simple interface.
- The Database Cloud Service includes a variety of tools and utilities, including development wizards and flexible interactive reporting. Most importantly, the Database Cloud Service offers rapid application development and instant deployment, which enable developers and users to work together in real time to create optimal solutions for business needs.

# Using Oracle Application Express in Oracle Database Cloud Service

## Oracle Application Express:

- Is offered as a platform for rapid application development
- Resides within the Oracle Database Cloud Service
- Contains features that enable secure application development



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Oracle Application Express is used to create cloud-based applications in your Database Cloud Service. Oracle Application Express is provided as a platform for rapid application development on the Oracle Database Cloud Service. Oracle Application Express includes several features that help develop secure applications in Oracle Database Cloud service. Because Oracle Application Express and applications developed on it reside in an Oracle Database instance, you can develop and deploy applications using Oracle Application Express running on Oracle Database Cloud service.

You can log in to [cloud.oracle.com](http://cloud.oracle.com) for a free trial.

For more details about using Oracle Application Express in Oracle Database Cloud Service, refer to Appendix C of this course.

## Summary

In this lesson, you should have learned how to:

- Describe Oracle Application Express and its concepts
- Explain the Oracle Application Express architecture
- Identify the components of Oracle Application Express
- Identify the different types of applications available
- Install, run, and unlock a packaged productivity application
- Export and import applications



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Oracle Application Express is a rapid application development tool that is available in Oracle database. In this lesson, you were introduced to Oracle Application Express, the advantages of using Oracle Application Express to build applications, and the Oracle Application Express features that you use when building your application. You also learned about the architecture and the components of Oracle Application Express, as well as the steps to get started.

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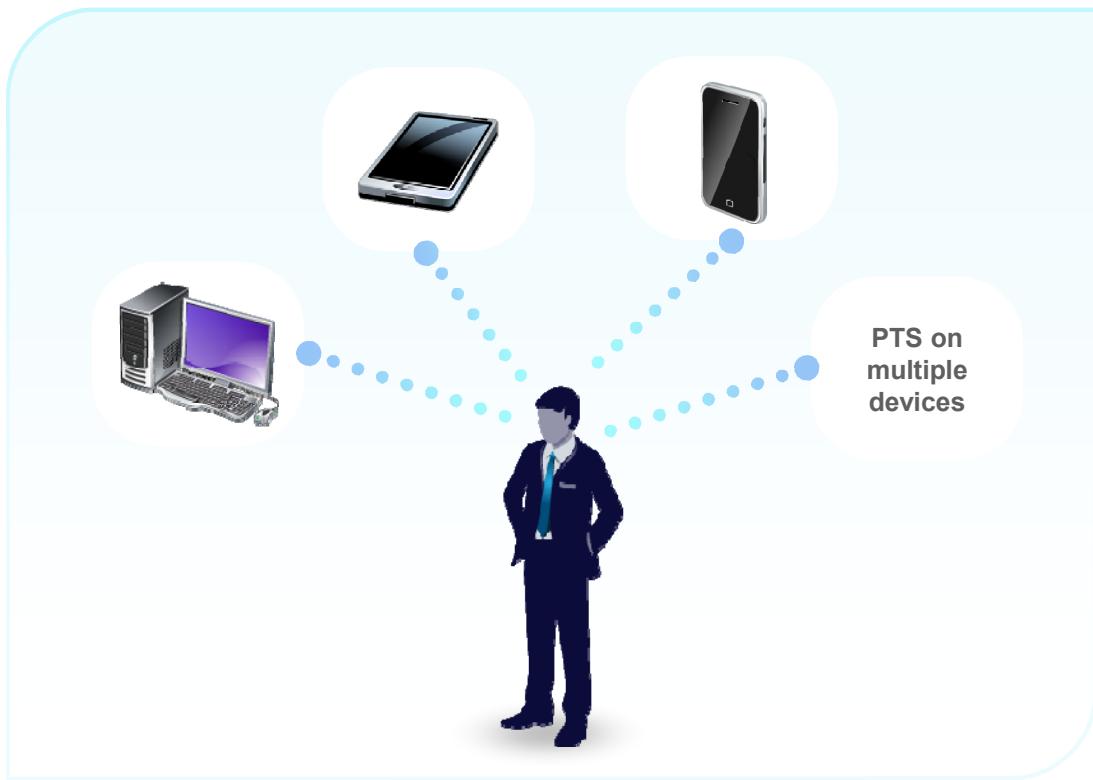
3

# Creating a Database Application

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## Jack Thinks of Developing PTS for Different Interfaces

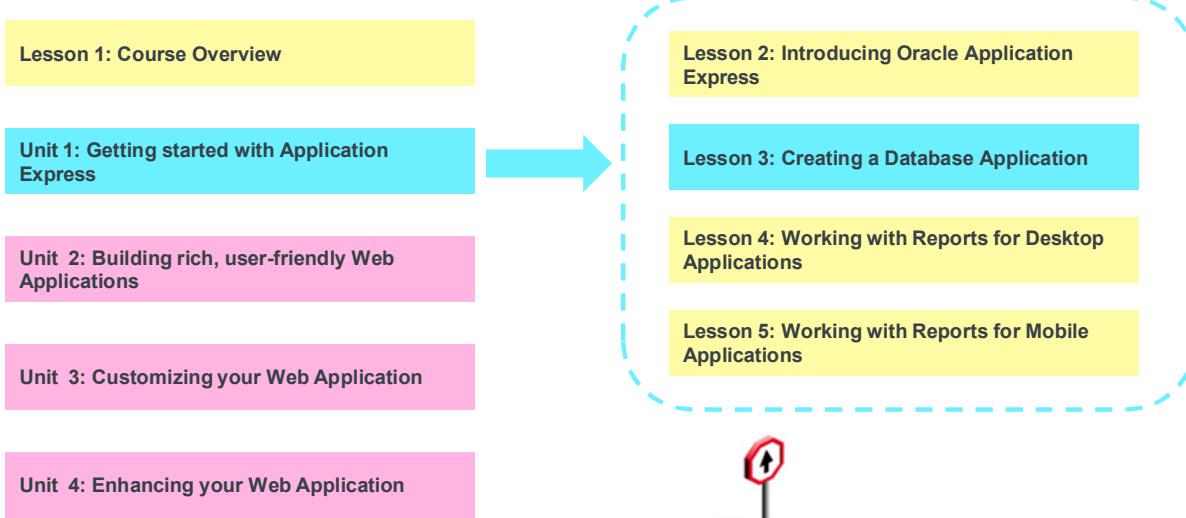


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Now that Jack got a basic understanding of Oracle APEX, he is very confident that it is the correct tool for developing a database application such as PTS. However, he is curious to know if Oracle APEX can help him in developing PTS as a mobile application as well. Jack wants to get a clear understanding on all the types of applications that can be developed / run using Oracle APEX.

# You Are Here in This Course



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

## Objectives

After completing this lesson, you should be able to:

- Identify the components of a database application
- Describe the database application user interfaces
- Explain the various ways of creating a database application



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This lesson introduces you to Application Builder. In this lesson, you learn about the different components of a database application and the concepts associated with building a database application from the beginning, from a spreadsheet, and instantly.

## Lesson Agenda

- Application Builder Overview
  - Accessing Application Builder
  - Application Builder Interface
- Introducing Database Applications
- Creating a Database Application



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# Accessing Application Builder

The screenshot shows the Oracle Application Express workspace home page. At the top, there is a navigation bar with tabs: Application Builder, SQL Workshop, Team Development, and Packaged Apps. Below the navigation bar are four icons: Application Builder (blue square with a pencil icon), SQL Workshop (green square with a database icon), Team Development (yellow square with a circular arrow icon), and Packaged Apps (red square with four small icons). A red box labeled 'a' highlights the Application Builder icon. A red box labeled 'b' highlights the Application Builder tab in the navigation bar, which has a dropdown menu open showing options: Database Applications, Websheet Applications, Create, Import, Export, Workspace Utilities, and Migrations. The bottom of the screen features the Oracle logo and a copyright notice: Copyright © 2015, Oracle and/or its affiliates. All rights reserved.

When you log in to Oracle Application Express, the Workspace home page appears.

To view the Application Builder home page, you can choose one of the following options:

- Click the Application Builder icon to drill down to the Application Builder home page.
- Click the down arrow next to Application Builder to view the pull-down menu. You can then select the appropriate menu option.

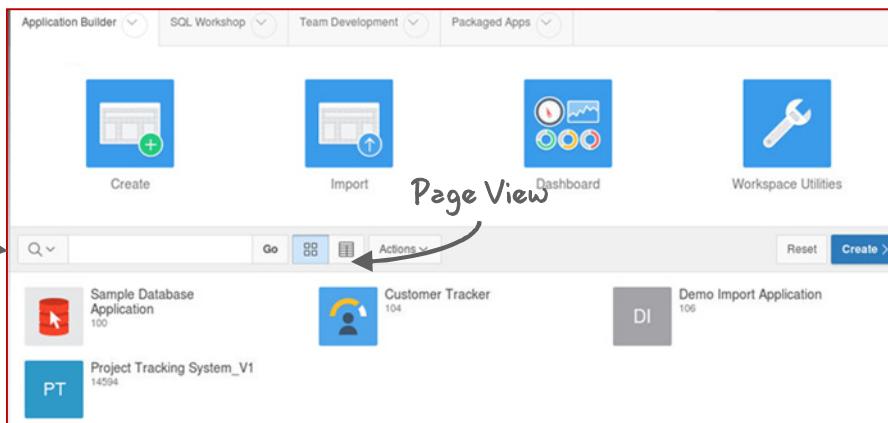
# Application Builder Home Page

From the Application Builder home page, you can:

- Create an application
- Import an application/files
- Access Workspace Utilities
- Change the page view
- Reset the application report
- Use the Actions menu
- Search for an application
- Edit/run an application

Search Area

Page View



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The Application Builder home page displays the currently installed applications. From the Application Builder home page, you can:

- **Search for an application:** To search for a particular application, enter the name of the application in the Search area and click Go. You can also search a particular column by clicking the magnifying glass icon and selecting a column to search on. If no column is selected, all the columns are searched.
- **Change the page view:** You can change the appearance of a page by making a selection from the three View icons next to the Go button. These icons consist of:
  - **View Icons** (the default): Displays each application as an icon and identifies it by the application name
  - **View Report:** Displays a list of the applications in a report
- **Use the Actions menu:** Enables you to perform different tasks for the data that is displayed
- **Reset the application report:** Returns you to the default display
- **Import an application:** Imports an exported application file. This enables you to import an applications, Plug-Ins, Themes, User Interface Defaults, and Team Development Feedback into the workspace.

- **Create an application:** Creates a new application or installs a sample application
- **View/run an application:** Enables you to view a specific application. This opens the home page of that application. Selecting any application on Application Builder home page highlights a small Run icon by clicking which you can run the application without even opening it.

## Lesson Agenda

- Using Application Builder
- Introducing Database Applications
  - Database Application Home Page
  - Themes
  - Components of a Database Application
  - What Is a Page?
  - Different Views of a Page
  - Switching Between Pages and View Types
- Creating a Database Application

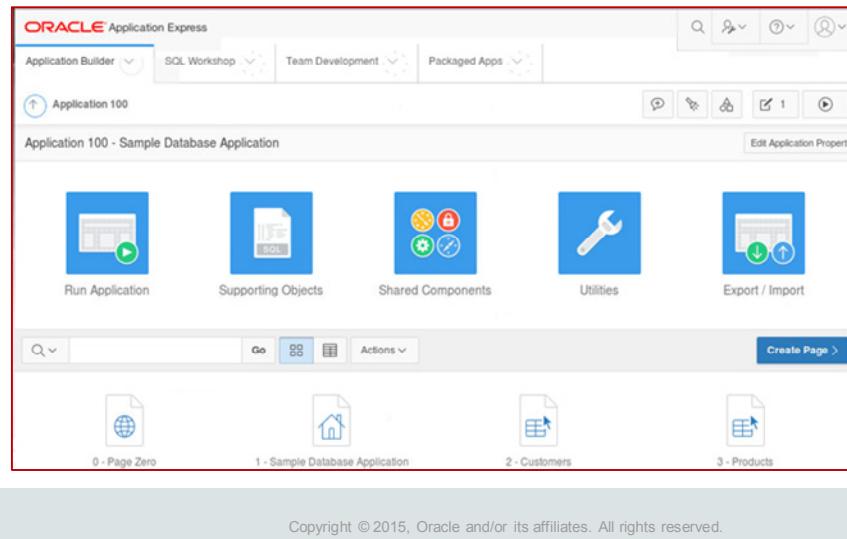


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# Database Application Home Page

From an application home page, you can:

- Run the application
- Use the Supporting Objects utility
- Create shared components
- Create a page
- Examine application utilities
- Export and import applications
- Edit application properties



When you click the application icon or application name, the application home page appears. You can see the application ID and the name of the application at the top of the page.

From the application home page, you can:

- **Run the application:** Click the Run Application icon to submit the pages to the Oracle Application Express engine to render a viewable HTML page.
- **Use the Supporting Objects utility:** Click Supporting Objects to access the utility to define the database object definitions, images, and seed data to be included in your application export for your packaged application.
- **Create shared components:** Click Shared Components to build shared application components and user interface controls.
- **Examine application utilities:** Click Utilities to monitor developer activity, view dashboards, run the Advisor, and view numerous other reports.
- **Export and import an application:** Click the Export/Import icon to export or import an entire application or its components, such as cascading style sheets, images, static files, themes, and user interface defaults.

- **Edit application properties:** Click Edit Application Properties to edit the application name and availability, and to define static substitution strings. Additionally, the Edit Application page displays the defined build options, the associated theme, template defaults, and component defaults.
- **Create a page:** Click Create Page to add a page to your application.

On the application home page, you also see a list of icons for each page. To open a page, click one of the page icons.

# Database Application User Interfaces

From a spreadsheet • Copy an existing application

Select the user interface.

Mobile User Interface

Desktop User Interface

**Sample Database Application**

Home Customers Products Orders Reports

Sales for this Month

Top Customers

Customer	Order(s)	Amount
Bradley, Eugene	2	\$2,760.00
Logan, Edward	2	\$2,420.00
Dulles, John	1	\$2,380.00
Hartsfield, William	2	\$2,370.00
Laguardia, Pierello	1	\$1,090.00

Top Products

Product	Quantity	Amount
Jacket - 18 x \$1.50	18	\$2,700.00
Bag - 16 x \$1.25	16	\$2,000.00
Tiepins - 21 x \$80	21	\$1,680.00

Top Orders by Date

Date	Amount
September 04, 2012	2,380
August 21, 2012	1,890
September 15, 2012	1,640

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At the time of creating a database application, you have the option to choose the type of user interface that you can develop your application for.

Oracle Application Express supports two user interface models for database applications:

- **Desktop:** Used for applications that are primarily used on a desktop
- **jQuery Mobile Smartphone:** Used for applications that are developed for smartphones or tablets

Websheet applications are different from database applications. They allow the users to create data-centric applications without any SQL programming knowledge. Websheet Applications is beyond the scope of this course and for more information about it refer to the course appendix.

## Themes

### Desktop user interface

Select Theme

Show: All Themes

Applications developed with Oracle Application Express 5.0 will run on Mozilla Firefox, Google Chrome, Apple Safari, and Microsoft Internet Explorer. Please reference the Oracle Application Express User's Guide for specific version information. Please note that the Universal Theme requires Internet Explorer 9 or newer.

ID	Name	Navigation
42	Universal Theme	List
1	Simple Red	Tabs
2	Builder Blue	Tabs
3	Midnight Blue	Tabs
4	Topaz	Tabs
5	Sunrise	Tabs
6	Centered Blue	
7	Modem Blue	

### Mobile user interface

Select Theme

Show: All Themes

Applications developed with Oracle Application Express 5.0 will run on Mozilla Firefox, Google Chrome, Apple Safari, and Microsoft Internet Explorer. Please reference the Oracle Application Express User's Guide for specific version information. Please note that the Universal Theme requires Internet Explorer 9 or newer.

ID	Name	Navigation
51	Mobile	List

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Themes are used to define the layout and style of an entire application. Themes provide a set of templates that accommodate every User Interface pattern that may be needed in an application. Oracle Application Express supports three types of user interface themes for database applications built using the desktop user interface: Standard, Custom, and Legacy.

Standard themes are provided by Application Express. For example, the Blue Responsive theme (theme 25) is a standard theme that can be used to develop responsive web applications that can be used on desktop, smartphones, and tablets.

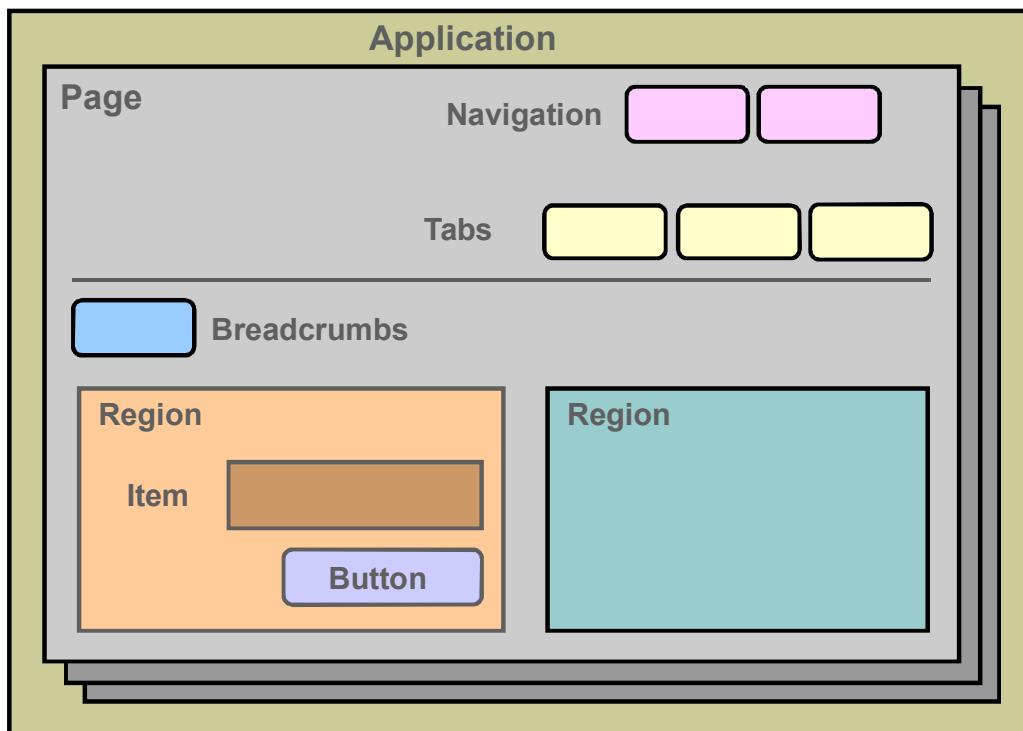
Custom themes are additional themes available for use. These are themes that are built by the user and then made available for other workspaces in the same installation. Therefore, if an organization wants to create a company-specific theme, it can create it and then make it available to other workspaces. Legacy themes are themes developed prior to HTML5 and have an older look and feel.

For nondesktop applications, jQuery Mobile Smartphone (theme 50) is used. Even though an application created with any responsive theme can be accessed from a mobile device, creating a mobile application using jQuery Mobile Smartphone theme creates webpages using a light-weight framework that allows you to create compact and minimalistic websites that include only few images and CSS files. So, if you want to create an application targeted only to mobile users, creating it as a Mobile Database Application using Theme 50 is recommended.

Universal Theme is a new highly responsive user interface theme introduced with Oracle APEX 5.0 which requires Internet Explorer 9 or later.

**Note:** This topic is discussed in more detail in Unit 3 of this course in the lesson titled “Working with Themes, Templates, and Files.”

# Components of a Database Application



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A database application is a collection of database-driven webpages that are linked by navigational controls, such as tabs, buttons, and hypertext links.

A page is the basic element of an application. A page is divided into regions; a region is a section of a page that contains content. The content of the region is determined by the region source. For example, a region can contain a report based on a SQL query, or it can contain static HTML.

A region can also contain the following:

- Items such as a text field, text area, select list, and check box
- Buttons to direct users to a specific page or URL, and also to post and process information
- Breadcrumbs (locator links) to provide hierarchical navigation

Navigation entries are placed outside regions to enable users to navigate between the pages of an application.

# Page Designer: The World's Most Advanced IDE

The screenshot shows the Oracle Application Express Page Designer interface. On the left, the **Component Selector** (highlighted with a red box) displays a hierarchical tree of page components for "Page 6: Create Employees". It includes sections for Regions (Content Body, Buttons), Page Items, and Attributes. On the right, the **Property Editor** (highlighted with a red box) provides configuration options for the selected component. The "Identification" section contains fields for Name (Create Employees), Page Alias, Title (Create Employees), and Page Group (- Select -). The "Appearance" section includes User Interface (Desktop), Page Mode (Normal), Page Template (Theme Defa), Template Options (Use Template Defaults), CSS Classes, and Media Type.

Component Selector

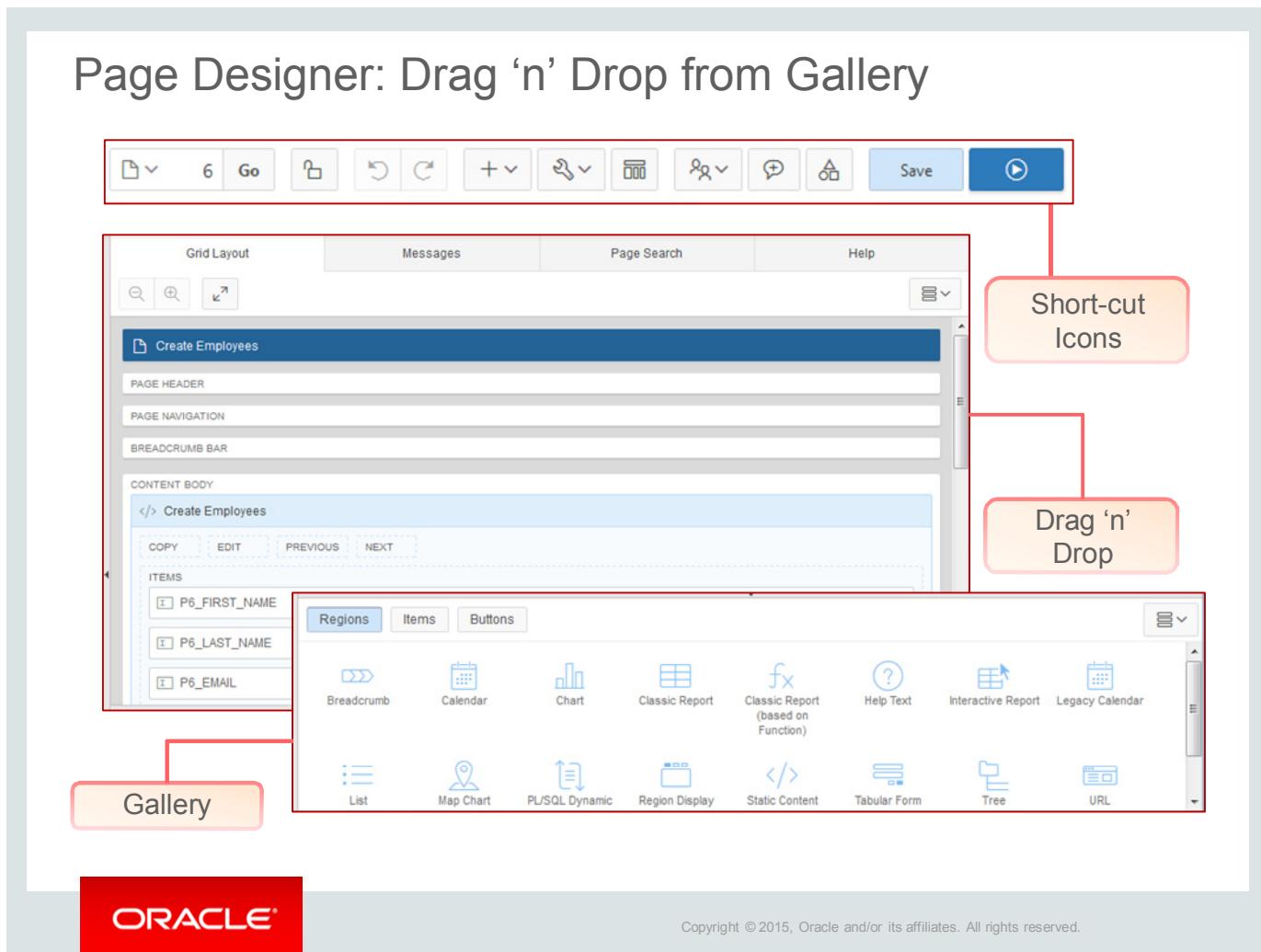
Property Editor

Next level of declarative programming → Design your page as you visualize!

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**Page items, regions, computations, processes, validations** are all organized under Rendering and Processing tabs automatically. **Dynamic actions and shared components** organized under separate tabs. Select a component in **Component Selector** and update its properties in **Property Editor**.

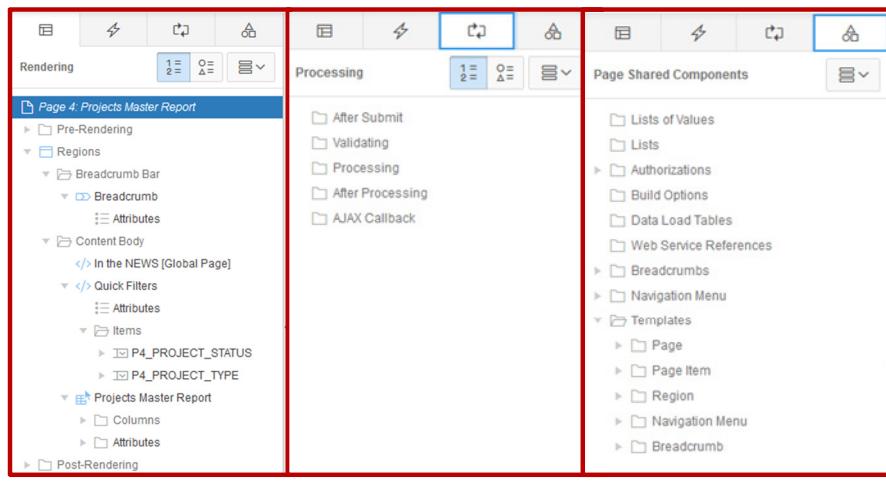


Page designer provides many useful features to the developers:

- You can **drag 'n' drop** regions, items, and buttons into **grid layout**. All the related **properties** will be updated automatically
- Backward compatibility with **Component view**. You can easily view the page in component view just by clicking one icon.
- **Help tab** specific for providing help on any attribute in property editor of selected component
- **Shortcut icons** to create a new page, copy page , create any type of region on the current page, shared component, bug, feedback and so on
- **Shortcut icons** to access debugging tools and other utilities
- **Undo Redo** support
- **Errors and Warnings** are immediately visible

# Page Definition: Overview

- A page is the basic building block of an application.
- The Page Definition is divided into three sections:
  - Page Rendering
  - Page Processing
  - Shared Components



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You build an application by using pages. The Page Definition is divided into:

- **Page Rendering:** The process of generating a page from the database. You can use the Page Rendering section to modify the controls that impact the rendering of a page, including the page definition, regions, buttons, items, page-rendering computations, and page processes.
- **Page Processing:** The process of submitting a page. A page is typically submitted when a user clicks a button. You can use the Page Processing section of the Page Definition to specify application logic, such as computations, validations, processes, and branches. In general, the Application Express engine runs the logic of specific applications in the order in which they appear on the Page Definition.
- **Shared Components:** List of the common components that can be displayed or applied on every page within an application. Some of the shared components include tabs, lists of values, breadcrumbs, lists, and navigation bars.

## Different Views of a Page

**Page Designer**

The screenshot shows the Oracle Application Express Page Designer. On the left, there's a tree view of page components under 'Page 4 - Projects Master Report'. The tree includes sections like 'Regions' (Breadcrumb Bar), 'Content Body' (In the NEWS [Global Page], Quick Filters, Items, P4\_PROJECT\_STATUS, P4\_PROJECT\_TYPE, Projects Master Report), and 'Post-Rendering'. On the right, there's a 'Page' panel with tabs for 'Identification', 'Appearance', 'User Interface', 'Page Mode', and 'Template Options'. Below the tree view is a 'Page Rendering' section with tabs for 'Page', 'Regions', and 'Buttons'. The 'Page' tab shows details like Page Name: Projects Master Report, Title: Projects Master Report, and Help Text: 'This page gives all details of...'. The 'Regions' tab lists regions like 'Quick Filter', 'Projects Master Report', and 'Breadcrumb'. The 'Buttons' tab lists items like 'P4\_PROJECT\_STATUS' and 'P4\_PROJECT\_TYPE'. To the right of the rendering section is a 'Page Processing' section with tabs for 'Computations', 'Validations', 'Processes', and 'Branches'. At the bottom right is a 'Shared Components' section with tabs for 'Navigation Menu', 'Lists of Values', 'Breadcrumbs', 'Lists', 'Plug-ins', and 'Templates'. The 'Templates' tab shows standard, interactive report, optional, breadcrumb, and top navigation menu options. The bottom of the interface features an 'ORACLE' logo and a copyright notice: 'Copyright © 2015, Oracle and/or its affiliates. All rights reserved.'

**Component View**

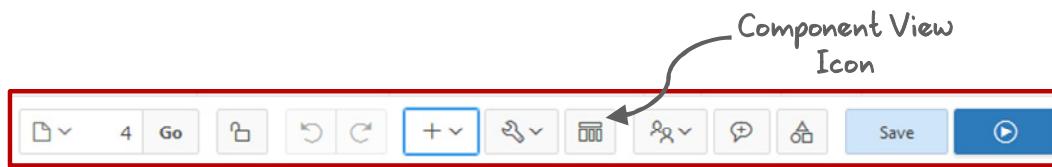
There are two ways to view a page: Page Designer and Component view.

- The **Page Designer** organizes the page components under four major categories:
  - **Tree View:** The components can be seen in tree view organized under Page Rendering, Dynamic Actions, Page Processing, and Shared Components.
  - **Grid Layout:** Gives a snapshot of how the page is going to look as per the design. You can drag an item or region or button to the required position on the grid layout. It also has tabs to show error messages (If any), Page Search and Help on an attribute selected in the property editor for any item.
  - **Gallery:** The gallery contains all possible types of Regions, Items, and Buttons which can be designed into this page using grid layout.
  - **Property Editor:** This is located on the left side of the page designer and shows a complete list of all the properties of a component selected in the Page Components on the right side of the page.
- The **Component view** groups user interface elements and application logic by component type.

# Switching Between Pages and View Types

The navigation bar enables you to:

- Specify a specific page
- Undo or Redo a recent change
- Change view types
- Use shortcut links to create another Page, Region, Items and so on
- Access debugging tools
- Lock or unlock the page
- Save or ‘Save and Run’ the page



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The following are the three ways to switch from one page to another:

1. Enter a page number in the Page field, and then click Go.
2. Click the up arrow next to the Page field, and then select a page from the list.
3. Click the Previous and Next buttons to the right of the Go button.

To switch from the Designer view (which is the default) to the Component view, click the Component View icon on the navigation bar. To switch to the Designer view, click the Designer View icon on the navigation bar.

## Quiz



Application Builder enables you to create both database and websheet applications.

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

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**Answer: a**

## Quiz



Which of the following steps would you perform to navigate from one page to another? (Choose all that apply.)

- a. Click the Component View icon.
- b. Enter a page number in the Page field and click Go.
- c. Use the Previous and Next buttons.
- d. Click the Detail View icon on the application home page.



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**Answer: b, c**

## Lesson Agenda

- Using Application Builder
- Introducing Database Applications
- Creating a Database Application
  - Accessing the Create Application Wizard
  - Different ways of Creating an Application
  - Using User Interface Types
  - Running an Application
  - Using the Developer Toolbar

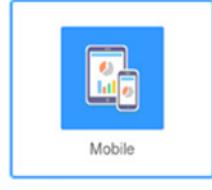
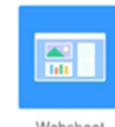
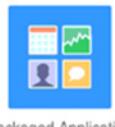


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# Create Application Wizard

## Create an Application

What type of application would you like to create?

 Desktop     Mobile     Websheet     Packaged Application

[From a spreadsheet](#) • [Copy an existing application](#)

 About

 Cancel

 Next >

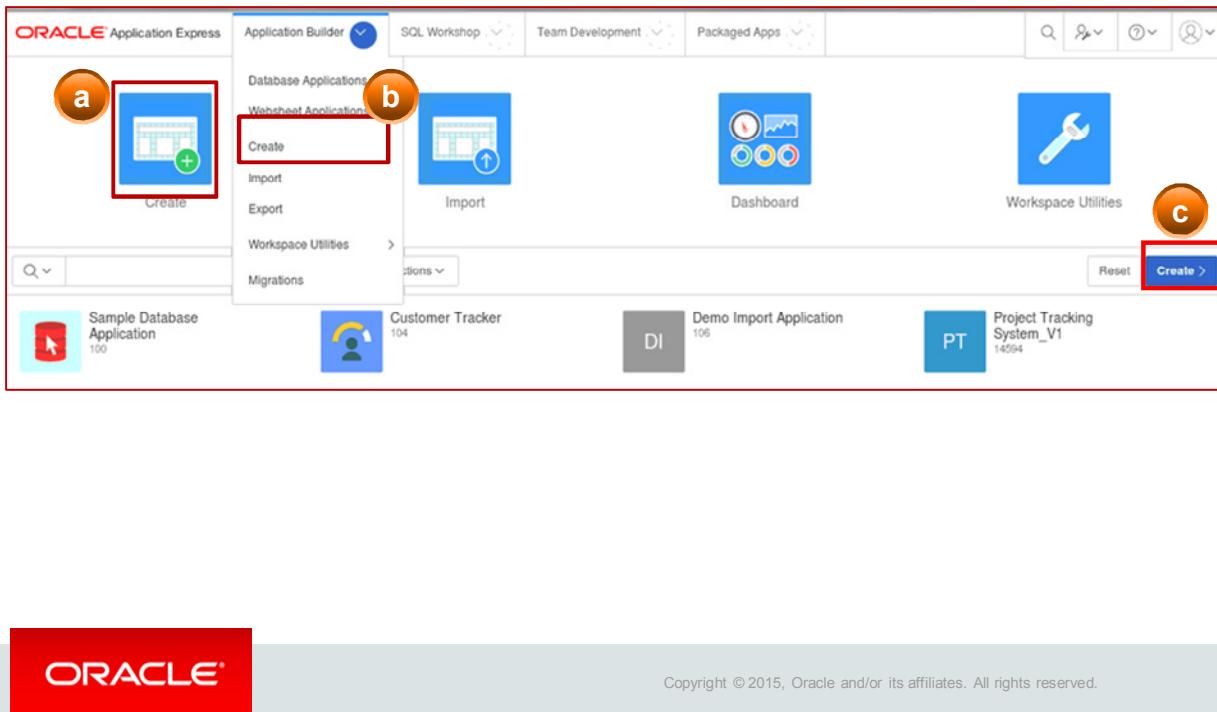
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You create an Oracle Application Express application by running the Create Application Wizard. To run the Create Application Wizard, click the Create button on the Application Builder home page.

While stepping through the wizard, there are some decisions that you have to take to choose the type of application you want to create. These options include Database, Mobile, Websheet, and Packaged Application.

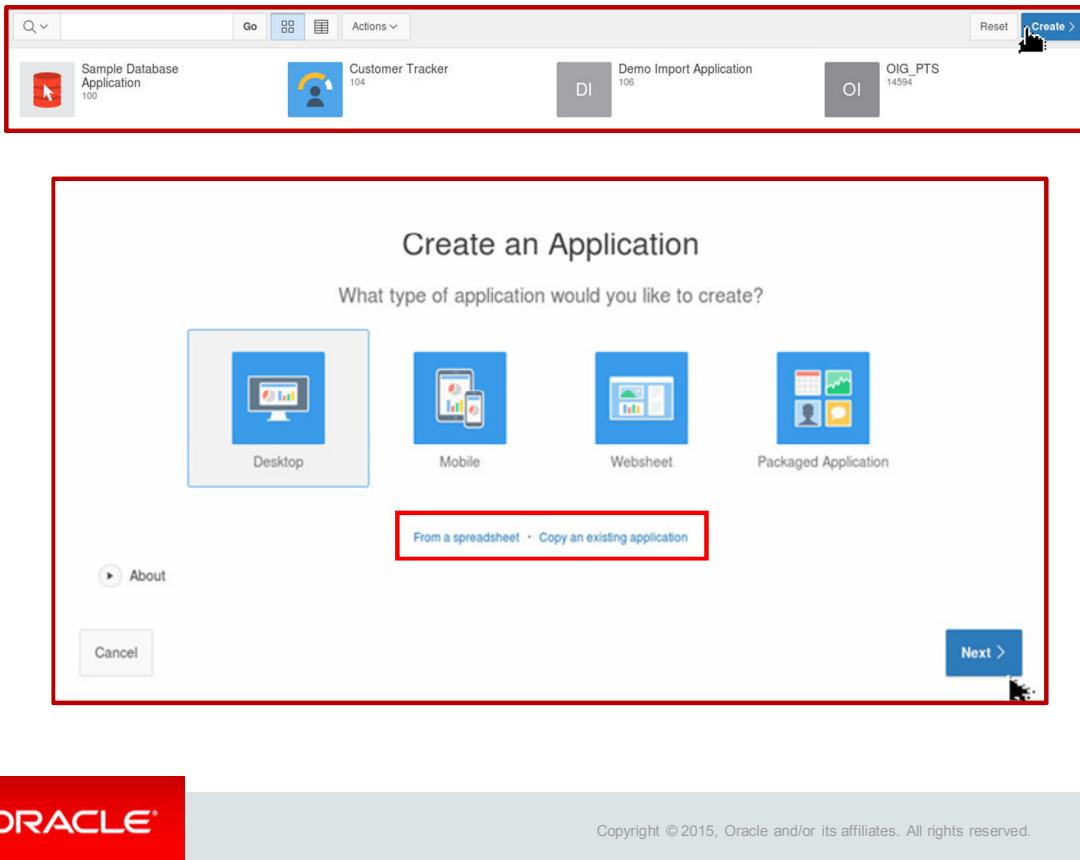
# Accessing the Create Application Wizard



To access the Create Application Wizard, perform any of the following steps:

- Navigate to the Application Builder home page and click the Create icon.
- Select Create from the Application Builder menu.
- Navigate to the Application Builder home page and click the Create button.

# Different Ways of Creating a Database Application



To create a database application, select Database for the application type, and then click Next. You have four options to create a database application:

- **From Spreadsheet:** You can create an application based on spreadsheet data. You first upload or paste the spreadsheet data to create a table. Then you select a default appearance. The resulting application enables end users to query, insert, or update records, or analyze the data.
- **Copy of existing Application:** You can create a copy of an existing application by running the Create Application Wizard or by selecting the application and then copying the application on the Application home page.
- **Install sample applications:** Oracle Application Express includes several sample applications. You can install, run, and use sample applications as they are, or analyze them to better understand how to use Application Builder to build specific types of functionality.

You can also create a database application based on a table, query, or drill-down query.

Because Jack decides to develop a project management tool for his manager Jill, he creates a new desktop application in this step and names it “Project Tracking System.”

# Creating a Desktop Database Application

In the Create Application Wizard, after selecting Desktop, perform the following steps:

1. Specify an application name.
2. Select the type of page you want to add.
3. Specify whether you want to copy shared components from another application.
4. Specify the authentication scheme and date format.
5. Select a theme.
6. Confirm your selections to create the application.

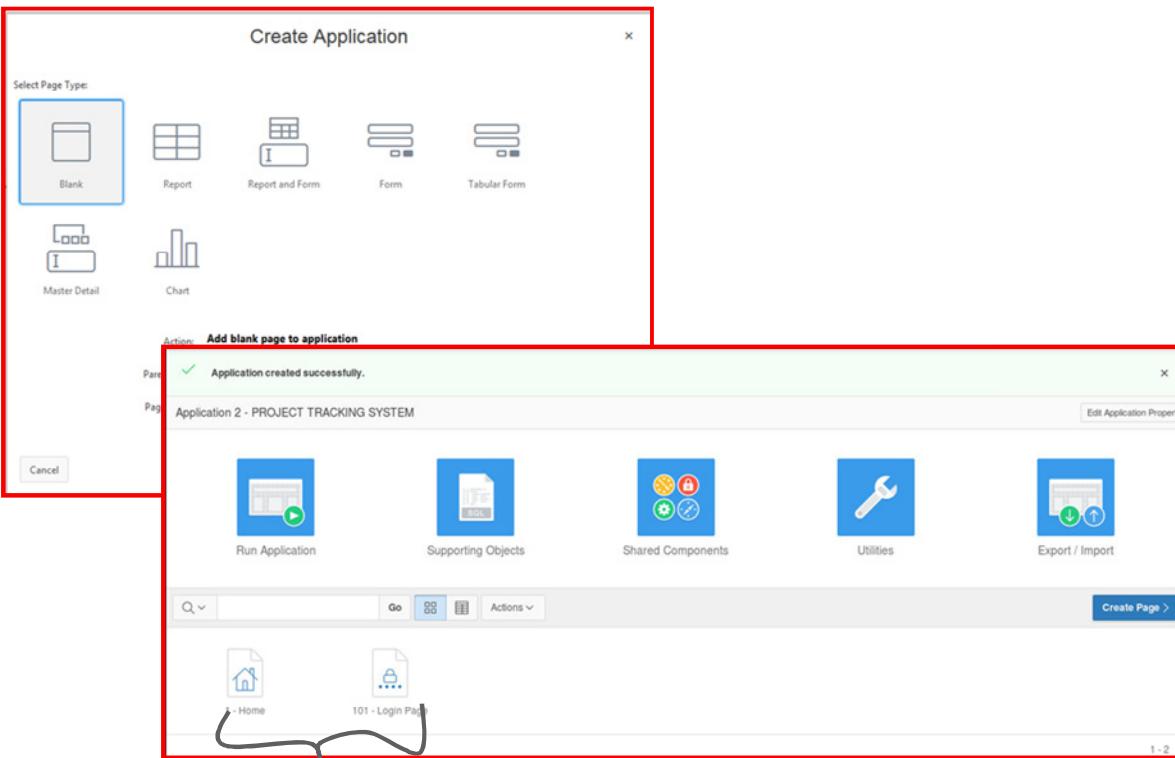


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When running the Create Application Wizard, you must choose a target user interface based on which the wizard is optimized to display the appropriate page types, attributes, and themes. The slide provides an overview of the steps to create a database application based on a table, query, or a drill-down query.

Jack successfully creates a new database desktop application called PROJECT TRACKING SYSTEM (PTS) from Application Builder.

# Page Wizard for Desktop User Interface



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The slide shows the page wizard for a database application using the desktop user interface. The page wizard displays the various page types available based on the type of user interface.

When you create an application using the desktop user interface, a blank page called the Home page is automatically created. The Home page acts as the parent of any new pages added to the application. The page number for the Home page is always 1.

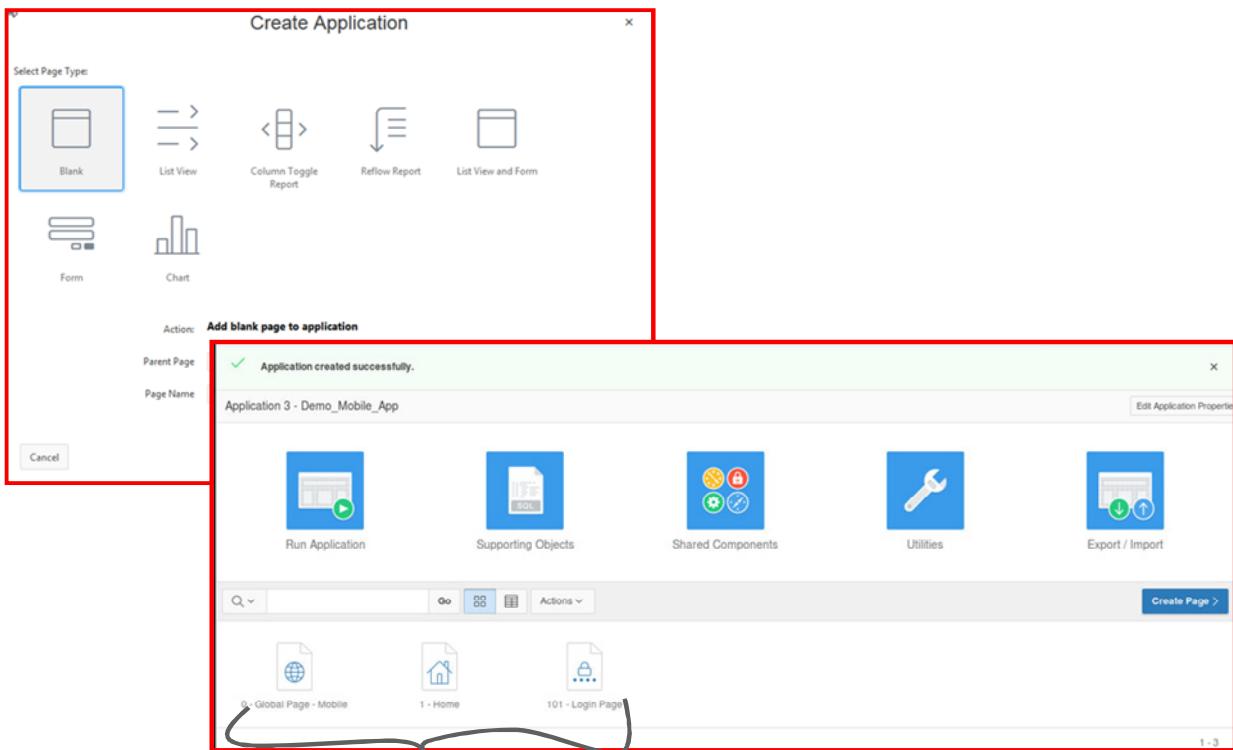
A Login page also gets created at the time of creating an application. This page is used to enter the login credentials of the application. The page number for the Login page is 101.

At the time of creation, PTS application has two pages created within it by default. They are:

1- Home

101 - Login

# Page Wizard for Mobile User Interface



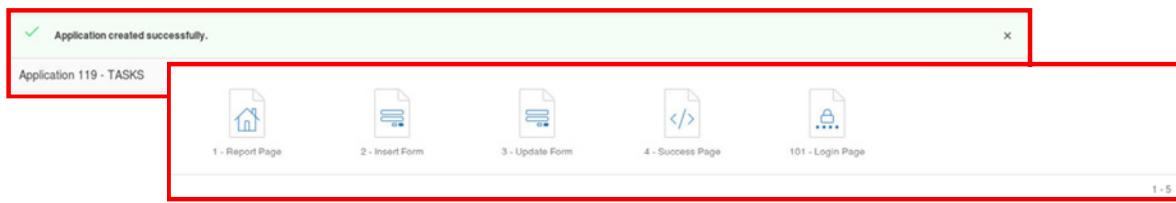
Mobile User Interface Default Pages

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The slide shows the page wizard for a database application using the mobile user interface. When you create an application using the mobile user interface, a blank page called the Home page, Login page, and Global Page are created. The Global page functions as the master page. The Global page renders all components you add to it on every page in your application.

# Creating a Database Application from a Spreadsheet



In the Create Application Wizard, after clicking **From a spreadsheet**, perform the following steps:

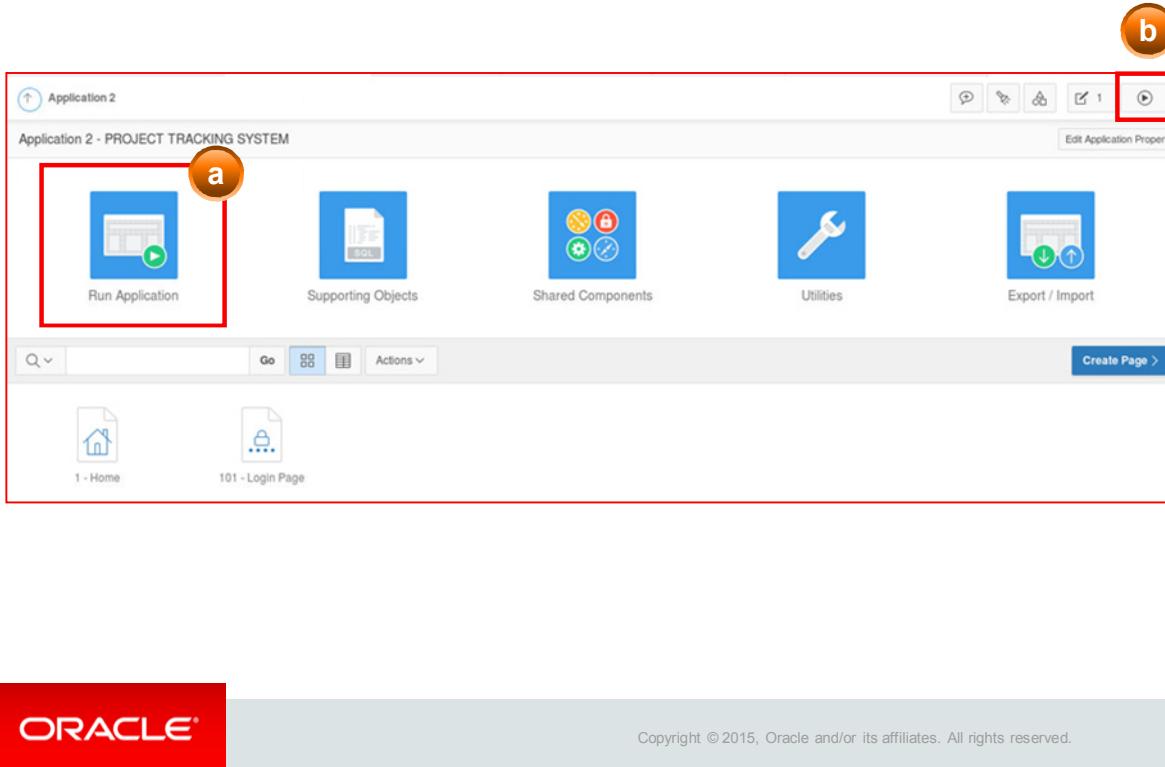
1. Specify how the data will be loaded.
2. Select a file, or copy and paste the data.
3. Specify the table name and column specifications.
4. Specify user interface defaults.
5. Enter the application name.
6. Select a theme.
7. Specify whether you want the data to be summarized, as well as which columns to use.

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You can create an application based on a spreadsheet by clicking From Spreadsheet in the Create Application Wizard. The slide provides an overview of the steps that are necessary to create a database application from a spreadsheet.

# Running an Application

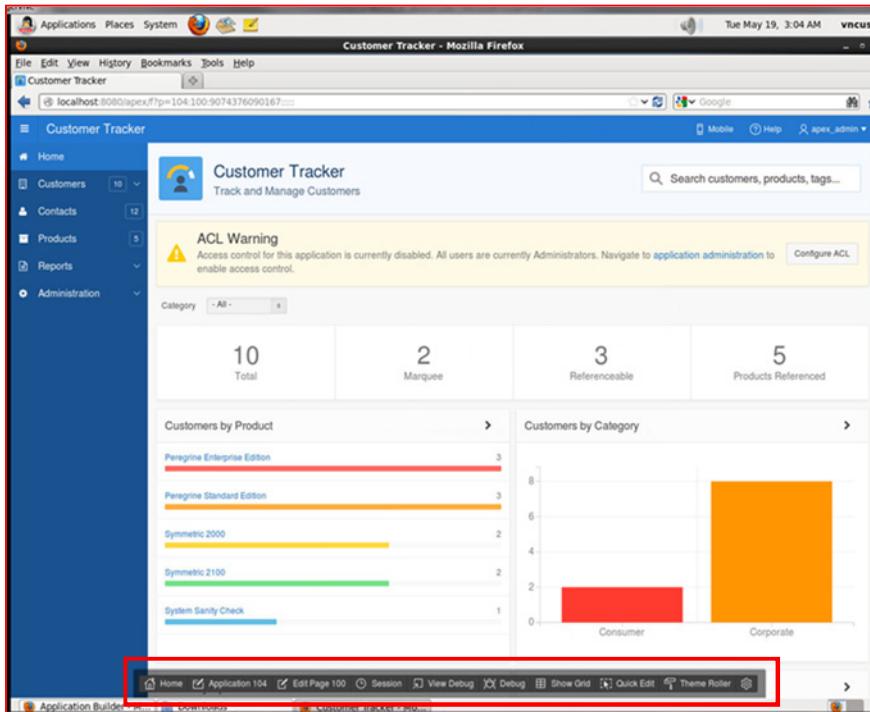


Regardless of the application that you create, you can run the application in two ways:

- By clicking the Run Application icon with “Run Application” written on it
- By clicking the Run Application icon at the top-right side of the Application Page

**Note:** If you have chosen the Application Express authentication scheme, the Login page appears. Enter your workspace username and password, and click Login to log in to your application.

# Using the Developer Toolbar



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Users who log in to Oracle Application Express with developer privileges have access to the Developer toolbar. The Developer toolbar offers a quick way to accomplish the following:

- Edit the currently running page
- Create a new page, control, or component
- View session state
- Toggle the edit links on and off

**Note:** The Developer toolbar is displayed for applications with desktop user interface only.

The page displayed in this slide is the home page of the Customer Tracker Packaged Application in Oracle Application Express. The Developer toolbar is displayed at the bottom of every page in a running application, and has the following options:

- **Home:** Opens the Workspace home page
- **Application <n>:** Opens the application home page
- **Edit Page <n>:** Accesses the Page Definition for the current page
- **Session:** Displays a new window that contains session state information for the current page. You learn more about sessions in the lesson titled "Understanding Session State."

- **View Debug:** Displays another window with debug information by session
- **Debug:** Toggles the page between Debug and No Debug mode. To view the debug information after Debug is selected, click View Debug.
- **Show Grid:** Enables you to see how regions and page items are positioned on a page if a grid layout is used
- **Quick Edit:** Allows you to choose any component on the current page and opens the page with that component selected for editing
- **Theme Roller:** Is a new feature introduced in Oracle APEX 5.0 and is part of Universal Theme (Theme 42). It provides many options to change the look and feel of the user interface of the application and allows you to save your private themes created using theme roller.

**Note:** Theme Roller is discussed in more detail in Unit 3 of this course in the lesson titled “Working with Themes, Templates, and Files.”

## Practice 3 Overview: Creating Database Applications

This practice covers the following topics:

- Creating a database application by using a spreadsheet
- Creating a desktop database application
- Adding a mobile user interface to the application



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## Summary

In this lesson, you should have learned how to:

- Identify the components of a database application
- Describe the database application user interfaces
- Explain the various ways of creating a database application



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This lesson introduced you to Application Builder. You learned about the different types of applications that you can build and the various components of an application. You also learned how to create different types of database applications.

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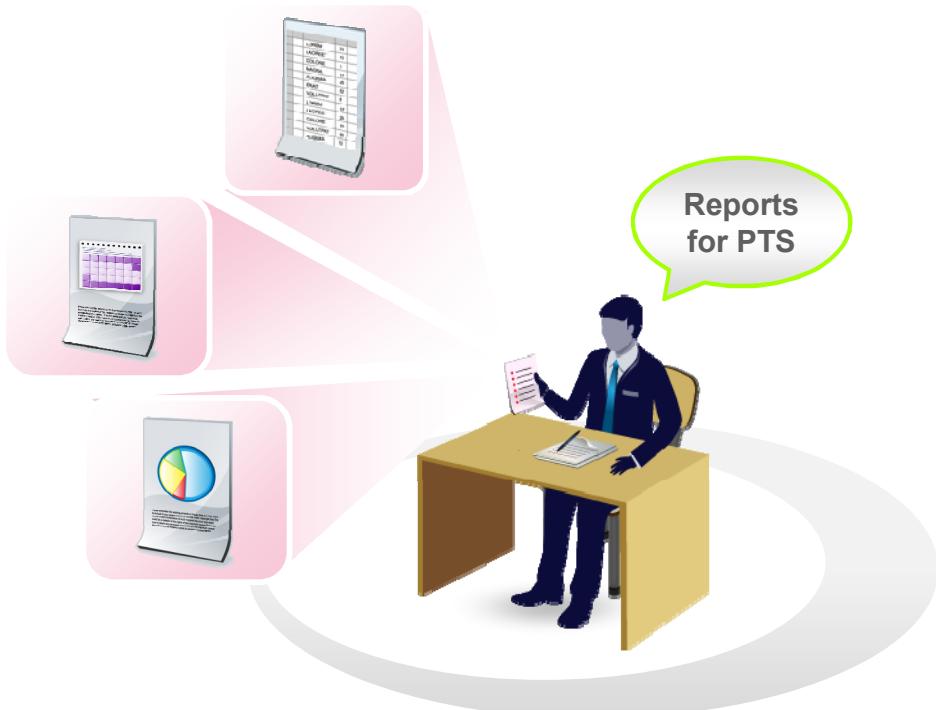
4

# Working with Reports for Desktop Applications

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## Jack Designs Reports for Tracking Projects

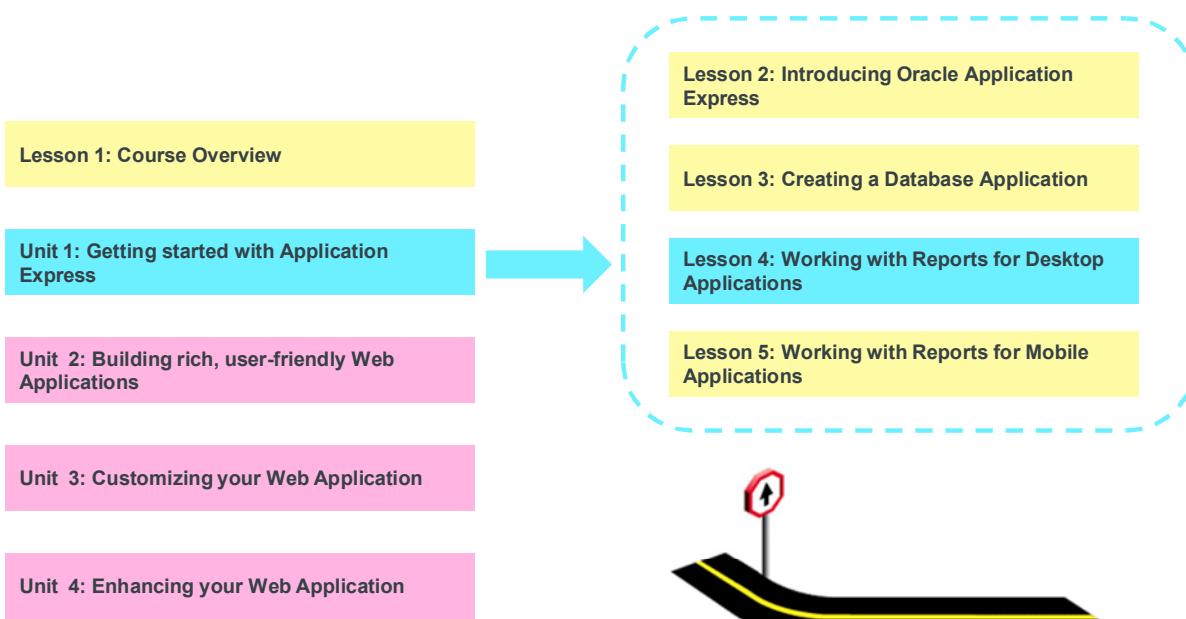


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Having got a clear idea on Oracle APEX, Jack now creates a PTS application. He now looks into PTS features and realizes that PTS should provide users with various reports to bring more clarity in tracking multiple projects. Project master report should provide user options to customize the details by filtering, sorting, grouping and so on. But there are other reports such as project status report, which does not need any customization at the user's end.

# You Are Here in This Course



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

## Objectives

After completing this lesson, you should be able to:

- Identify the types of reports that you can create for a desktop application in Oracle Application Express
- Create a classic report and modify it
- Create and customize interactive reports
- Manipulate interactive reports



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This lesson introduces you to reports for desktop application in Oracle Application Express. You are introduced to the various built-in wizards that help you create both classic and interactive reports. You also learn how to manipulate interactive reports from the application and how to change the way an interactive report is rendered to users.

## Lesson Agenda

- Overview
  - Accessing the Create Report Wizard
  - Types of Reports
  - Selecting the Appropriate Report Type
- Creating Classic Reports
- Creating and Using Interactive Reports
- Customizing an Interactive Report



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## Different Ways of Creating a Report

To access the Create Report Wizard by creating a new page:

1. Navigate to the Application home page and click Create Page.
2. From the “Select a page type” options, select the Report option.

To create a report by creating a new region on an existing page:

1. Select a report type region from Regions Gallery.
2. Drag the selected report region to Content Body on the Grid Layout.
3. Update the report region properties in the property editor.

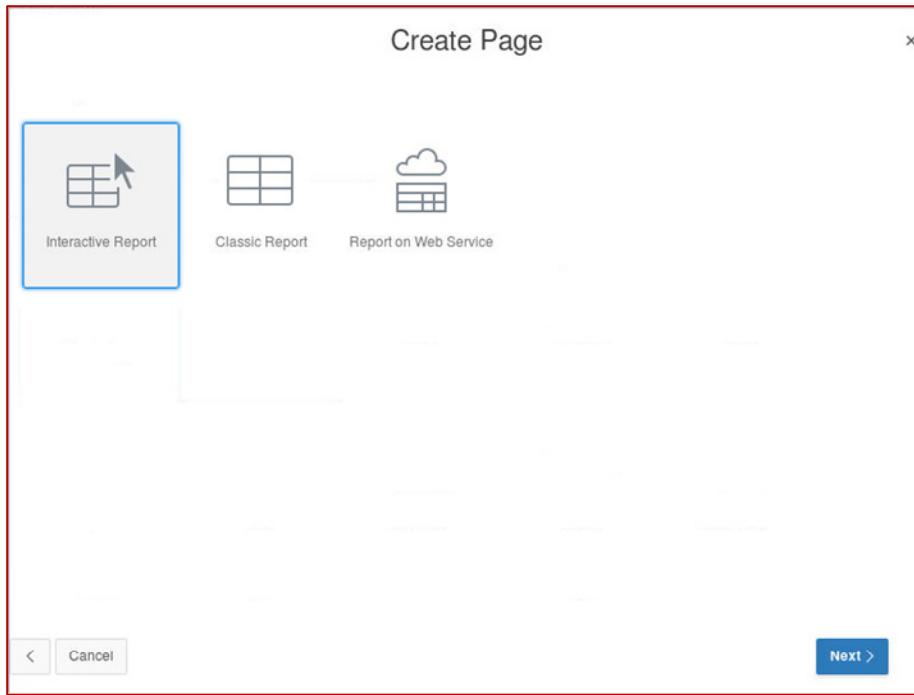


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You can create a report in two ways:

- By accessing the Create Report Wizard while creating a new page in the application
- By creating a report region on an existing page using page designer

## Types of Reports



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There are two basic types of reports: an interactive report and a classic report. The interactive report is the default type when you create a new pages of type Report.

When you create a report by using the Create Page Wizard, you can select different report types:

- **Interactive Report:** Creates an interactive report based on a custom SQL SELECT statement that you provide. End users can customize the layout of their data by selecting the options from the Actions menu.
- **Classic Report:** Creates a report based on a custom SQL SELECT statement or a PL/SQL function that returns a SQL SELECT statement
- **Report on Web Service Result:** Creates a report based on a web service result

# Selecting the Appropriate Report Type

## Interactive Report

The screenshot shows an interactive report interface. At the top, there's a search bar (Q v), a Go button, and an Actions dropdown menu. The Actions menu is open, displaying options: Select Columns, Filter, Rows Per Page (with a submenu), Format, Flashback, Save Report, Reset, Help, and Download. Below the menu is a table with columns: Project Id, Project Name, Project Type, and Project Description. The table contains six rows of project data. Each row has a small orange icon in the first column.

Project Id	Project Name	Project Type	Project Description	Project Start Date	Project Planned End Date	Project End Date	Project Upgrade Of	Project Created By	Project Created On
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	01-FEB-15	23-MAR-15	26-MAR-15	-	504	01-FEB-15
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	20-DEC-14	01-APR-15	24-MAR-15	-	504	20-DEC-14
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	15-JAN-15	15-APR-15	-	607	504	15-JAN-15
602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	05-MAY-15	-	
603	Order Management	303	Order Management Database Application	103	01-MAR-15	01-MAR-15	01-JUN-15	20-MAR-15	
605	Super Insurance Solutions	305	Application development for Super Insurance Solutions	102	01-MAR-15	15-MAR-15	15-APR-15	-	
606	MFP Firmware Testing	306	Multi Functional Printers Firmware Testing	102	20-FEB-15	25-FEB-15	05-MAY-15	-	

## Classic Report

The screenshot shows a classic report interface. At the top, it says "Classic Report". Below is a table with columns: Project Id, Project Name, Project Type, Project Description, Project Status, Project Planned Start Date, Project Start Date, and Project Planned End Date. The table contains seven rows of project data.

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	19-JAN-2015	01-FEB-2015	23-MAR-2015
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-2014	20-DEC-2014	01-APR-2015
601	BOFA_Customer_Care	301	Developing customer care online portal for Bank Of America	101	04-MAY-2015	11-MAY-2015	31-JUL-2015
602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-2015	10-FEB-2015	05-MAY-2015
603	Order Management	303	Order Management Database Application	103	01-MAR-2015	01-MAR-2015	01-JUN-2015
605	Super Insurance Solutions	305	Application development for Super Insurance Solutions	102	01-MAR-2015	15-MAR-2015	15-APR-2015
606	MFP Firmware Testing	306	Multi Functional Printers Firmware Testing	102	20-FEB-2015	25-FEB-2015	05-MAY-2015
608	SPRINT P2K	308	Billing Product for SPRINT mobiles	101	10-APR-2015	15-APR-2015	15-JUN-2015
609	Peoplesoft	309	Peoplesoft Project	101	02-APR-2015	02-APR-2015	15-MAY-2015



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The slide examples show the classic and interactive reports. Both these reports are created by the Create Page Wizard. The classic report queries the same columns in the PROJECTS table as the interactive report.

- Interactive report:** Notice the automatically built-in search bar, column heading menu links, and icons in the first column of each row. These options allow you to drill down to view row details. With interactive reports, you can provide end-user customizations, such as searching, filtering, and sorting.
- Classic report:** Notice that there is no search bar, no column heading links, and no drill-down capability. A classic report does not, by default, include any of the interactive report features. However, you can customize the classic report to include some features such as sorting on column heading, downloading the report to CSV file, printing the report and including a search bar in the report.

An interactive report has many options available to the user for report customization. Therefore, if you want built-in customization capability, select interactive reports. If your report needs no such controls, a classic report is a better option. You can create only one interactive report on a page. Therefore, if you want multiple reports on a single page, you must create some classic reports.

Having listed out all the reporting requirements for Project Tracking System (PTS), Jack categorizes them into Classic and Interactive Reports.

## Quiz



Which of the following report types would be appropriate if you want to include end-user customization?

- a. Report based on a SQL query
- b. Interactive report
- c. Wizard report
- d. End-user report

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**Answer: b**

## Lesson Agenda

- Overview
- Creating Classic Reports
  - Classic (SQL) Report
  - Creating a Classic Report
- Creating and Using Interactive Reports
- Customizing an Interactive Report



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# Classic (SQL) Report

Classic Report												
Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Upgrade Yn	Project Upgrade Of	Project Created By	
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	19-JAN-2015	01-FEB-2015	23-MAR-2015	26-MAR-2015	N		504	
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-2014	20-DEC-2014	01-APR-2015	24-MAR-2015	N		504	
601	BOFA_Customer_Care	301	Developing customer care online portal for Bank Of America	101	04-MAY-2015	11-MAY-2015	31-JUL-2015		N		504	
602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-2015	10-FEB-2015	05-MAY-2015		N		518	
603	Order Management	303	Order Management Database Application	103	01-MAR-2015	01-MAR-2015	01-JUN-2015	20-MAR-2015	N		520	
605	Super Insurance Solutions	305	Application development for Super Insurance Solutions	102	01-MAR-2015	15-MAR-2015	15-APR-2015		N		518	
606	MFP Firmware Testing	306	Multi Functional Printers Firmware Testing	102	20-FEB-2015	25-FEB-2015	05-MAY-2015		N		520	
608	SPRINT P2K	308	Billing Product for SPRINT mobiles	101	10-APR-2015	15-APR-2015	15-JUN-2015		Y	604	518	
609	Peoplesoft	309	Peoplesoft Project	101	02-APR-2015	02-APR-2015	15-MAY-2015		N		520	
610	XYZ Store CRM	310	CRM for XYZ online store	101	10-APR-2015	10-APR-2015	15-JUL-2015		N		504	
611	Zigbee_Testing	306	Testing Zigbee Stack Protocols	103	02-APR-2015	06-APR-2015	30-JUN-2015	21-APR-2015	N		518	
NoSQL Course												

 Home  Application 23611  Edit Page ?  Session  View Debug  Debug  Show Grid  Quick Edit  Theme Roller

Sometimes an interactive report may not be appropriate, as in the following situations:

- When you want to build the SQL query dynamically by using a PL/SQL function that returns a SQL query
- When you want multiple reports on a page. Currently, you can have only one interactive report on a page.

The classic reports are based on SQL queries. The screenshot in the slide displays a classic report.

One of the reports which Jack wants from PTS application is the “Project Status Report.”

Project Status Report provides a snapshot of all the action items along with their current status in all the projects being managed by the project manager who is using the PTS tool. Therefore, Jack feels it can be a classic report with a minimum option of Search provided. Jack creates the Project Status Report as a Classic Report in the PTS application.

## Creating a Classic (SQL) Report

To create a classic (SQL) report:

1. Access the Create Report Wizard by clicking the Create Page button in Application home page.
2. Select Report for the page type.
3. Select Classic Report for the report type.
4. Specify the page name and region name, and choose whether you want to add it to navigation menu.
5. Enter the SQL query for the report source, or use Query Builder to create the SQL.
6. Specify the report attributes (such as column heading sorting, CSV output, and enable search).
7. Confirm your selections and click Create.



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The slide shows the steps to create a classic report.

## Practice 4-1 Overview: Creating Classic Reports

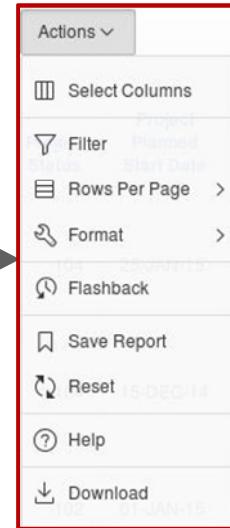
This practice covers creating two classic reports for the GlobalMart Management application.



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## Lesson Agenda

- Overview
- Creating Classic Reports
- Creating and Using Interactive Reports
  - Creating an Interactive Report
  - Interactive Report Interface
  - Searching for Information
  - Using the Actions Menu
  - Manipulating the Report by Using Column Headers
  - Different Views of the Interactive Report
- Customizing an Interactive Report



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# Creating an Interactive Report

Ways to create an interactive report:

- When creating a new database application
- By creating a new page in an existing database application
- By creating a new region on an existing page

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Upgrade Of	Project Created By	Project Created On
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	25-JAN-15	01-FEB-15	23-MAR-15	26-MAR-15	-	504	01-FEB-15
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	-	504	20-DEC-14
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15	-	607	504	15-JAN-15
602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	05-MAY-15	-	-	518	10-FEB-15
603	Order Management	303	Order Management Database Application	103	01-MAR-15	01-MAR-15	01-JUN-15	20-MAR-15	-	520	01-MAR-15
605	Super Insurance Solutions	305	Application development for Super Insurance Solutions	102	01-MAR-15	15-MAR-15	15-APR-15	-	-	518	15-MAR-15



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There are several ways to create an interactive report. You can create the report when you create the following:

- A new database application
- A new page in an existing database application
- A new region on an existing page in a database application

How to access the Create Report Wizard has already been covered in the Overview topic of this lesson. An interactive report is based on a SQL query that can be entered or created by using the Query Builder.

One of the reports which Jack wants from PTS tool is the “Projects Master Report,” which presents complete details of all the projects managed using PTS. Because this report has to be comprehensive with many details, Jack feels it must be created as an Interactive Report.

This allows the project managers to manipulate the report and see only those details which they are interested in and for only those projects which they manage.

# Interactive Report Components

The screenshot shows an Oracle Application Express report page with the following components labeled:

- Search Bar**: Located at the top left.
- Column Heading Menu**: A context menu that appears when you click on a column header, such as "Project Description". It includes options like "Select Columns", "Filter", and "Rows Per Page".
- Saved Reports**: A menu item in the top right corner.
- Actions Menu**: A context menu that appears when you click the "Actions" button in the top right. It includes options like "Format", "Sort", "Control Break", and "Download".
- Link Column**: A feature indicated by a yellow pencil icon in the first column of each row.

The report displays a list of projects with columns for Project Id, Project Name, Project Type, Project Description, Project Status, Project Planned Start Date, Project Start Date, Project Created By, and Project Created On. The "Project Description" column is currently selected, showing a "Filter..." option.

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In an interactive report, you can customize the layout of the data by selecting the columns that you are interested in, applying filters, highlighting, and sorting. You can also define control breaks, aggregations, and computed columns, and include a chart of the query results. You can create multiple variations of the report and save them as named reports, output to comma-delimited files, and print as PDF documents.

The following components are, by default, included on an interactive report page:

- Search bar**: The search bar is at the top of an interactive report and provides features such as the Select Columns icon, Text Area, Go button, and the Actions menu button.
- Column heading menu**: Click any column heading to see a column heading menu. This menu allows you to change the sort order, hide columns, create break groups on a column, view Help about the column, and create a filter.
- Saved reports**: You can create and save alternative views of a report.
- Actions menu**: This menu is used to customize the display of your interactive report.
- Link to custom target**: You can link to another page in your application.

In the next few slides, you learn about each of these components in detail.

# Searching for Information

The screenshot illustrates two scenarios for searching information in Oracle Application Express:

**Scenario 1:** Shows a search for 'APEX' across the entire report. A red box highlights the search bar with 'APEX' and the 'Go' button. A callout labeled 'Search Criteria' points to the search bar. A callout labeled 'Filter Applied' points to the table rows, which are highlighted in blue to indicate they contain the search term.

**Scenario 2:** Shows a search for 'Project Type' containing '302'. A red box highlights the search bar with '302' and the 'Go' button. A callout labeled '1' points to the search icon before the search bar. A callout labeled '2' points to the 'Project Type' column header in the results table. A callout labeled '3' points to the 'Project Type' column header in the search criteria sidebar.

**Enable or disable filter options:** A callout points to the search criteria sidebar, which shows filters for 'Row text contains 'APEX'' and 'Project Type contains 302'. It includes checkmarks and a 'Remove' icon next to each filter entry.

**Remove filter option:** A callout points to the 'Remove' icon in the search criteria sidebar.

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You can perform a non-case-sensitive search on the entire report or on a specific column.

To search in the entire report, enter the search criteria in the text area and click the Go button. A filter is applied on the report and all the rows that contain the search criteria are displayed. (Scenario 1).

To search within a specific column, perform the following steps: (Scenario 2)

1. Click the icon before the text area and select the column to search on.
2. Enter the search criteria and click the Go button.
3. The search is applied and the results are displayed.

You can create multiple filters on a report. For the row to be displayed, the row must satisfy all the filters (an AND condition is implied).

You can remove a filter by clicking the Remove Filter icon (it looks like a filter with a red X over it) next to the filter that you want to remove. Alternatively, you can enable or disable the filter by using the Enable/Disable check box.

## Selecting Columns

**Move Columns**

**1** Actions ▾

**2** Select Columns

**3** Select Columns

**4**

Project Status	Project Name	Project Created By
104	MFG Sugar Industry	504
104	APEX4.2 Course Development	504
102	APEX5.0 Course Development	504
102	AMEX Cobrand	518
103	Order Management	520
102	Super Insurance Solutions	518
102	MFP Firmware Testing	520
101	SPRINT P2K	518
101	Peoplesoft	520
101	XYZ Store CRM	504

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The Actions menu contains many tasks that are useful for manipulating an interactive report. Using the Select Columns option, you can specify which columns to display and in what order. To specify the columns to be displayed in a report, from the Actions menu, choose **Select Columns**. Then perform the following steps:

1. To show a column in the report display, select a column and click the right arrow (>) to move the column to the “Display in Report” region. In the example in the slide, **Project Name, Project Status, and Project Created By** from the Do Not Display region are moved to the “Display in Report” region.
2. To reorder the columns, select the column and click the up or down arrow. In the example in the slide, Project Status is placed directly above Project Name. Click Apply. The report is displayed, showing the changes made.

## Adding a Column Filter

Only rows that meet the filter criteria are displayed.

Project Status	Project Name	Project Created By	Project Created On	Project Description	Project End Date	Project Id	Project Last Updated By	Project Last Updated On
104	MFG Sugar Industry	504	01-FEB-15	Engineering Design Capabilities in the Sugar Industry	26-MAR-15	604	504	20-APR-15 09.49.18.822525 PM
104	APEX4.2 Course Development	504	20-DEC-14	Developing Course Lessons for APEX 4.2	24-MAR-15	607	504	23-MAR-15 10.48.22.568954 AM

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As you previously saw, you can create a filter by using the search bar. You can also use the Filter option from the Actions menu to add or modify a filter. There are two types of filters: column and row. A column filter shows the rows that match the criteria from all the filters (an AND condition is implied) applied together. A row filter contains an expression (shown in the next slide). Note that a filter adjusts the WHERE clause on the query. To add a column filter by using the Actions menu, perform the following steps:

1. Click the **Actions** menu button and select **Filter**.
2. Select a column (which does not have to be the one that is displayed).
3. Select from a list of standard Oracle operators (`=`, `!=`, `not in`, `between`).
4. Enter an expression to compare against. The expression is case-sensitive and you can use `%` as a wildcard (for example, `PROJECT_STATUS = 104`).
5. Click **Apply**.

You can have multiple filters for a report. If you decide that you want to disable a particular filter, select the Remove Filter check box.

The example in the slide shows a filter created on the `PROJECT_STATUS` column.

## Adding a Row Filter

**1**

**2**

**3**

A row filter allows for more than one search criterion, without an implied AND condition.

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Upgrade Of	Project Created By	Project Created On
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	-	504	20-DEC-14
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15	-	607	504	15-JAN-15
603	Order Management	303	Order Management Database Application	103	01-MAR-15	01-MAR-15	01-JUN-15	20-MAR-15	-	520	01-MAR-15

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A row filter allows you to specify multiple column filters, by using an expression. In the example in the slide, the filter selects rows where Project Type is 303 **OR** where the Project name is having the word “APEX” in it. If two column filters were created rather than one row filter, the rows satisfying both the conditions will be displayed. To add a row filter by using the Actions menu, perform the following steps:

1. From the **Actions** menu, select **Filter**.
2. Select the **Row Filter** type.
3. Specify the expression by using the Columns and Functions/Operators values, or simply enter it in the Filter Expression field.
4. Click **Apply**.

## Sorting Columns

The screenshot illustrates the process of sorting columns in Oracle Application Express. It shows three main steps:

- Step 1:** The Actions menu is open, with the Format option selected. A callout points to the 'Format' option.
- Step 2:** The Sort dialog is displayed. It shows two entries: 'Project Id' with 'Ascending' direction and 'Default' null sorting, and '- Select Column -' with 'Ascending' direction and 'Default' null sorting. A callout points to the 'Project Id' entry, with the annotation: 'Column 1 shows the sort icon in the report.'
- Step 3:** The report grid is shown with the 'Project Id' column sorted ascending. The first row (Project ID 601) has a sort icon (up arrow) next to it. The data in the grid is as follows:

	Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date
	601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15
	602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	05-MAY-15

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The sort action is used to specify which columns to sort on and whether to sort in ascending or descending order. You can also specify how to handle nulls (use the default setting, display them first, or display them last). The sort icon is displayed to the right of the column heading in the report for the column specified in the 1 slot. In the example in the slide, Project ID is sorted first, so it has the sort icon.

To sort columns, perform the following steps:

1. Click the **Actions** menu button and select **Format > Sort**.
2. Select a column from the Column drop-down list. In the slide example, Order Items is selected.
3. Specify whether to sort the report in Ascending or Descending order.
4. Specify how null values should be displayed in the sort column. If this is set to Default, nulls will default to the value set in the Direction field for this sort entry.
5. Click **Apply**.

Another way to sort is by using the column header, which is discussed later in this lesson.

## Creating Control Breaks

**Step 1:** Click the **Actions** menu button and select **Format > Control Break**.

**Step 2:** In the **Control Break** dialog, select **Project Type** from the Column dropdown and click **Apply**.

**Step 3:** The report displays two master records for Project Type: 301 and 302, each with its corresponding project details.

Project Type : 301						
Project Id	Project Name	Project Description	Project Status	Project Planned Start Date	Project Start Date	
602	AMEX Cobrand	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	

Project Type : 302						
Project Id	Project Name	Project Description	Project Status	Project Planned Start Date	Project Start Date	
601	APEX5.0 Course Development	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	

You can use the Control Break option to create a break group on one or several columns. This pulls the columns out of the interactive report and displays them as a master record.

To create a break group, perform the following steps:

1. Click the **Actions** menu button and select **Format > Control Break**.
2. Select a column from the Column drop-down list.
3. Click **Apply**.

The example in the slide creates a control break on Project Type. Notice that the Project Type column is extracted from the report and displayed as a master record.

You can also break a particular column from the column header, which is discussed later in this lesson.

## Highlighting a Row or Cell

The screenshot illustrates the steps to highlight specific rows in a table:

- Step 1:** Click the **Actions** menu button (1) and select **Format > Highlight**.
- Step 2:** In the **Highlight** dialog (2), enter **Deferred Projects** as the name, select **Row** as the **Highlight Type**, and set the **Background Color** to **#FFFF99** and the **Text Color** to **#FF7755**. Under **Highlight Condition**, select **Project Status** from the **Column** dropdown, choose **=** as the **Operator**, and enter **103** as the **Expression**. Click **Apply**.
- Step 3:** The table (3) shows the results of the highlighting. The row where Project Status is 103 (Order Management Database Application) is highlighted with a yellow background and red text.

*These rows are highlighted because the condition is true.*

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15	-
602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	05-MAY-15	-
603	Order Management	303	Order Management Database Application	103	01-MAR-15	01-MAR-15	01-JUN-15	20-MAR-15
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	25-JAN-15	01-FEB-15	23-MAR-15	26-MAR-15

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You can highlight specific rows or cells based on a filter. The rows or cells that meet the condition are highlighted by using the characteristics associated with the highlight.

To highlight a row or cell, perform the following steps:

1. Click the **Actions** menu button and select **Format > Highlight**.
2. Enter a name, and select either a row or cell for Highlight Type. You can select any color from the palette for the background and text.
3. Under Highlight Condition, select a column from the drop-down list. Then select an operator and an expression to be evaluated.
4. Click **Apply**.

The example in the slide shows that the rows are highlighted when Project Status is set to 103 which means “deferred projects.”

## Adding Computed Columns

The screenshot shows the Oracle Application Express interface. A red box labeled '1' highlights the 'Format' option in the 'Actions' menu. A red box labeled '2' highlights the 'Compute' dialog box, which contains the computation settings: 'Column Heading' set to 'Created before days', 'Format Mask' set to '999G999G999G999G999G', and 'Computation Expression' set to 'SYSDATE - L'. A red box labeled '3' highlights the newly generated 'Created before days' column in the report table, which displays numerical values like 110, 68, 86, and 153.

Project Planned End Date	Project End Date	Project Upgrade Of	Project Created By	Project Created On	Project Last Updated By	Project Last Updated On	Created before days
23-MAR-15	26-MAR-15	-	504	01-FEB-15	504	20-APR-15 09.49.18.822525 PM	110
15-APR-15	-	-	518	15-MAR-15	518	23-APR-15 09.32.55.663214 AM	68
05-MAY-15	-	-	520	25-FEB-15	520	20-APR-15 04.22.33.446585 PM	86
01-APR-15	24-MAR-15	-	504	20-DEC-14	504	23-MAR-15 10.48.22.568954 AM	153

You can use the Compute option to add computed columns to a report. These can be mathematical computations (for example, NBR\_HOURS/24) or standard Oracle functions that are applied to existing columns (some columns have been displayed; other columns, such as TO\_DATE, can also be used).

To add a computed column to your report, perform the following steps:

1. Click the **Actions** menu button and select **Format > Compute**.
2. Enter a name for Column Heading. In the slide example, **Created Before Days** is entered.
3. Select a value for Format Mask. In the slide example, **5,234** is selected.
4. Place your cursor in the Computation field and click a column from the list of columns. A column alias appears in the Computations area.
5. Use numbers and symbols from the Keypad. For example, to specify subtraction, click **-**. If required, use functions displayed in the table. In the slide example, **SYSDATE** is specified. Click **Apply**. The new computed column now appears in the report.

The example in the slide shows a computed column that has the sysdate – Project Created On. The “Created Before Days” computed column is displayed in the report and the format mask 5,234 is applied to the report.

## Aggregating Columns

The screenshot shows the Oracle Application Express interface. A red box highlights the 'Actions' menu in the top-left corner. Step 1 is indicated by a red circle with the number 1 over the 'Format' option in the dropdown. A red box highlights the 'Aggregate' option in the dropdown, with Step 3 indicated by a red circle with the number 3 over it. Another red box highlights the 'Function' dropdown in the 'Aggregate' dialog, with Step 2 indicated by a red circle with the number 2 over the 'Count' option. Step 4 is indicated by a red circle with the number 4 over the report output, which shows two sections: 'Project Type : 301' and 'Project Type : 302'. In each section, there is a row for 'Project Id' followed by a red box labeled 'Count:1' or 'Count:2' respectively.

Project Type : 301	Project Id	Project Name	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Upgrade Of
	602	AMEX Cobrand	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	05-MAY-15	-	-
			<b>Count:1</b>						

Project Type : 302	Project Id	Project Name	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Upgrade Of
	601	APEX5.0 Course Development	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15	-	607
	607	APEX4.2 Course Development	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	-
			<b>Count:2</b>						

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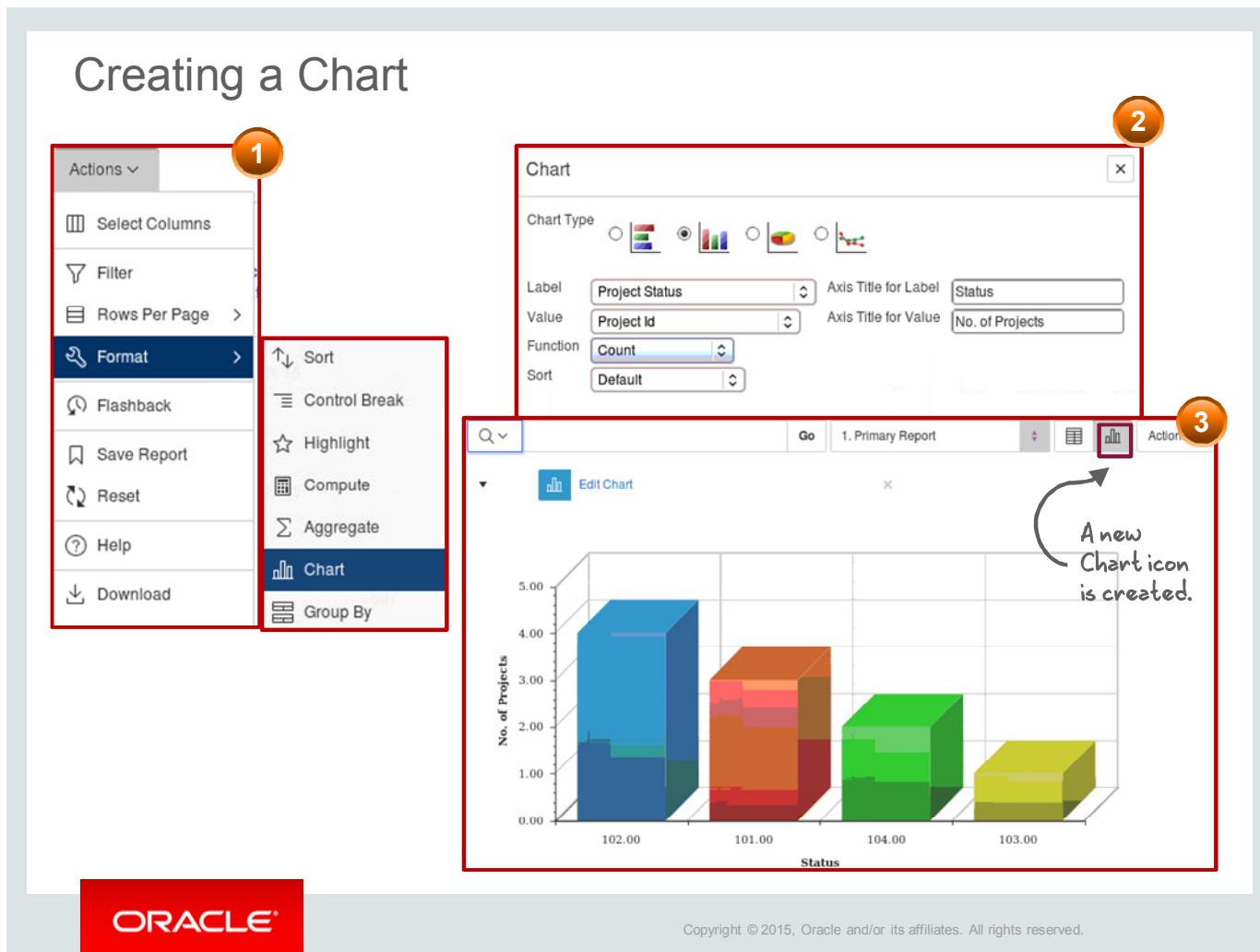
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You can use the Aggregate option to perform mathematical computations against a column in your report. Aggregates are displayed after each control break and at the end of the report within the column for which they are defined.

To aggregate columns in your report, perform the following steps:

1. Click the **Actions** menu button and select **Format > Aggregate**.
2. Select a function from the Function drop-down list. The following functions are available in the Function drop-down list: Sum, Average, Count, Count Distinct, Minimum, Maximum, and Median. In the example in the slide, **Count** is selected.
3. Select a column from the list of columns. Only base columns can be used in aggregates, and not computed columns. In the example in the slide, **Project Id** is selected.
4. Click **Apply**.

The slide example shows an aggregate that is a count of Projects applied on a report with control break for each Project Type. Therefore, you see count of projects under each Project Type at the bottom of each control break.



You can create a chart based on the data contained in the report. You can include only one chart per interactive report. After a chart is defined, you can change the definition of the chart by clicking the Edit Chart link below the search bar. You can return to the detailed report by clicking the desired icon on the search bar.

To create a chart, perform the following steps:

1. Click the **Actions** menu button and select **Format > Chart**.
2. Specify the chart type.
3. Select a column for Label.
4. Select a column for Value.
5. Select a function.
6. Select a sort value.
7. Click **Apply**. You can edit the chart or switch back to the report.

The slide example creates a horizontal bar chart that shows the number of projects per status.

The screenshot illustrates the process of creating a Group By report in Oracle Application Express. It shows the following steps:

- Step 1:** Click the **Actions** menu button (1).
- Step 2:** Select **Format > Group By** (2).
- Step 3:** Click the **Group By** icon in the search bar (3).
- Step 4:** The report displays a table of project types and their counts (4). The table data is as follows:

Project Type	No. of Projects
303	1
309	1
310	1

You can create a Group By report for multiple columns based on multiple functions. You can include only one Group By report per interactive report. After a Group By report is defined, you can change the definition of the Group By report by clicking the Edit Group By link below the search bar. You can return to the detailed report by clicking the desired icon on the search bar.

To create a Group By report, perform the following steps:

1. Click the **Actions** menu button and select **Format > Group By**.
2. Select at least one Group By column.
3. Select at least one function and column to base the function on. Enter a label and format mask.
4. Click **Apply**. You can edit the Group By report or switch back to the report (by using the icon on the search bar).

The slide example creates a Group By report that shows the total count of projects for each project type.

## Creating a Group By Sort Order

Column 1 shows the sort icon in the report.

Project Type	No. of Projects
302	2
309	1
310	1
306	1

You can specify group by column sort order (ascending or descending) by either clicking the group by column heading or selecting Group By Sort from the Format submenu. You can also specify how to handle NULL values. Using the default setting always displays NULL values last or always displays them first.

To sort a group by column, perform the following steps:

1. Access a Group By view as shown in the previous slide.
2. Click the **Actions** menu, and select **Format** and then **Group By Sort**. The Group By Sort region appears.
3. Select a column, the sort direction (ascending or descending), and Null Sorting behavior.
4. Click **Apply**.

The slide example creates a Group By report with the Project Type in descending order. Note that the Group By Sort menu is only visible when you are using the Group By view.

## Quiz



Which of the following actions would you choose from the Actions menu if you want to pull a column from an interactive report and display it as a master record?

- a. Select Columns
- b. Compute
- c. Control Break
- d. Highlight

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**Answer: c**

# Performing a Flashback Query

A project is edited.

Flashback

A flashback query allows you to view the data as it existed at a previous point in time.  
As of [10] minutes ago.

Report data as of 10 minutes ago.

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	20-JAN-15	01-FEB-15	23-MAR-15
607	APEX4.2 Course Development	302	Developing Course Lessons for	104	25-JAN-15	01-FEB-15	23-MAR-15

Flash back 10 minutes to see the order details before the edit.

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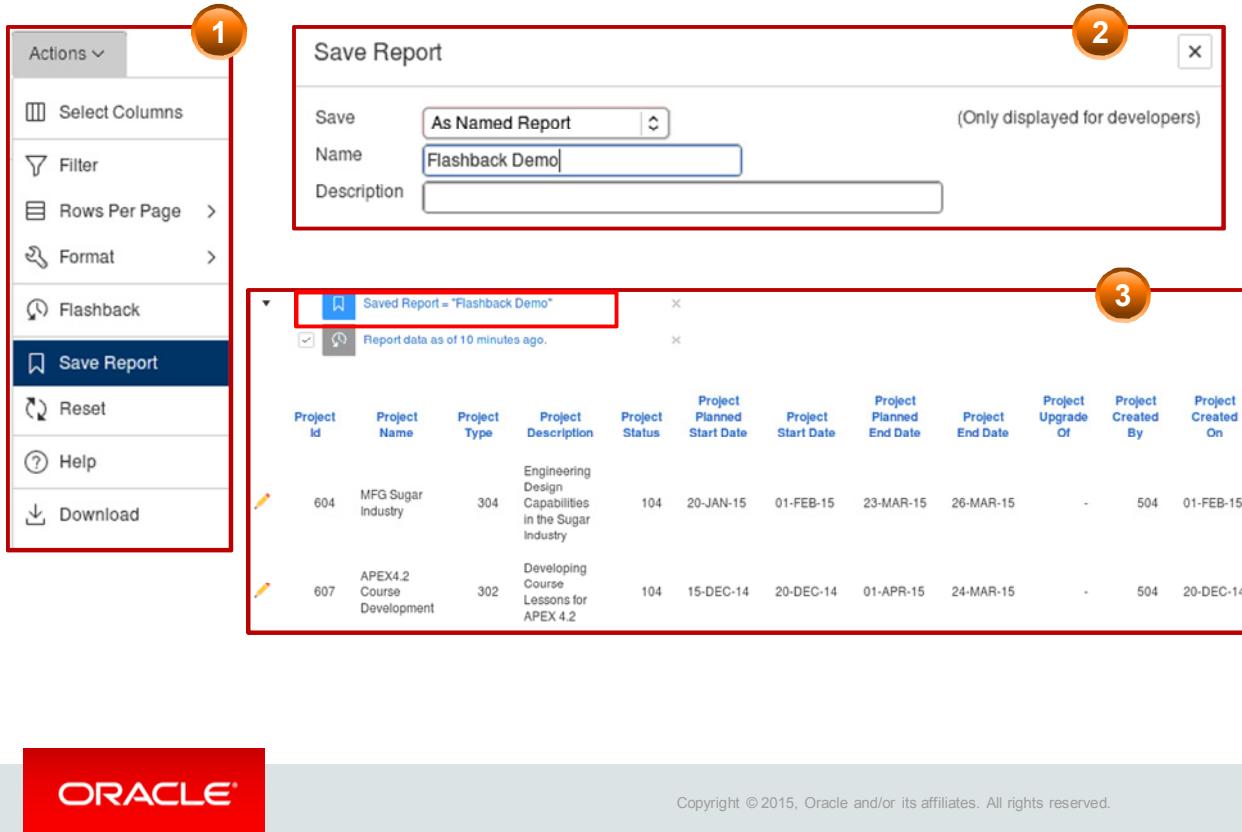
You can use the Flashback option to perform a flashback query. This allows you to view the data as it existed at a previous point in time. The default amount of time that you can flashback is three hours (or 180 minutes), but the actual amount differs per database.

To perform a flashback on a report, perform the following steps:

1. Click the **Actions** menu button and select **Flashback**.
2. Enter a value in the “As of” field.
3. Click **Apply**. The flashback query is applied and you view the data as it existed at a previous point in time.

In the example in the slide, a project is edited. After the flashback query is applied, you see the project details before the edit was made.

# Saving a Report



You can save a customized report for future use. While navigating between pages in an application, if you select the report from the list in the Reports drop-down list, your changes (filters, control breaks, and so on) will still be available. If you log out, however, your changes will not be saved unless you have saved the report. You can save multiple versions of a report and each will appear as a separate report.

You can save a report as private or public. Private reports are accessible only to the creator. Public reports are available to all authenticated users. There are two types of public reports: a primary and an alternative. The Primary Report is the default view. If a developer wants certain changes to be made to the Primary Report, the developer must save the changes as Default Report Settings. You can have only one primary report but multiple alternative reports. To save a report, perform the following steps:

1. From the **Actions** menu, select **Save Report**.
2. In the Save Report dialog box, specify the following:
  - **Save:** Select the As Named Report option.
  - **Name:** Enter a name for the report. If you do not select the Public check box, the report will be a private report.
  - **Description:** Enter an optional description.
3. Click **Apply**. Your report is added to the list of reports in the drop-down list.

# Resetting Reports

**Before reset**

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15

**After reset**

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	20-JAN-15	01-FEB-15
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15

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You can reset an interactive report back to the default settings and remove any customizations that you have made. To reset the defaults, perform the following steps:

1. Click the **Actions** menu button and select **Reset**.
2. Click **Apply** to confirm that you want the reset to be performed.

**Note:** Each saved report can be reset to its own default settings. For example, if a sort and a filter were applied on the report and Reset option is selected, the report will lose all the customizations done so far and go back to the report's original default view.

## Downloading Reports

The screenshot shows a report page with a sidebar on the left containing various actions like 'Select Columns', 'Filter', 'Rows Per Page', 'Format', 'Flashback', 'Save Report', 'Reset', 'Help', and a prominent 'Download' button. A red box labeled 'HTML Format' highlights the 'Download' button. Step 1 is indicated by a red circle with the number 1 above the 'Actions' dropdown. Step 2 is indicated by a red circle with the number 2 above the 'Download' dialog box. Step 3 is indicated by a red circle with the number 3 above the 'HTML' icon in the download dialog.

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date
604	MFG Sugar Industry	304	Engineering Design Capabilities in the Sugar Industry	104	20-JAN-15	01-FEB-15	23-MAR-15
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15
602	AMEX Cobrand	301	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	05-MAY-15
603	Order Management	303	Order Management Database Application	103	01-MAR-15	01-MAR-15	01-JUN-15
605	Super Insurance Solutions	305	Application development for Super Insurance Solutions	102	01-MAR-15	15-MAR-15	15-APR-15
606	MFP Firmware Testing	306	Multi Functional Printers Firmware Testing	102	20-FEB-15	25-FEB-15	05-MAY-15

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You can use the Download option to download the current result set. The download formats differ depending on your installation and report definition but may include CSV, HTML, XLS, PDF, or RTF. You can also email the HTML file by using the Email option.

The example in the slide shows the HTML format of the report data.

# Manipulating the Interactive Report by Using a Column Header

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date
604	AMEX Cobrand	Engineering Design Capabilities in the Sugar Industry	104	20-JAN-15	01-FEB-15	
607	APEX4.2 Course Development	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	
601	APEX5.0 Course Development	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	
602	MFG Sugar Industry	Cobrand Application Development for AMEX	102	01-FEB-15	10-FEB-15	
603	MFP Firmware Testing	Order Management Database Application	103	01-MAR-15	01-MAR-15	
	Order Management					
605	Super Insurance Solutions	305	Application development for Super Insurance Solutions	102	01-MAR-15	15-MAR-15
606	MFP Firmware Testing	306	Multi Functional Printers Firmware Testing	102	20-FEB-15	25-FEB-15
608	SPRINT P2K	308	Billing Product for SPRINT mobiles	101	10-APR-15	15-APR-15
609	Peoplesoft	309	Peoplesoft Project	101	02-APR-15	02-APR-15
610	XYZ Store CRM	310	CRM for XYZ online store	101	10-APR-15	10-APR-15

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You can click any column heading to display the Column Heading menu. You can also perform all the functions in the Column Heading menu by using the Actions menu. The Column Heading menu contains the following functions:

- Sorting columns
- Hiding a column
- Creating a control break on a column
- Displaying column information
- Creating a filter

The Column Information icon appears only if there is Help defined for the column. The help text is defined by the developer who created the report.

The slide example shows the Column Heading menu on the Project Name. Notice that the list of values for that column is displayed.

You can break a particular column from the column header. When control break is created, the column becomes a master record for the report.

When you add some text in the text field, a filter is created on the column.

## Quiz



Which of the following functions in the Column Heading menu can also be performed by using the Actions menu?  
(Choose all that apply.)

- a. Sorting columns
- b. Creating a control break
- c. Hiding a column
- d. Creating a filter

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**Answer: a, b, c, d**

Note that you can also hide a column by using Select Columns.

## Practice 4-2 Overview: Building and Manipulating an Interactive Report

This practice covers creating and manipulating two interactive reports for GlobalMart Management application.



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## Lesson Agenda

- Overview
- Creating Classic Reports
- Creating and Using Interactive Reports
- Customizing an Interactive Report
  - Accessing the Report Attributes Page
  - Editing Report Attributes
  - Customizing the Search Bar
  - Specifying the Download Formats
  - Specifying the Detail View and Icon View
  - Using the Link Column
  - Modifying the Interactive Report Query



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## Accessing the Report Attributes

To access the Report Attributes:

1. Access the page definition where the interactive report is created in page designer mode.
2. In the Rendering Tree, select the region. The region can be identified by the same name as the report. In this example, Projects Master Report.
3. The Property Editor displays the region attributes in the right column.
4. Attributes are organized into functional groups.



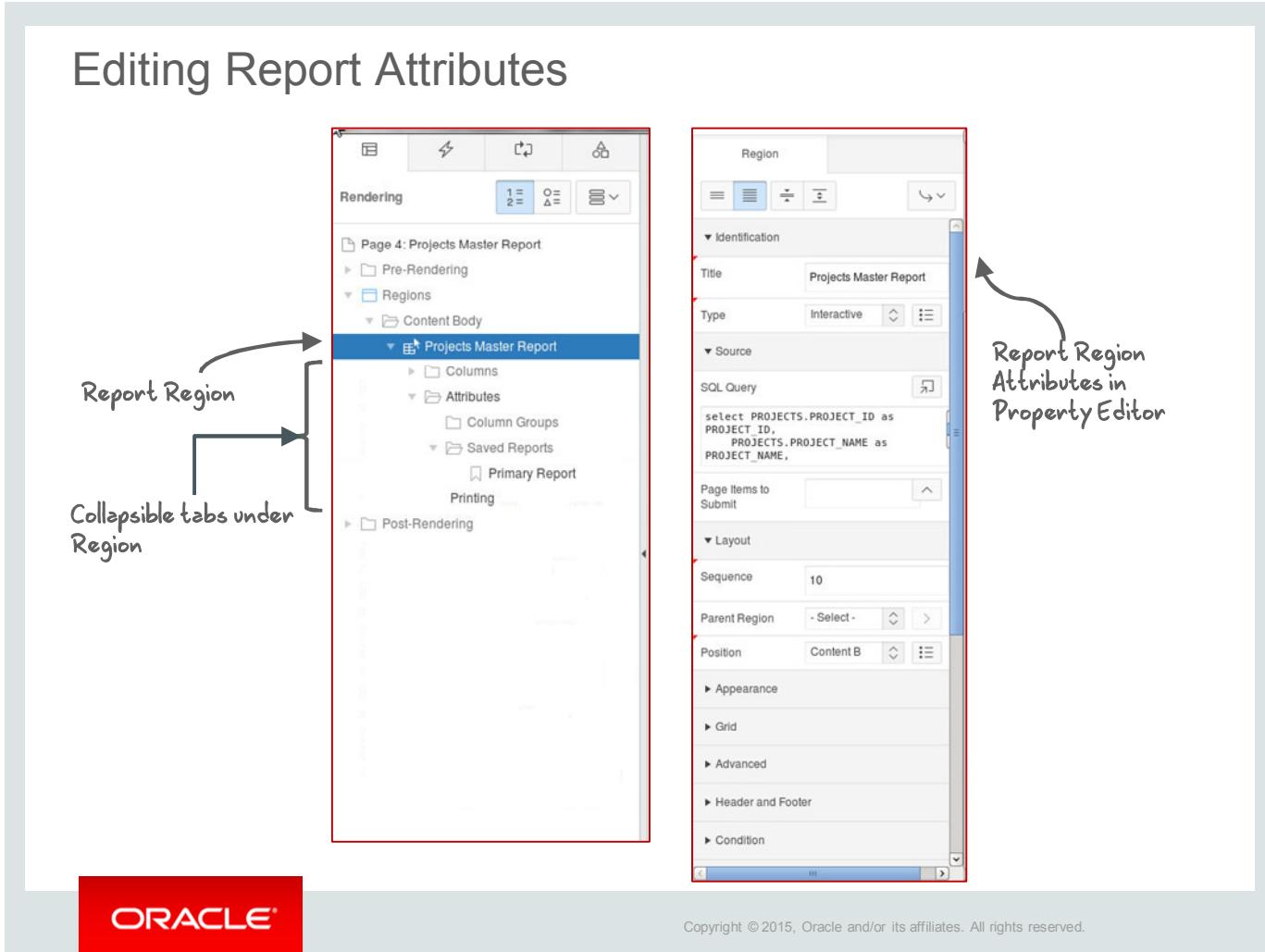
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As a developer, you can change the way an interactive report is rendered to users by editing the Report Attributes. The steps to access the Report Attributes is shown in the slide.

All the attributes of the report region can be found in the Property Editor in the right column. You can find details such as Report Title, Type, Source SQL Query, Report layout, appearance and other advanced features.

Jack created the Projects Master Report as an interactive report to give complete information about all the projects entered into PTS. After creating the report, Jack thought that it will be better to display Project Name instead of Project ID for Project Upgrade Of field in the report. Jack also removes Pivot option from the Actions Menu by customizing the Projects Master Report.

## Editing Report Attributes



When you open the page in page designer mode and select the report region in “Page Rendering,” all the report attributes will be listed in the Property Editor on the right column of the page. All the attributes are organized into functional groups.

To edit any report attribute, locate it in the Property Editor and update its value as per the change required. The Messages tab will highlight errors in red color if any of the values updated in the properties pane is invalid.

Update the report attributes as required and click the “Save and Run Page” icon on the page to see the updated report.

All the report attributes are not associated only with the Report Region directly. Some of the attributes are organized under collapsible tabs shown under Report Region.

All the columns selected from database to show on the report are listed under the Columns tab. By clicking each column, its properties appear in the Properties Pane on the right column. This allows you to update the properties at an individual column level. For example, by changing the “Type” to “Hidden”, you can make any column not to be listed even in the “Do Not Display” box of the report.

The Attributes tab, allows developers to deal with the properties related to Column Groups, Saved Reports, and Printing.

# Customizing the Search Bar and Actions Menu

The screenshot shows the Oracle Application Express interface. On the left, the report attributes are displayed, including sections for Rendering, Page 4: Projects Master Report, Regions, Content Body, Attributes (which is currently selected), and Printing. A red box highlights the 'Attributes' section. An arrow points from this section to the right-hand property editor. The property editor is divided into two main sections: 'Actions Menu' and 'Search Bar'. The 'Actions Menu' section contains options like 'Include Actions Menu' (Yes), 'Filter' (Yes), 'Select Columns' (Yes), 'Rows Per Page' (Yes), 'Sort' (Yes), 'Control Break' (Yes), 'Highlight' (Yes), 'Compute' (Yes), 'Aggregate' (Yes), 'Chart' (Yes), 'Group By' (Yes), 'Pivot' (Yes), 'Flashback' (Yes), and 'Save Report' (Yes). The 'Search Bar' section contains options like 'Include Search Bar' (Yes), 'Search Field' (Yes), 'Finder Drop Down' (Yes), 'Reports Select List' (Yes), 'Rows Per Page Selector' (Yes), 'Search Button Label' (No), and 'Maximum Rows Per Page' (No). A callout bubble with the text 'Functional groups in Property Editor' points to the 'Actions Menu' section.

Actions Menu	
Include Actions Menu	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Filter	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Select Columns	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Rows Per Page	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Sort	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Control Break	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Highlight	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Compute	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Aggregate	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Chart	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Group By	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Pivot	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Flashback	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Save Report	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Search Bar	
Include Search Bar	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Search Field	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Finder Drop Down	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Reports Select List	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Rows Per Page Selector	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Search Button Label	<input type="checkbox"/> No
Maximum Rows Per Page	<input type="checkbox"/> No

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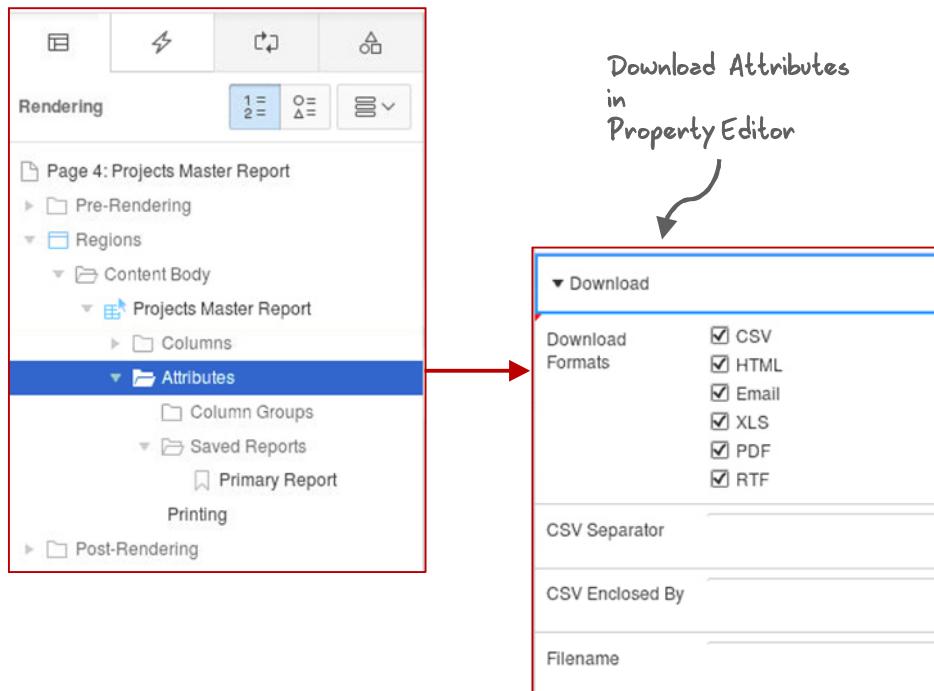
You can choose whether or not to include a search bar in an interactive report. By default, a search bar is included in an interactive report. If you set Include Search Bar to No, the search bar and all its components are removed from the interactive report. You can specify which components of the search bar should be displayed.

You can also control the options that are displayed under the Actions menu. All the actions are selected by default. Deselect the option that you do not want in the Actions menu of the report.

Click **Save and Run Page** to save the changes that you made to the report attributes.

Jack removes Pivot option from the Actions Menu by accessing the Actions Menu Properties from the Property Editor.

## Specifying the Download Formats



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On the Download Attributes in the Property Editor, you can specify the formats in which users can download the report data. The available formats are CSV, HTML, Email, XLS, PDF, and RTF.

Click **Save and Run Page** to save the changes that you made to the report attributes.

## Icon and Detail Views

The screenshot illustrates the configuration of Icon and Detail Views in Oracle Application Express. On the left, the 'Rendering' tab of the report configuration interface is shown. A red arrow points from the 'Icon View' section of the configuration to the 'Icon View' tab of the report preview on the right. Another red arrow points from the 'Detail View' section of the configuration to the 'Detail View' tab of the report preview. The report preview shows two tabs: 'Icon View' and 'Detail View'. The 'Icon View' tab displays icons for various products like a bag, belt, blouse, trousers, and jacket. The 'Detail View' tab displays detailed product information for a Bag and a Belt.

Category	Description	Available	Last Date Sold
Bag	Unisex bag suitable for carrying laptops with room for many additional items	Yes	10/23/2012
Belt	Leather belt	Yes	10/9/2012

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On the Icon View and Detail View tabs, you can define Icon and Detail views for an interactive report. When you enable each of these views, an icon is created on the search bar of the interactive report.

The Icon View is ideal when you have an image column in your report. The Detail View enables you to display the report data by using HTML formatting. Examples of these views (shown in the screenshot in the slide) are included on the Products tab in the Sample Database application that is installed in each Application Express workspace by default.

## Using the Link Column

The screenshot illustrates the Oracle Application Express (APEX) interface for creating a report. On the left, the 'Rendering' tab is selected in the top navigation bar. Under the 'Regions' section, the 'Content Body' region is expanded, showing the 'Projects Master Report' page. Within this page, the 'Columns' and 'Attributes' sections are visible. A red arrow points from the 'Attributes' section to the right panel, which displays the 'Link' column configuration.

**Link Column Configuration:**

- Link Column:** Set to "Link to Single Row".
- Uniquely Identify Rows by:** Set to "Link to Single Row View".
- Link Icon:** An icon representing an edit pencil.
- Link Attributes:** Not explicitly defined.
- Authorization Scheme:** Set to "- Select -".
- Condition Type:** Set to "- Select -".

**Single-row view of the report:**

The report displays a single row of project data:

Project Id	604
Project Name	MFG Sugar Industry
Project Type	304
Project Description	Engineering Design Capabilities in the Sugar Industry
Project Status	104
Project Planned Start Date	20-JAN-15
Project Start Date	01-FEB-15
Project Planned End Date	23-MAR-15
Project End Date	26-MAR-15

At the bottom of the report area, there is a 'Report View' button, which is highlighted with a red box. A curved arrow points from this button to the 'Link Column' configuration in the right panel.

For an interactive report, you can specify a link column. You can create a column link to a single-row view or to another page in the application.

The single-row view is used by default when you create an interactive report. The single-row view is a display-only view of all the columns in the report. If you have a column in your query but it is hidden in Column Attributes, it will not be displayed in the single-row view. If you have a column that you have hidden in the report by using Select Columns in the Actions menu, it will appear in the single-row view. From the single-row view, you can navigate through all the rows by clicking the Previous and Next buttons. To return to the report, you can click the Review View button.

If you choose to link to a custom page, you can pass item session state values. Linking to a custom page is explained in detail in the lesson titled “Creating Forms.”

You can also completely remove the link column from the report. A link column cannot be sorted, hidden, or moved by an end user.

Click **Save and Run Page** to save the changes that you made to the report attributes.

## Modifying the Interactive Report Query

The screenshot shows the Oracle Application Express (APEX) Page Designer interface. On the left, the 'Page 4: Projects Master Report' tree view is expanded to show 'Regions' > 'Content Body' > 'Projects Master Report'. A red box highlights this section. An arrow points from this area to the right-hand 'Properties' panel. The 'Properties' panel shows the 'Identification' section with 'Title' set to 'Projects Master Report' and 'Type' set to 'Interactive'. Under the 'Source' section, the 'SQL Query' is displayed:

```
select PROJECTS.PROJECT_ID as
PROJECT_ID,
PROJECTS.PROJECT_NAME as
PROJECT_NAME,
PROJECTS.PROJECT_TYPE as
PROJECT_TYPE,
PROJECTS.PROJECT_DESCRIPTION as
PROJECT_DESCRIPTION,
PROJECTS.PROJECT_STATUS as
PROJECT_STATUS,
PROJECTS.PROJECT_PLANNED_START_DATE
```

Below the properties panel, a table displays project data:

Project Created On	Project Last Updated By	Project Last Updated On	Project upgrade yn	Project upgrade of
15-JAN-15	504	20-MAR-15 11.55.42.665444 AM	Y	APEX4.2 Course Development
15-APR-15	518	23-MAR-15 01.24.19.231656 PM	Y	MFG Sugar Industry

A callout bubble with an arrow points from the 'Project upgrade of' column to the 'Project upgrade of' field in the 'Properties' panel, containing the text: "Project names instead of Project ID for 'Project upgrade of'".

You can change the query that is executed when the report is run. To do this, perform the following steps:

1. From the page definition in page designer mode, locate and select Report Region under Page Rendering.
2. In the Property Editor, the properties of the report region can be seen.
3. Locate **SQL Query** under **Source** and replace the old query with a new query.
4. Alternatively, you can rebuild the new query using a Query Builder.
5. Click **Save and Run Page**.

If you add columns to the query, they are not displayed when the report is run. In this case, to see the changes in your report, you must reset the report.

To replace Project ID with the Project Name for the "Project upgrade of" field, Jack created a new query using Join. The SQL query used for creating the Projects Master Report is replaced with the new query.

## Quiz



Which of the following must you do to hide a column so that it is not shown in the report but allows the value to be passed to another page?

- a. Make sure that it is not displayed in Select Columns.
- b. Hide the column in the report and make sure that it is saved.
- c. Hide the column in Column Attributes.
- d. Delete the column from the SQL query.



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**Answer: c**

## Quiz



Which of the following must you define when creating an interactive report?

- a.** A SQL query
- b.** A control break
- c.** Page and region names
- d.** A filter

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## Practice 4-3 Overview: Customizing an Interactive Report

This practice covers customizing the interactive reports created for the GlobalMart Management application.



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## Summary

In this lesson, you should have learned how to:

- Identify the types of reports that you can create in Oracle Application Express
- Create classic reports
- Manipulate interactive reports
- Create and customize interactive reports



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5

# Working with Reports for Mobile Applications

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## Jack Extends PTS Reports to Mobile Interface

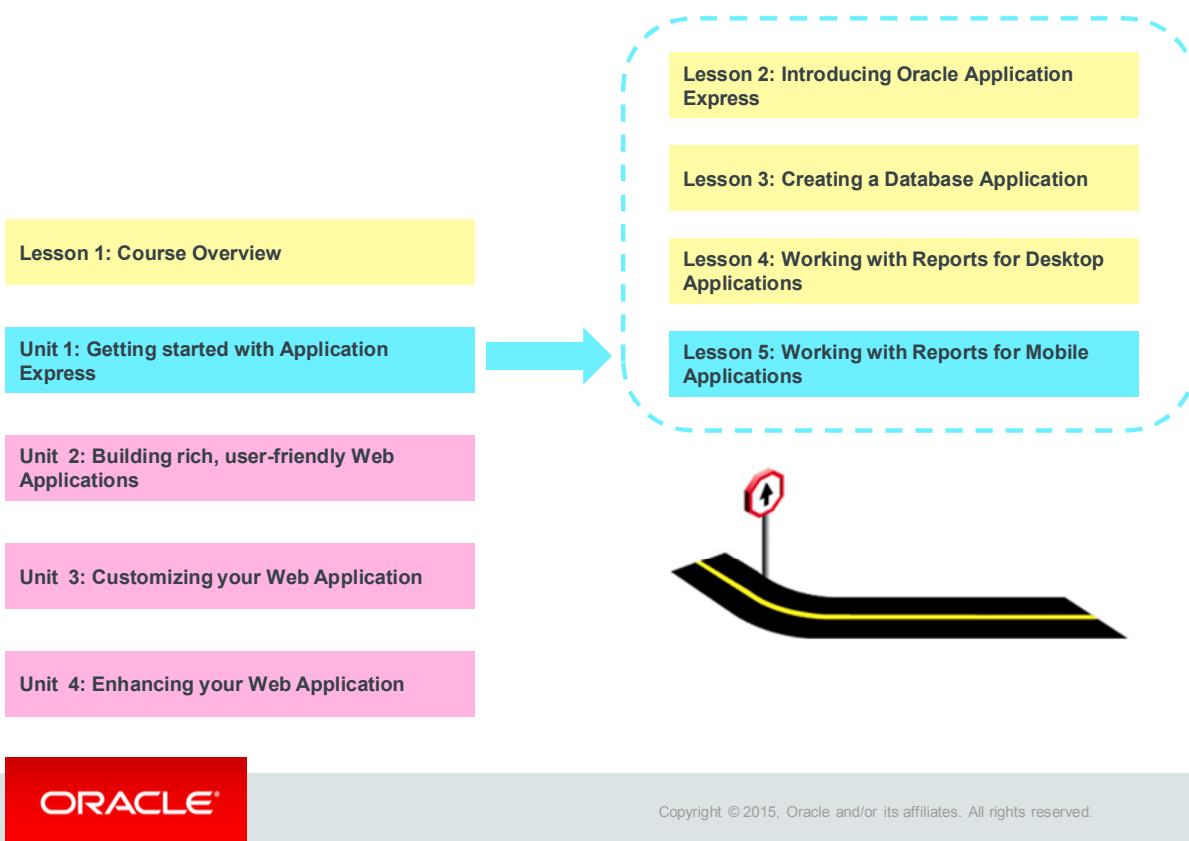


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Jack successfully created reports for the desktop interface of Project Tracking System (PTS) and is now looking at creating light-weight reports that can be accessed from a mobile interface easily.

# You Are Here in This Course



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

## Objectives

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

- A List View report
- A Column Toggle report
- A Reflow report



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This lesson introduces you to Mobile Reports in Oracle Application Express. In this lesson, you learn how to create reports for mobile applications. It focuses on different types of mobile reports namely List View, Column Toggle, and Reflow reports.

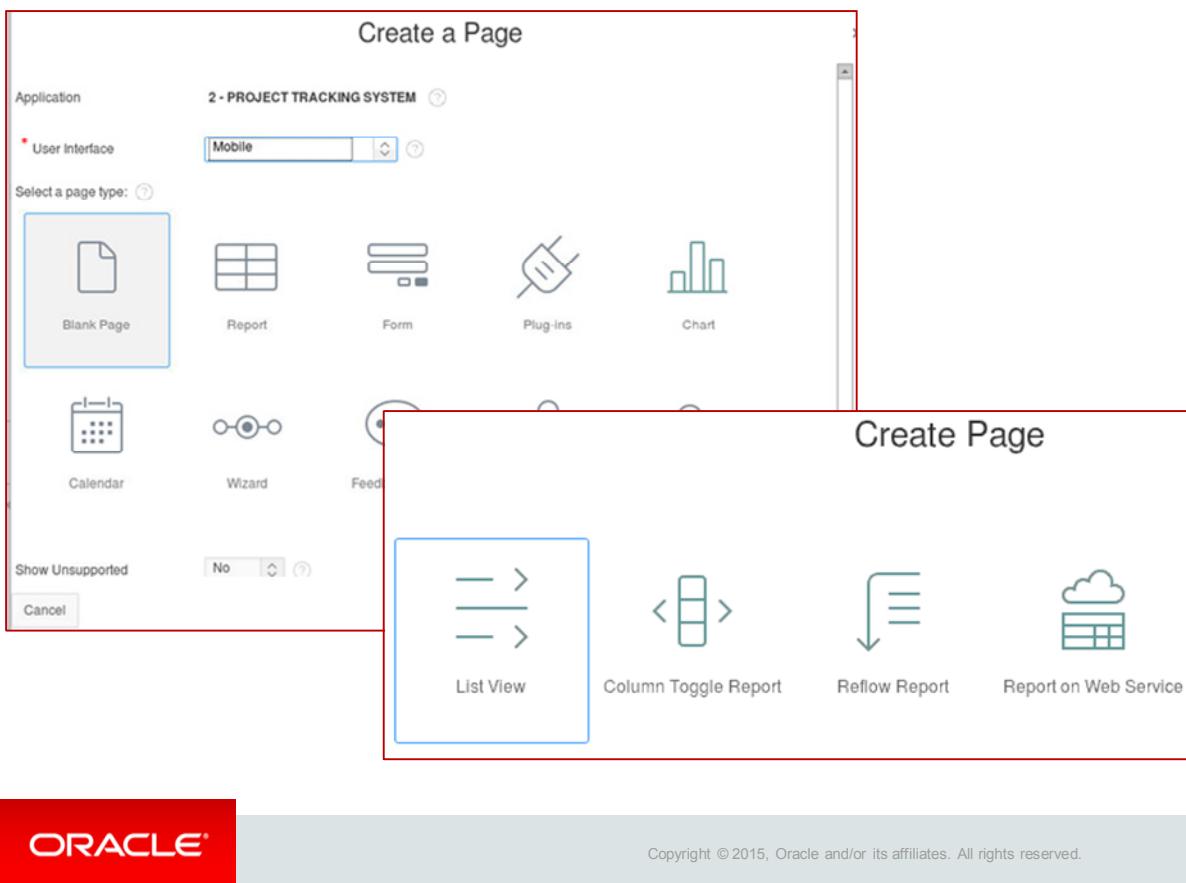
## Lesson Agenda

- Identifying different types of reports provided for Mobile Applications
- Creating List View for Mobile Applications
- Creating Column Toggle Report
- Creating Reflow Report



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## Types of Reports Supported for Mobile Interface



When you create a report for a mobile application by using the Create Page Wizard, you can select different report types. These report types are specific to the mobile interface.

When you create a new page of type report in a desktop application which has mobile interface added to it, you will be prompted to select the interface for which a new page is being created. If you select Mobile as the interface, the wizard shows four types of reports as seen in the slide.

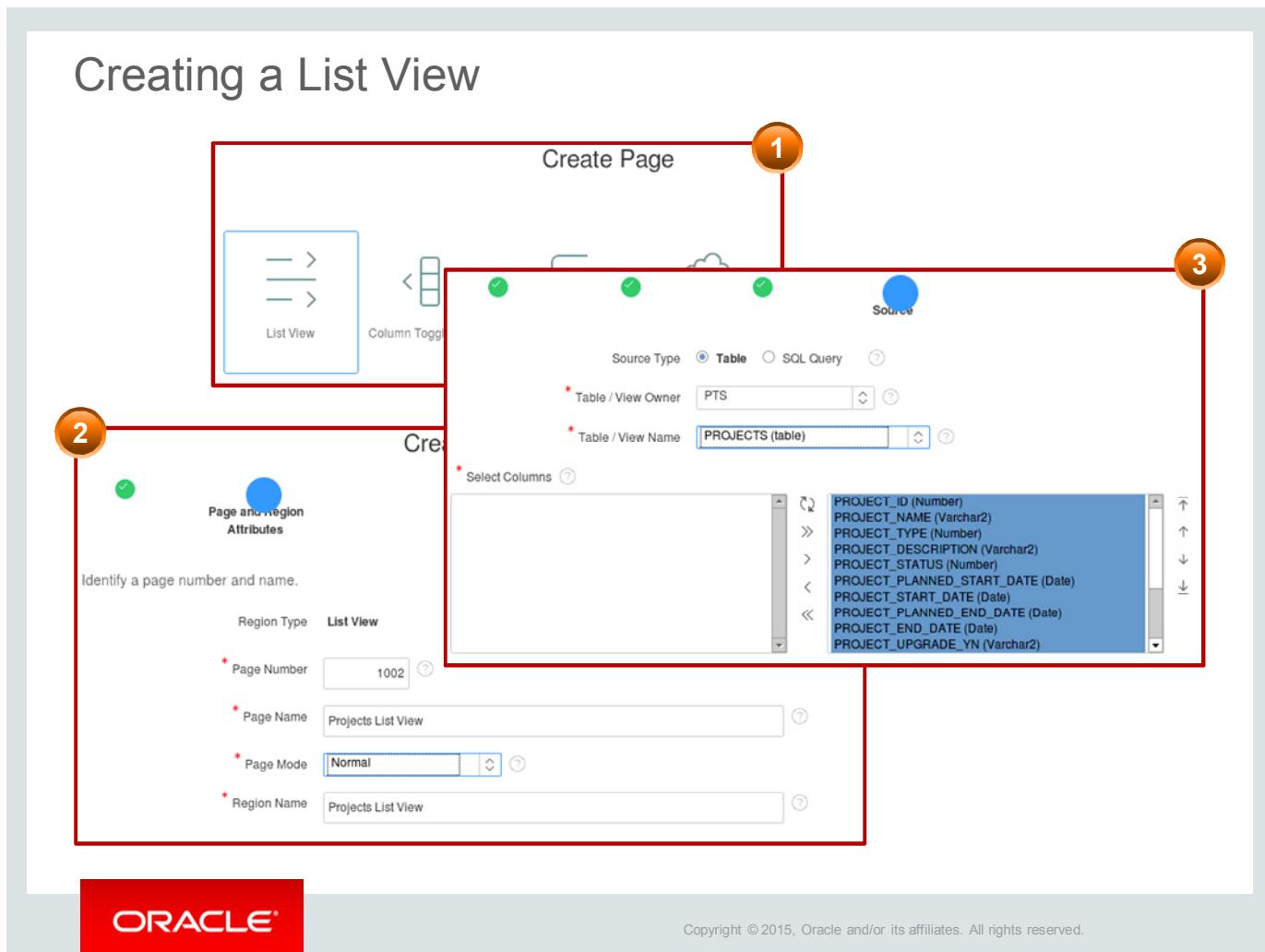
- **List View:** Creates a report that displays the result of an SQL SELECT statement in the form of a list
- **Column Toggle Report:** Creates a report based on a custom SQL SELECT statement with priority set at column level. It allows end users to select or deselect columns so that you can control which columns to be displayed.
- **Reflow Report:** Creates a responsive report which will automatically reflow itself into vertical view when the screen size is not sufficient to display the report in horizontal view
- **Report on Web Service:** Creates a report based on a web service result

## Lesson Agenda

- Identifying different types of reports provided for Mobile Applications
- Creating a List View for Mobile Applications
  - Creating a List View
  - Modifying a List View
- Creating a Column Toggle Report
- Creating a Reflow Report



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To create a List View, perform the following steps:

1. Access the **Create Page** Wizard and select **Mobile** for User Interface. Select **Report** as the page type.
2. Select **List View** for the report type.
3. Specify the Page Number, Page Name, and Region Name. Make sure to specify the Page Number to be distinct for mobile application pages. Notice that all the mobile application pages will be created with 1000 series by default.
4. Enter the Region Source.
5. Specify the Report Settings (such as features to enable search and search column in the report).
6. Click Create.

# Creating a List View

The screenshot illustrates the process of creating a List View report in Oracle Application Express. It consists of three main panels:

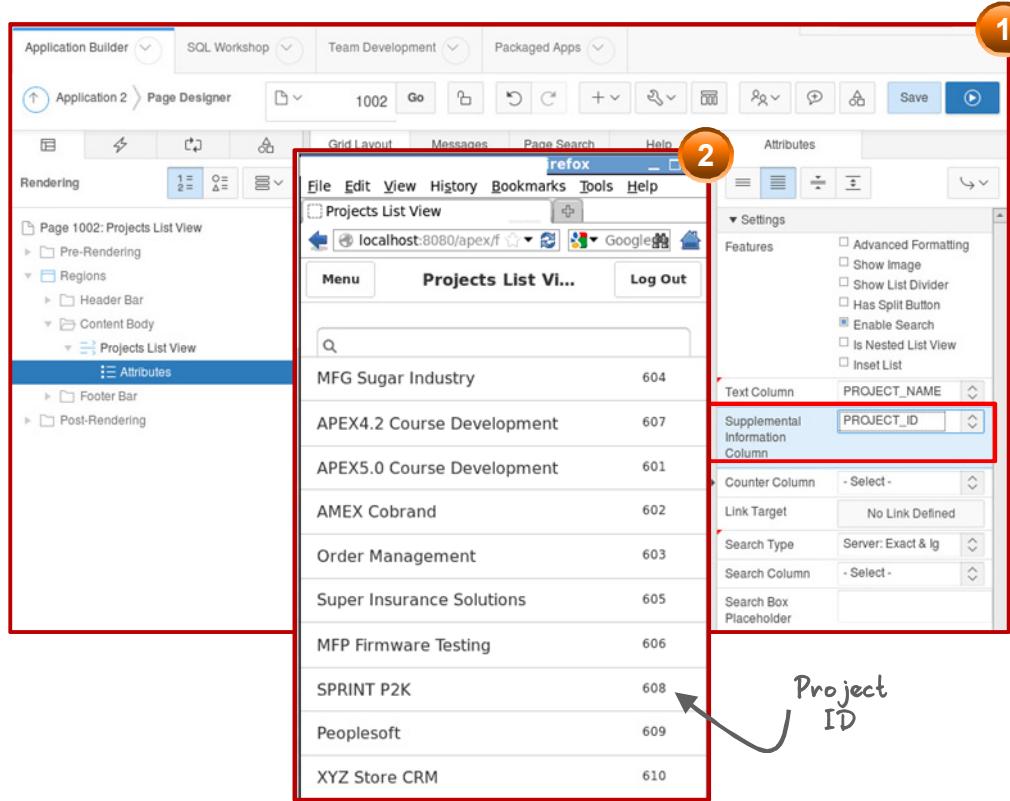
- Left Panel (Step 4): Configuration Form**
  - Features:** Advanced Formatting, Show Image, Show List Divider, Has Split Button, **Enable Search** (selected), Is Nested List View, Inset List.
  - Text Column:** PROJECT\_NAME
  - Supplemental Information Column:** - Select -
  - Counter Column:** - Select -
  - Link Target:** - Select -
  - Search Type:** Server: Exact & Ignore Case
- Middle Panel (Step 6): Search Bar**
  - A search bar contains the text "sprint".
  - A result list shows "SPRINT P2K".
- Right Panel (Step 5): Projects List View Report**
  - Shows a list of projects: MFG Sugar Industry, APEX4.2 Course Development, APEX5.0 Course Development, AMEX Cobrand, Order Management, Super Insurance Solutions, MFP Firmware Testing, SPRINT P2K, Peoplesoft, XYZ Store CRM.

Annotations include:

- A red box highlights the configuration form.
- Orange circles numbered 4, 5, and 6 indicate the sequence of steps.
- An arrow points from the search bar in the middle panel to the search bar in the configuration form.
- A callout labeled "Search Bar" points to the search bar in the middle panel.

This slide shows the remaining steps for creating a List View report and a sample List View report snapshot.

# Modifying a List View



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You can modify your List View by modifying the features and some attributes of the report. For example, selecting Enable Search allows you to enable search in your report based on the Search Column. Similarly, adding Supplemental Information Column enables you to add supplemental information for the List View entry. In the example shown in the slide, project ID is the Supplemental Information Column using Page Designer Property Editor.

## Practice 5-1 Overview: Creating a List View Report

This practice covers adding and modifying a List View report in a mobile application.



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## Lesson Agenda

- Identifying different types of reports provided for Mobile Applications
- Creating a List View for Mobile Applications
- Creating a Column Toggle Report
  - What is a Column Toggle Report?
  - Creating a Column Toggle Report
- Creating a Reflow Report



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# What Is a Column Toggle Report?

The screenshot shows a web browser window for Oracle APEX 5.0. The title bar says "Employees ...". The main content area displays a table with columns "Employee Id", "First Name", and "Last Name". Below the table is a "Columns..." button. To the right of the table is a vertical list of columns: Employee Id, First Name, Last Name, Email, Phone Number, Mobile Number, Address, Designation, Salary, Manager Id, and Hire Date. The first three are checked with blue checkboxes, while the others are gray. A red arrow points from the "Columns..." button to the list of columns.

Employee Id First Name Last Name

505	Fiorello	LaGuardia
504	Frank	OHare
518	Turner	Thomas
520	Rebecca	Mary
501	John	Dulles
502	William	Hartsfield
503	Edward	Logan
506	Albert	Lambert
507	Eugene	Bradley

Columns...

Employee Id  
First Name  
Last Name  
Email  
Phone Number  
Mobile Number  
Address  
Designation  
Salary  
Manager Id  
Hire Date

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Oracle APEX 5.0 introduced two new reports for mobile applications. One of them is the Column Toggle report. The Column Toggle report allows user to see the entire or partial record depending on which columns a user selects/deselects from the toggle list.

As you can see in the slide, a Column Toggle report is created on the Employees table. By default, when you run the report, all columns will be deselected and, therefore, no details will be displayed. By clicking the **Columns** button on the report, you can select or deselect the columns to be seen on the report.

## Creating a Column Toggle Report

To create a Column Toggle Report from Application Builder:

1. Navigate to the Application home page and click Create Page.
2. Select Mobile for the “User Interface”.
3. From the “Select a page type” options, select the Report option.
4. Select Column Toggle for the Report Type.
5. Specify the Page Number, Page Name, and Region Name.
6. Enter the Region Source.
7. Specify the Report Settings (such as, features to enable search and search column in the report).
8. Click Create.



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This slide shows the steps to create a Column Toggle report for mobile applications. This type of report can be created on a database application with mobile interface also.

## Practice 5-2 Overview: Creating a Column Toggle Report

This practice covers creating a Column Toggle report for your mobile application.



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## Lesson Agenda

- Identifying different types of reports provided for Mobile Applications
- Creating a List View for Mobile Applications
- Creating a Column Toggle Report
- Creating a Reflow Report
  - What is a Reflow Report?
  - Creating a Reflow Report



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# What Is a Reflow Report?

The screenshot illustrates a reflow report feature. On the left, a desktop browser window displays a horizontal table titled "Employees Reflow Report" with columns for Employee Id, First Name, Last Name, Email, Phone Number, Mobile Number, and Address. The table contains five records. A red box highlights the first record (Employee Id 505). An arrow points from this record to a mobile browser window on the right, which shows the same data in a vertical list format, demonstrating how the report automatically refows into a vertical format for smaller screens.

Employee Id	First Name	Last Name	Email	Phone Number	Mobile Number	Address
505	Fiorello	LaGuardia	fiorello.laguardia@pts.com	2125553923	1235342653	Hangar Center, Third Floor, Flushing, NY
504	Frank	OHare	frank.ohare@pts.com	7735557693	3157862405	10000 West OHare, Chicago, IL
518	Turner	Thomas	turner.thomas@pts.com	7642788982	1238767344	1234 Sacramento, CA
520	Rebecca	Mary	rebecca.mary@pts.com	3157862401	3157862401	5623 W University Dr, Tempe, AZ

The report automatically refows into Vertical Format when the display is not sufficient to show all records horizontally.

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A Reflow report flows into a vertical format automatically when the display area is not sufficient to display all records horizontally. With introduction of this new type of report, user can see all the details of a record at a time on a mobile interface also unlike a List View report.

## Creating a Reflow Report

To create a Reflow report from Application Builder:

1. Navigate to the Application home page and click Create Page.
2. Select Mobile for the “User Interface”.
3. From the “Select a page type” options, select the Report option.
4. Select Reflow Report for the Report Type.
5. Specify the Page Number, Page Name, and Region Name.
6. Enter the Region Source.
7. Specify the Report Settings (such as features to enable search and search column in the report).
8. Click Create.



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This slide shows the steps to create a Reflow report for mobile applications. This type of report can be created on a database application with mobile interface also.

## Practice 5-3 Overview: Creating a Reflow Report

This practice covers creating a Reflow report for your mobile application.



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## Summary

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

- A List View type of mobile report and modify it
- A Column Toggle report and manipulate it
- A Reflow report and access it



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In this lesson, you learned how to create Classic (SQL), Wizard, and List View reports.

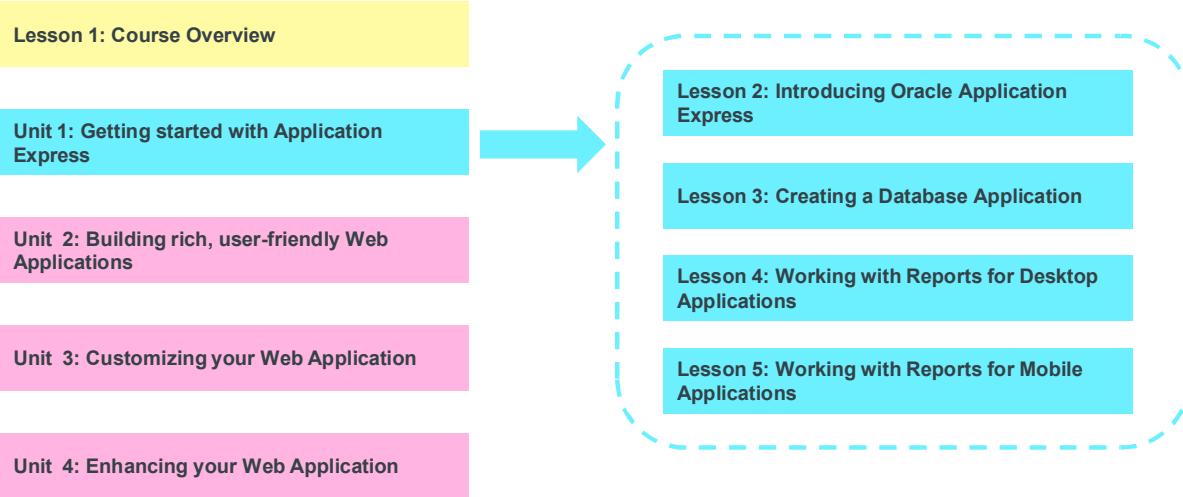


# Unit I: Getting Started with Application Express

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# Unit I Road Map



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In Unit 1, you completed four topics.

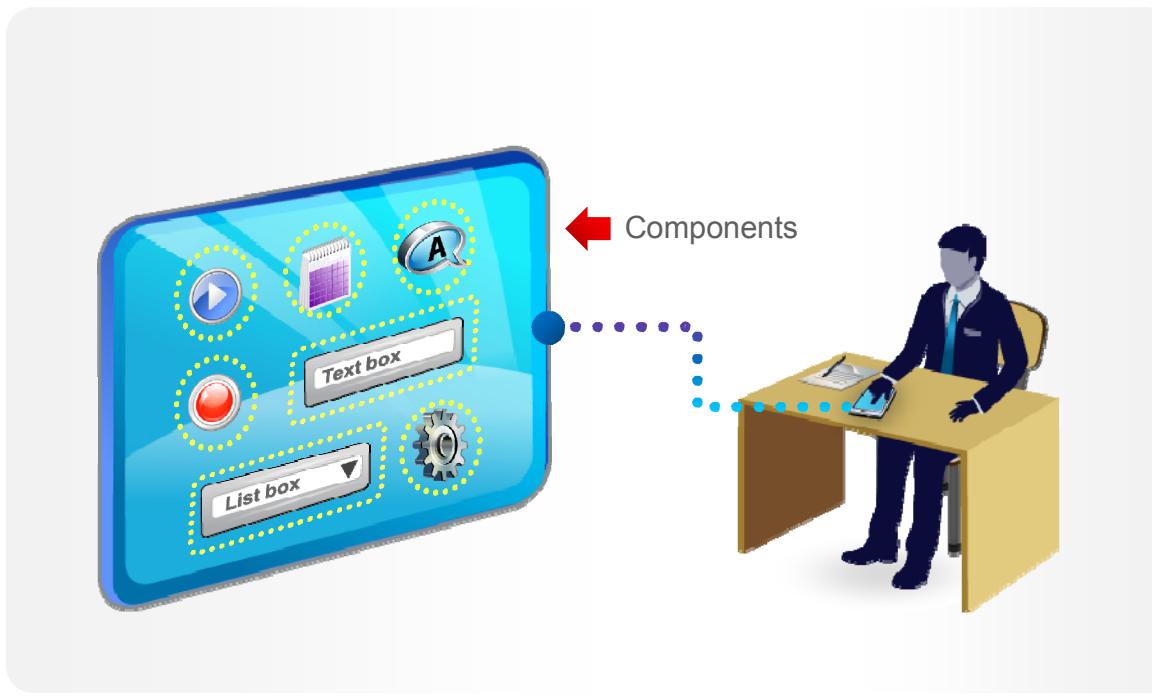


## Unit II: Building Rich, User-Friendly Web Applications

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## Jack Explores Oracle Application Express Further



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Jack got some good experience working with Oracle APEX for developing database applications and has created a PTS application, which generates required reports. He now wants to add additional user interface screens to PTS and make it more user friendly. To do this, he plans to look deeper into Oracle APEX Pages, Regions, and other Page Components.

## Unit II Road Map

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 6: Creating Forms

Lesson 7: Working with Pages and Regions

Lesson 8: Adding Items and Buttons

Lesson 9: Understanding Session State

Lesson 10: Including Page Processing

Lesson 11: Validating and Debugging Your Application



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In Unit 2, you learn to build a user-friendly interface to your application with the help of forms, pages, and regions. You also learn how to add items, buttons, and processing to your pages to support validations and computations.

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# Creating Forms

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## Jack Gets into Next Step: Data Entry Through Forms

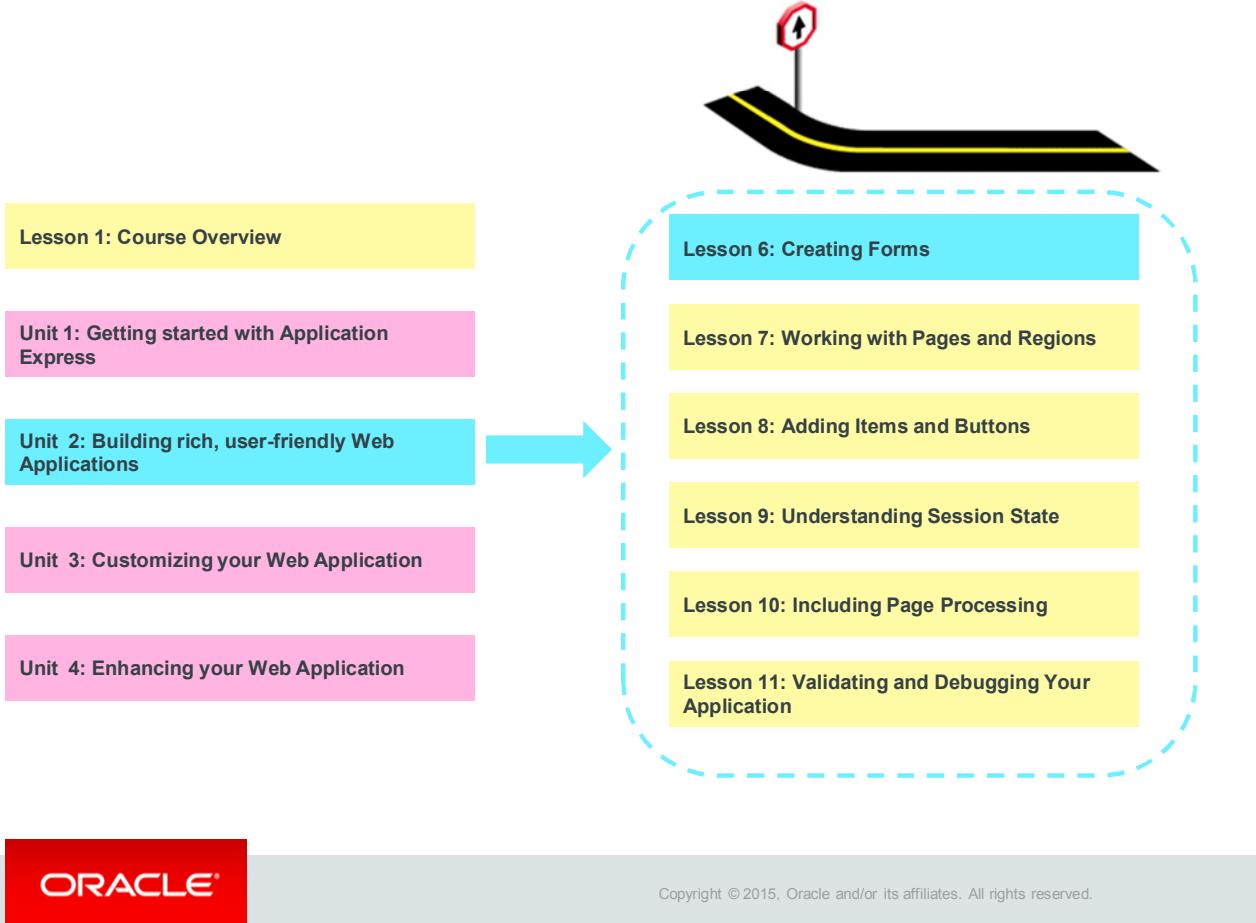


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Jack thinks of improving the user interface (UI) for PTS. He understands that apart from generating reports, PTS should also provide users with options for entering new projects, updating existing projects, and so on. Therefore, he begins exploring all features of Oracle APEX that provide various page items such as buttons, list box, drop down box, text box, and so on.

# You Are Here in The Course



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

## Objectives

After completing this lesson, you should be able to:

- Identify the types of forms that you can include in an application
- Create different forms for desktop application
- Edit forms
- Create forms in a mobile application



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In this lesson, you learn how to create forms in your application by using the various built-in wizards. You also learn how to edit and modify forms.

## Lesson Agenda

- Using Forms
  - Introducing Forms
  - Types of Forms
  - Accessing the Create Form Wizard
  - ROWID Versus Primary Key
- Creating Forms
- Modifying Forms
- Creating Forms in a Mobile Application



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# Introducing Forms

- What are forms in Oracle APEX?
  - Forms are application components that are used to manipulate database tables and objects.
- How are forms created in Oracle APEX?
  - Manually
  - Declaratively by using wizards
- Where are forms created?
  - On a new page in the application
  - On an existing page of the application



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Forms are application components that take input from a user and submit it to a server. A form usually consists of one or more page items (drop-down list, text box, check box, option buttons, and so on), which enable users to enter information, and a button or link with a submit action.

In Oracle Application Express, you use forms when you must gather input from a user before performing a task on a database table. For example, you can create a form to insert data into a database table.

In Oracle Application Express, you can create forms easily by using wizards. For example, by using the “Form on a Table or View” wizard, you can create one item for each column in a table. The wizard automatically includes the necessary buttons and processes that are required to insert, update, and delete rows from the table.

You can create a form when you create a page in an application. You can also include a form on an existing page by creating a region.

## Types of Forms



Form on a  
Table or View



Tabular Form



Form on a  
Table with Report



Master Detail  
Form



Form on a  
Procedure



Form on a  
SQL Query



Form on  
Web Service



Form and Report  
on Web Service



Summary Page

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Oracle Application Express provides wizards to create the types of forms listed in the slide.

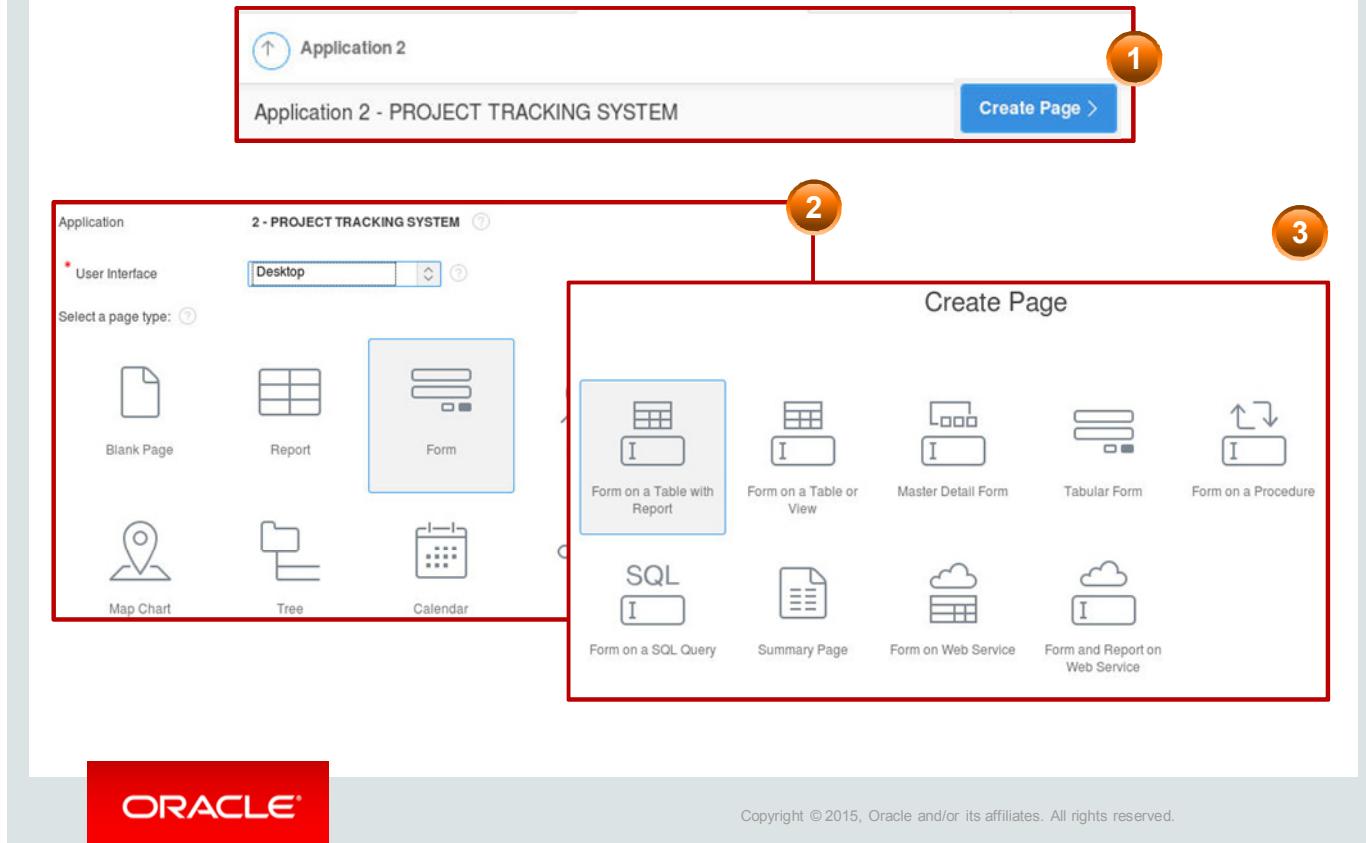
- **“Form on a Table or View” wizard:** Create a form to enable users to insert rows into a table.
- **Tabular Form Wizard:** Create a form to enable users to edit or delete multiple rows in a table simultaneously. Users will also be able to insert rows into the table.
- **“Form on a Table with Report” wizard:** Display a report and enable users to edit or delete rows one at a time. Users will also be able to insert rows into the table.
- **Master Detail Form Wizard:** Enable users to update data from two tables. You should have a foreign key relation between the two tables.

In this lesson, you learn how to create forms by using these four wizards.

The following are the other wizards:

- **“Form on a Procedure” wizard:** Create a form based on stored procedure arguments. Use this approach when you have implemented logic or data manipulation language (DML) in a stored procedure or package.
- **“Form on a SQL Query” wizard:** Create a form based on the columns returned by a SQL SELECT query.
- **“Form on Web Service” wizard:** Create a page with items based on a web service definition. This wizard creates a user input form, a process to call the web service, and a Submit button.
- **“Form and Report on Web Service” wizard:** Create a page with items based on a web service definition. This wizard creates a user input form, a process to call the web service, and a Submit button, and displays the results returned in a report.
- **Summary Page Wizard:** Create a read-only version of a form. A typical use case is to provide a confirmation page at the end of a wizard.

# Accessing the Create Form Wizards



To access the Create Form wizards while creating a new page in your application, perform the following steps:

1. Click **Create Page** on the home page of the application where you want to create the form.
2. The **Create Page Wizard** opens. Select **Form** from the available options and click **Next**.
3. The form wizards are displayed. You can select a wizard based on the type of form that you want to create.

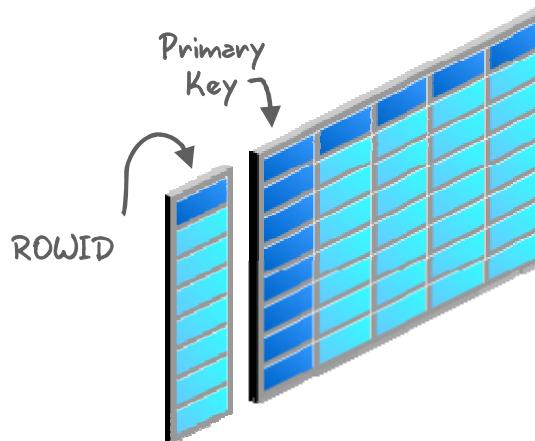
You can also access these wizards while creating a region on a page. You learn more about regions in the lesson titled “Working with Pages and Regions.”

The following wizards are also accessible when you create a database application from the beginning:

- Form
- Report and Form
- Tabular Form
- Master Detail

## ROWID Versus Primary Key

- Oracle Application Express supports up to two primary key columns.
- For tables with no primary key or more than two primary key columns, use ROWID.



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Each row in a database table should be uniquely identifiable so that the DML operations in a form function properly. The most common practice is to specify a primary key for the table. A primary key can be a single column in a table or can be a combination of two or more columns.

In Oracle Application Express, the Create Form wizards allow you to specify up to a maximum of two columns for a primary key. If your table does not have a primary key or if it has three or more columns, Oracle Application Express recommends that you use the ROWID feature. ROWID is a pseudocolumn that uniquely identifies a row in a table.

## Lesson Agenda

- Using Forms
- Creating Forms
  - Creating a Form on a Table
  - Linking a Report to a Form
  - Creating a Form with a Report
  - Creating a Tabular Form
  - Creating a Master Detail Form
- Modifying Forms
- Creating Forms in a Mobile Application



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## Example: Form on a Table

Manage Projects

Each table column is displayed as a field.

Project Name \*

Project Type \*

Project Description \*

Project Status \*

Project Planned Start Date \*

Project Start Date \*

Project Planned End Date \*

Project End Date

Project Upgrade Yn \*

Project Upgrade Of

Project Created By \*

Project Created On

Project Last Updated By \*

Project Last Updated On

Automatically created Region Buttons

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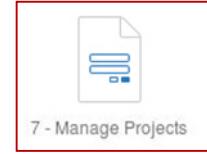
The slide shows the form that is created by using the “Form on a Table or View” wizard. The wizard creates a form where users can enter values for the selected columns of the PROJECTS table. The wizard displays two buttons on the page: Cancel and Create. To create a new row in the table, enter the details and click the Create button. The data is inserted in the table and you are redirected to the page that you specified while creating the form. Click Cancel to return to the page that you specified while creating the form.

Jack created Master Projects Report to display complete details about all the projects entered into the PTS application. But, he has not yet created any component which can allow users to enter the Projects into PTS. Jack now creates “Form on a Table” using Oracle APEX for the PROJECTS table.

## Creating a Form on a Table

Access the “Form on a Table or View” wizard, and then perform the following steps:

1. Select the schema and table.
2. Enter the page number and name, region name, and template (filled by default).
3. Select a Navigation Menu Item option.
4. Select the primary key columns.
5. Select the source for primary key column.
6. Select the columns to include in the form.
7. Select and name the buttons.
8. Select the pages to branch to.
9. Confirm the details and create the form.

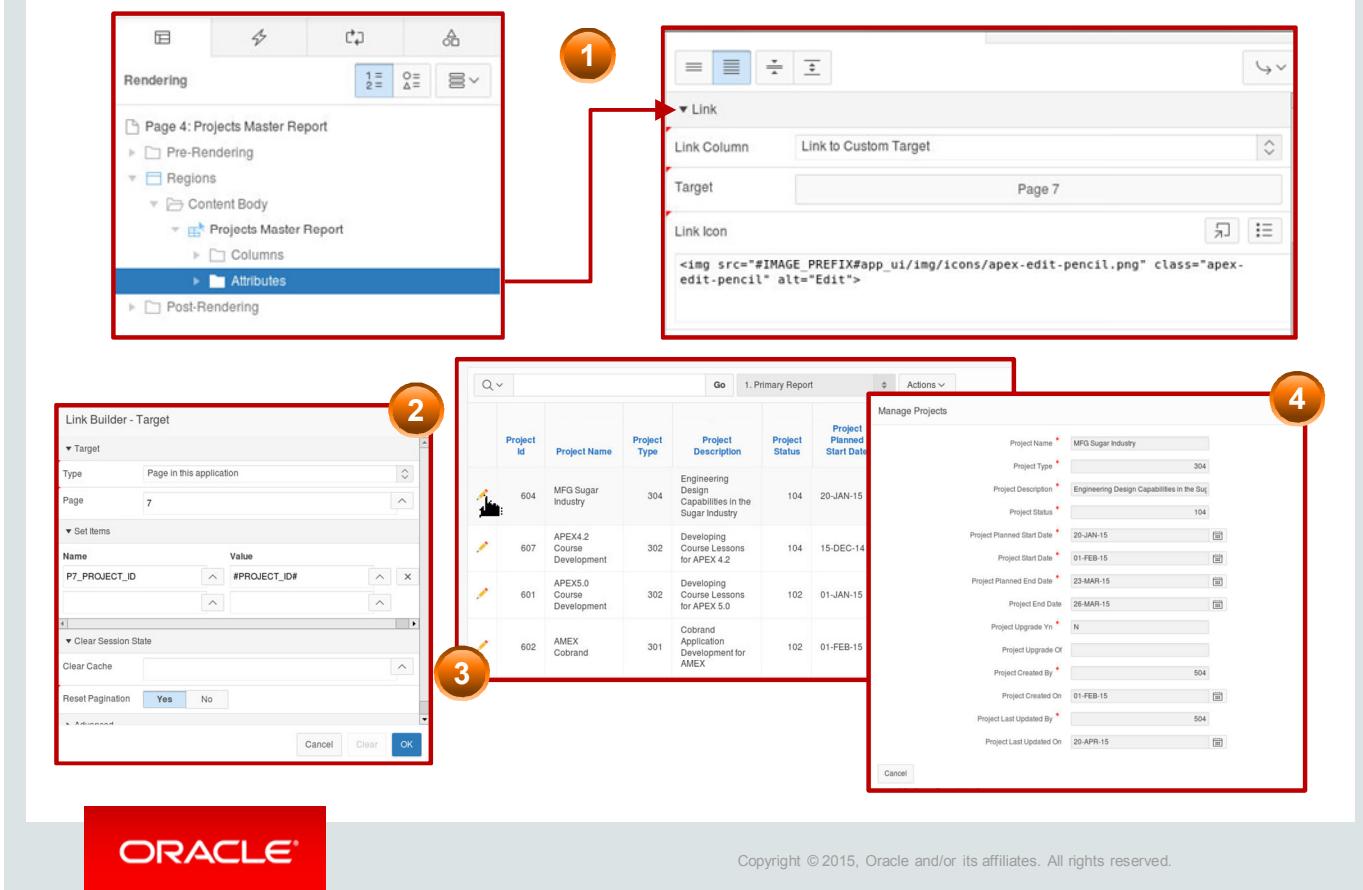


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The slide provides an overview of the steps to create a form on a table by using the “Form on a Table or View” wizard. You must access the wizard and follow the wizard instructions. You can change the label name of the buttons created on the form page. You can also specify the page that should be displayed after clicking these buttons.

# Linking a Report to a Form



Jack created a report and a form to manage projects separately as “Projects Master Report” and “Manage Projects” form. To establish a link between this report and form, Jack updates the report attributes as shown in the slide.

When you create a “Form on a Table with Report,” the wizard automatically creates the required report and form and links between them. Stand-alone reports (interactive or classic) can also be linked to existing forms. This slide shows how you can link a classic report to a form.

- From the page definition of the page where you have created the report, click **Attributes** under Rendering in the left pane.
- Locate **Link** under Properties in the right pane and select **Link to custom target** for Link Column.
- Click **Target** and a pop-up window opens. Click the “Up Arrow” beside Page and select target page from All Pages. In this example, the Manage Projects form is selected as the target page.
- Select the item and value that is to be passed with the link. In this example, select P7\_PROJECT\_ID for Name and #PROJECT\_ID# for value and click **OK**.

- Click the **Save and Run** icon to view the report.
- Click edit icon beside any row which you want to modify. Update the values and click **Apply changes**. You can see that the changes are reflected in the report for that record.
- To create a new Project, click the **Run** icon on the form directly.
- Enter all the details in the form and click **Create**. You can see the new record in the Report immediately.

## Practice 6-1 Overview: Creating a Form on a Table

This practice covers creating a form based on a table, and then linking it to an existing report that was created previously.



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## Example: Form on a Table with Report

The screenshot shows a user interface for managing employee data. At the top, there is a search bar, a 'Go' button, and an 'Actions' dropdown menu. A 'Create' button is located in the top right corner of the main content area. Below these, there is a table with columns: Employee Id, First Name, Last Name, Email, Phone Number, Mobile Number, and Address. The table contains several rows of employee data. Red boxes highlight the 'Employee Id' column and the 'Address' column. Red arrows point from these highlighted areas to two separate forms. One arrow points from the 'Employee Id' column to a detailed view of an employee record for Edward Logan. Another arrow points from the 'Address' column to a general address input field. Both the detailed view and the general address field are enclosed in red boxes.

	Employee Id	First Name	Last Name	Email	Phone Number	Mobile Number	Address
	505	Fiorello	LaGuardia	fiorello.laguardia@pts.com	2125553923	1235342653	Hangar Center, Third Floor, Flushing, NY
	504	Frank	OHare	frank.ohare@pts.com	7735557693	3157862405	10000 West OHare, Chicago, IL
	518	Turner	Thomas	turner.thomas@pts.com	7642788982	123	
	520	Rebecca	Mary	rebecca.mary@pts.com	3157862401	315	
	501	John	Dulles	john.dulles@pts.com	7035552143	703	
	502	William	Hartsfield	william.harstfield@pts.com	4045553285	987	
	503	Edward	Logan	edward.logan@pts.com	6175553295	567	
	506	Albert	Lambert	alber.lambert@pts.com	3145554022	315	
	507	Eugene	Bradley	eugene.bradley@pts.com	8605551835	234	

First Name \*   
 Last Name \*   
 Email \*   
 Phone Number \*   
 Mobile Number \*   
 Address   
 Designation \*   
 Salary \*   
 Manager Id   
 Hire Date \*

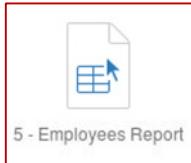
First Name \*   
 Last Name \*   
 Email \*   
 Phone Number \*   
 Mobile Number \*   
 Address   
 Designation \*   
 Salary \*   
 Manager Id   
 Hire Date \*

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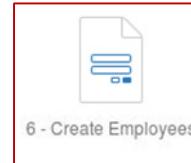
The slide shows the pages that are created by using the “Form on a Table with Report” wizard. The first page is an interactive report that lists the details from an EMPLOYEES table. When you click the Create button, a form appears where you can insert new rows in the EMPLOYEES table. When you click the link column in the report, the form is populated with the row details. If the Form is created with “Update” as “Yes”, then you can edit the details and save your changes.

Project Managers who are using PTS for managing their projects will also need an interface to add or modify the employees who work in that organization. Only when the employees’ database is up to date, they can be allocated to the various projects accurately. Jack creates a Form on the EMPLOYEES table with Report to meet this purpose.

# Creating a Form on a Table with a Report



5 - Employees Report



6 - Create Employees

- Type of report
- Page number and name
- Region template and name
- Navigation Menu Entry
- Columns to display
- Image for edit link

- Page number and name
- Region template and name
- Primary key and trigger source
- Columns to edit
- Actions to enable (insert, update, and delete)

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

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The “Form on a Table with Report” wizard combines the steps to create a report and the steps to create a form—and creates two pages. The first page is a report with an edit link (link column) for each row. The report page also includes a Create button to enable users to insert rows into the table. The second page is a form to edit or delete the row selected from the first page (reports page). The slide shows the various wizard steps for creating the Report and Form pages.

## Example: Master Detail Form

The screenshot displays a Master Detail Form interface. On the left, a sidebar titled "Project Document Types" lists document types with icons: Document (Pencil), JPEG (Camera), PNG (Image), XLS (Spreadsheet), MPP (Bar Chart), PDF (Document), and URL (Link). A red box highlights the "Create" button at the bottom of this sidebar. An arrow points from this red box to the main content area. The main content area is divided into two sections: "PROJECT\_DOCUMENTS Master" and "PROJECT\_DOCUMENTS Detail". The Master section shows a form with "Document Type Name" set to "Document" and a "Cancel" button. The Detail section shows a table with three rows of document data:

	Project	Document Name	Document Url	Document Created On	Document Created By
<input type="checkbox"/>	601	SQL scripts	https://stbeehive.oracle...	25-JAN-15 <input type="button" value="Edit"/>	502
<input type="checkbox"/>	603	Pre-Definition Document	https://stbeehive.oracle...	23-APR-15 <input type="button" value="Edit"/>	520
<input type="checkbox"/>	607	Test Results	https://stbeehive.oracle...	10-MAR-15 <input type="button" value="Edit"/>	502

At the bottom right of the Detail section, there is a page number "1 - 3".

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The slide shows the form that is created by using the Master Detail Form Wizard. You can select whether you want the wizard to create a report page on the master table. You can also specify whether you want the master and details information on the same page or on different pages. In the slide example, the reports page is created and the master and details information is shown on the same page. On the reports page, you can insert rows into the master table or edit the information in the existing rows. When you click the Edit icon, the master table row and any associated rows in the details table are shown. You can modify the data, as well as add or delete rows in the details table.

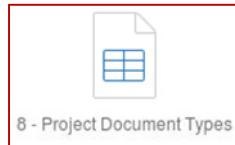
In PTS, Jack creates a Master Detail Form for managing various project documents. The Master table `DOCUMENT_TYPES` gives a report of different types of documents that can be created in any project. By clicking the edit icon on document type, the master detail form appears listing all the documents from `PROJECT_DOCUMENTS` of the selected document type.

Jack thinks that having a Master Detail Form for managing project documents will bring more clarity to the end users while managing various project documents.

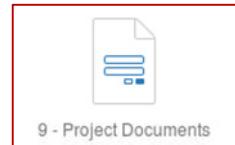
# Creating a Master Detail Form

Access the Master Detail Form Wizard, and then perform the following steps:

1. Select the schema, table, and columns for the master and detail tables.
2. Select the primary key source for the master and detail tables.
3. Specify master row navigation and the master report (optional).
4. Specify layout, page attributes, and tab options.
5. Review the details and create the form.



8 - Project Document Types



9 - Project Documents

Master Report

Detail Form

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A master detail form reflects a one-to-many relationship between two tables in a database. Typically, a master detail form displays a master row and multiple detail rows within a single HTML form. With this form, users can insert, update, and delete values from two tables or views. When you create the master detail form, you have the option to customize the output. Your decisions result in the creation of one to three pages.

- You can include a master report. This displays the selected master columns and provides links to the master detail page, displaying the selected master record.
- You decide whether to edit the detail records on the same page (that is, you get a tabular form on your master detail page) or to edit the detail records on a separate page (that is, you get only a report in the detail section of your master detail page and the editing is done by using a form on another page).

## Practice 6-2 Overview: Creating a Master Detail Form

This practice covers creating a form based on two tables (Master table and Detail table) and making some modifications to it.



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## Example: Tabular Form

Update Employees

Employee Id	First Name	Last Name	Email	Phone Number	Mobile Number	Address	Designation	Salary
501	John	Dulles	john.dulles@pts.com	7035552143	7035558967	45020 Aviation Drive,	Developer	100000
502	William	Hartsfield	william.hartsfield@pts	4045553285	9873567899	6000 North Terminal F	Senior Developer	150000
503	Edward	Logan	edward.logan@pts.co	6175553295	5673459876	1 Harborside Drive, Et	QA Engineer	90000
504	Frank	OHare	frank.ohare@pts.com	7735557693	3157862405	10000 West OHare, C	Manager	180000
505	Fiorello	LaGuardia	fiorello.laguardia@pts	2125553923	1235342653	Hangar Center, Third I	Senior Manager	240000
506	Albert	Lambert	albert.lambert@pts.co	3145554022	3157862399	10701 Lambert Intern	Trainee	50000
507	Eugene	Bradley	eugene.bradley@pts.c	8605551835	2349872345	Schoephoester Road,	Trainee	50000
508	King	John	king.john@pts.com	3242597586	3148762983	602 Scottsdale, AZ	Developer	100000
509	Blake	Joesph	blake.joseph@pts.con	6231148976	2345432345	89 Camelback Road, :	Trainee	50000
510	Clark	James	clark.james@pts.com	5672878364	9874569834	56234 New Blvd, NJ	Developer	100000

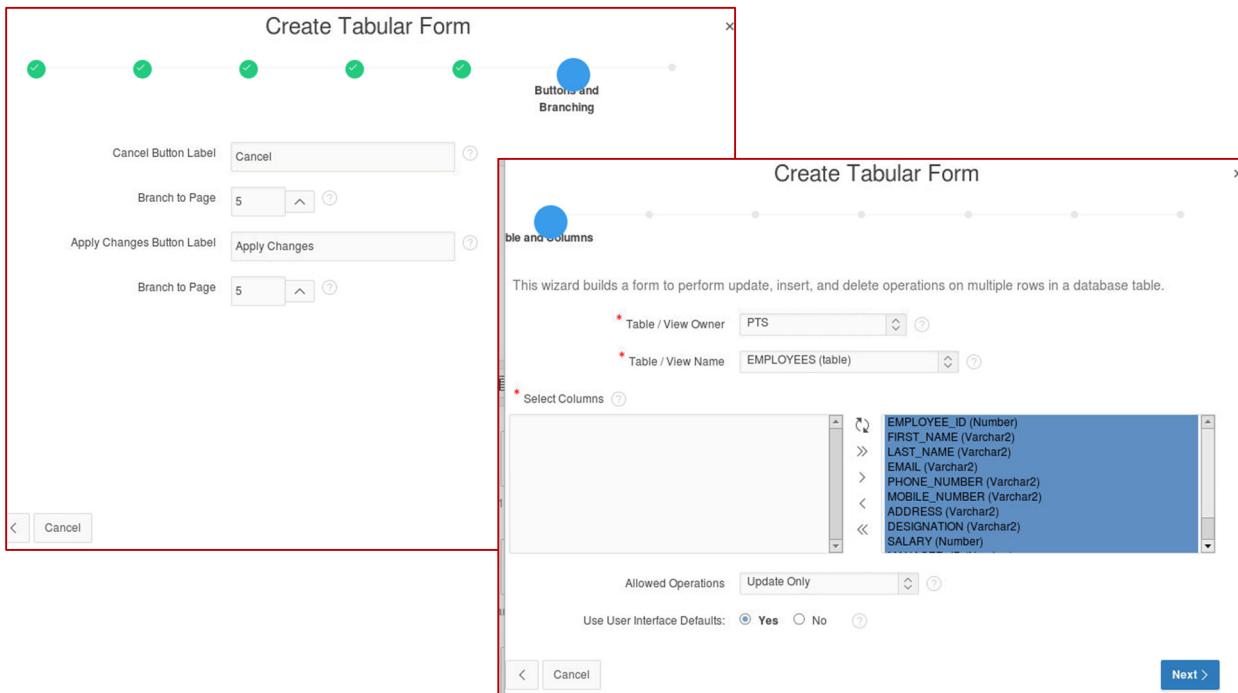
X | Cancel | Apply Changes



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The slide shows the form that is created by using the Tabular Form Wizard. If you allowed all the operations in the wizard, the tabular form presents the user with four action buttons. By default, Cancel, Delete, and Submit are displayed on the upper-right corner and Add Row is displayed at the bottom. Additionally, a check box appears to the left of each row, enabling you to select the rows and delete them. You can also select all the rows simultaneously by selecting the check box to the left of the column headings. You can make changes to the data in any row, and then click the Submit button to save the changes in the database.

## Creating a Tabular Form



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The Tabular Form Wizard has steps that are similar to the “Form on a Table or View” wizard. While selecting the schema, the wizard prompts you to set the operations that you want to allow users to perform on the form. By default, the “Update, Insert and Delete” option is selected. The wizard enables you to select the columns to be displayed in the form and the columns that can be updatable. Depending on the operations that you allowed the users to perform, the buttons are included on the form page. You can change the label name for the buttons.

Jack already created a data entry form for entering new employees or removing any existing employees from PTS. This form was developed as “Form on a Table with Report”. Jack now wants to create a separate form that allows project managers to modify any employee details only on the allowed fields such as Email, Phone Number, Address, Manager, Designation, and Salary. Jack creates a Tabular Form on the EMPLOYEES table for this requirement.

## Quiz



Which type of form would you create if you want to show a CUSTOMER and all the ORDERS that the customer has placed for a product?

- a. Form on a table
- b. Tabular form
- c. Master detail form
- d. Form on a table with report

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**Answer: c**

## Quiz



You have a report that displays a list of all employees.  
You want to create a page to enter details for a new employee.  
Which of the following wizards should you use?

- a. Form on a Table or View
- b. Tabular Form
- c. Master Detail Form
- d. Form on a Table with Report



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**Answer: a**

## Practice 6-3 Overview: Creating a Tabular Form

This practice covers creating and manipulating a form that shows information in tabular form with few columns available for update.



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## Lesson Agenda

- Using Forms
- Creating Forms
- Modifying Forms
  - Linking a Report to a Form
  - Reordering Items in the Tree View
  - Changing the Item Display Type
  - Customizing Forms
- Creating Forms in a Mobile Application



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## Using Quick Edit

Update Employees

Employee Id	First Name	Last Name	Email	Phone Number	Mobile Number	Address	Designation	Salary
501	John	Dulles	john.dulles@pts.com	7035552143	7035558967	45020 Aviation Drive,	Developer	100000
502	William	Hartsfield	william.hartsfield@pts	4045553285	9873567899	6000 North Terminal F	Senior Developer	150000
503	Edward	Logan	edward.logan@pts.co	6175553295	5673459876	1 Harborside Drive, E	QA Engineer	90000
504	Frank	OHare	frank.ohare@pts.com	7735557693	3157862405	10000 West OHare, C	Manager	180000
505	Fiorello	LaGuardia	fiorello.laguardia@pts	2125553923	1235342653	Hangar Center, Third I	Senior Manager	240000
506	Albert	Lambert	albert.lambert@pts.co	3145554022	3157862399	10701 Lambert Intern	Trainee	50000
507	Eugene	Bradley	eugene.bradley@pts.c	8605551835	2349872345	Schoephester Road,	Trainee	50000
508	King	John	king.john@pts.com	3242597586	3148762983	602 Scottsdale, AZ	Developer	100000
509	Blake	Joesph	blake.joseph@pts.con	6231148976	2345432345	89 Camelback Road, :	Trainee	50000
510	Clark	James	clark.james@pts.com	5672878364	9874569834	56234 New Blvd, NJ	Developer	100000

Cancel

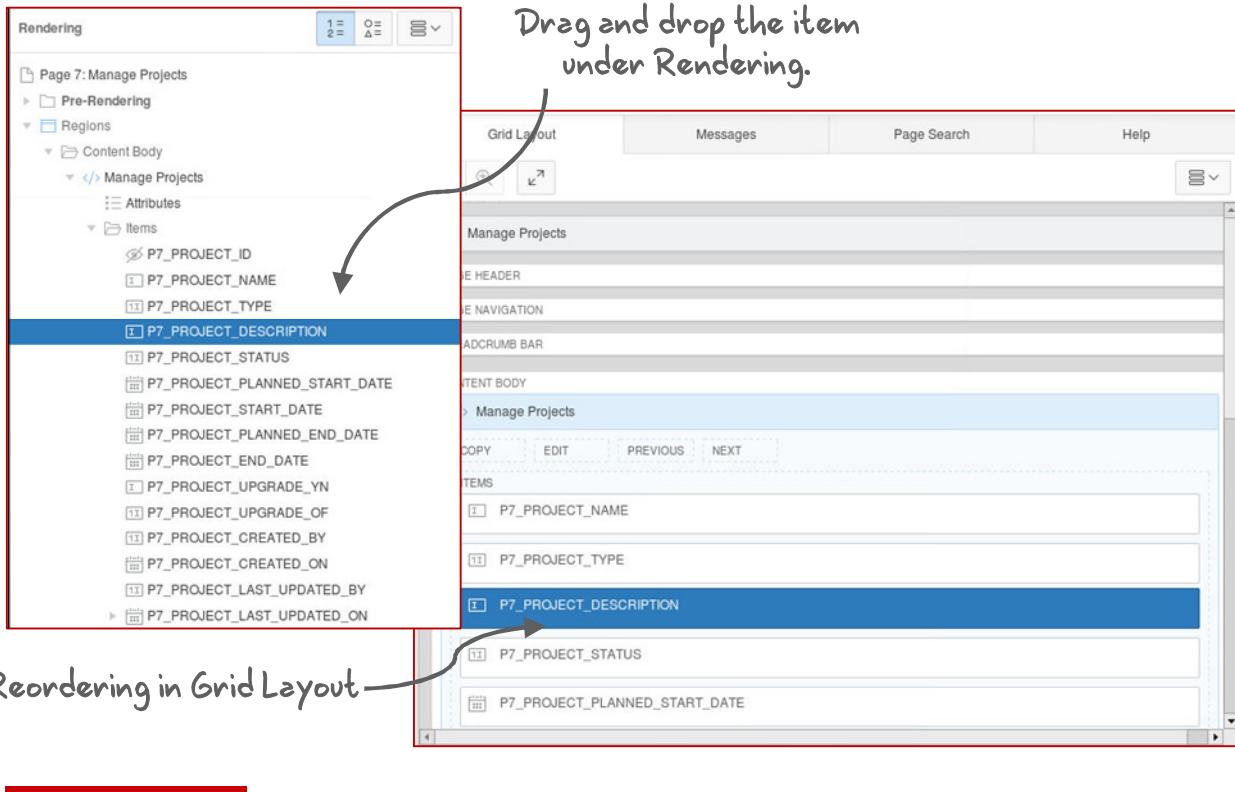
Home Application 2 Edit Page 10 Session View Debug Debug Show Grid Quick Edit Theme Roller

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When you run your form page, you can modify its objects by using the Quick Edit button on the Developer toolbar. When you click Quick Edit, the cursor changes to a + symbol and highlights the item wherever the cursor is placed in the form. Click the highlighted icon to open the page in page designer with the same item pre-selected. Because the page opens with the item selected already, you can see its properties right away in the property editor and make the required modifications quickly. This is useful, for example, when changing a label or the format of an item.

## Reordering Items



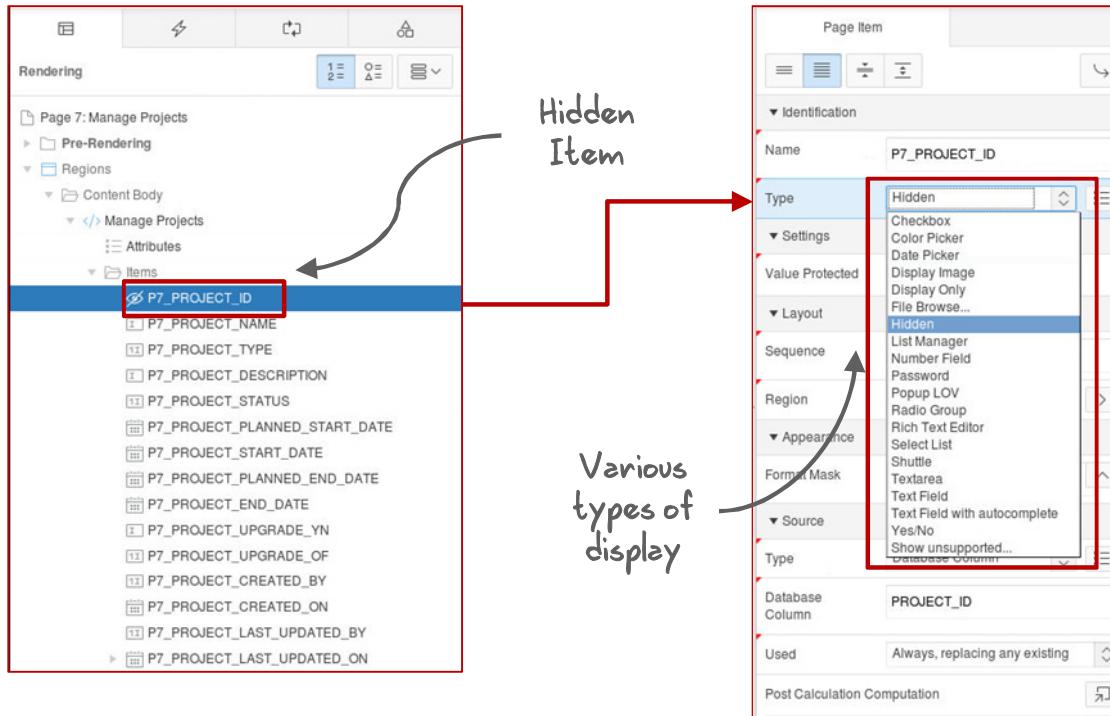
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The items on a form can be reordered in page designer in two ways:

- Drag the item to the desired position among other items under the Rendering tab.
- Drag the item to the desired position in the Grid Layout of page designer.

# Changing Item Display Type



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By default, your varchar/number type columns are displayed as text fields in a form. You can change this default type to other available types, such as drop-down lists, option buttons, check boxes, and pop-up LOVs.

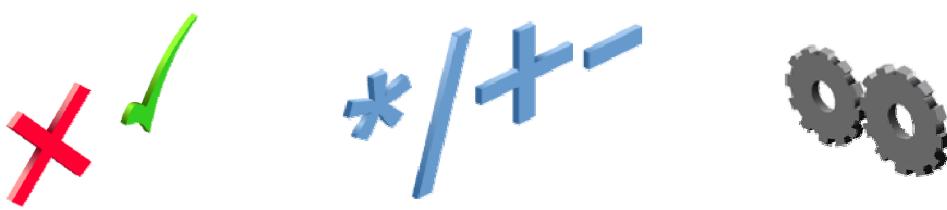
To change the display type for an item, perform the following steps:

1. Select the item under **Rendering** tab.
2. In the **Property Editor**, select the new type from the drop-down list for **Type**.
3. You can modify the display type to a select list, Popup LOV, Date Picker, Color Picker and so on based on the requirement.

## Customizing Forms

You can include the following in your forms:

- Validations
- Computations
- Processes



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You can customize your forms by creating computations and processes. You can also include validations to verify user inputs. You learn about these topics in detail in the lesson titled “Adding Page Processing.”

## Quiz



How can you change properties of all the items on a page simultaneously?

- a. Click Show Edit Links
- b. Select all items and update properties in property editor
- c. Click Edit All

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**Answer: b**

## Lesson Agenda

- Using Forms
- Creating Forms
- Modifying Forms
- Creating Forms in a Mobile Application
  - Creating a Form with List View
  - Creating a Form on a Table and linking it from an existing List View



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## Form on a Table with List View

The screenshot illustrates the creation of a mobile application and the resulting user interface.

**Left Panel (Create Page Wizard):**

- User Interface:** Set to "Mobile".
- Select a page type:** Options include "Blank Page", "Report", and "Form". The "Form" option is selected and highlighted with a red box.

**Right Panel (Employee List View):**

- Header:** "Employees Li..."
- Search Bar:** A search input field with a magnifying glass icon.
- List View:** Displays employee names: Fiorello, Frank, Turner, Rebecca, John, William, Edward, Albert, Eugene, and King. Each name has a right-pointing arrow icon next to it.
- Form Overlay:** A modal window titled "Form on EMP...". It contains fields for "First Name\*" (Fiorello), "Last Name\*" (LaGuardia), "Email\*" (fiorello.laguardia@pts.com), and "Phone Number\*" (2125553923). The "Log Out" button is also visible.

**Annotations:**

- A blue box labeled "List View Report with Create button" points to the "Report" icon in the creation wizard.
- A blue box labeled "Form with Cancel and Apply Changes buttons" points to the "Form" icon in the creation wizard.

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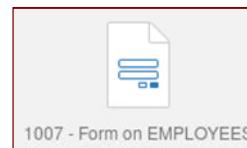
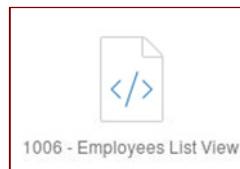
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When you create a form for a mobile application using the Create Page Wizard, you can choose different form types. “Form on a Table with List View” is the commonly used form in a mobile application. To select this option, you first select Mobile User Interface and then select Form. You then select “Form on a Table with List View.”

## Creating a Form on a Table with List View

Access the “Form on a Table with List View” wizard for Mobile User Interface, and then perform the following steps:

1. On the List View Page, specify the Page Number, Page Name, and Region Title.
2. This page builds two pages, which is a combination of a report and a form on a single table/view. Specify the Table/View Name.
3. Select the columns to include on the page.
4. Specify page and region information for the Form page.
5. Review the details and create the form and list view pages.



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The “Form on a Table with List View” wizard combines the steps to create a list view and the steps to create a form by creating two pages. The first page (List View Page) enables users to specify the row to be updated. It also includes a button to create a new row. The second page (Form Page) provides users with the ability to update the selected table or view. The slide lists the steps to define the List View and Form pages.

Because Jack already created PTS as an application with mobile interface, he now creates a Form on the EMPLOYEES table with List View so that the list view can be accessed as a employee lookup and the form allows users to add new employees or modify existing employees even from mobile interface.

## Practice 6-4 Overview: Creating a Form on a Table with List View for Mobile Applications

This practice covers creating a form for mobile interface and linking it from a mobile list view page.



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# Creating a Form on a Table

The screenshot shows the Oracle Application Express interface. On the left, there's a 'Projects List' page with a table of projects. One row, 'APEX4.2 Course Development', has a red box around it. To the right, a 'Create Page' wizard is open. It has four options: 'Form on a Table with List View' (red box), 'Form on a Table or View' (blue box), 'Form on a Web Service' (red box), and 'Form and Report on Web Service' (red box). A large red bracket on the right points from the 'List View' part of the 'Form on a Table or View' option to the 'List View' part of the table on the Projects List page. Another red bracket points from the 'Report' part of the same option to the 'Report' part of the table. At the bottom right of the wizard are 'Cancel' and 'Create' buttons.

In the Create Page Wizard for Form using Mobile user interface, you can also select the “Form on a Table or View” form type. With this option, you create a form to update a single row in a database table or view. Access the “Form on a Table” wizard for Mobile User Interface, and then perform the following steps:

1. Select the table or view name on which you want to build a form.
2. Specify page and region information by specifying the Page Number, Page Name, and Region Name.
3. Select the Primary Key type.
4. Select the columns to include in the form.
5. Identify the process options and button display text for the form.
6. Specify the branching details of the page and confirm your selections.

# Linking to a Form on a Table from an Existing List View

The screenshot illustrates the process of linking a Form to a List View in Oracle Application Express.

**Left Panel (List View Configuration):**

- The page title is "Page 1002: Projects List View".
- The "Regions" section shows the "Content Body" region expanded, with "Projects List View" selected.
- The "Attributes" section is highlighted with a red box.
- Under "Attributes", the "Link Target" field is set to "No Link Defined".
- Handwritten annotations include a red arrow pointing from the "Link Target" field to the "Form" section on the right, and the word "List View" written above the list of projects.

**Right Panel (Resulting Form Interface):**

- The title bar says "Projects List ...".
- A search bar is present.
- The main area displays a list of projects with various fields for editing:
  - MFG Sugar Industry
  - APEX4.2 Course Development
  - APEX5.0 Course Development
  - AMEX Cobrand
  - Order Management
  - Super Insurance Solutions
  - MFP Firmware Testing
  - SPRINT P2K
  - Peoplesoft
  - XYZ Store CRM
  - Superia Banking Solutions
- To the right of the list, a red box highlights the "Project Planned End Date\*" field.
- Handwritten annotations include a red arrow pointing from the "Form" section on the left to this field, and the word "Form" written below the list of projects.
- At the bottom right are "Cancel" and "Create" buttons.

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You have seen how a List View report was created in the lesson titled “Working with Reports for Mobile Applications.” You can link to a Form on a Table from an existing List View. This can be done by editing the Settings in the Region Attributes of the List View page and by specifying a Link Target to the Form page.

Because Jack created a List View report for Projects already, he chooses to create a Form on the PROJECTS table for the mobile interface and link the new form to the already existing Projects List View report. This enables project managers to create or update projects from a mobile interface also.

## Summary

In this lesson, you should have learned how to:

- Identify the types of forms that you can include in an application
- Create and edit:
  - A form on a table
  - A form with a report
  - A tabular form
  - A master detail form
- Create forms in a mobile application



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This lesson showed you how to create forms, how to use the various built-in wizards that help you create forms, and how to edit the attributes of a form.

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7

# Working with Pages and Regions

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## Jack Works with Pages and Regions



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Jack has the forms and reports in place for the PTS application. He realizes that he cannot create a complete application by using just these. While going through the features of APEX, he discovers that he can create blank pages in the application that can be customized based on his requirements.

# You Are Here in This Course

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 6: Creating Forms

Lesson 7: Working with Pages and Regions

Lesson 8: Adding Items and Buttons

Lesson 9: Understanding Session State

Lesson 10: Including Page Processing

Lesson 11: Validating and Debugging Your Application

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

## Objectives

After completing this lesson, you should be able to:

- View page definitions
- Edit page attributes
- Create a new region
- View region attributes
- Create a subregion
- Create a global page
- Create common pages for different user interfaces



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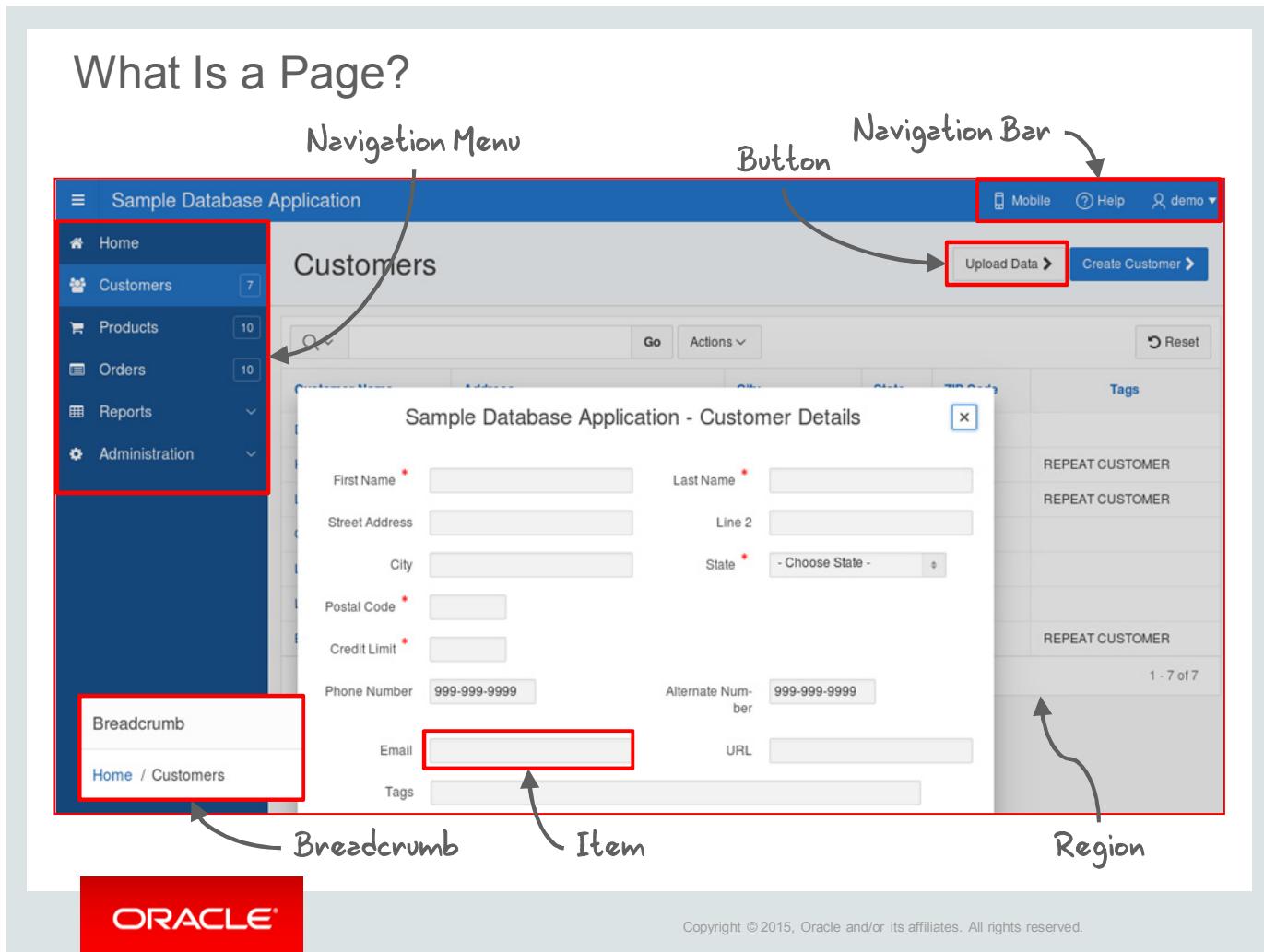
This lesson shows you how to create pages and regions and how to edit their attributes.

## Lesson Agenda

- Introducing Page Definition
  - What Is a Page?
  - Page Modes: Normal, Modal, and Nonmodal
  - What is Page Designer?
  - Understanding Common Page Designer UI Elements
  - Accessing Page Definition
  - Editing Page Attributes
  - Running a Page
  - Runtime Developer Toolbar
  - Copying a Database Application Page
  - Deleting a Page
- Working with Page Regions
- Working with Pages



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In the lesson titled “Creating a Database Application,” you learned that a page is the basic building block of any application. This slide presents a recap of the components of a page.

A page contains user interface elements and application logic. A page is divided into regions. A region is a section of a page that contains content. The content of a region is determined by the region source. For example, a region can contain a report based on a SQL query, or it can contain static HTML.

A region can also contain the following:

- Items, such as a text field, text area, select list, and check box
- Buttons to direct users to a specific page or URL, and also to post and process information
- Breadcrumbs, navigation menu, and a navigation bar to enable navigation

Each page in your application has a unique page ID and name. All information about a page and its components is displayed in a *page definition*.

# Page Modes: Normal, Modal, and Nonmodal

The screenshot illustrates three different page modes for displaying the Customers page in Oracle Application Express:

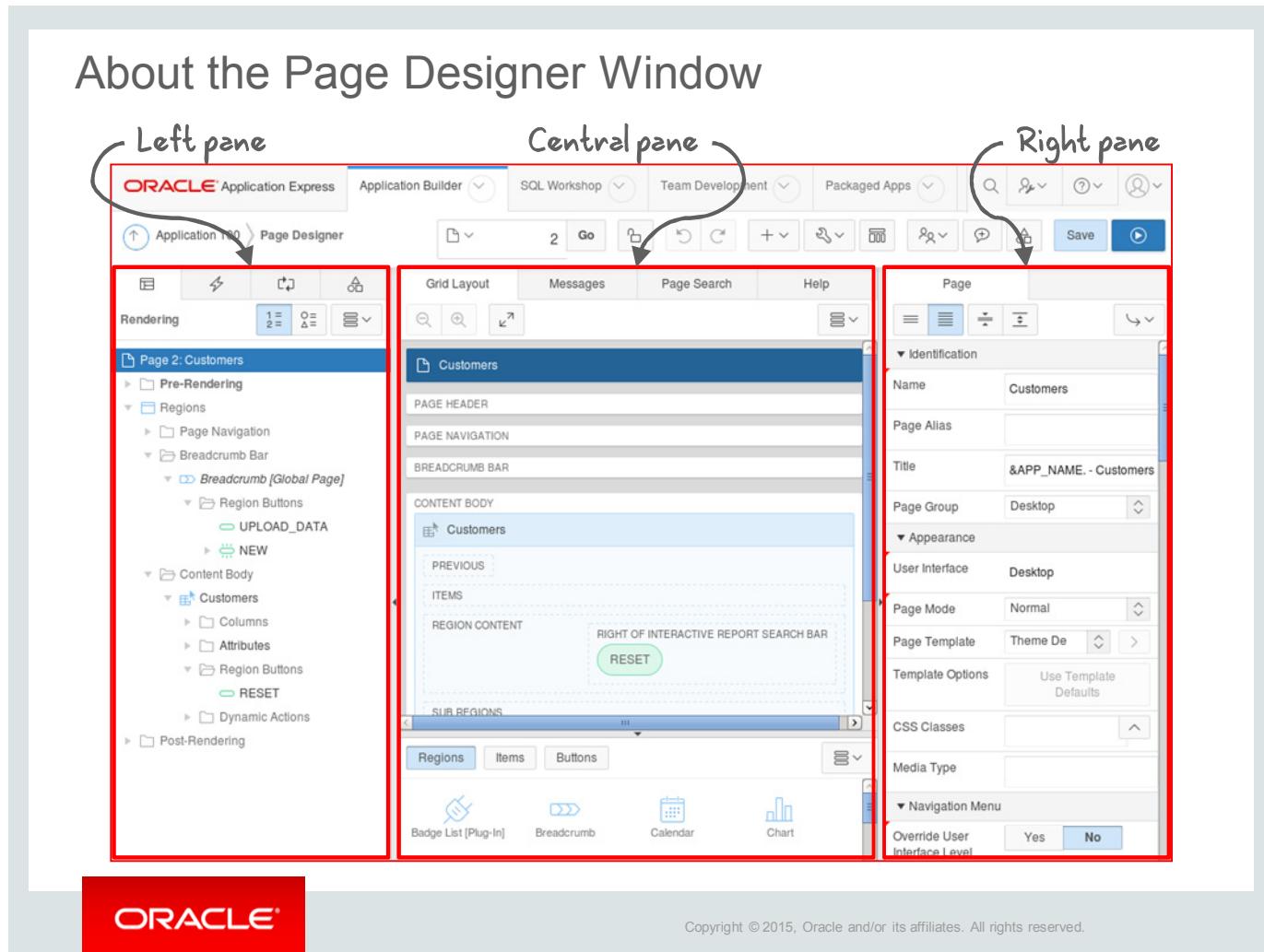
- Normal:** The top-left section shows the standard application navigation bar and the Customers page content.
- Modal:** The top-right section shows a modal dialog box titled "Customers" overlaid on the main page. It contains a search bar, a "Create Customer" button, and a table of customer data.
- Nonmodal:** The bottom section shows a separate browser window titled "Sample Database Application - Customers - Mozilla Firefox" with the URL "localhost:8080/apex/f?p=100:2:924368308480::NO:RIR::&cs=3hE99\_fjS\_-SvAyR8G3dy1qKNUZd5F3-5Zl4rfy8RoC8kZAI\_EI". This window displays the same Customers data as the other modes.

Arrows labeled "Normal", "Modal", and "Nonmodal" point to each respective mode in the screenshot.

There are three page modes available in Oracle Application Express 5.0:

- **Normal:** The page is displayed as a normal Application Express application page.
- **Modal Dialog:** A modal dialog is an overlay window position within the same browser window. A modal dialog remains active and focused until the user finishes or closes it. While a modal dialog is active, the user is unable to interact with the rest of the page until the dialog box is closed.
- **Nonmodal Dialog:** A nonmodal dialog displays a separate popup browser window. A user can interact with a nonmodal dialog and content of the page. Use a nonmodal dialog when the requested information is not essential to continue. This type of window can be left open while work continues elsewhere.

The slide shows the Customers page in all three page modes.



Page Designer is a fully featured web-based Integrated Development Environment (IDE), designed to maximize developer productivity for maintaining application pages. It is very advanced and simple to use.

As shown in the slide, the Page Designer window is divided into three panes:

- **Left Pane:** The left pane (also known as Tree Pane) features the following tabs: Rendering, Dynamic Actions, Processing, and Page Shared Components.
- **Central Pane:** The central pane features the Grid Layout and associated Gallery, Messages, Page Search, and Help tab.
- **Right Pane:** The right pane is the Property Editor which is used to edit the properties of the component currently selected in the Tree Pane or the Grid Layout.

# Understanding Page Designer UI Elements

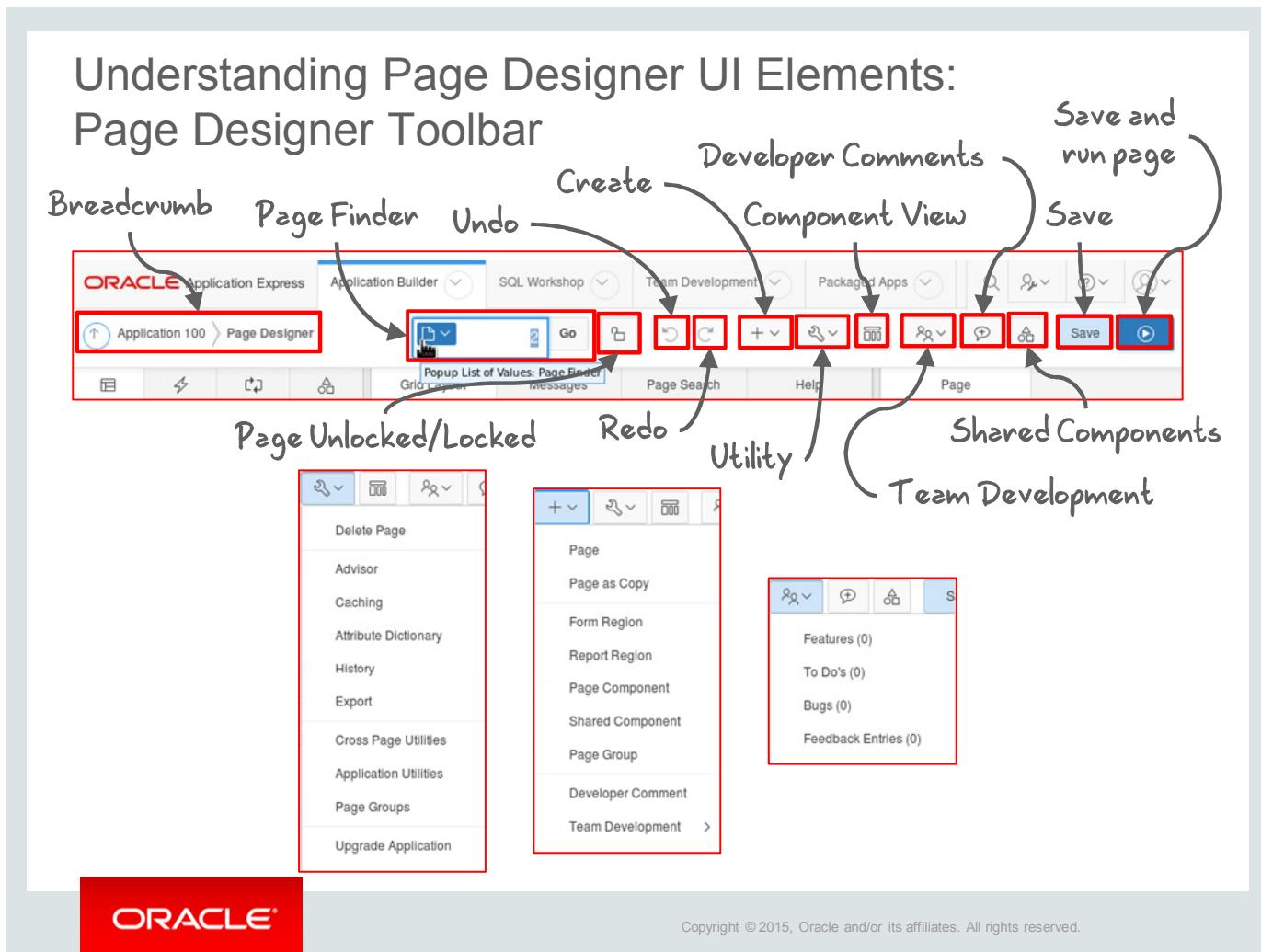
The following are the common UI elements of Page Designer:

- Page Designer Toolbar
- Tree Pane
- Central Pane
  - Grid Layout
  - Gallery
  - Messages
  - Page Search
  - Help
- Property Editor
  - Code Editor



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The UI elements shown in the slide are explained in detail in the following slides.



## Page Designer Toolbar

The Page Designer toolbar is displayed at the top of the Page Designer. Whenever you move your cursor over any item, button or textbox, a tooltip is displayed. The Page Designer toolbar features the following buttons and menu options:

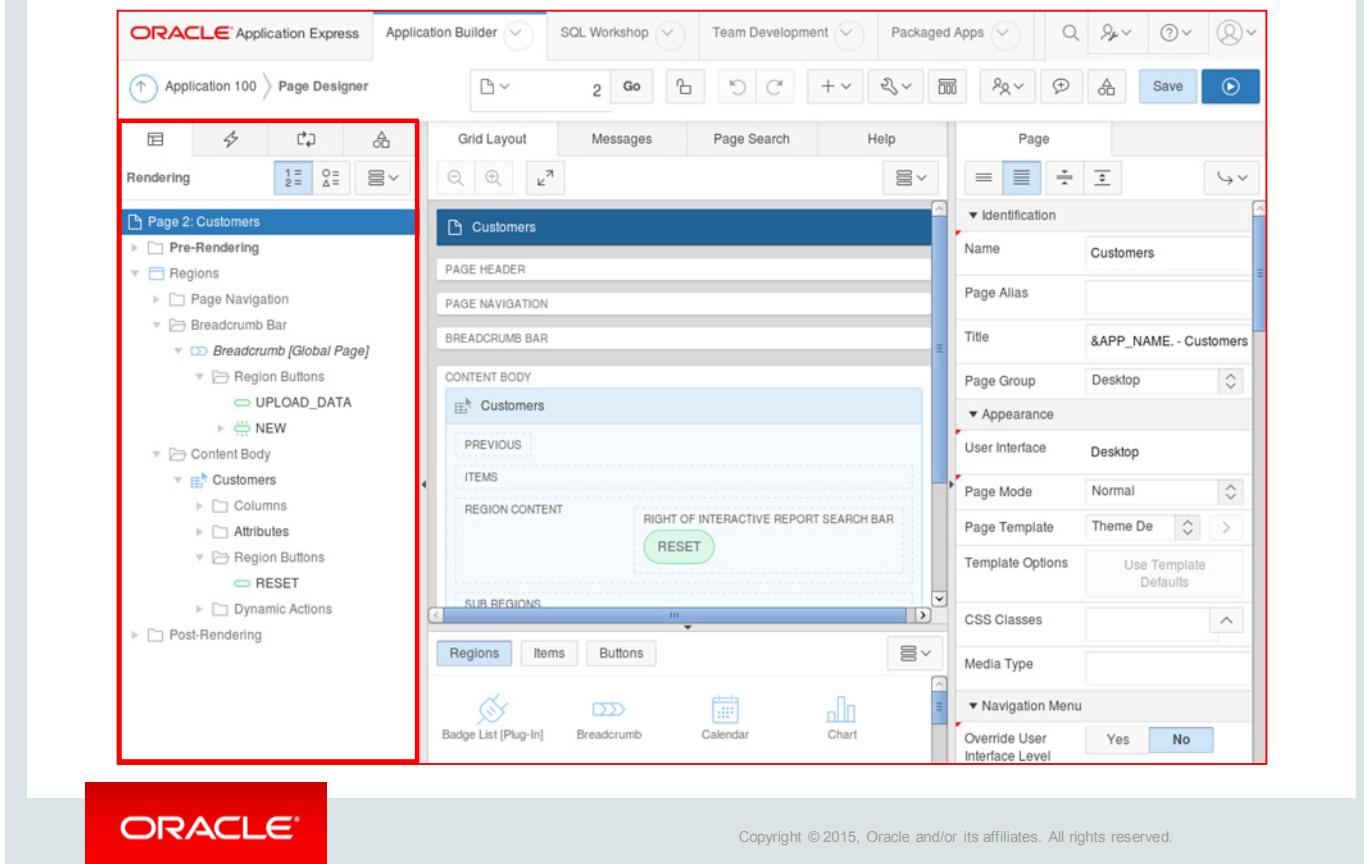
- **Page Finder:** Displays the Page Finder to search for pages. Also shows the current page opened.
- **Page Unlocked and Page Locked:** The Page Unlocked and Page Locked button indicate whether a page is available for editing. If the page is unlocked, the lock appears as open (as shown in the slide). If the page is locked, the lock appears as locked and the tooltip includes the user who locked the page. A green lock indicates that you have locked the page. A red lock indicates another developer has locked the page.
- **Undo:** Click **Undo** to revert the previous change.
- **Redo:** Click **Redo** to repeat the previously reverted change.
- **Create:**
  - **Page:** Adds a page to an existing database application. When you click **Page**, the Create Page Wizard opens.

- **Page as Copy:** Creates a copy of a page. If you want to create a copy of a page, click **Page as Copy**. You can copy a page from the current application or from another application.
  - **Form Region:** Adds a new form to a page in Page Designer
  - **Report Region:** Adds a new report to a page in Page Designer
  - **Page Component:** Provides a summary of how to create page components in Page Designer
  - **Shared Component:** Links to the Shared Components page
  - **Page Group:** Links to the Page Group page. You can make the pages within your application easier to access by organizing them into page groups. To use page groups, you create a group and then assign pages to the group.
  - **Developer Comment:** Adds developer comments to the page. You can use developer comments to communicate application changes, report issues, or record developer suggestions.
  - **Team Development:** Displays the submenus Feature, To Do, and Bug
- **Utilities:**
    - **Delete Page:** Deletes the current page
    - **Advisor:** Opens the Oracle Application Express Advisor, which enables you to check the integrity and quality of your application
    - **Caching:** Links to the Caching page where you can set caching preferences for pages and regions
    - **Attribute Dictionary:** Links to the Attribute Dictionary page, which contains a set of attributes about a column that are used in creating forms and reports
    - **History:** Displays a report of changes to the current page
    - **Export:** Links to the Export Page to export the current page to a SQL file
    - **Cross Page Utilities:** Takes you to the Cross Page Utilities page where you view and edit information across multiple application in the current workspace
    - **Application Utilities:** Links to the Application Builder Utilities page
    - **Page Groups:** Links to the Page Groups page where you can make the pages within your application easier to access by organizing them into page groups.
    - **Upgrade Application:** Links to the Upgrade Application Summary page where an application can be upgraded to include new components available
  - **Component View:** Displays the page in Component View
  - **Team Development:**
    - **Features:** Links to the Create Feature page
    - **To Do:** Links to the Create To Do page
    - **Bugs:** Links to the Create Bug page
    - **Feedback Entries:** Links to the Feedback report
  - **Developer Comments:** Displays the View Developer Comments window
  - **Shared Components:** Links to the Shared Components page. Shared components can display or be applied to any page within an application.

- **Save:** Saves the current page
- **Save and Run Page:** Saves and then runs the current page

**Note:** Team Developments is displayed only if this feature is enabled for the workspace.

# Understanding Page Designer UI Elements: Tree Pane



The Tree pane is displayed in the left pane. It displays regions, page items, buttons, application logic (such as computations, processes, and validations), dynamic actions, branches, and shared components as nodes on a tree. The Tree pane features four tabs:

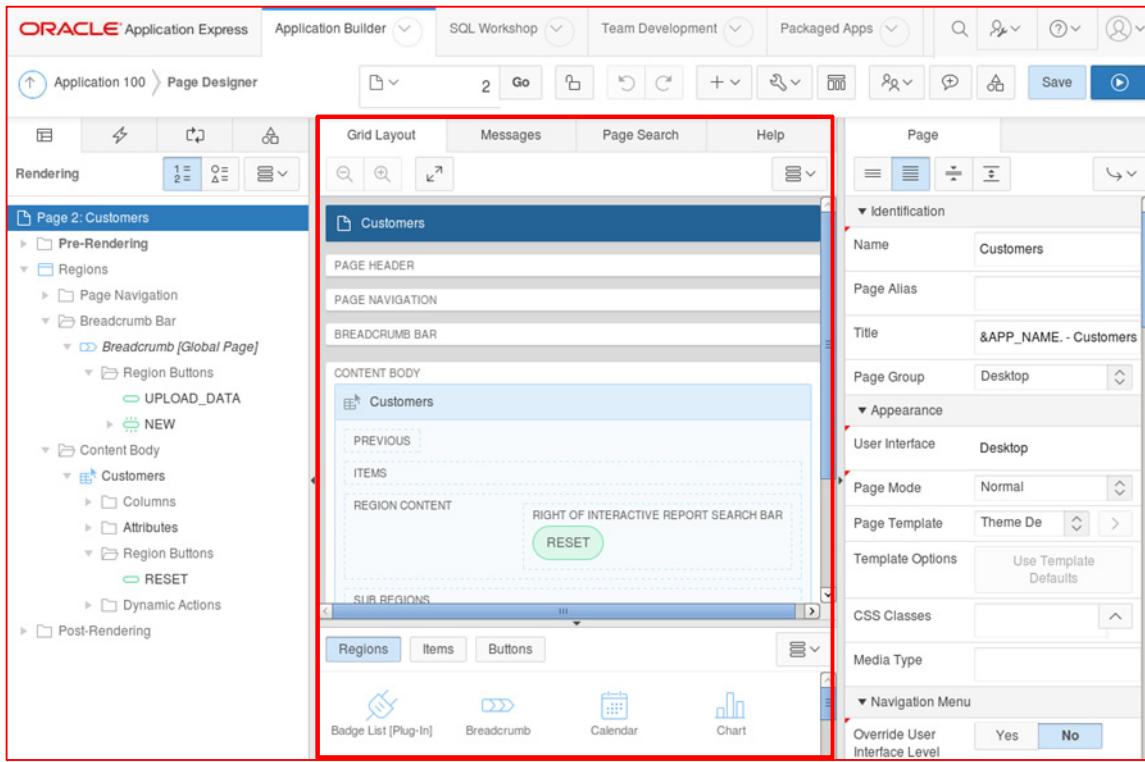
- **Rendering:** Displays regions, page items, page buttons, page components, and application logic as nodes in a tree
- **Dynamic Actions:** Displays dynamic actions defined on this page. By creating a dynamic action, you can define complex client-side behavior declaratively without the need for JavaScript.
- **Processing:** Displays application logic defined on this page
- **Page Shared Components:** Displays shared components associated with this page

The Dynamic Actions and Page Shared Components trees are grouped by event or component type and then ordered by sequence. The Rendering and Processing trees are grouped and ordered based on how Oracle Application Express processes them. This organization enables you to better understand when a component is processed and how the page is laid out. The Rendering and Processing tree have an option to group the nodes by component type. To control how tree components are displayed, click **the Group by Processing Order or Group by Component Type** buttons in the tree header bar.

Key features of the Tree pane include:

- **Context menus:** Right-click a component or control to display a context menu.
- **Quick Access to the Property Editor:** Select a component or multiple components to display the corresponding attributes in the Property Editor in the right pane.
- **Drag and Drop:** Reorder components and controls by dragging and dropping within the tree.
- **Tooltips:** Position the mouse over a component or control to view a tooltip of basic information, such as the region type, item type, and so on.

# Understanding Page Designer UI Elements: Central Pane

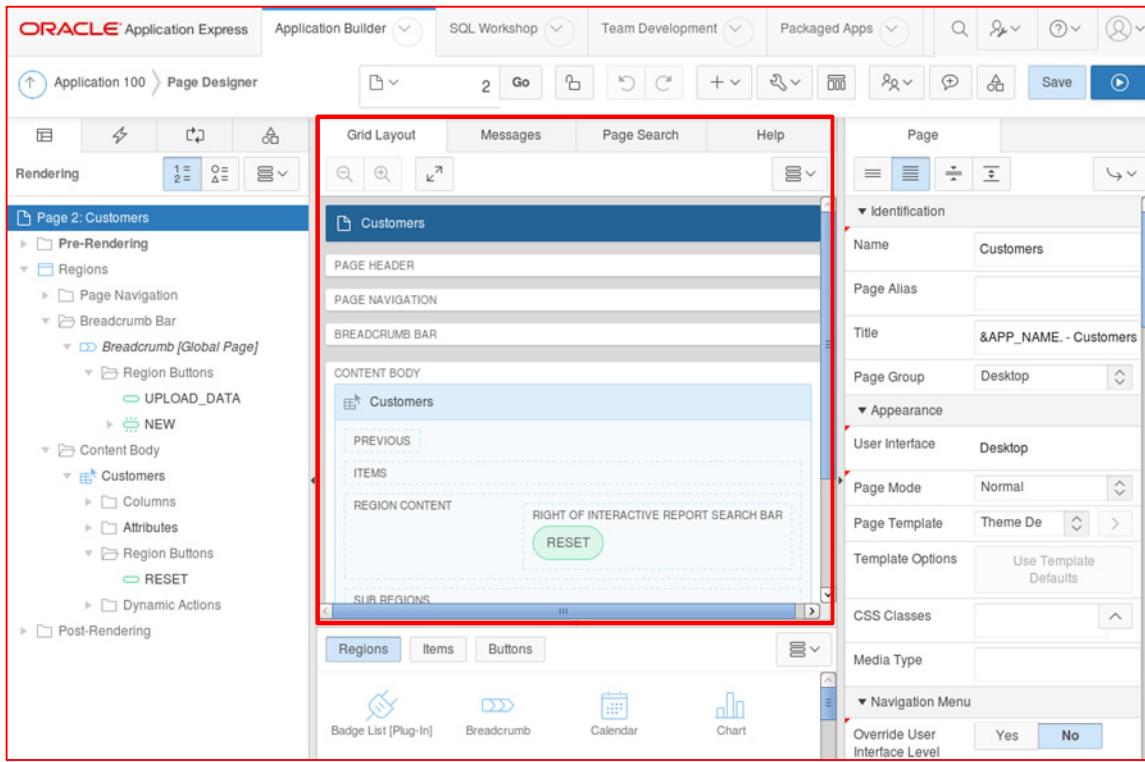


The central pane in Page Designer contains four tabs:

- **Grid Layout:** Is a visual representation of the regions, items, and buttons that define a page. You can add new regions, items, and buttons to a page by selecting them from the Gallery at the bottom of the page.
- **Messages:** Is displayed to the right of Grid Layout. When you create components or edit attributes in Page Designer, Messages notifies you of errors and warnings you need to address.
- **Page Search:** Is displayed to the right of Messages. Use Page Search to search all page metadata including regions, items buttons, dynamic actions, columns, and so on.
- **Help:** Is displayed to the right of Page Search. Help displays Help text for Property Editor attributes.

# Understanding Page Designer UI Elements:

## Central Pane: Grid Layout



Grid Layout is displayed in the central pane and is a visual representation of the regions, items, and buttons that define a page. You can adjust the size of Grid Layout using the window splitters. Alternatively, you can click the **Expand** button to make Grid Layout larger and then **Restore** to return it to the previous size.

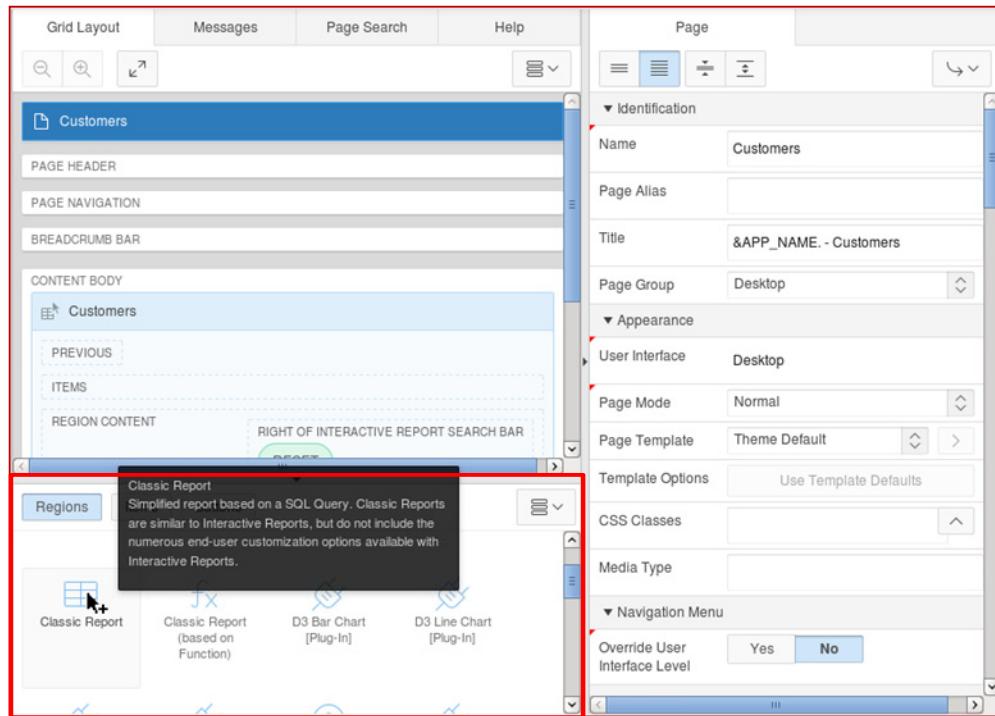
The Grid Layout menu is displayed on the right side of the pane. Use this menu to customize the type and amount of information that is displayed and to delete, move, and copy selected components. To have a specific region fill the Grid Layout pane, select the region and select **Display from Here** from the Grid Layout menu. The selected region fills Grid Layout. To restore the view, select **Display from Page**.

You can move, copy, and reorder regions, items, and buttons by dragging and dropping them. You can add new regions, items, and button by dragging them from the Gallery to the desired position on the page. When dragging components to a new position, such as dragging an item onto the same line as an exiting item, you need to drag the component into the desired position and wait until the grid changes and the new drop position is displayed.

The key features of the Grid Layout are the same as that of the Tree pane.

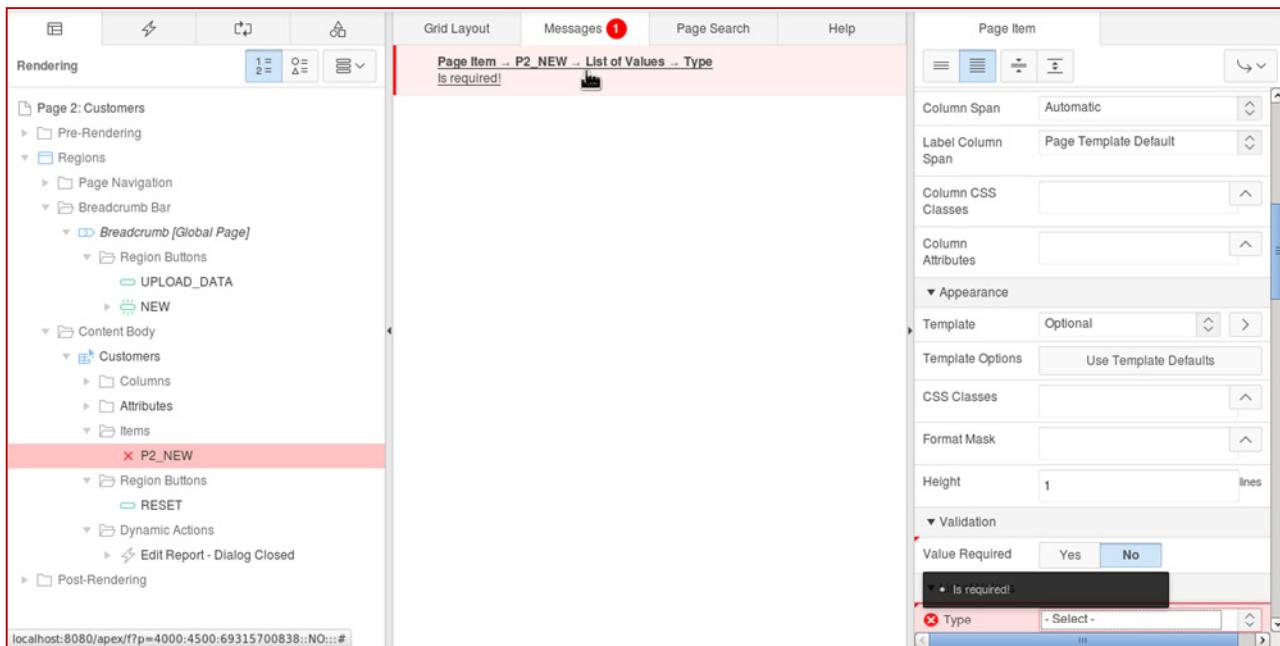
**Note:** Hidden items are not displayed in Grid Layout, but are displayed in the Rendering tree.

# Understanding Page Designer UI Elements: Central Pane: Gallery



The Gallery is displayed at the bottom of the Grid Layout pane and features three tabs: **Regions, Items, and Buttons**. By default, only supported controls and components appear. When you pass the cursor over a control or component, a tooltip is displayed that describes it. You can add new controls and components to a page by selecting them in the Gallery and dragging them into Grid Layout.

# Understanding Page Designer UI Elements: Central Pane: Messages

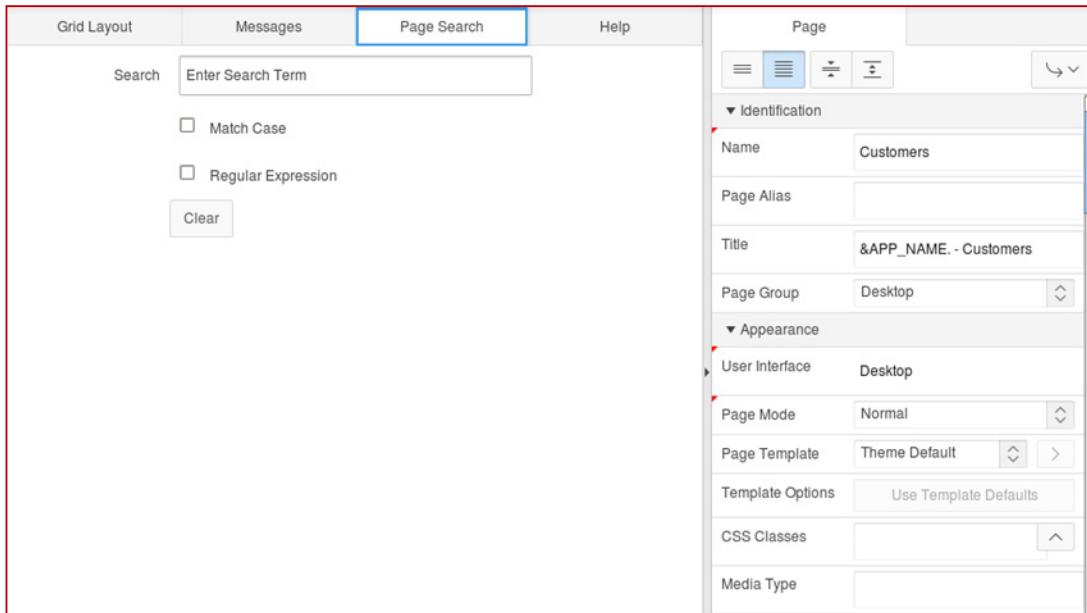


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When you create components or edit attributes in Page Designer, Messages notify you of errors and warnings that you need to address. The Messages tab displays a red or yellow badge indicating the number of messages you need to address. The Message tab displays two types of messages:

- **Errors:** Error messages are displayed in red. Selecting an error message displays the associated attribute in red in the Property Editor. You must address errors before a page can be saved.
- **Warnings:** Warning messages are displayed in yellow. Selecting a warning message displays the associated attribute in yellow in the Property Editor. You can save a page without addressing warning messages.

# Understanding Page Designer UI Elements: Central Pane: Page Search

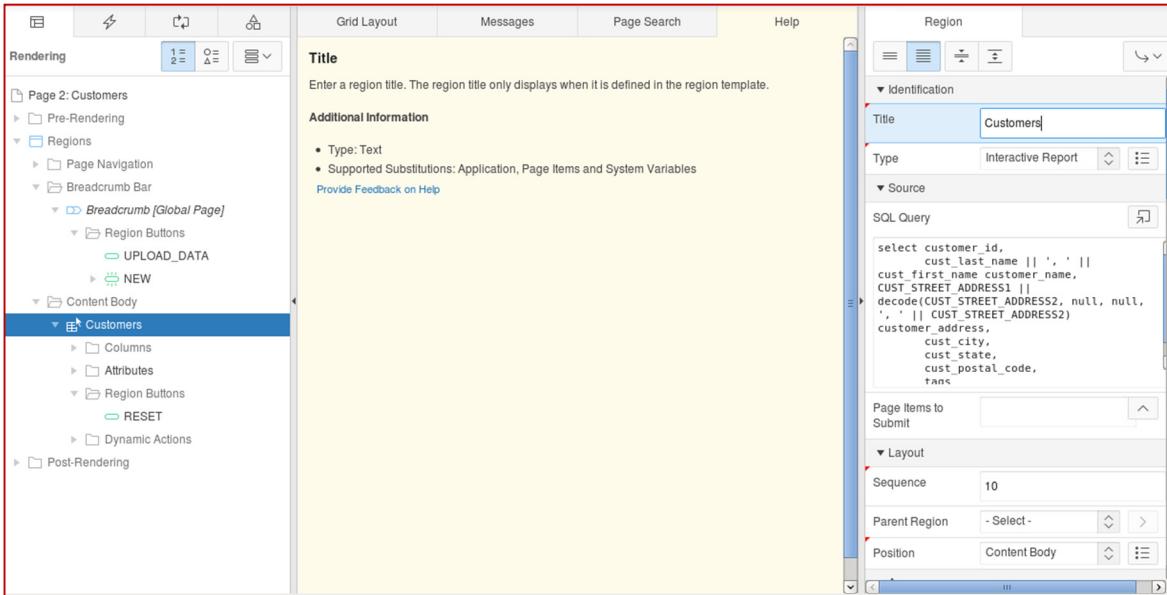


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Page Search displays to the right of Messages in the central pane. Use Page Search to search all page metadata including regions, items, buttons, dynamic actions, columns, and so on. To search a page, enter a search terms in the field provided. To match the case, select **Match Case**. To search for a regular expression, select **Regular Expression**.

# Understanding Page Designer UI Elements: Central Pane: Help



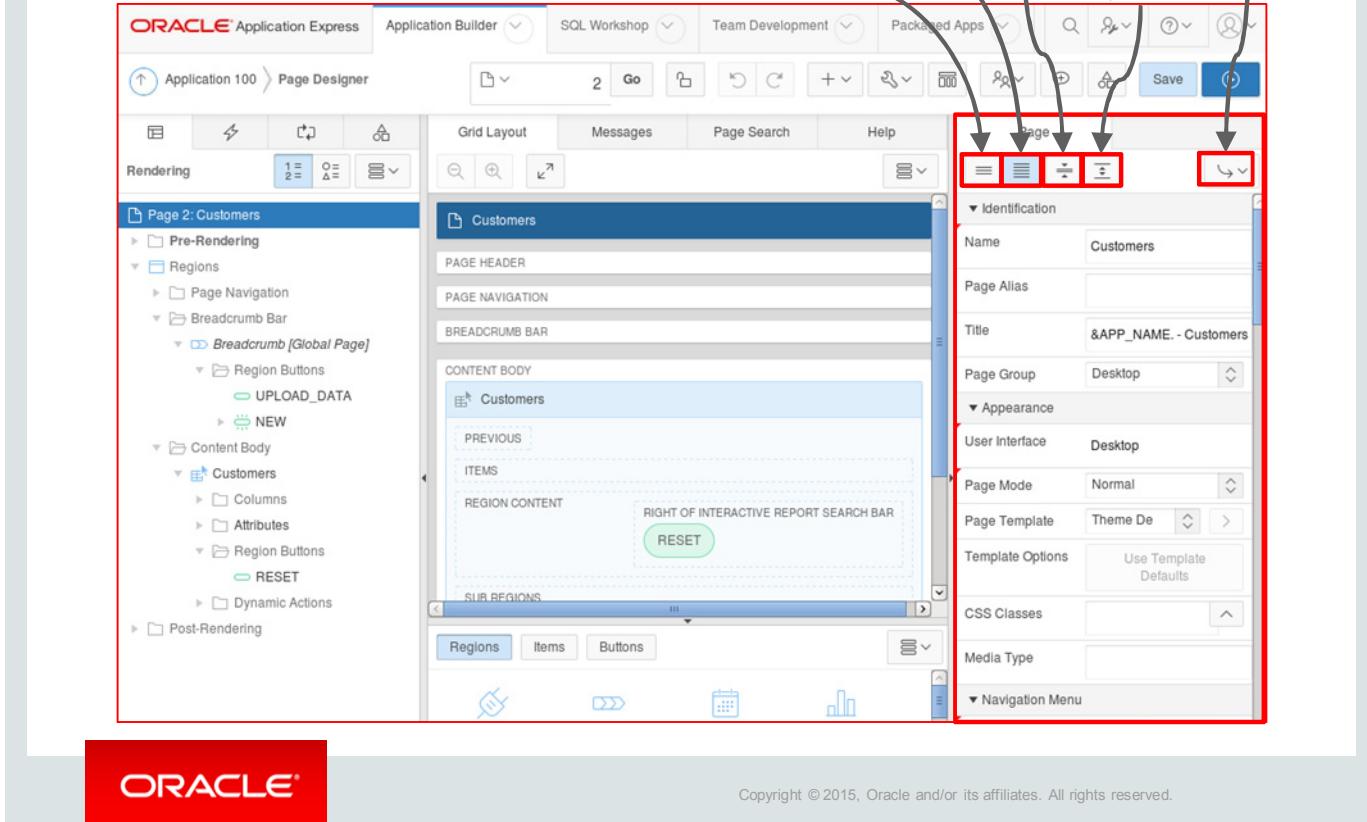
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Page Designer includes Help for every Property Editor attribute. To view Help, select the attribute and click the **Help** tab. After you activate the Help pane, the content that is displayed changes every time you select another attribute.

# Understanding Page Designer UI Elements:

## Property Editor

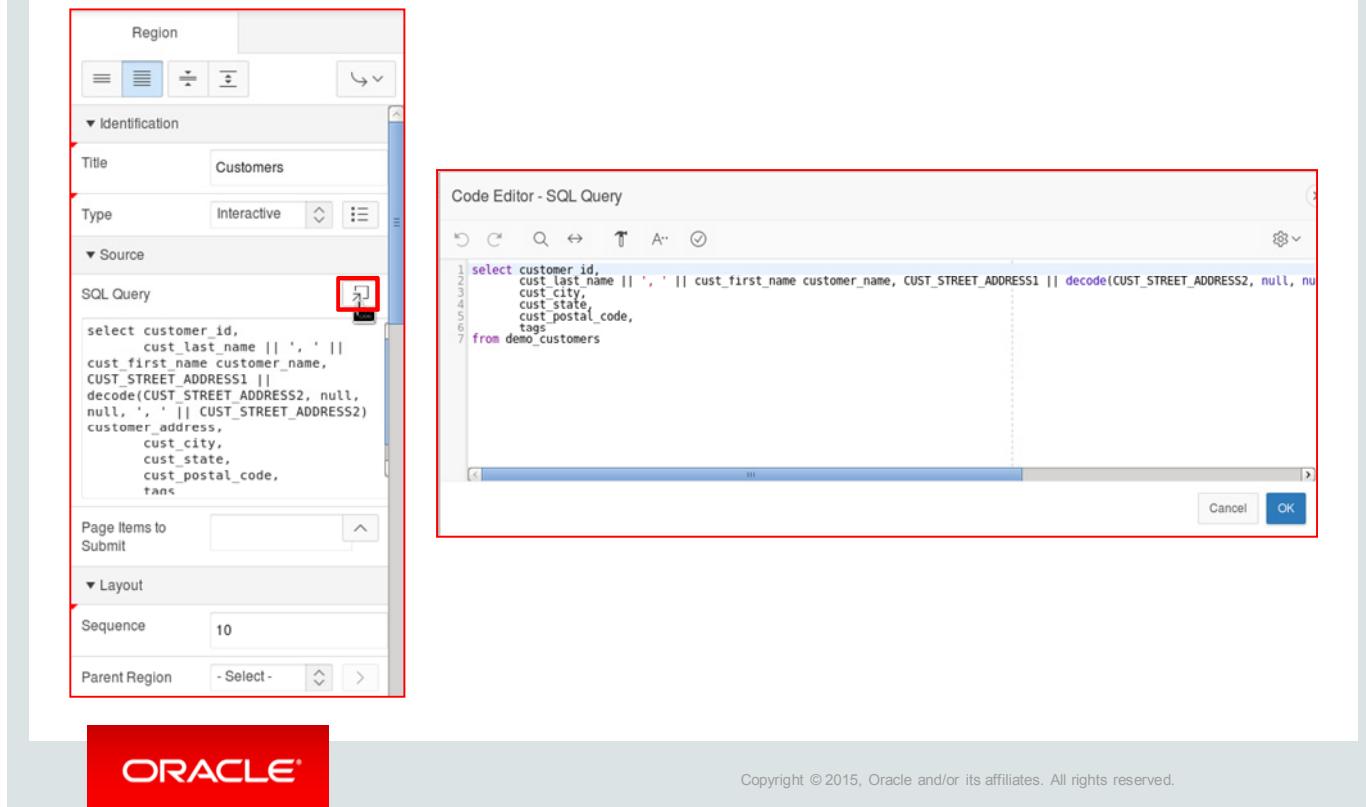


The Property Editor is displayed in the right pane. It displays all attributes for the current component. As you select different components in either Tree View or Grid Layout, the Property Editor automatically updates to reflect the current selection. Attributes are organized into functional groups that describe their purpose. Required attributes display a red triangle in the upper-left corner above the attribute label.

You can control the amount of information that is displayed using the following buttons at the top of the pane:

- **Show Common:** Displays only those attributes for which the default value has changed or are commonly edited
- **Show All:** Displays all attributes (default)
- **Collapse All:** Shows only functional group headings
- **Expand All:** Shows all attributes under each group heading
- **Go to Group:** Displays the first attribute in the group that you select

# Understanding Page Designer UI Elements: Property Editor: Code Editor

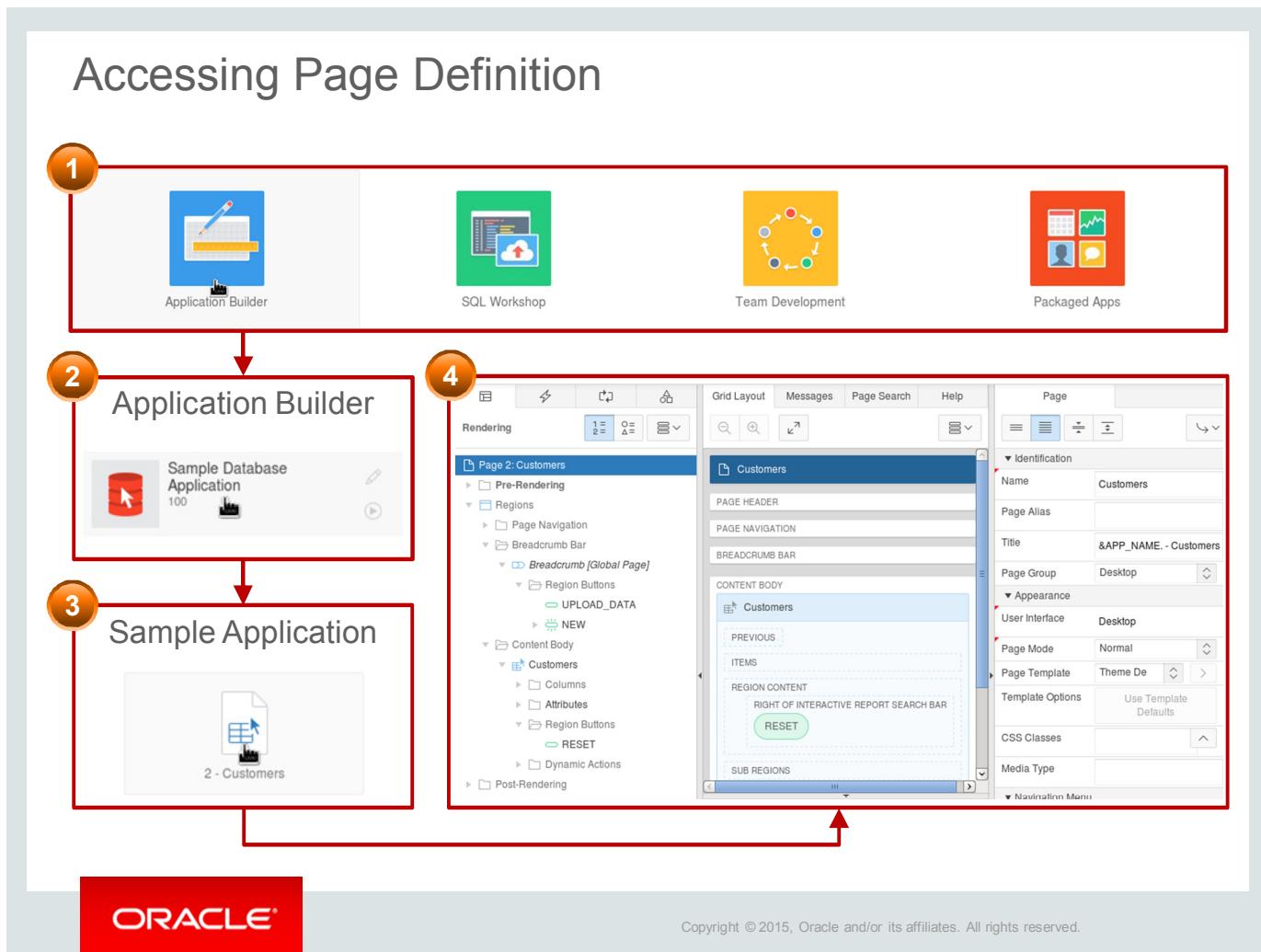


For attributes requiring large amounts of code (for example, a Region Source), you can:

- Enter text directly into the field
- Click **Code Editor** to enter text into a full featured code editor

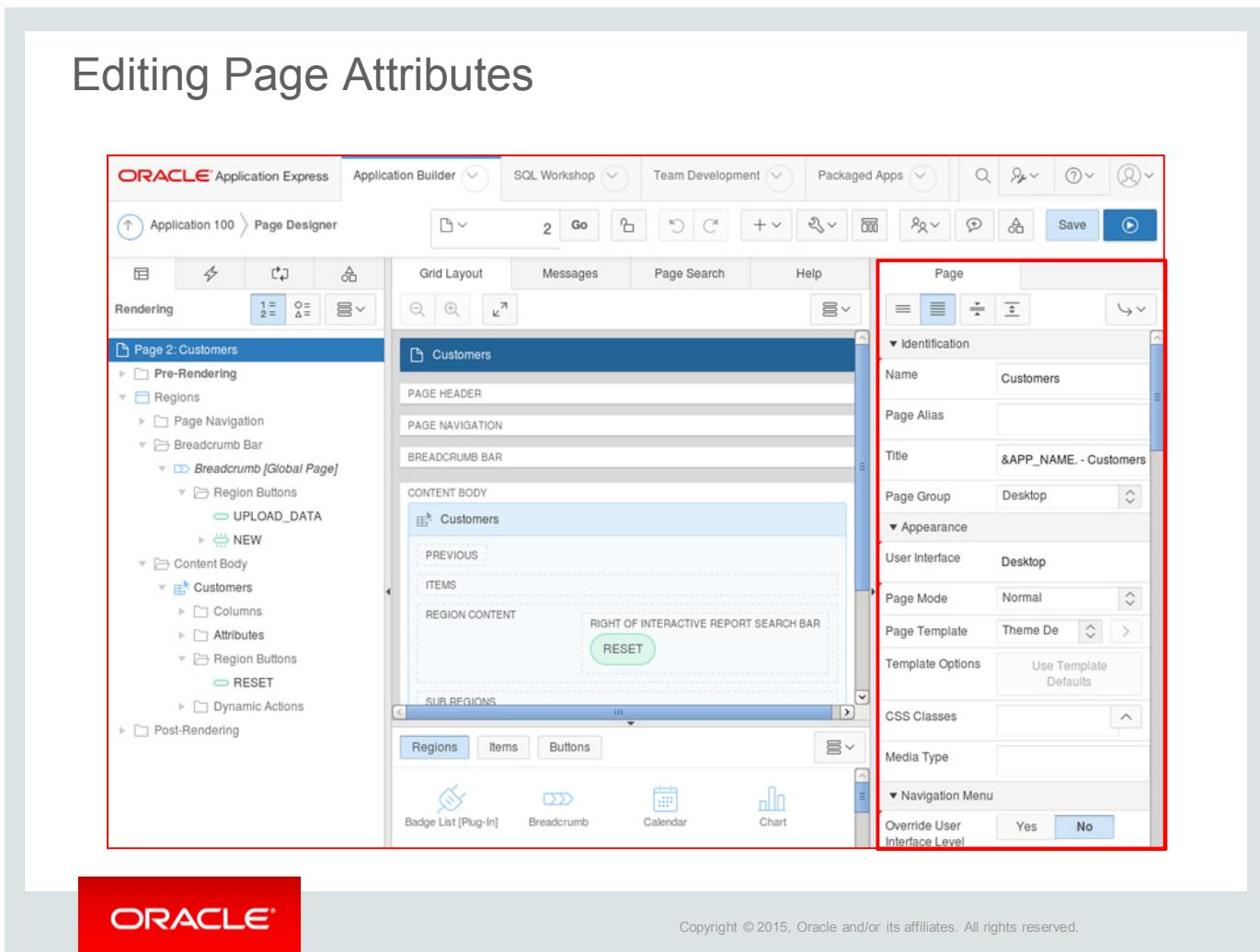
A Code Editor is displayed as a modal dialog. You use the Code Editor to edit attributes requiring a large amount of code. The Code Editor provides an enhanced code editor to edit PL/SQL, SQL, HTML, CSS, and JavaScript component properties. The code highlighting is determined by the input required for the specific property.

Key features of the Code Editor include Undo, Redo, Find, Replace, Query Builder, Autocomplete, Validate, Syntax highlighting, Block indent and unindent, and Resize dialog box.



You use the Page Definition to view, create, and edit the components of a page. To access the page definition for a page, perform the following steps:

1. On the Oracle Application Express home page, click the Application Builder icon.
2. On the Application Builder page, click the application that you want to access.
3. On the selected application page, click a page to view its definition.
4. The page definition is displayed.



To edit page attributes, perform the following steps:

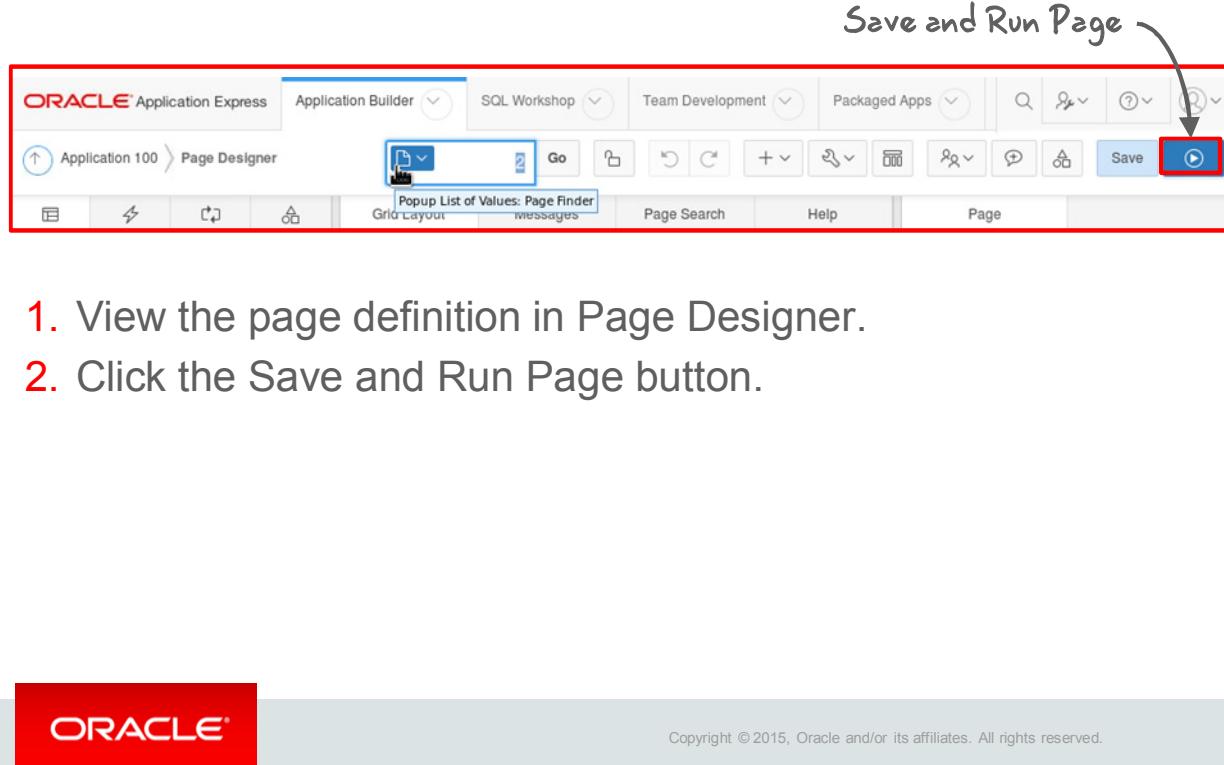
1. View the page definition in Page Designer.
2. In either the Rendering Tree or Grid Layout, select the page name. The page name is selected by default when you access the Page Definition. The Property Editor displays the page attributes.
3. Edit the appropriate attributes in the Property Editor.

A few attributes of the Page are listed below:

- **Name:** It identifies the name of the current page for application developers. This name is used in numerous pages and reports, along with the page number and page title.
- **Page Alias:** Enter an alphanumeric alias for this page. This alias must be unique with the current application. For example, if you were working on page 1 of application 100, you could create an alias called home. You could then access this page from other pages using the following f?p syntax: f?p=100 : home
- **Title:** Enter a title to be displayed in the title bar of the browser window.
- **Page Mode:** Select a page mode (Normal, Modal Dialog, and Nonmodal Dialog).

To learn more about an attribute, use the Help tab in the center pane.

## Running a Page



1. View the page definition in Page Designer.
2. Click the Save and Run Page button.

The Application Express engine dynamically renders and processes pages based on data stored in database tables. To view a rendered version of an application, you run or submit it to the Application Express engine.

To run a page:

1. View the page definition in Page Designer.
2. Click the **Save and Run Page** button in the upper-right corner.

**Note:** You cannot run Modal and Nonmodal dialog pages directly using the Save and Run Page button. To view a Modal and Nonmodal dialog page, run the normal page that is responsible for opening the dialog page and access it from there.

## Runtime Developer Toolbar



- **Home:** Links to the Workspace home page
- **Application:** Links to the Application home page
- **Edit Page:** Opens the current page in edit mode
- **Session:** Opens the session state information
- **View Debug:** Displays the Debug reports
- **Debug:** Toggles the page between **Debug** and **No Debug** mode
- **Show Grid:** Toggles between **Show Grid** and **Hide Grid**
- **Quick Edit:** Enables developers to enter the Quick Edit mode
- **Theme Roller:** Enables developers to easily customize the appearance of an application

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When you run a desktop application from Application Builder, the Runtime Developer toolbar is displayed at the bottom of any editable running page. Use the Developer toolbar to quickly edit the current application or currently running page, or view session state.

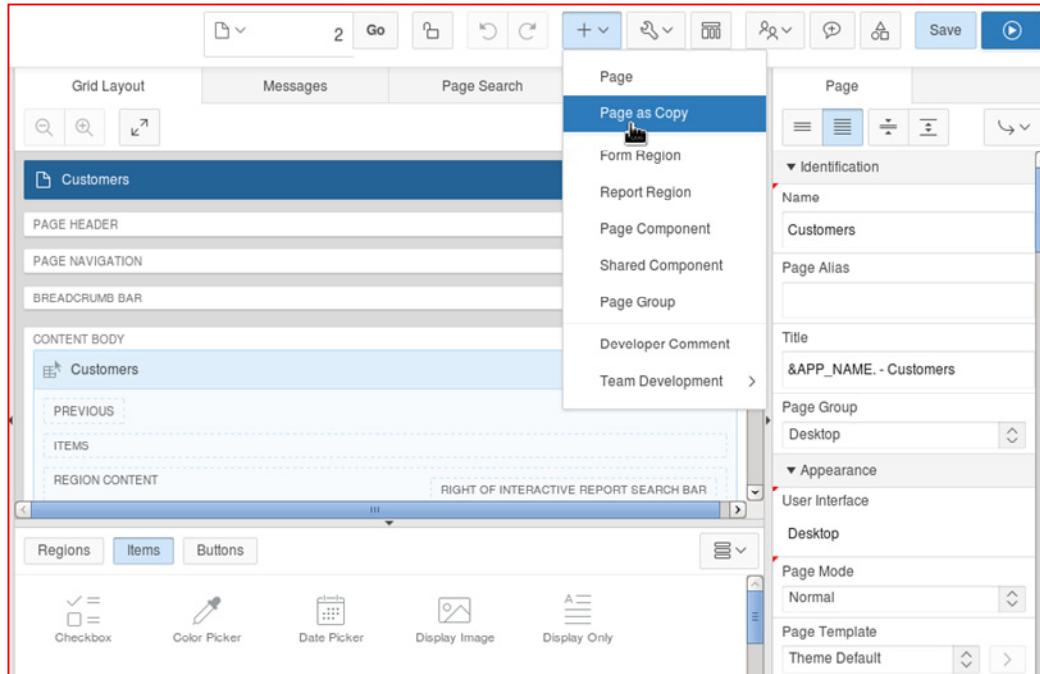
**Note:** The Runtime Developer toolbar is not displayed on locked packaged applications pages or on jQuery Mobile Smartphone pages.

The Developer toolbar consists of the following controls:

- **Home:** Links to the Workspace home page
- **Application:** Links to the Application home page
- **Edit Page:** Opens the current page in edit mode
- **Session:** Opens a nonmodal dialog with the session state information
- **View Debug:** Displays the Debug reports
- **Debug:** Toggles the page between **Debug** and **No Debug** mode
- **Show Grid:** Toggles between **Show Grid** and **Hide Grid**
- **Quick Edit:** Enables developers to enter Quick Edit mode and then select the desired component/item to instantly access it in Page Designer. Press **ESCAPE** or click outside a component to exit Quick Edit mode.

- **Theme Roller:** Enables developers to easily customize the appearance of an application by selecting colors from color picker and setting values. It is only displayed for themes that support Theme Roller.
- **Developer Toolbar Options:** Displays on the far right of the Developer toolbar. You can customize how the Developer Toolbar is displayed by using the following controls:
  - **Auto Hide**
  - **Show Icons Only**
  - **Display Position** (Top, Left, Bottom, Right)

# Copying a Database Application Page



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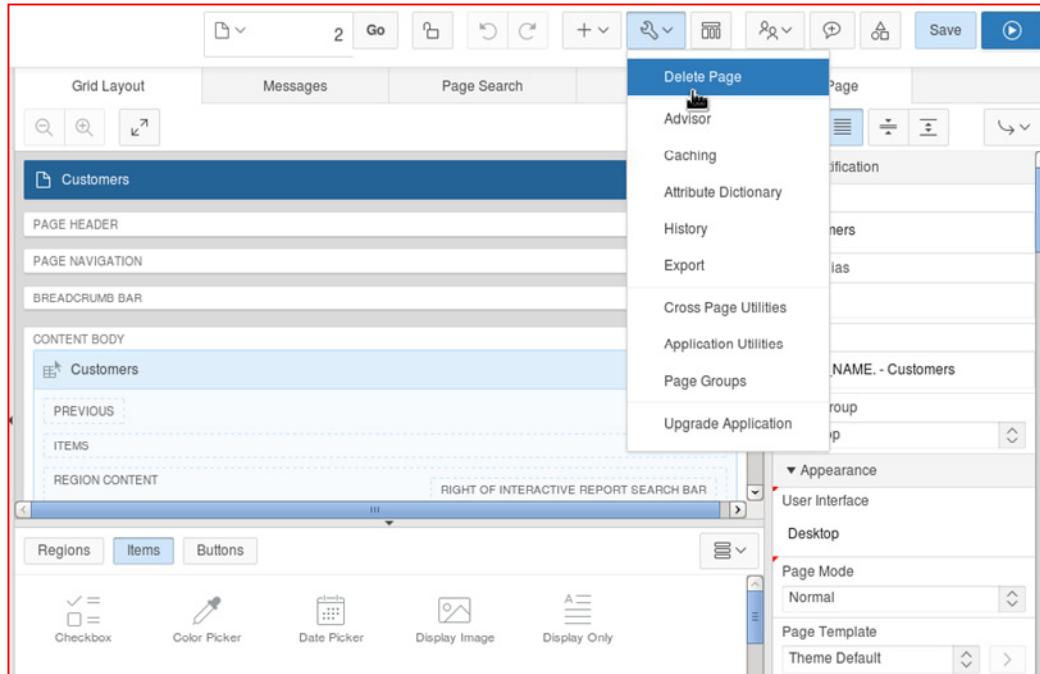
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You can copy a page from the current application or from another application. During the copy process, you can also copy shared components or change mappings to shared components in the target application.

To copy a page:

1. Open the Page Definition of the page you want to copy.
2. On the Page Designer toolbar, click the **Create** menu and then select **Page as Copy**.
3. On Copy Page Option, select one of the following:
  - **Page in this application**
  - **Page in another application**
4. Follow the on-screen instructions.

# Deleting a Page



Deleting a page deletes the corresponding tabs, breadcrumbs, and list entries. To delete a page in Page Designer:

1. View the page in Page Designer.
2. Verify the page number.
3. On the Page Designer toolbar, click **Utilities** and select **Delete Page**.
4. Click **Permanently Delete Page**.

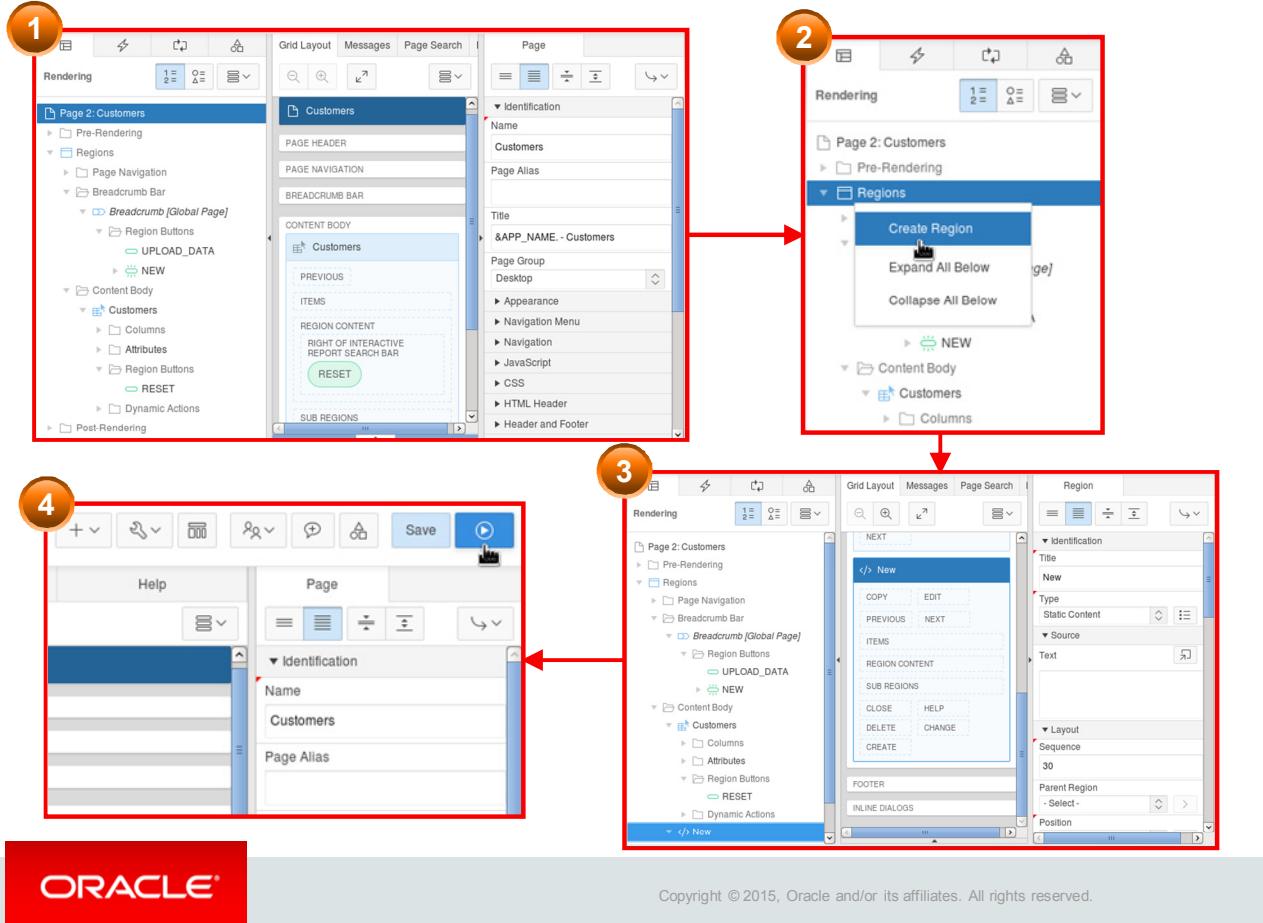
## Lesson Agenda

- Introducing Page Definition
- Working with Page Regions
  - Adding a Region
  - About Region Types
  - Positioning a Region
  - Conditional Display of Regions
  - Viewing and Editing Region Attributes
  - Specifying Region Header or Footer
  - Creating a Region Display Selector
  - Copying Regions
  - Creating a Subregion
- Working with Pages



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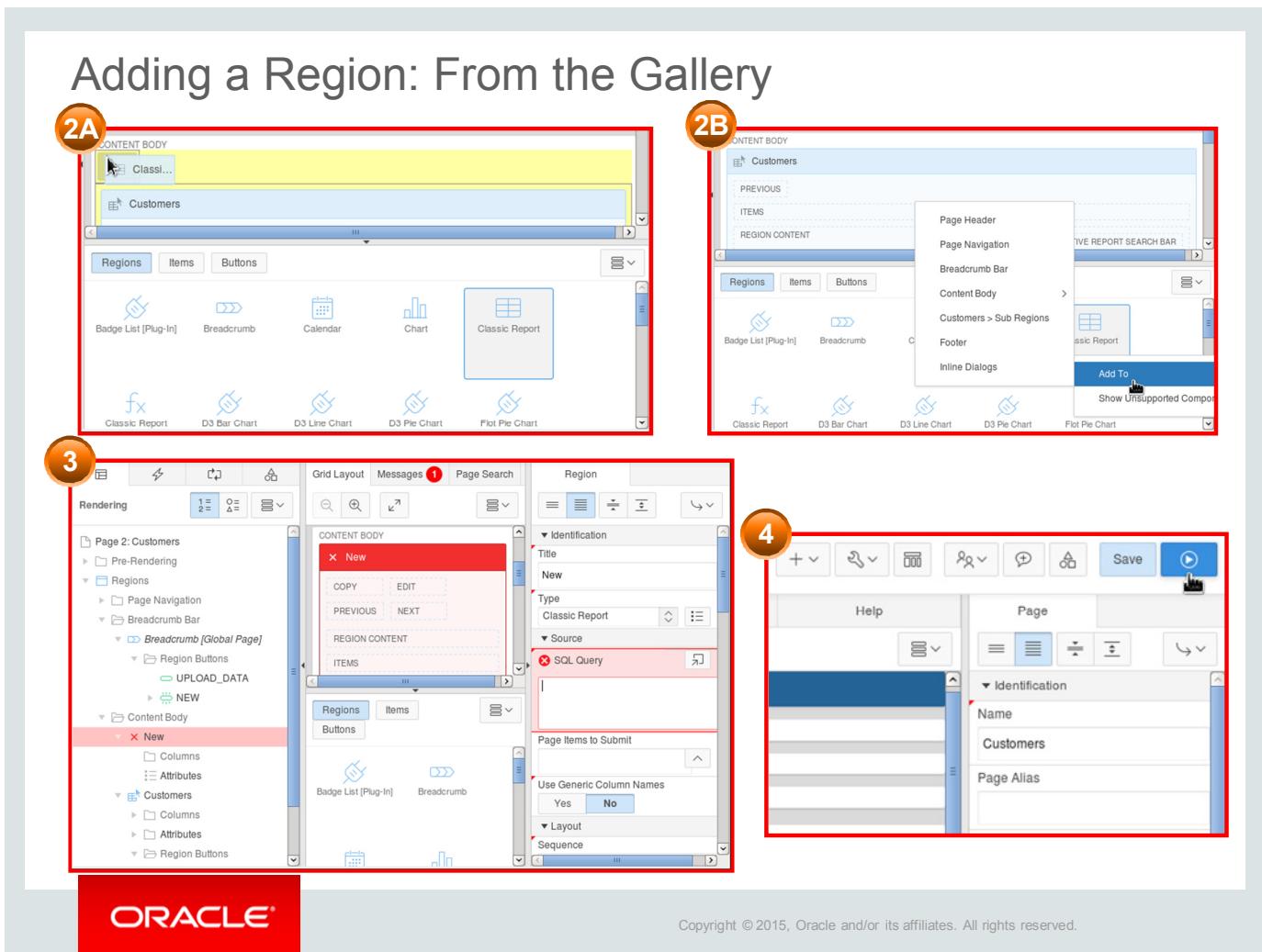
## Adding a Region: From the Rendering Tree



Each page can have buttons and fields (called items) which are grouped into containers called regions. You can add regions to a page from the Rendering tree or from the Gallery.

To add a region from the Rendering Tree, perform the following steps:

1. View the page in Page Designer.
2. In the left pane, right-click **Regions** in the Rendering tab and select **Create Region**.
3. The Region is created. Edit the appropriate attributes in the Property Editor. Required attributes display a red triangle in the upper-left corner above attribute label.
4. Click **Save** or **Save and Run Page**.

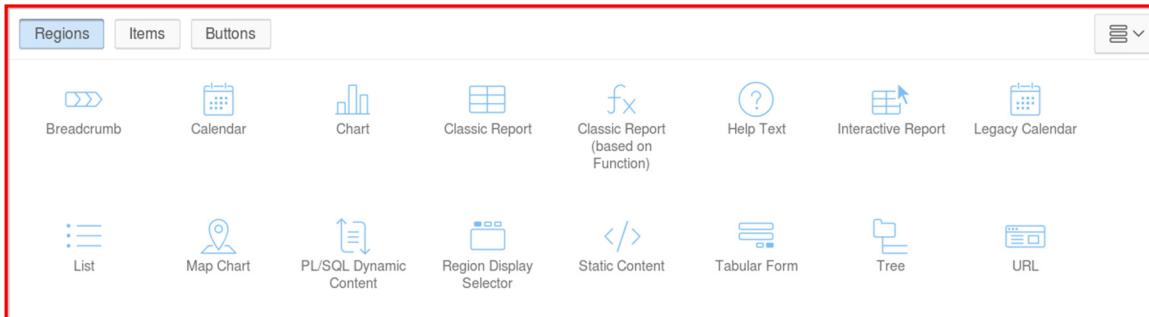


To add a region from the Gallery, perform the following steps:

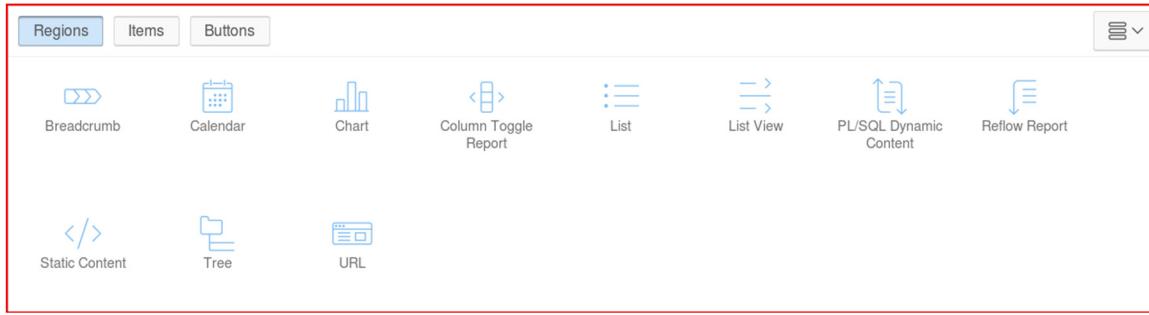
1. View the page in Page Designer.
2. In the Gallery, locate the region you want to add.
  - A. Click and hold the mouse on the component to be created and drag it to the desired location in Grid Layout.
  - B. Or right-click a component to view a context menu. For **Add To**, select the location where you want the region to be added.
3. The Region is created. Edit the appropriate attributes in the Property Editor. Required attributes display a red triangle in the upper-left corner above attribute label.
4. Click **Save** or **Save and Run Page**.

# About Region Types

## Desktop Interface:



## Mobile Interface:



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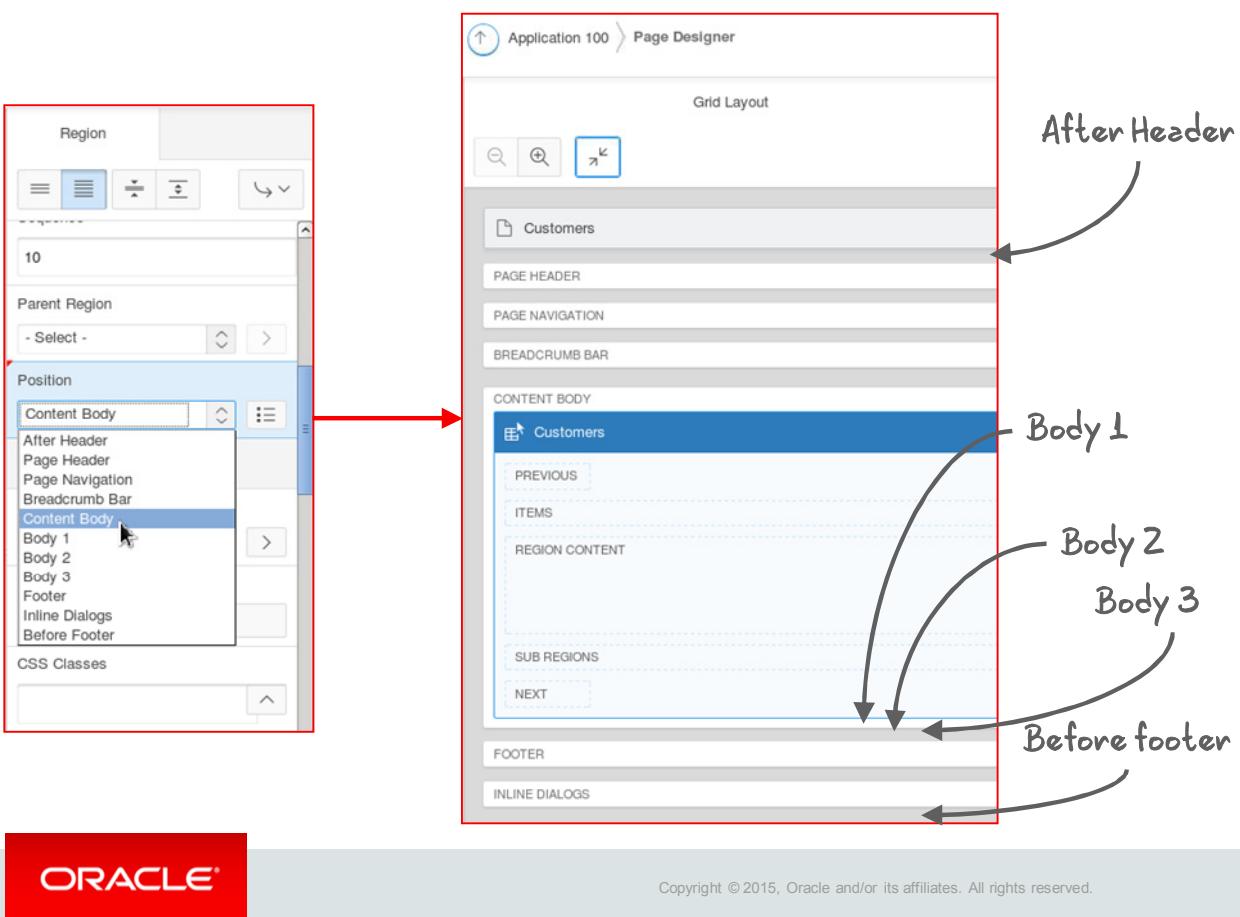
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When you create a region, you select a region type. The Application Express engine interprets a region differently based on the region type you select. The available region types differ depending on the selected user interface (for example, Desktop and jQuery Mobile Smartphone).

- **Breadcrumb:** Creates a region to contain a breadcrumb. Breadcrumbs are a hierarchical list of links.
- **Calendar, Legacy Calendar:** Create a region to contain a calendar with monthly, weekly, daily, and list views
- **Chart:** Creates line, bar, or pie charts based on SQL queries
- **Classic Report, Interactive Report:** Create a formatted result of a SQL query
- **Column Toggle Report, Reflow Report:** Create a responsive report for mobile applications
- **Help Text:** Enables you to provide page-level help for your application
- **List:** Creates a list region containing a shared collection of links
- **List View:** Is optimized to display data and provide easy navigation on smart phones
- **Map Chart:** Creates declaratively defined Flash maps

- **PL/SQL Dynamic Content:** Creates a region based on PL/SQL that enables you to render any HTML or text using the PL/SQL Web Toolkit
- **Region Display Selector:** Enables the display of show hide controls for each region on a page for which region display selection has been enabled
- **Static Content:** Functions as containers for items and contains the HTML you provide. Any HTML you type may contain substitution strings.
- **Tabular Form:** Creates a form to perform update, insert, and delete operations on multiple rows in a database table
- **Tree:** Creates hierarchical navigational control (or tree) based on a SQL query executed at run time
- **URL:** Creates URL-based regions that obtain content by calling a web server using a predefined URL

# Positioning the Region



When you create a region, you must specify its **Position** (Display Point) on the page. You can select either a default position (such as Content Body) or a user-defined position in the template (such as Body 1).

You can also specify the sequence of the region to position the region in relation to other regions on the page.

If you position an item/region to After Header, Body 1, Body 2, Body 3, and Before Footer, it appears as marked in the slide.

**Note:** The Parent Region field is used to create a subregion. You learn to create a subregion later in the lesson.

## Conditional Display of Regions

The screenshot shows the Oracle Application Express Property Editor with two panels side-by-side, both with red boxes highlighting the 'Condition' tab.

- Left Panel:** Shows the 'Condition' tab with the 'Type' dropdown set to 'Select'. A list of condition types is visible, including 'Rows returned', 'SQL Expression', 'PL/SQL Expression', 'PL/SQL Function Body', 'Request = Value', 'Request != Value', 'Request is contained in Value', 'Request is NOT contained in Value', 'Item = Value', 'Item != Value', 'Item is NULL', 'Item is NOT NULL', 'Item is zero', 'Item is NOT zero', 'Item is NULL or zero', 'Item is NOT NULL and NOT zero', 'Item contains no spaces', and 'Item is numeric'. The 'Rows returned' option is selected.
- Right Panel:** Shows the 'Condition' tab with the 'Type' dropdown set to 'Rows returned'. Below it, an 'SQL Query' field contains the SQL statement: 'SELECT cust\_first\_name FROM demo\_customers'. Other tabs like 'Read Only', 'Security', 'Configuration', 'Server Cache', and 'Customization' are also visible.

Both panels have red arrows pointing from the 'Condition' tab to the right panel's configuration area. To the right of the panels is a preview window titled 'Customers' showing a list of five customer records:

Customer Name	Address	City
Dulles, John	45020 Aviation Drive	Sterling
Hartsfield, William	6000 North Terminal Parkway	Atlanta
Logan, Edward	1 Harborside Drive	East Boston
OHare, Frank	10000 West OHare	Chicago
LaGuardia, Fiorello	Hangar Center, Third Floor	Flushing

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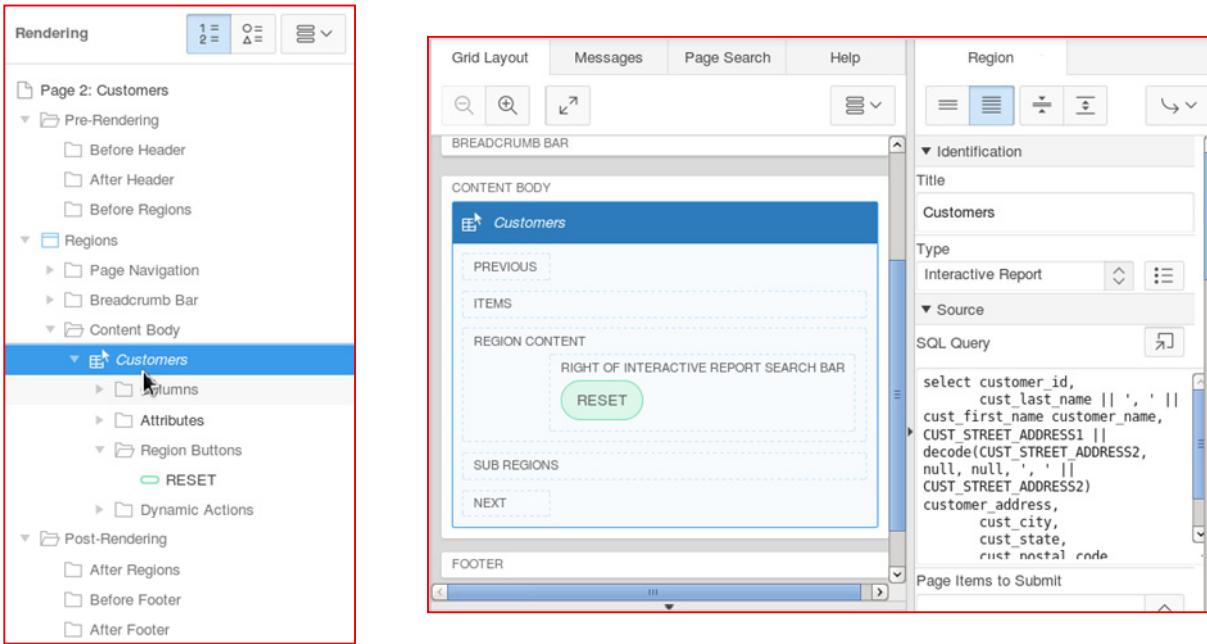
You can display regions conditionally. A condition is a small unit of logic that enables you to control the display of regions, items, buttons, tabs, and other components. When you apply the condition to a component (for example, a region), the condition is evaluated at run time. The component is displayed only if the condition evaluates to true.

You can set the condition by selecting a condition type when you create the component or by editing the component's conditional display attribute. For example, if you want a particular region to be displayed only when the administrator logs in, you can set an appropriate condition for that region. The condition evaluates to true or false based on the values you enter in the expression fields (SQL Query, Item/Value, or Expression).

In the Property Editor, navigate to the **Condition** tab and select the appropriate Type. The slide shows the available condition type. After selecting the condition type, fill in the SQL Query/Item/Value/Expression depending on the Type selected. When you run the page, if the condition evaluates to true, the region is displayed.

In this example, the Region is displayed only if the DEMO\_CUSTOMERS table has records in it.

# Editing a Region



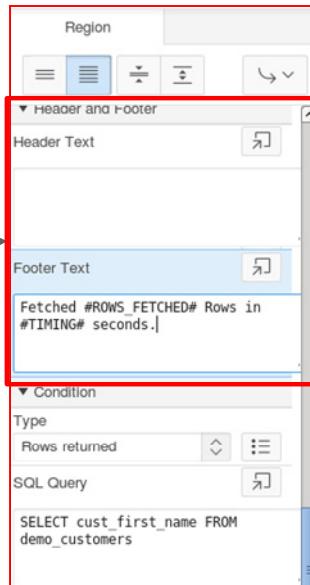
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To edit a region, select the Region you want to edit in the Rendering pane of the Page Designer. Alternatively, you can select the region from the Grid Layout. As soon as you select the region, the Property Editor loads the region attributes in the right pane. Use the Property Editor to edit the attributes and save and run the page.

# Specifying a Region Header and Footer

You can use substitution strings in region headers and footers.



OHare, Frank	10000 West OHare	Chicago
LaGuardia, Florello	Hangar Center, Third Floor	Flushing
Lambert, Albert	10701 Lambert International Blvd.	St. Louis
Bradley, Eugene	Schoephoester Road	Windsor Locks
Shridhar, Priya	XYZ Boulevard	Burlington
Smith, Jack	ABC Boulevard	

Fetched 9 Rows in 0.03 seconds.

9.0.2 Set Screen Header Mode On

This displays the time taken to render the region.

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You can specify additional HTML to be placed above and below a region, or in its header and footer. Substitution strings can be used in region headers and footers.

In the example shown in the slide, the #ROWS\_FETCHED# and #TIMING# substitution strings are used in the region footer. These substitution strings calculate the number of rows fetched in the elapsed time in seconds when rendering a region.

# Creating a Region Display Selector

The screenshot shows the Oracle Application Express (APEX) interface. On the left, the 'Regions' page is displayed, featuring a 'Tabs' region with tabs for 'Customers' and 'Orders'. A red box highlights the 'Region Display Selector' icon in the toolbar below the tabs. On the right, the 'Region' configuration page is open, showing the 'Identification' section with 'Title' set to 'Tabs' and 'Type' set to 'Region Display Selector'. Another red box highlights the 'Region Display Selector' section in the 'Advanced' tab, where 'Yes' is selected for the attribute. Handwritten annotations with arrows point from the text 'Click to view all regions' to the 'Tabs' title and from 'Click to view the Orders region' to the 'Orders' tab.

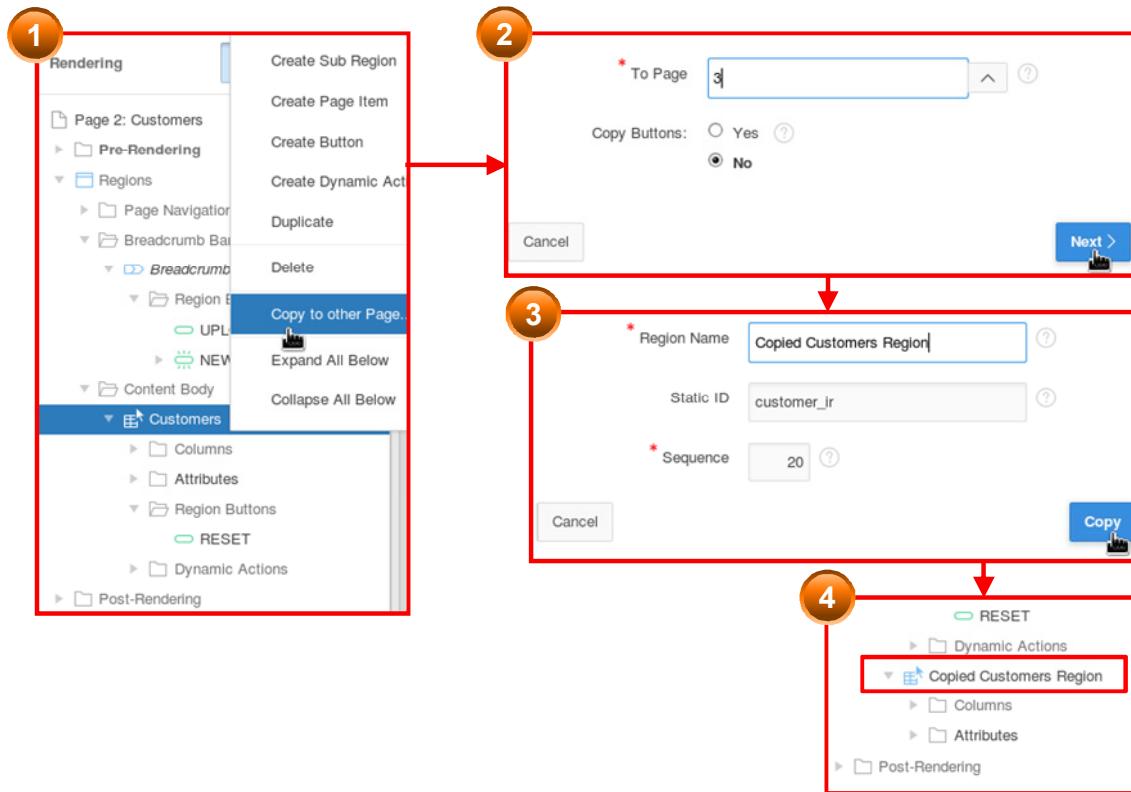
Customer Name	Address
Dulles, John	45020 Aviation
Hartsfield, William	6000 North Te
Logan, Edward	1 Harborside B
OHare, Frank	10000 West C
LaGuardia, Fiorello	Hangar Cente
Lambert, Albert	10701 Lambe
Bradley, Eugene	Schoepheoste

The Region Display Selector region enables you to include show and hide controls for each region on a page.

To create a Region Display Selector:

1. Create a region of type Region Display Selector.
  - From the Gallery, select the region type **Region Display Selector** and drag it to the appropriate location in Grid Layout.
  - Enter a Title for the Region Display Selector and select **Yes** for Advanced > Region Display Selector.
2. For each region to be included in the selector, select **Yes** for the Region Display Selector attribute. Save and run the page.

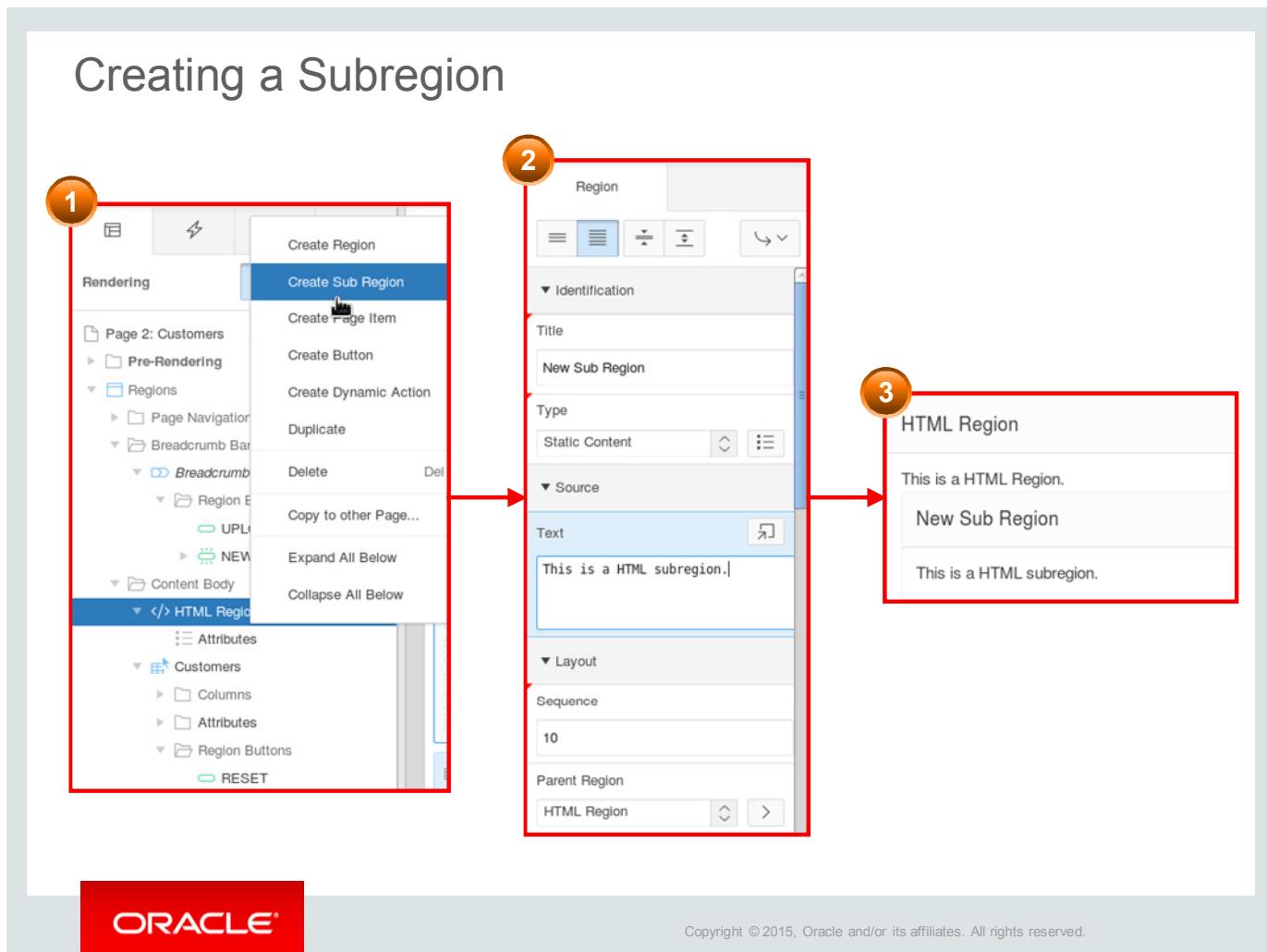
# Copying Regions



You can copy regions from one page to another within an application. When copying, you can include the region items and buttons as well. To copy a region, perform the following steps:

1. In the Rendering pane, right-click the region node and select “Copy to other Page”.
2. Specify the page where you want to copy the region. You also have an option to copy the buttons. Click Next >.
3. Enter the new region name and click Copy.
4. The region is copied to the specified page.

**Note:** There are certain restrictions in Application Express that prevent you from copying a region to another page.



A subregion is a region within another region. To create a subregion, you need to specify a parent region while creating the region. Detailed steps are as follows:

1. In the Rendering pane, right-click the node for the region where you want a subregion and select Create Sub Region.
2. The subregion is created. Specify the region attributes in the Property Editor. Note that the Parent Region field is automatically set to the region node that you selected in the previous step.
3. Save and Run the page.

**Note:** A subregion can also be created by dragging a region from the Regions gallery to inside the parent region.

## Practice 7-1 Overview: Creating and Modifying Pages and Regions

This practice covers the following topics:

- Creating a report region
- Creating a sidebar region
- Editing region attributes, including:
  - Adding a region footer



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## Lesson Agenda

- Introducing Page Definition
- Working with Page Regions
- Working with Pages
  - What Is a Global Page?
  - Creating a Global Page
  - Common Pages for Different User Interfaces
  - Auto-detection of Application Pages
  - Creating and Using Page Groups
  - Copying a Page



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## Global Page

Any item, button, or region on this page is displayed on all the pages in the application.

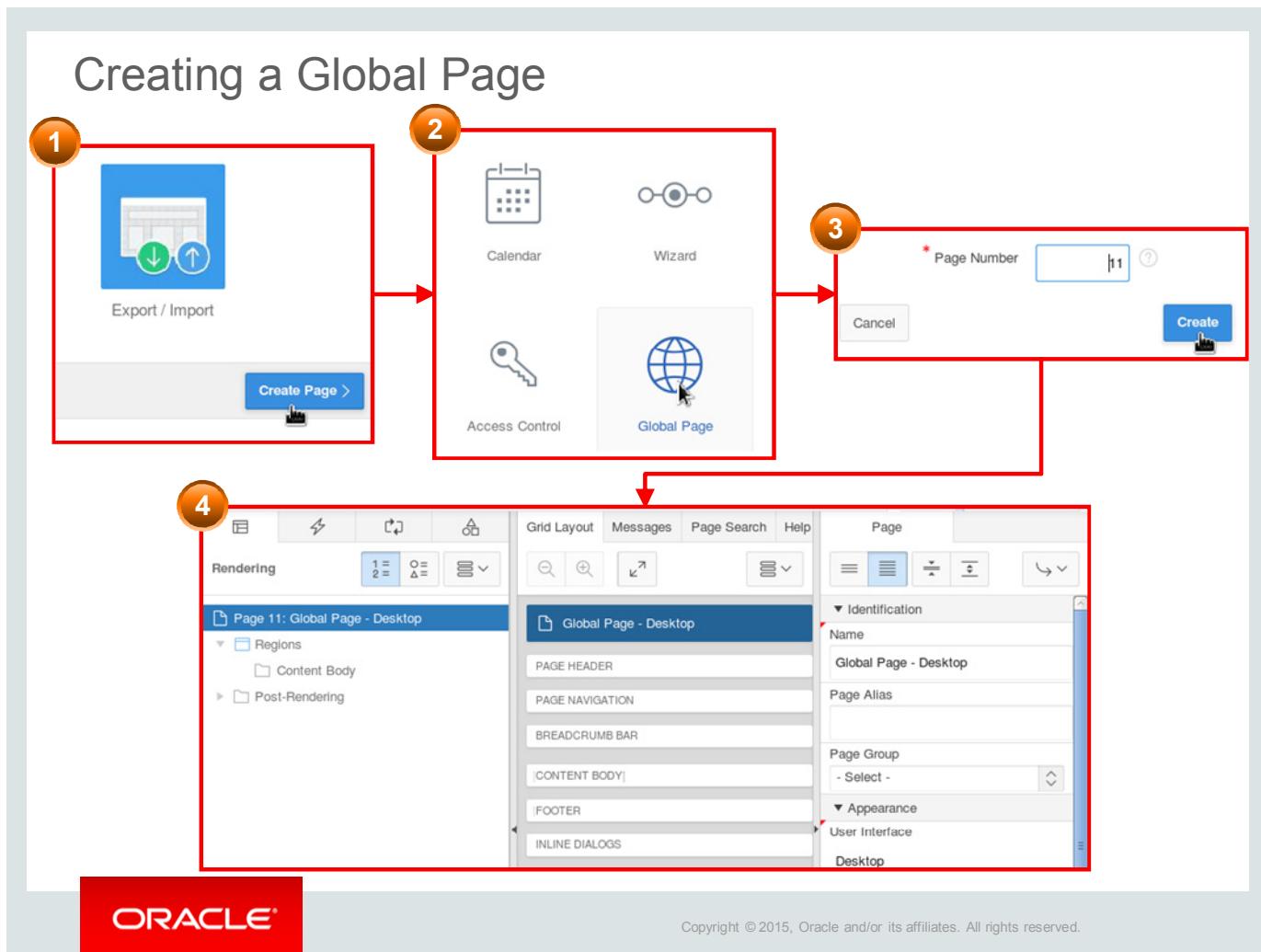
The screenshot shows two views of an Oracle Application Express application. On the left, a 'Global Page' is displayed with a red border around its entire content area. It contains a 'Search' section with a search bar, a 'Browse the Web' section with a link to www.bing.com, and a 'Project Status Report' section with a table showing one row of data. A callout arrow points from the text 'Region created on global page' to the 'Browse the Web' section of the Global Page. On the right, a specific page from the application is shown, also with a red border. This page includes the same 'Browse the Web' section and a table titled 'Project Status Report' with columns for ActionItem Id, ActionItem Assigned To, and ActionItem Name. The table has one row with values 801, Edward Logan, and Validation Test. The Oracle logo is at the bottom left, and a copyright notice is at the bottom right.

The global page of your application functions as a master page. You can add a separate global page for each user interface. The Application Express engine renders all components you add to a global page on every page within your application. You can further control whether the Application Express engine renders a component or runs a computation, validation, or process by defining conditions.

When you create a mobile application, apart from the Home page and the Login page, a Global page is automatically created.

The example in the slide first creates the “Browse the Web” HTML region type on the global page. By defining the region on the global page, the region is displayed on all pages in the application. You can also restrict the region to appear only on certain pages.

You cannot create processes, computations, or branches on the global page.



To create a global page, perform the following steps:

1. Navigate to the application home page and click Create Page >.
2. On the Create Page modal window, select a user interface for the page. If it is a Desktop interface, then select Global Page as the page type. Note that the Global Page option does not appear for a mobile application because it is already created at the time of creating the application. Also, note that the Global Page option appears only if the application does not have a global page already.
3. For Page Number, enter an integer value that identifies a page within the application. For Mobile applications, the Global Page has a default value of 0.
4. The definition of the Global Page opens in Page Designer.

The page definition for a global page looks different from other pages. You cannot run a global page directly.

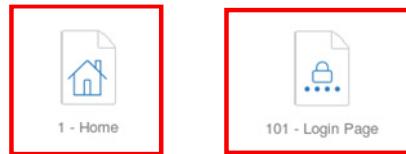
## Practice 7-2 Overview: Working with Global Pages

This practice covers creating a Global desktop page and adding a static HTML region to it.



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## Common Pages for Different User Interfaces



Desktop Application



Mobile Application

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At the time of creating an application, Oracle Application Express creates a set of default pages based on the type of user interface you select for the application.

- **Desktop applications:** Home page and Login page
- **Mobile applications:** Global Page, Home page, and Login page

If you add the mobile user interface to an existing desktop application, then new Global, Home, and Login pages for the mobile user interface will be added to the application.

# Autodetection of Application Pages

The screenshot shows the 'User Interfaces' section of the 'Application 101' configuration page. It lists two entries:

Name	Type	Default	Auto Detect	Global Page	Theme	Theme Style
Desktop	💻	✓		11	Universal Theme - 42	Vita
Mobile	📱		✓	0	Mobile - 51	Default

A red box highlights the 'Mobile' row, and a red arrow points from this row to the 'Attributes' panel below.

**Attributes**

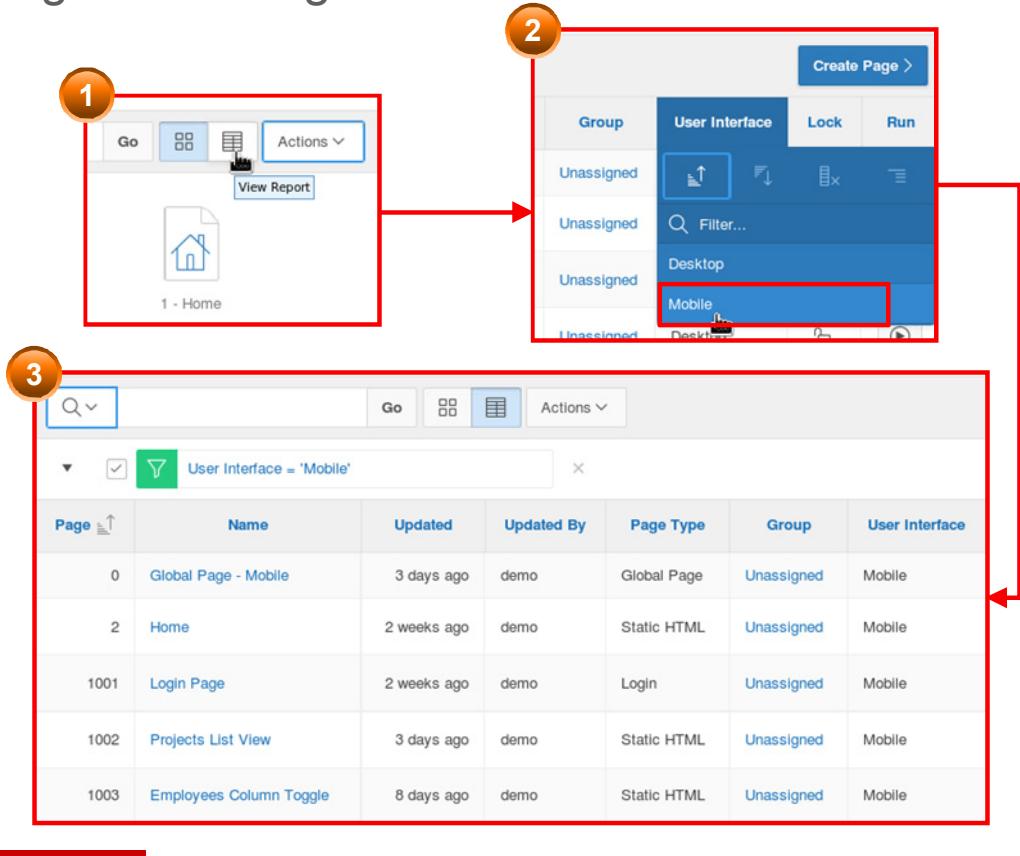
- Auto Detect: Yes
- Default: No
- Home URL: `f?p=&APP_ID.:HOME_JQM_SMARTPHONE:&SESSION.` (highlighted with a red box)
- Login URL: `f?p=&APP_ID.:LOGIN_JQM_SMARTPHONE:&SESSION.`
- Theme: Mobile
- Theme Style: Default

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Application Express can automatically detect application pages on multiple devices. Autodetection is enabled based on the user interface. In the screenshot in the slide, you have two user interfaces: Desktop and jQuery Mobile Smartphone. The Mobile user interface is set to Auto Detect. In addition, the Default is for the Desktop user interface to be displayed. When a user accesses the application, from a desktop or tablet, the Desktop user interface will be displayed. If on a mobile device, the jQuery Mobile Smartphone user interface is displayed. The value of `HOME_JQM_SMARTPHONE` is the page alias of the page that is displayed on a mobile device. Note that you can change this alias to a specific page number in the user interface definition or move the page alias to the desired page.

## Viewing Mobile Pages



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To view all the Mobile pages in your application, perform the following steps:

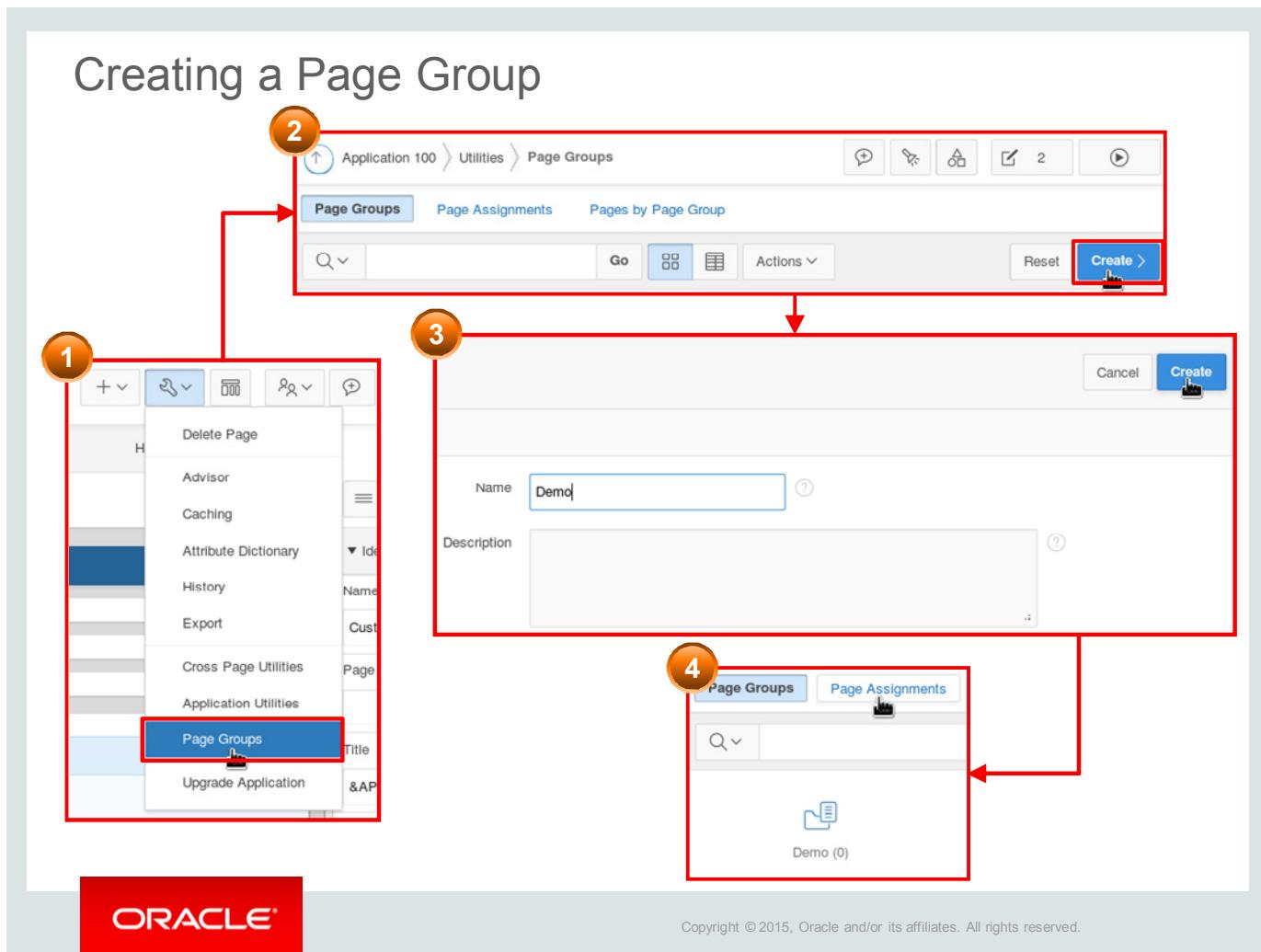
1. In the Application home page, change the view to View Report.
2. Click the User Interface header and select Mobile.
3. If you have both Desktop and Mobile user interfaces in the same application, it is a best practice to have the sequence numbers for all your Mobile pages together. In the example in the slide, all of the mobile pages are in the 1000 sequence series.

## Practice 7-3 Overview: Modifying the Mobile Home Page

This practice covers modifying the Home region on the Mobile Home page.



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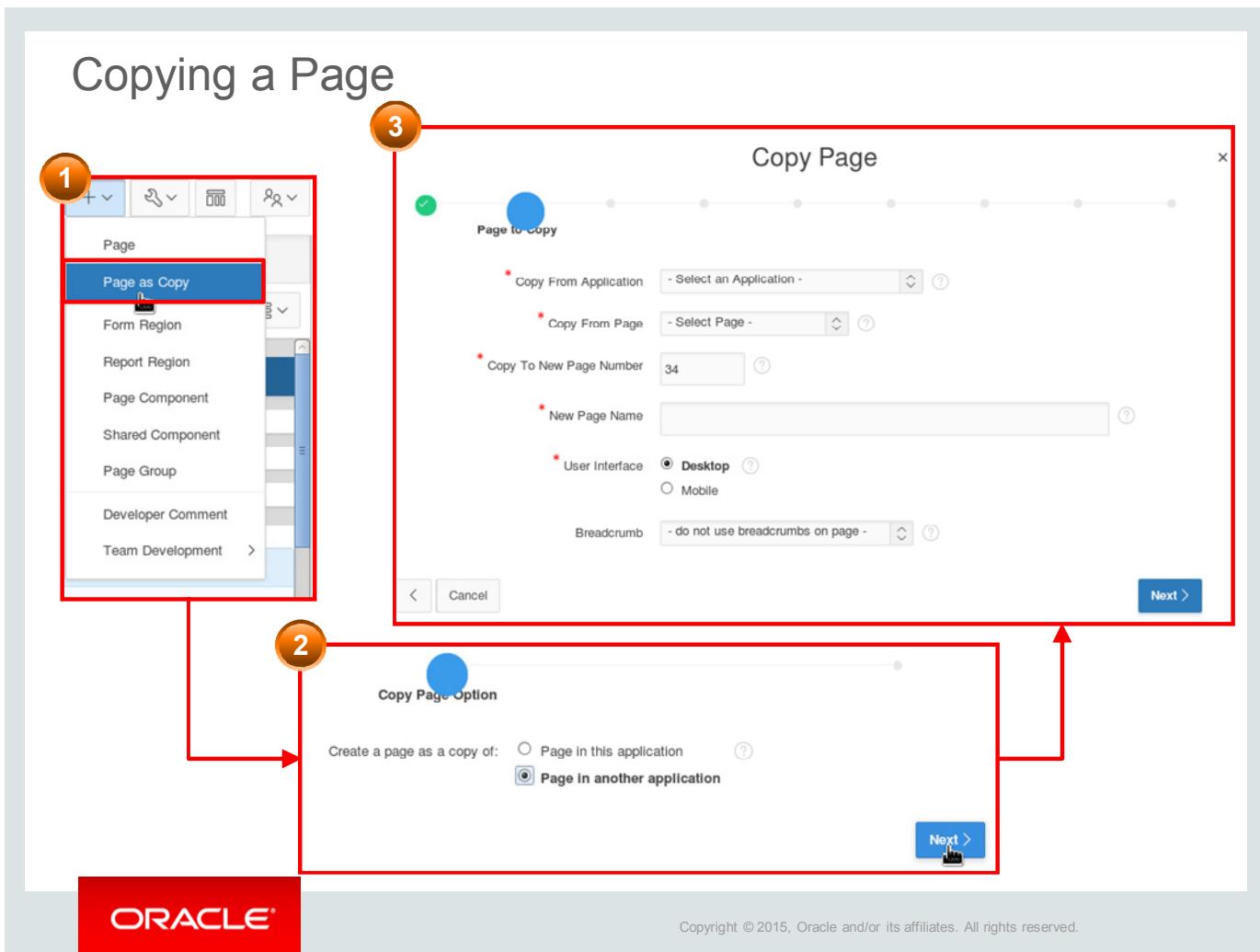
Page groups help you to organize pages. To use page groups, you must create a group, and then assign pages to this group.

To create a group, perform the following steps:

1. From the page definition of any page, click the down arrow on the Utilities button and select Page Groups.
2. Click the Create button.
3. Enter the name of the page group and click Create. The Page Group is created.

To assign pages to a group, click the Page Assignments tab and select the group from the New Group list. Select the check box next to the pages that you want to assign to the group and click the Assign Checked button.

After you have created page groups and assigned pages to them, you can view the page group by clicking "Pages by Page Group."



You can copy pages within an application or from another application. If you are copying a page from another application, that application must reside in the current workspace.

To copy a page from another application, perform the following steps:

1. Click the down arrow on the Create button from the Page Definition of any page. Select "Page as Copy."
2. Select "Page in another application" and click Next.

Follow the wizard instructions. You will be prompted to select the application to copy from, the page to copy, and so on, and whether you want to copy the tabs, templates, and so on from the other page.

## Quiz



A global page is used for:

- a. Performing page processing
- b. Identifying a different template
- c. Displaying a set of items or buttons on all the pages in your application
- d. Calculating session values

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**Answer: c**

## Quiz



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

- a. Each page can have any number of regions.
- b. You cannot copy a page from another application.
- c. You can add developer comments to an application, a page, or a group of pages.
- d. You can choose to display regions conditionally.

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**Answer: a, c, d**

## Summary

In this lesson, you should have learned how to:

- View page definitions
- Edit page attributes
- Create a new region
- View region attributes
- Create a subregion
- Create a global page
- Create common pages for different user interfaces



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In this lesson, you learned about pages and regions. You learned how to create pages and regions, and how to edit their attributes.

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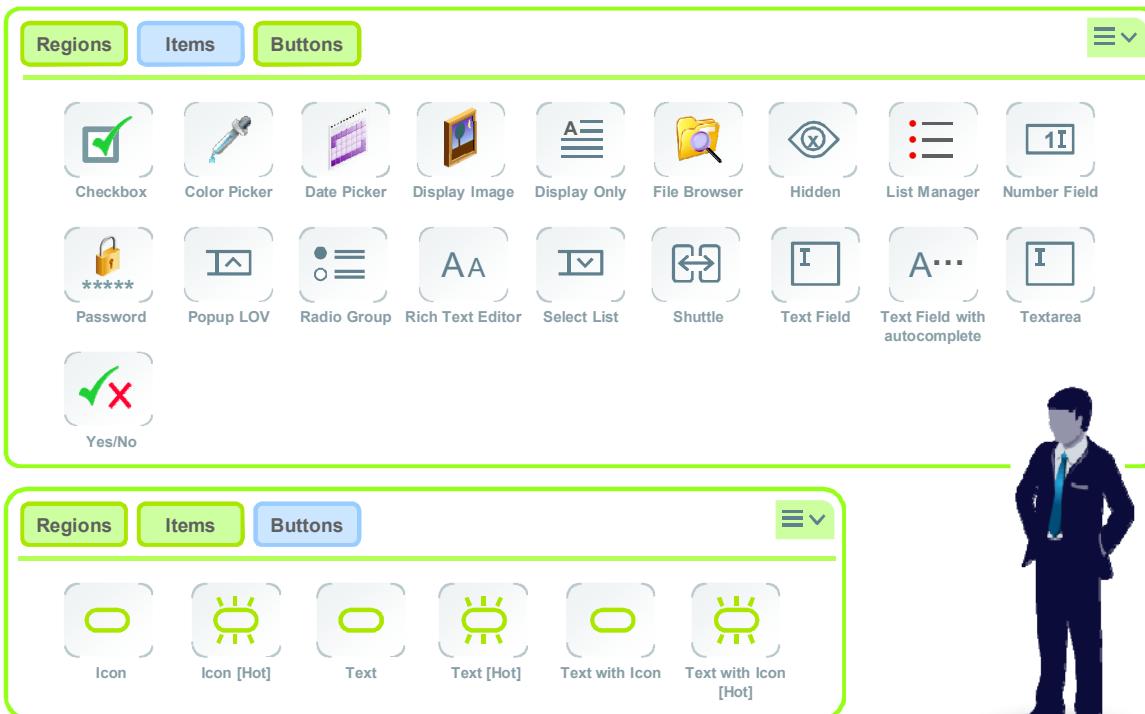
Oracle University and Error : You are not a Valid Partner use only

# Adding Items and Buttons

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## Jack Adds Items and Buttons to Pages

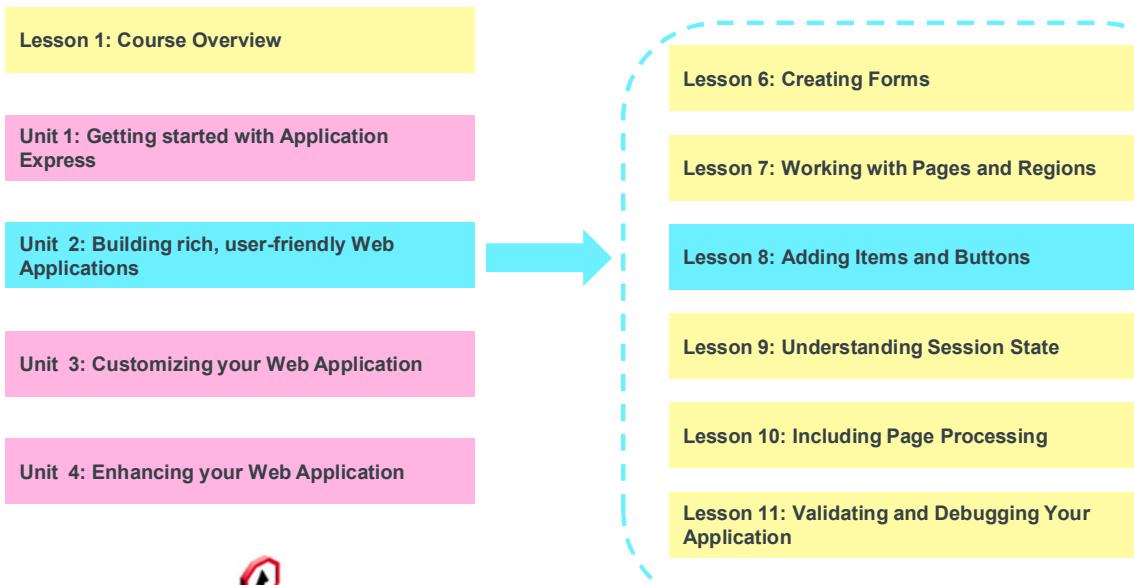


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Jack has the pages in place for the PTS application. However, the pages that he created are not functional. To make the page functional, he plans to add items and buttons to the page. He decides to look up the various items and buttons available in APEX and incorporate them in the PTS accordingly.

# You Are Here in This Course



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

## Objectives

After completing this lesson, you should be able to:

- Identify the different types of items
- Create items and edit item attributes
- Create and use lists of values
- Create buttons and edit button attributes



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In this lesson, you learn how to include items and buttons on application pages. You also learn how to create a list of values (which is a shared component) and associate it with the supported item types.

## Lesson Agenda

- Introducing Items
  - Examples
  - What Are Application Items?
  - Creating a Page Item
  - Types of Page Items
- Using Items
- Creating List of Value (LOV) Type Items
- Using Buttons



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## Items

Items are HTML form elements. There are two categories of items:

- Page-level items
- Application-level items



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Items are HTML form elements such as text fields, select lists, and check boxes with an associated session item. Item attributes affect the display and behavior of items on a page. For example, these attributes can impact where a label displays, how large an item is, and whether the item displays next to or below the previous item.

There are two categories of items: page items and application items. Page-level items are placed on a page and have associated user interface properties. Application-level items are not associated with a page and, therefore, have no user interface properties. An application item can be used as a global variable.

## Page Items: Examples

The screenshot shows a 'Sample Database Application - Product Details' page. Several UI components are highlighted with red boxes and labeled:

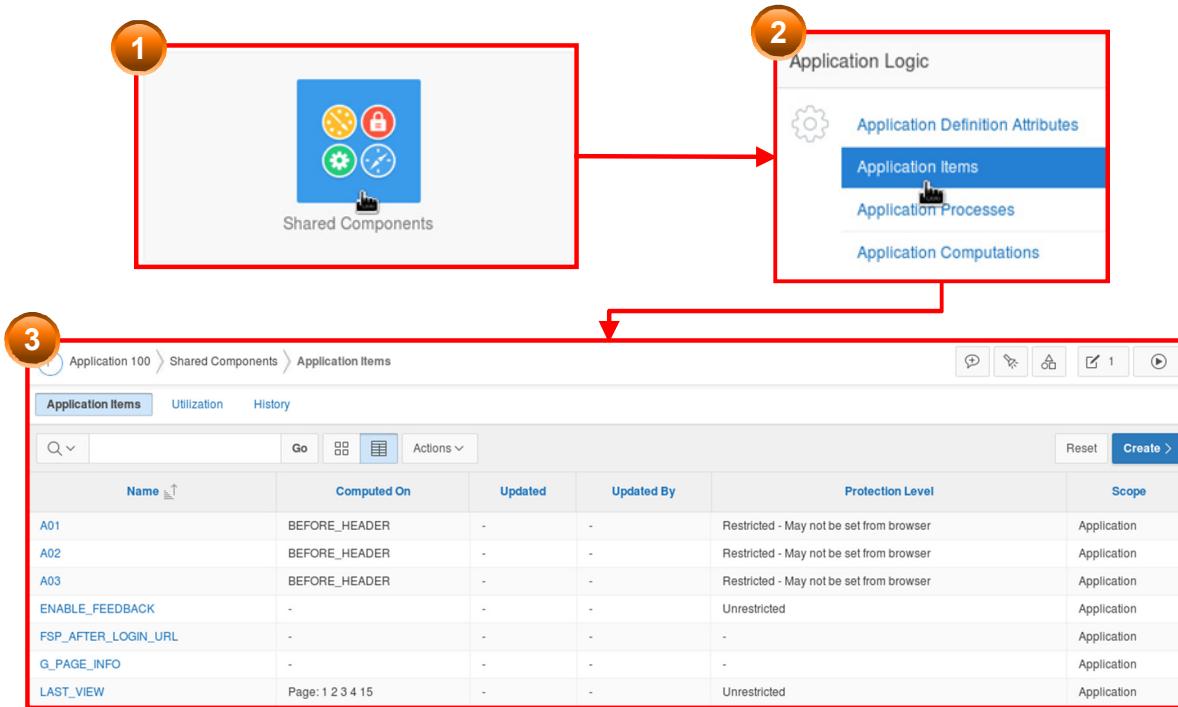
- Select List:** A dropdown menu labeled 'Category' with 'Mens' selected.
- Text Field:** An input field for 'Product Name'.
- Text Area:** A larger input field for 'Product Description'.
- Radio Group:** A group of radio buttons for 'Product Available' with 'Yes' selected.
- File Browse:** A file selection input field for 'Product Image' with a 'Browse...' button.
- Tags:** A simple input field for 'Tags'.
- Pop-up LOV:** A dropdown menu for 'Customer' with 'Existing customer' selected.

At the bottom, there are 'Cancel' and 'Add Product' buttons. The footer contains the ORACLE logo and the text 'Copyright © 2015, Oracle and/or its affiliates. All rights reserved.'

The slide displays some page item examples. An item is part of an HTML form and can be used to store a value in session state so that it can be retrieved at a later time. The examples shown in the slide are page items. Page items are placed on a page and have associated user interface properties, such as Display As, Label, and Label Templates. Another type of item, application items, is discussed in the next slide.

When you create a form by using a wizard, an item is created for each column of the table. The default item type is a text field, text area, number field, date picker, or File Browse depending on whether the database table column type is varchar, varchar2 (with size greater than 255 characters), numeric, date, or BLOB, respectively. You can edit the item properties to change the display type. For example, you can change a text field to a text area or select list.

# What Are Application Items?



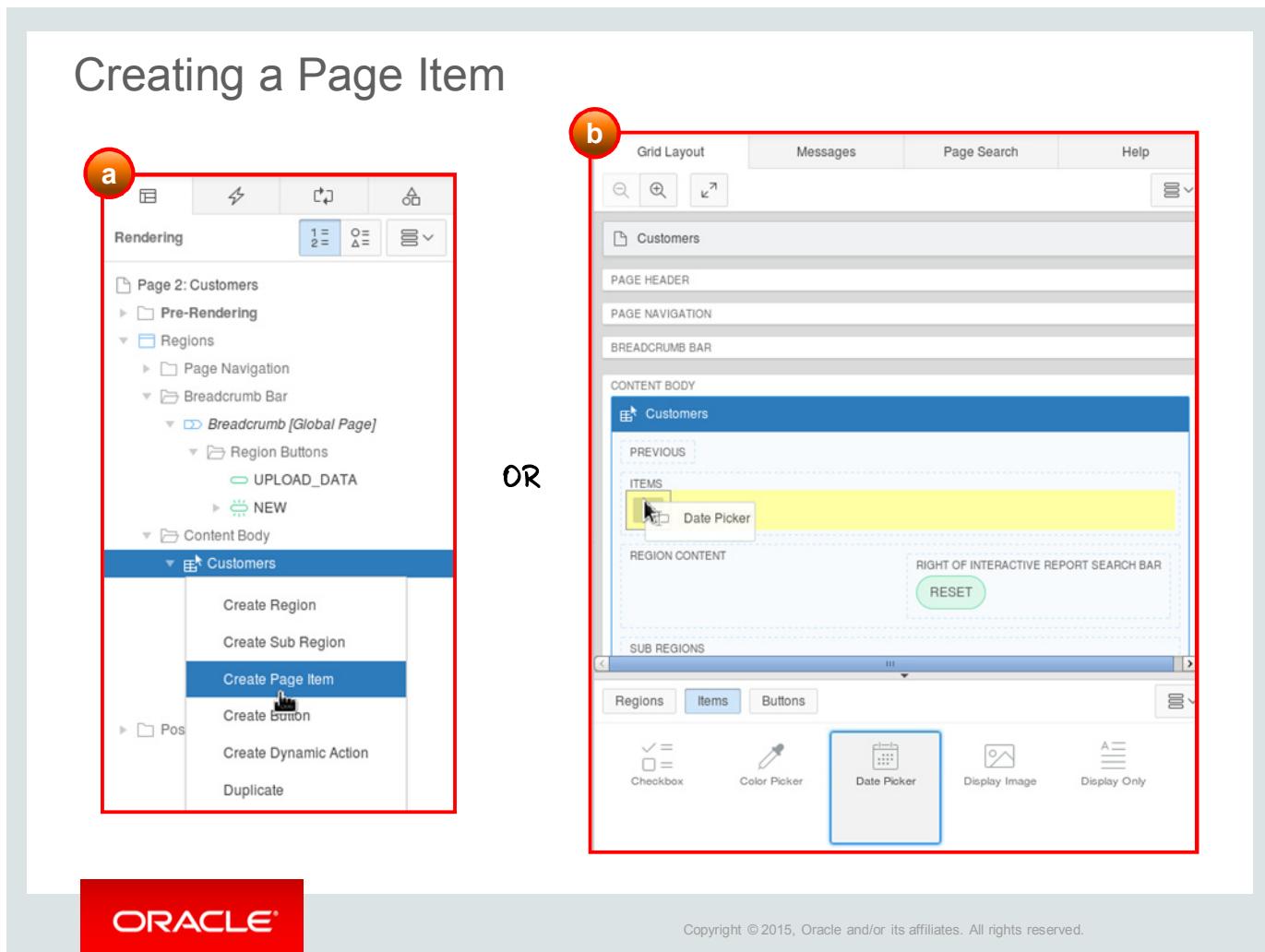
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Application items are not associated with a page and, therefore, have no user interface properties. An application item can be thought of as a global variable. You create an application item from the Application Items page. To access the Application Items page, perform the following steps:

1. Click the Shared Components icon on the application home page.
2. In the Logic pane, click Application Items.  
The Application Items page is displayed.

Application items are typically configured by using processes or computations, or by passing values in a URL. For example, the `FSP_AFTER_LOGIN_URL` application item is used internally by Oracle Application Express to remember the page that users attempted to visit before they were shown the login page. You can click the item icon to view or edit details.

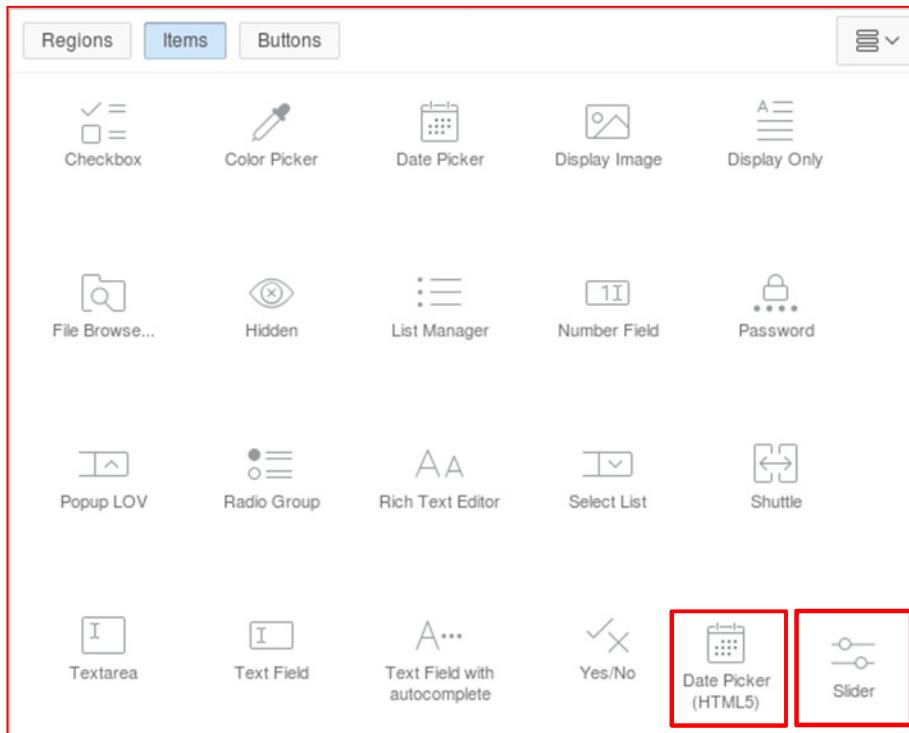


You can Create a Page Item in either of the following ways:

- In the Rendering pane of the Page Designer, right-click the region node where you want to create the item and select Create Page Item.
- Choose the item that you want to create from the Items gallery. Drag it from the gallery to the Grid Layout of the page under the region where you want to create the item.

After either of the above steps, set/edit the property of the item by using the Property Editor (right pane of the Page Designer).

# Types of Page Items



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- **Checkbox:** Is based on a list of values. The value corresponding to a check box is returned in a string delimited by a single colon ( : ).
- **Color Picker:** Renders as a text field with an icon. When the user clicks the icon, a pop-up window appears. When the user makes a selection from the palette, the HTML value for the color selected (for example, #0000000 for black) is returned.
- **Date Picker:** Displays a text field with a calendar icon next to the text field. You can specify a format mask, maximum and minimum date, year range, and so on while creating the item.
- **Display Image:** Displays a specified image
- **Display Only:** Displays a read-only version of a display value
- **File Browse:** Displays a text field with a Browse button. This enables you to locate a file in a local file system and upload it. The files that you upload are stored in a table called `wwv_flow_file_objects$`. Every workspace has access to this table through a view called `APEX_APPLICATION_FILES`.
- **Hidden:** Creates an HTML hidden form element. You can use this item to store session state values.
- **List Manager:** Is based on a list of values. It enables you to manage a list of items by selecting from and adding to a list.

- **Number Field:** Validates the user input and accepts only numerical data
- **Password:** Creates a text field that displays an asterisk for each character entered
- **Popup LOV:** Renders a text field with an icon next to it. A user can click it and select a value from the pop-up window. The list in the pop-up window is driven by a list of values.
- **Radio Group:** Displays an HTML radio group form element based on a list of values
- **Rich Text Editor, Text Area, Text Field:** Allow users to enter textual data. The Text Area field is resizable. Rich Text Editor provides various formatting options. You can specify up to 32,767 bytes for a Text Area or Rich Text Editor item.
- **Select List:** Displays a list of values. The values in the select list are determined by using a shared list of values or a list of values defined at the item level.
- **Shuttle:** Is used to move one or more list elements from left to right
- **Text Field with autocomplete:** Shows data from a table as you enter text in the field
- **Yes/No:** Displays Flip Toggle Switch in Mobile user interfaces and as a select list in nonmobile environments
- **Plug-ins:** Enable developers to declaratively extend, share, and reuse the built-in types available with Oracle Application Express
- **Slider:** Renders slider item type for Mobile applications. This item type enables users to use slide handler to set a value.

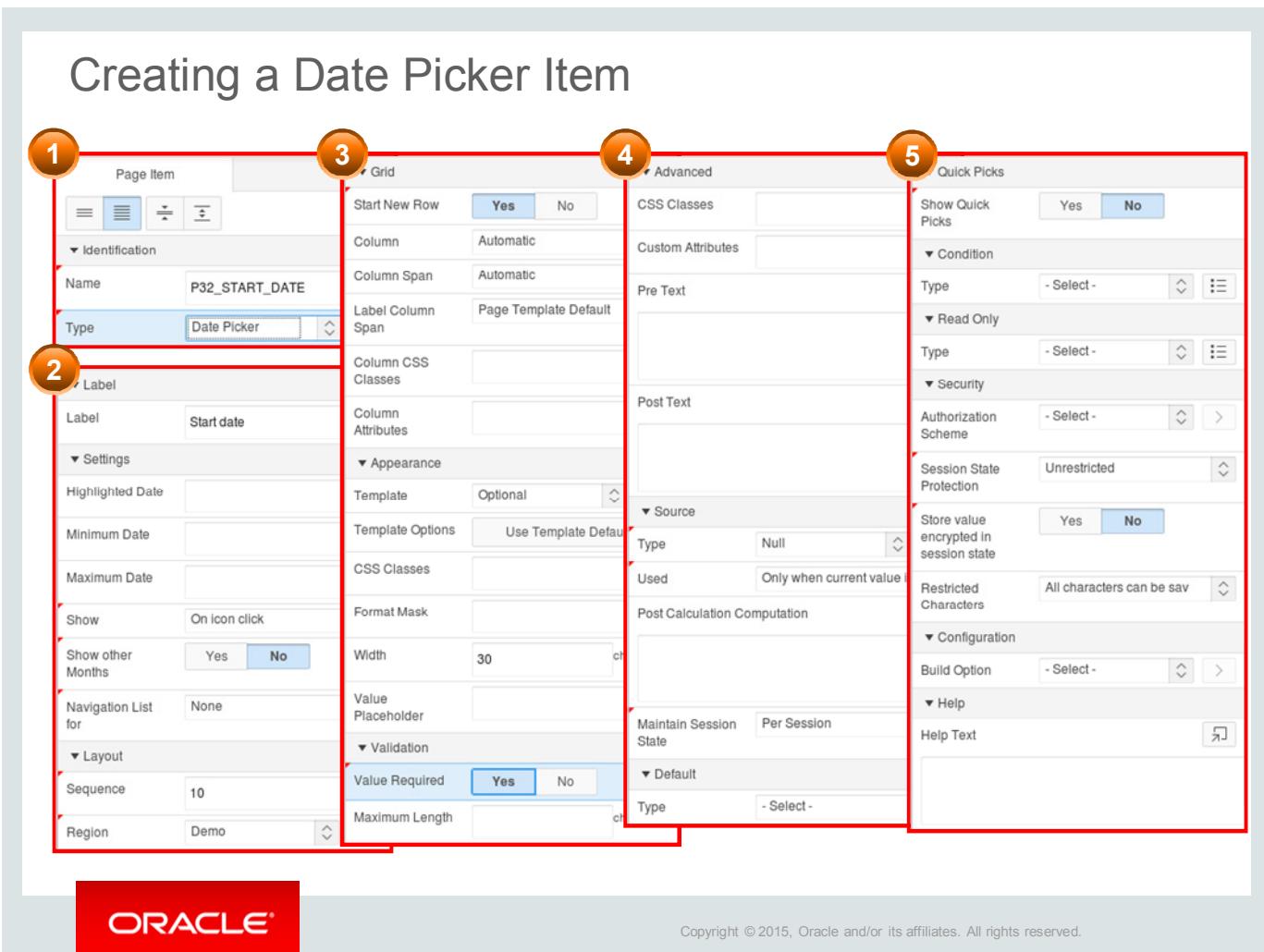
**Note:** You can create a maximum of 100 items on a page.

## Lesson Agenda

- Introducing Items
- Using Items
  - Creating a Date Picker Item
  - Editing an Item
  - Creating Quick Picks
  - Adding Subtypes on Mobile Item Types
- Creating List of Value (LOV) Type Items
- Using Buttons



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You can create a date picker item, in either of the following ways:

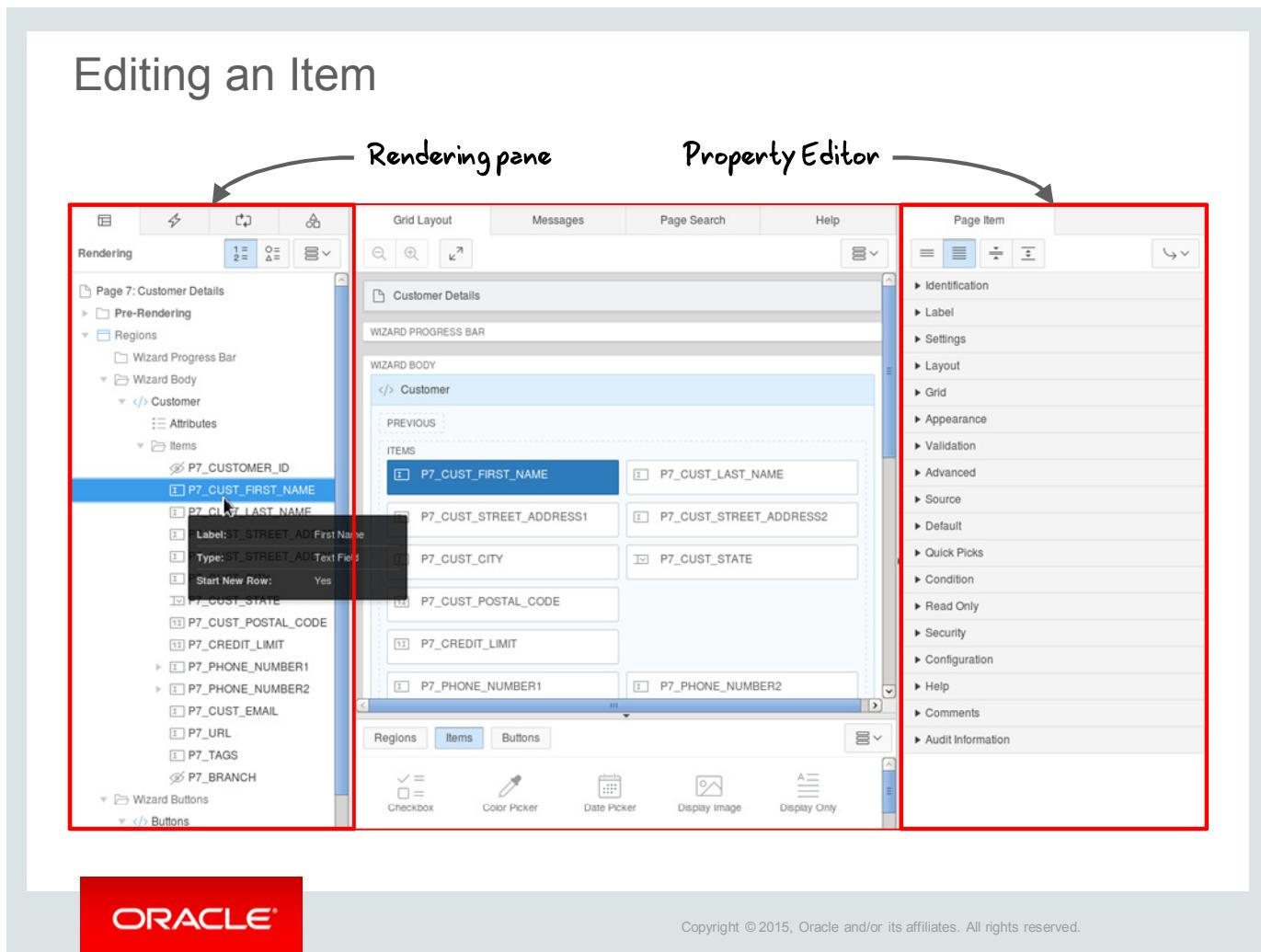
- In the Rendering pane of the Page Designer, right-click the region node where you want to create the item and select Create Page Item.
- Choose the Date Picker item from the Items gallery. Drag it from the gallery to the Grid Layout of the page under the region where you want to create the item.

After either of the above steps, select the item in the Grid Layout or the Rendering pane and perform the following steps:

- In the Identification section of the Property Editor pane, enter a name for the item. As a best practice, use the format P<n>\_<ITEM\_NAME> to name the item. Select the Type as Date Picker. Scroll down.
- Note:** If you used the drag-and-drop option to create the item, selecting the type will not be necessary.
- Accept the defaults or change the item Label, Settings, and Layout. Scroll down.
- You can specify whether a value is required for the item. Under Validation, if you select Yes for Value Required, the item is validated to ensure that it is not null when the page is submitted. The options in this step may differ for each item type. For the date picker item, you can specify a format mask, template, and so on.

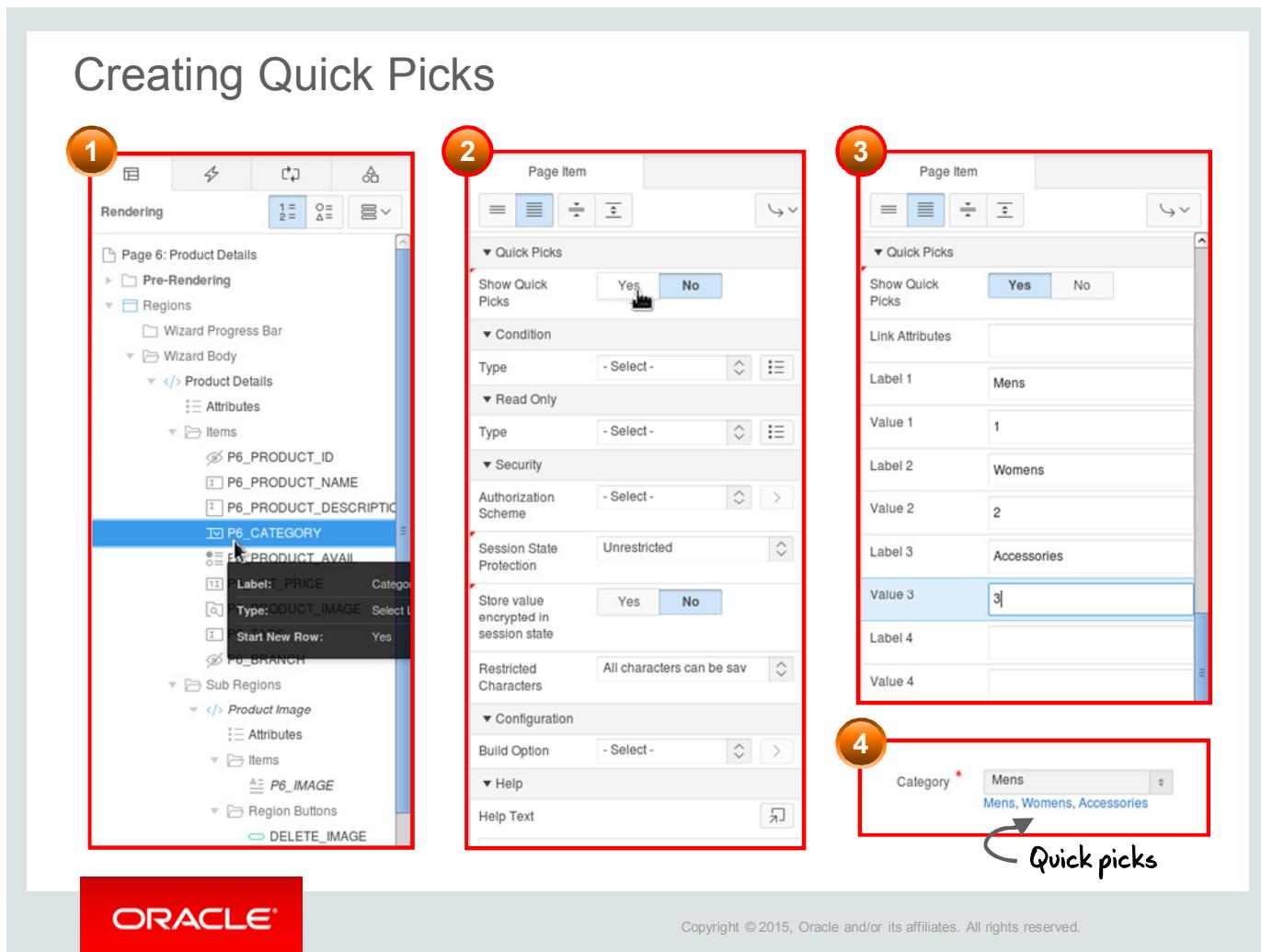
4. You can apply custom CSS to your item. Specify the source for the item. You can also specify a default value for the item.
5. You can specify a condition for the item so that the item appears only when the condition is true. Also, you can specify whether the item is Read-only or not, the various security parameters, the help text and so on.

Save and run the page to check whether the item was created successfully.



To edit an item, navigate to the Page Definition and select the item you want to edit in the Rendering pane of the Page Designer. When you select the item, you notice that the property editor on the right pane displays the list of attributes that can be edited for that particular item. These attributes are categorized as follows:

- Identification, Label, Settings, Layout, Grid, Appearance, Validation, Advanced, Source, Default, Quick Picks, Condition, Read Only, Security, Configuration, Help, Comments, Audit Information

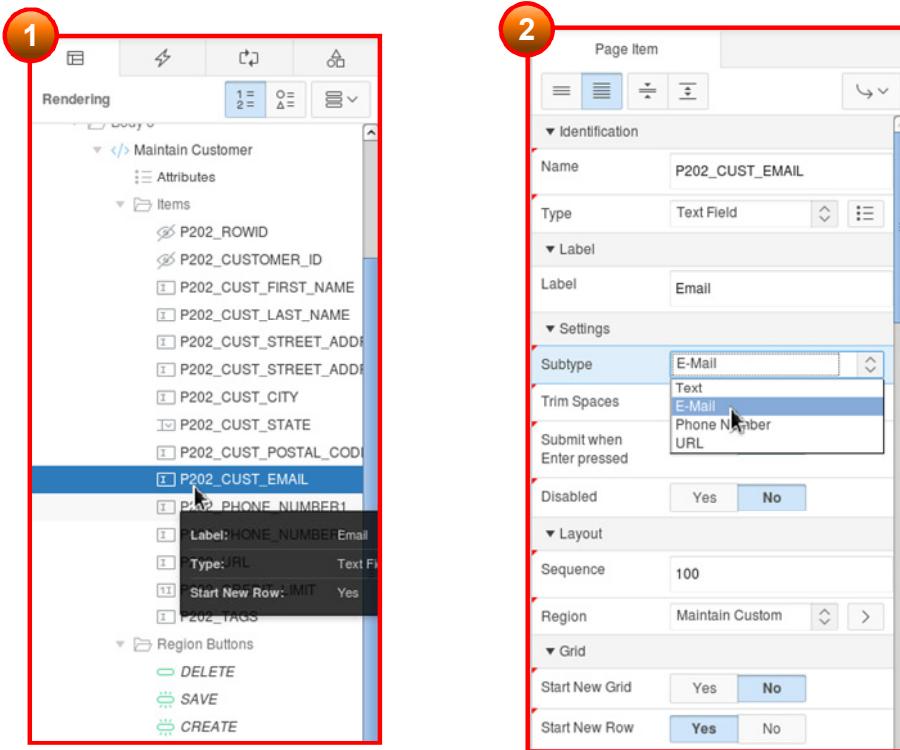


Quick picks are links that you display below an item. You can click the quick pick links to enter a value in the item field. You can create up to 10 selections for items that support quick picks, such as text field, number field, select list, and pop-up LOV.

1. To create quick picks, select the item in the Rendering pane of the Page Designer.
2. In the Property Editor pane, under Quick Picks, select Yes for Show Quick Picks.
3. Enter the label name and value for each quick pick that you want to create.
4. Save and Run the page to view the created quick picks.

In the example in the slide, three quick picks are created for the Category select list item.

# Adding Subtypes on Mobile Item Types



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Subtype specifies what kind of text field the page item is. This allows devices with on-screen keyboards to show an optimized keyboard layout specific to the subtype, for easier data input. The subtype selection is also used to render an appropriate link with the value of the page item, if it's rendered read-only. This HTML5 feature works in modern browsers only.

To access subtype, perform the following steps:

1. In the Rendering pane, select the item for which you wish to set up subtype.
2. In the Property Editor pane, select the appropriate Subtype for the item from the drop-down menu.

## Quiz



Which of the following is *not* a page item type?

- a. Date Picker
- b. File Browse
- c. HTML
- d. List Manager

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**Answer: c**

## Lesson Agenda

- Introducing Items
- Using Items
- Creating List of Value (LOV) Type Items
  - What Is an LOV?
  - Accessing the Lists of Values Page
  - Creating a Static LOV
  - Creating a Dynamic LOV
  - Associating an LOV with an Item
  - Creating a Select List Item
  - Creating a Cascading LOV
- Using Buttons



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## What Is an LOV?

**Pop-up LOV**

A screenshot of an Oracle Application Express page. A red box highlights a text input field labeled "Customer \*". To its right is a small icon of a person with an upward arrow. A red arrow points from this icon to a larger red box containing a list of names: Bradley, Eugene; Dulles, John; Hartsfield, William; LaGuardia, Fiorello; Lambert, Albert; Logan, Edward; OHare, Frank. Below the list is the text "Row(s) 1 - 7".

**Radio Group**

A screenshot of an Oracle Application Express page. A red box highlights a radio group labeled "Create Order for: \*". It contains two options: "Existing customer" (selected, indicated by a checked radio button) and "New customer".

**Checkbox**

A screenshot of an Oracle Application Express page. A red box highlights a checkbox group titled "Hobbies" with the following items: Dancing, Drawing, Music, Poetry, Reading, Singing.

**Select List**

A screenshot of an Oracle Application Express page. A red box highlights a select list labeled "State \*". The dropdown menu shows "- Choose State -" at the top, followed by a list of states: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut. A cursor is shown clicking on the dropdown menu.

**Shuttle**

A screenshot of an Oracle Application Express page. A red box highlights a shuttle interface titled "Hobbies" with the following items: Dancing, Drawing, Music, Poetry, Reading, Singing. To the right of the list are several navigation buttons: double-left, left, right, double-right, double-left, up, down, and double-down.

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A list of values (LOV) is used to display values for some specific type of page item, such as a radio group, check box, or select list. You can create an LOV while creating the item or create an LOV as a shared component, and then reference it in one or more items. An LOV can be either of the following:

- **Static:** Based on a set of predefined display and return values
- **Dynamic:** Based on a SQL query that selects values from tables

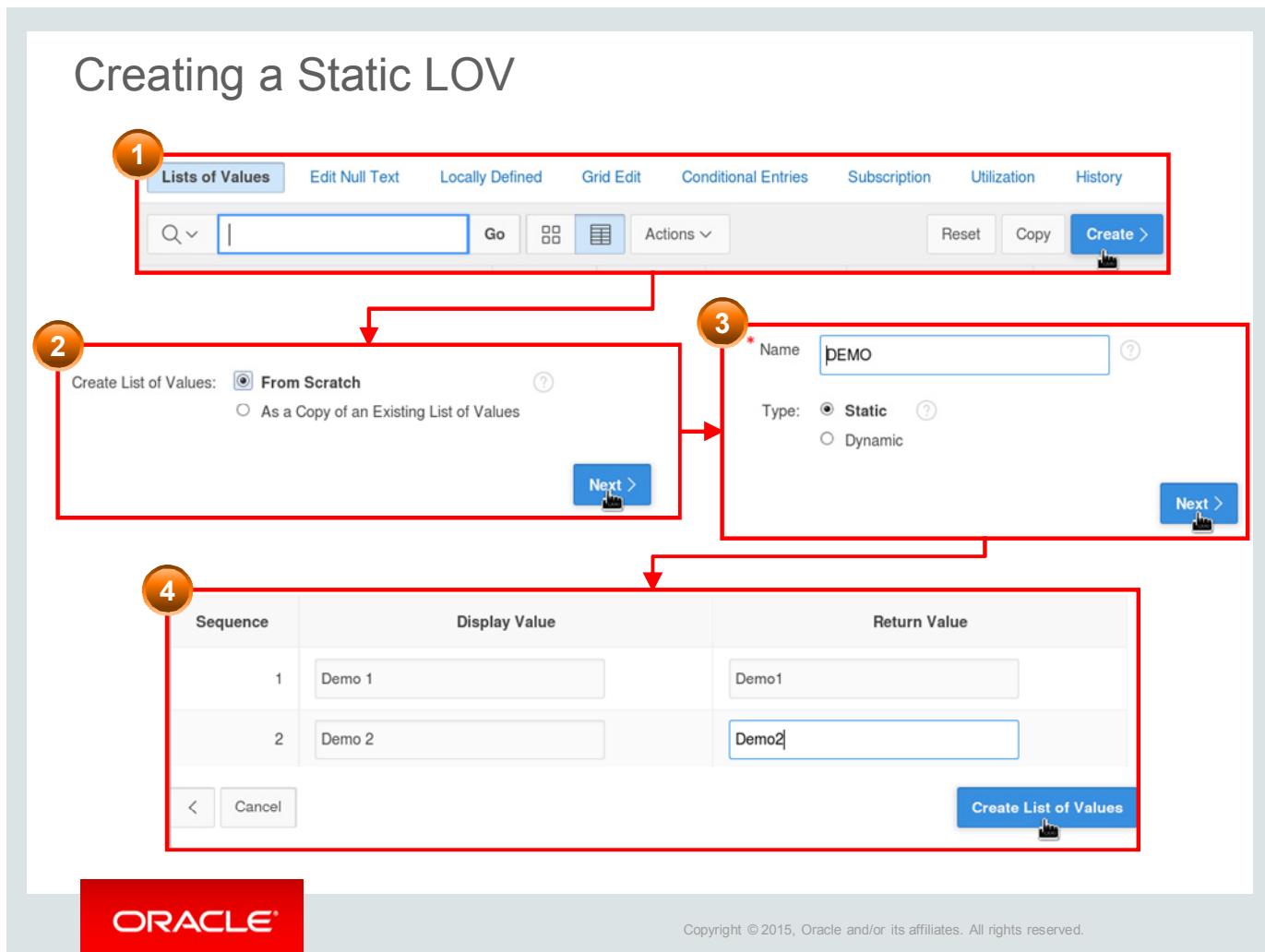
## Accessing the “Lists of Values” Page

The screenshot illustrates the navigation path to the 'List of Values' page. It starts with the Shared Components page for the 'Customers' application. A red box highlights the 'Shared Components' button in the toolbar. An arrow points from this button to the 'Other Components' sidebar, where 'List of Values' is also highlighted with a red box. Another arrow points from the 'List of Values' entry in the sidebar down to the final screenshot, which shows the 'List of Values' page itself. This page displays a table of existing LOVs, including 'CATEGORIES', 'DATA\_LOAD\_CHARSET', 'DATA\_LOAD\_OPTION', 'DATE\_FORMAT\_OPTION', 'FIRST\_ROW\_OPTION', 'LOV\_DATALOAD\_LOAD\_CUSTOMERS', and 'NEW OR EXISTING CUSTOMER', all categorized as 'Static'.

Name	Type	Updated	Entry Count
CATEGORIES	Static		3
DATA_LOAD_CHARSET	Static		30
DATA_LOAD_OPTION	Static		2
DATE_FORMAT_OPTION	Static		1
FIRST_ROW_OPTION	Static		1
LOV_DATALOAD_LOAD_CUSTOMERS	Static		14
NEW OR EXISTING CUSTOMER	Static		2

The LOVs that are created as shared components are listed on the “Lists of Values” page. To access the “Lists of Values” page, navigate to the Shared Components page for the application. Under Other Components, click “Lists of Values.” The LOVs that are created for the application are displayed. You can create new LOVs or create a copy of an existing LOV.

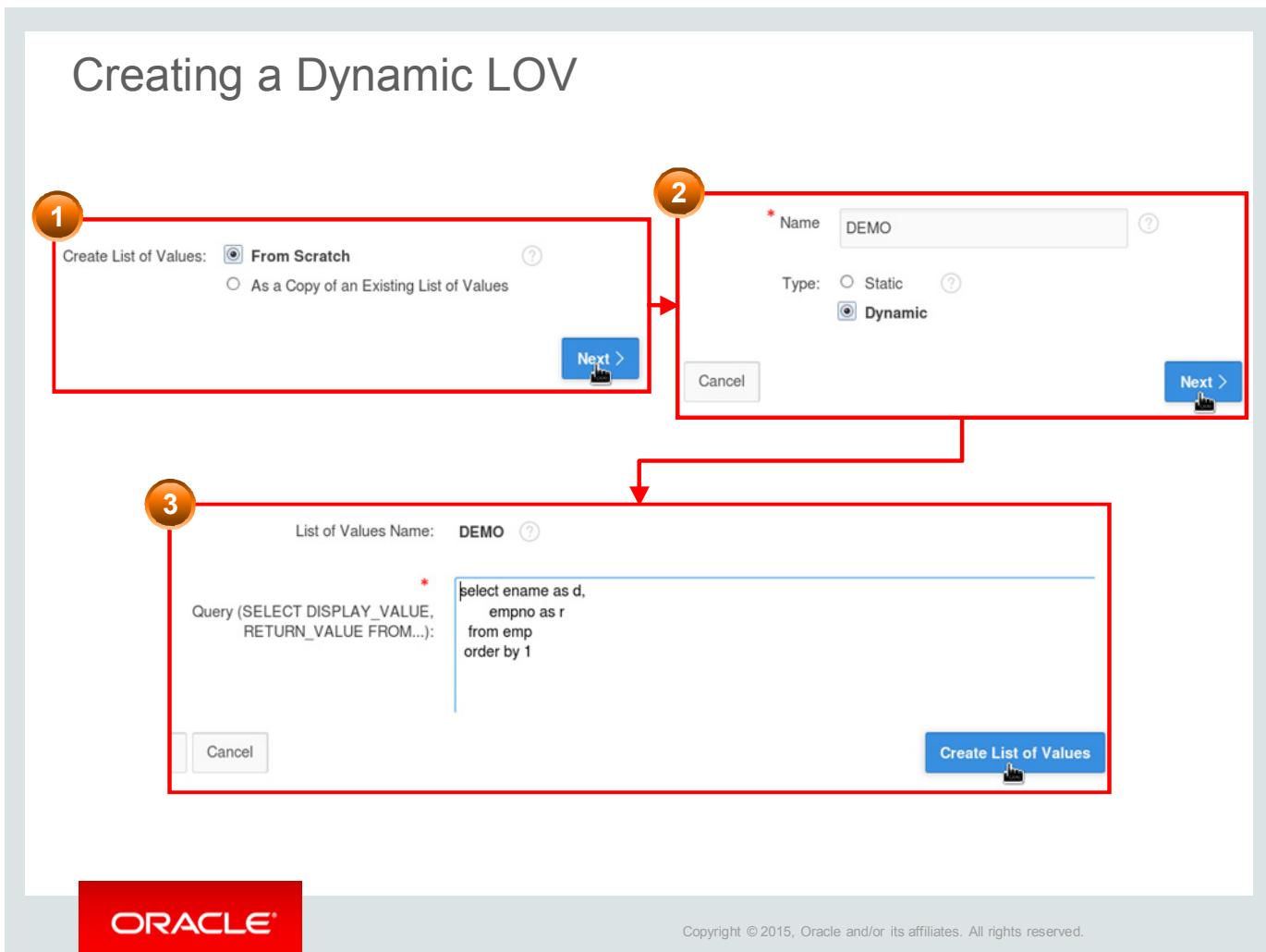
**Note:** Shared component LOVs are also called “named” LOVs.



A static LOV is based on a predefined list of display and return values. To create a static LOV, perform the following steps:

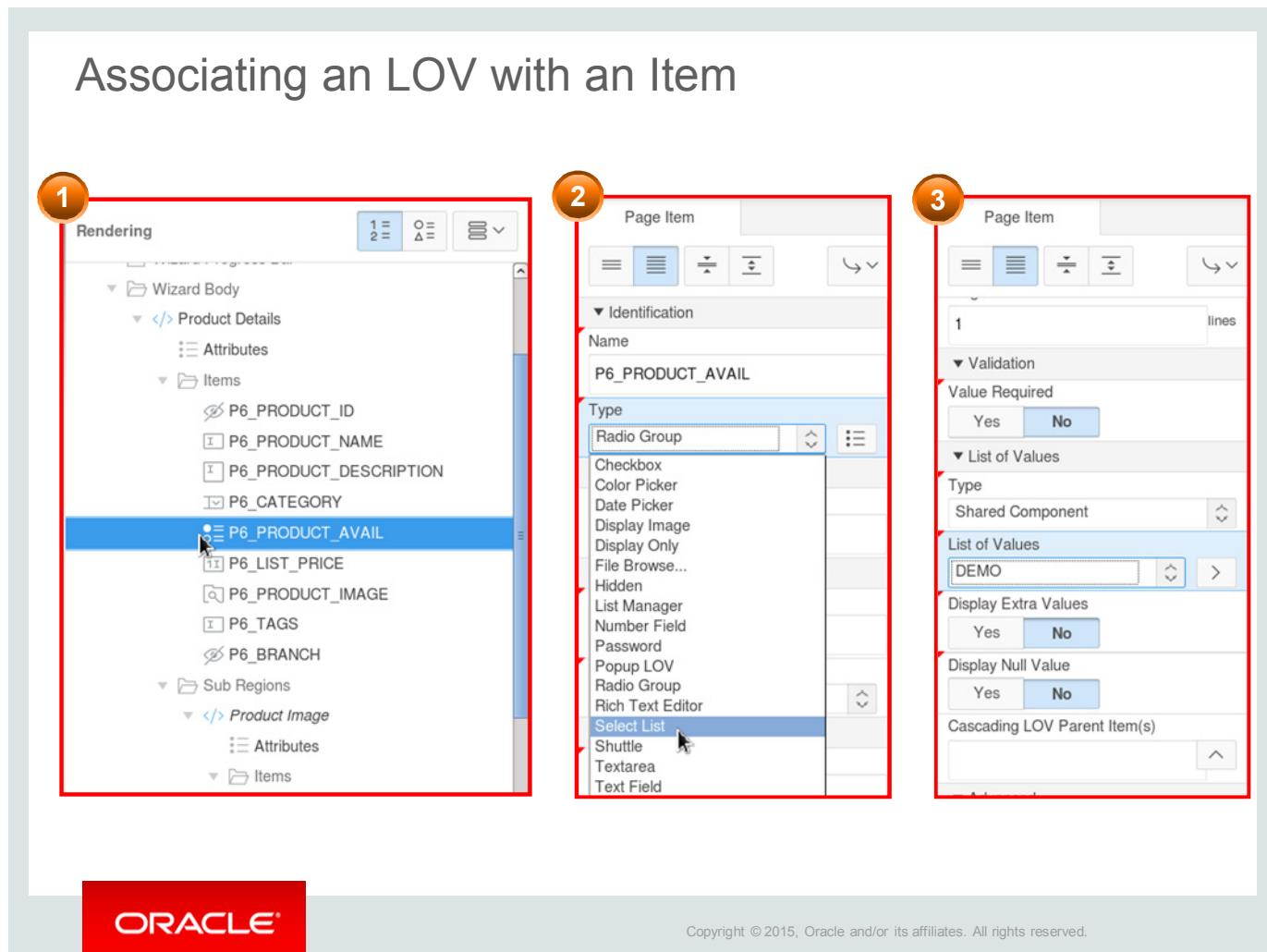
1. In the List of Values page, click **Create**. The steps to navigate to the List of Values page is explained in the previous slide.
2. Select **From Scratch** and click **Next >**. You can select the second option to create a copy of an LOV from another application in the same workspace.
3. Enter a name for the LOV. Select **Static** and click **Next >**.
4. Enter the static display and return values. Values are displayed in the order in which they are entered here. The return value is not displayed, and is the value returned to the Oracle Application Express engine. In a case where you do not enter a return value, the display value is also the return value. Click **Create List of Values**.

New named LOVs are added to the List of Values repository. After you add a static LOV to the repository, you can create a check box, radio group, select list, or pop-up list item and reference the LOV there.



Dynamic LOVs are based on SQL queries that are executed at run time and select values from tables or views. To create a dynamic LOV, click the Create button on the "Lists of Values" page and perform the following steps:

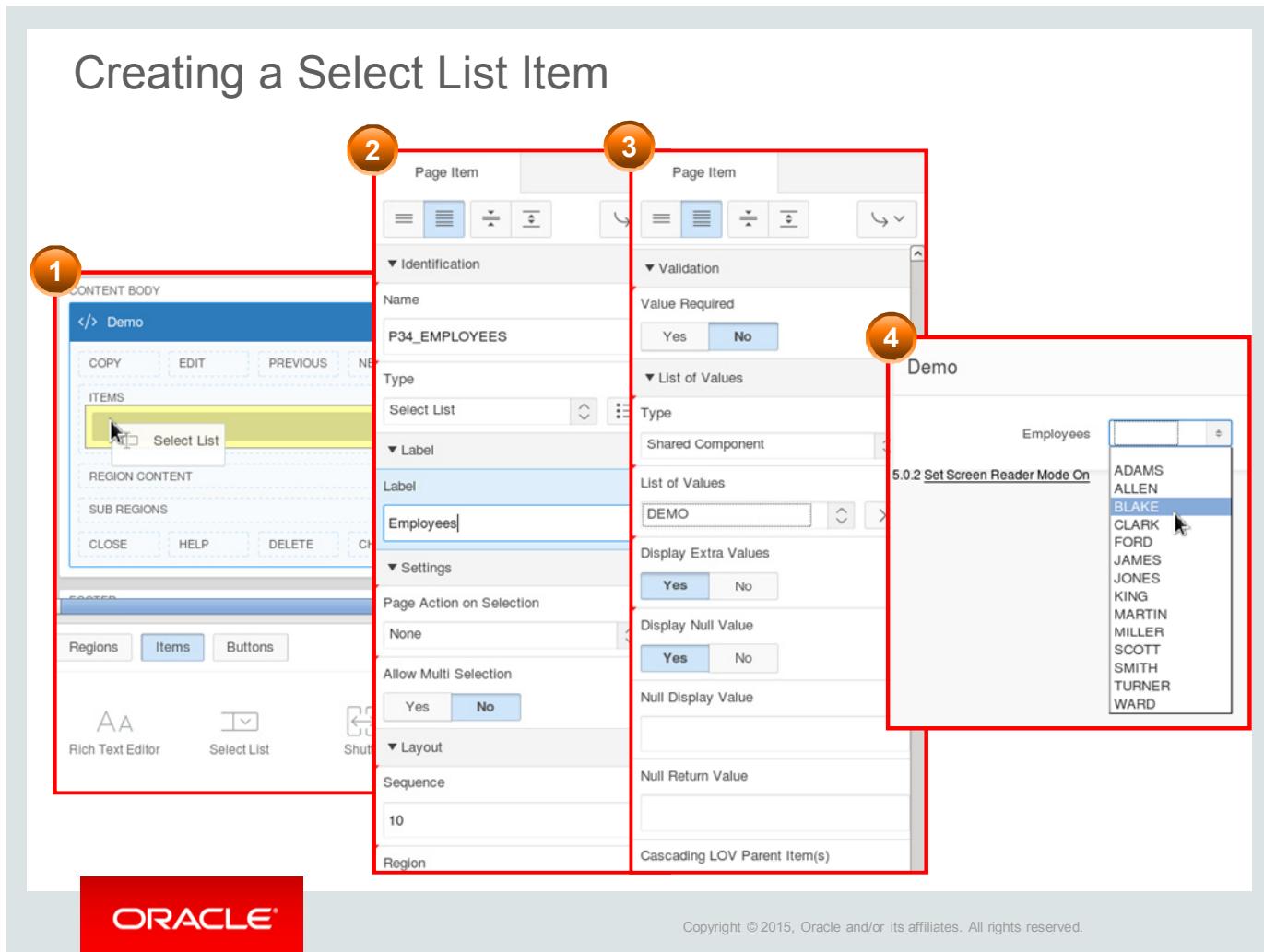
1. Select **From Scratch** and click **Next >**.
2. Enter a name for the LOV. Select **Dynamic** and click **Next >**.
3. Enter a SQL query that returns two columns. The first column returns the values to be displayed in the items list. The second column gives the value that is returned to the Oracle Application Express engine when the display value is selected. You can click the Examples link at the bottom of the page to see sample SQL queries. If the display and return columns are the same, or if a column includes a function or operator, you must use column aliases in the query. Click **Create List of Values**.



You can associate a named LOV with an item that can accept a list of values. To associate an LOV to an item, perform the following steps:

1. In the Rendering tab of the Page Designer, select the item.
2. In the Property Editor pane, ensure that the display type is an LOV type item by checking the Type field. You can change the display type, if required. In this example, the Product Available field is changed to Select List.
3. In the Property Editor pane, scroll down to List of Values. Select **Shared Component** for Type, and your LOV list for List of Values. In this example, DEMO is selected. Click Save.

Run the page to check whether the item displays the list of values.



The steps to create a Select List item is very similar to creating a date picker item that was discussed earlier in this lesson. Just like the date picker, you can create a select list item in two ways: from the Rendering Pane or from the Items gallery. In this example, the latter is used.

1. Choose the Select List item from the Items gallery. Drag it from the gallery to the Grid Layout of the page under the region where you want to create the item.
2. In the Identification section of the Property Editor pane, enter a name for the item. As a best practice, use the format `P<n>_<ITEM_NAME>` to name the item. In this example, the item is named `P34_EMPLOYEES`. Click the Label field. Notice that the value of the Label field is automatically populated as soon as you click it. Scroll down.
3. Under List of Values, select Type as **Shared Components**. In the List of Values field, select `DEMO`. You can specify static values for the select list by selecting the List of Values Type as Static Values and defining the list in the List of Values field . Similarly, you can use SQL or PL/SQL Query based on your requirement, to populate the values in the Select List.
4. Run the page to test if the select list is working.

# Creating a Cascading LOV

The values displayed in the Employee select list depend on the Department that is selected.

Item is referred in the query

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A cascading LOV is a dynamic LOV that references another page item for its list of values. For example (shown in the slide), you can populate an Employees item with the names of employees who work for the department entered in the Department item. You can define a cascading LOV while creating the item or by editing the item. Before creating a cascading LOV, you must first create the item that is referred to. To define a cascading LOV for an existing item, perform the following steps:

1. Navigate to the appropriate page definition. Select the item in the Rendering tab.
2. In the Property Editor, scroll down to the List of Values tab.
3. Click the up arrow for the Cascading LOV Parent Item(s) field and select the item that you want to refer in the SQL query.
4. Modify the SQL query to include the referred item in the WHERE clause. If you have selected a named LOV for the item, you must edit the named LOV from the List of Values page.

Save and run the page to confirm that the items are populated as required.

**Note:** You can define a cascading LOV only for LOV-type items, such as select list, check box, and pop-up LOV.

## Lesson Agenda

- Introducing Items
- Using Items
- Creating List of Value (LOV) Type Items
- Using Buttons
  - What Is a Button?
  - Creating a Button
  - Editing Button Attributes
  - Modifying a Button to Redirect to a URL



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## What Is a Button?

Sample Database Application - Customer Details

First Name \* John      Last Name \* Dulles

Street Address 45020 Aviation Drive      Line 2

City Sterling      State \* Virginia

Postal Code \* 20166

Credit Limit \* 1000

Phone Number 703-555-2143      Alternate Number 703-555-8967

Email john.dulles@email.com      URL http://www.johndulles.com

Tags

Cancel Delete      Apply Changes

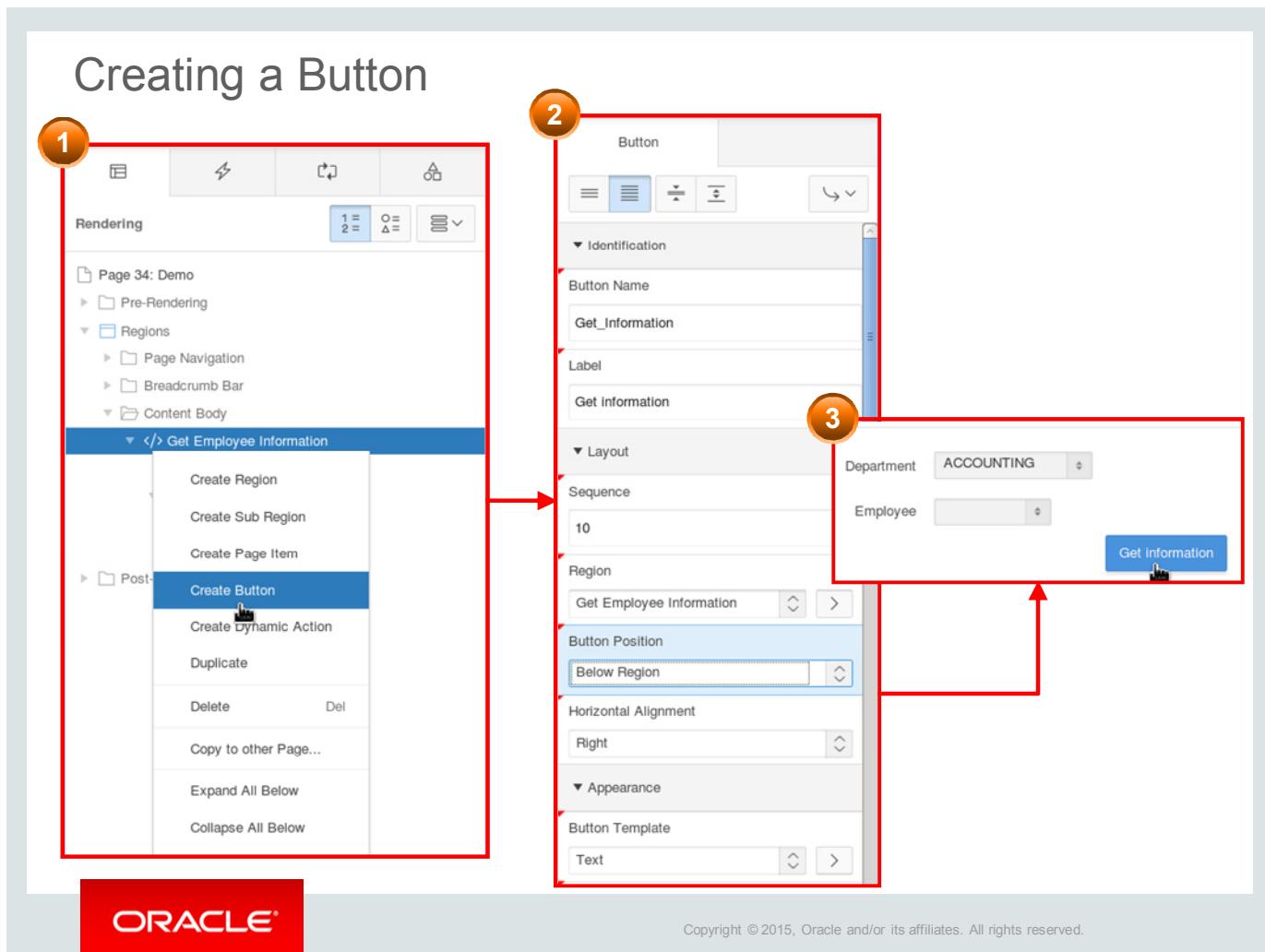
Region buttons

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A button is an interface element that is used to either submit a page or navigate to another page or URL. You can create a button that is placed next to other page items. You can also create region buttons that are placed in predefined region templates.

When you use wizards to create page components such as reports and forms, some buttons (such as Cancel, Save, Create, and Delete) are automatically created.

In this lesson, you learn how to create a region button named CANCEL, which, when clicked, clears the cache for the items on a page and redirects to another page. You also create a button named GO next to an item, which, when clicked, submits the page items and displays a report region.

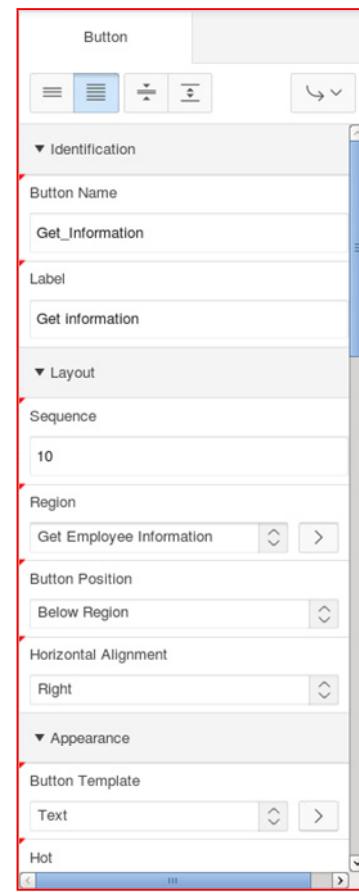
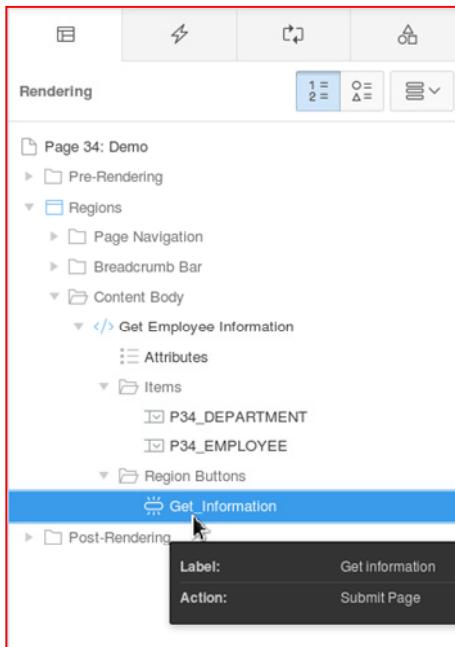


To create a new button, navigate to the Page Definition and perform the following steps:

1. Identify the region to contain the button. In the Rendering pane, right-click the region node and select Create Button. Alternatively, you can drag a button from the Buttons Gallery to the Grid Layout.
2. Fill details in the Property Editor and click the Save and Run Page button.
  - Enter a name and label for the button.
  - Specify the Button Position. You can also drag the button in the Grid Layout to the desired position.
  - Select a style for the button.

The button is created. If you run the page and click the button, you notice that the page gets submitted. You can now define the actions that are required when the page is submitted.

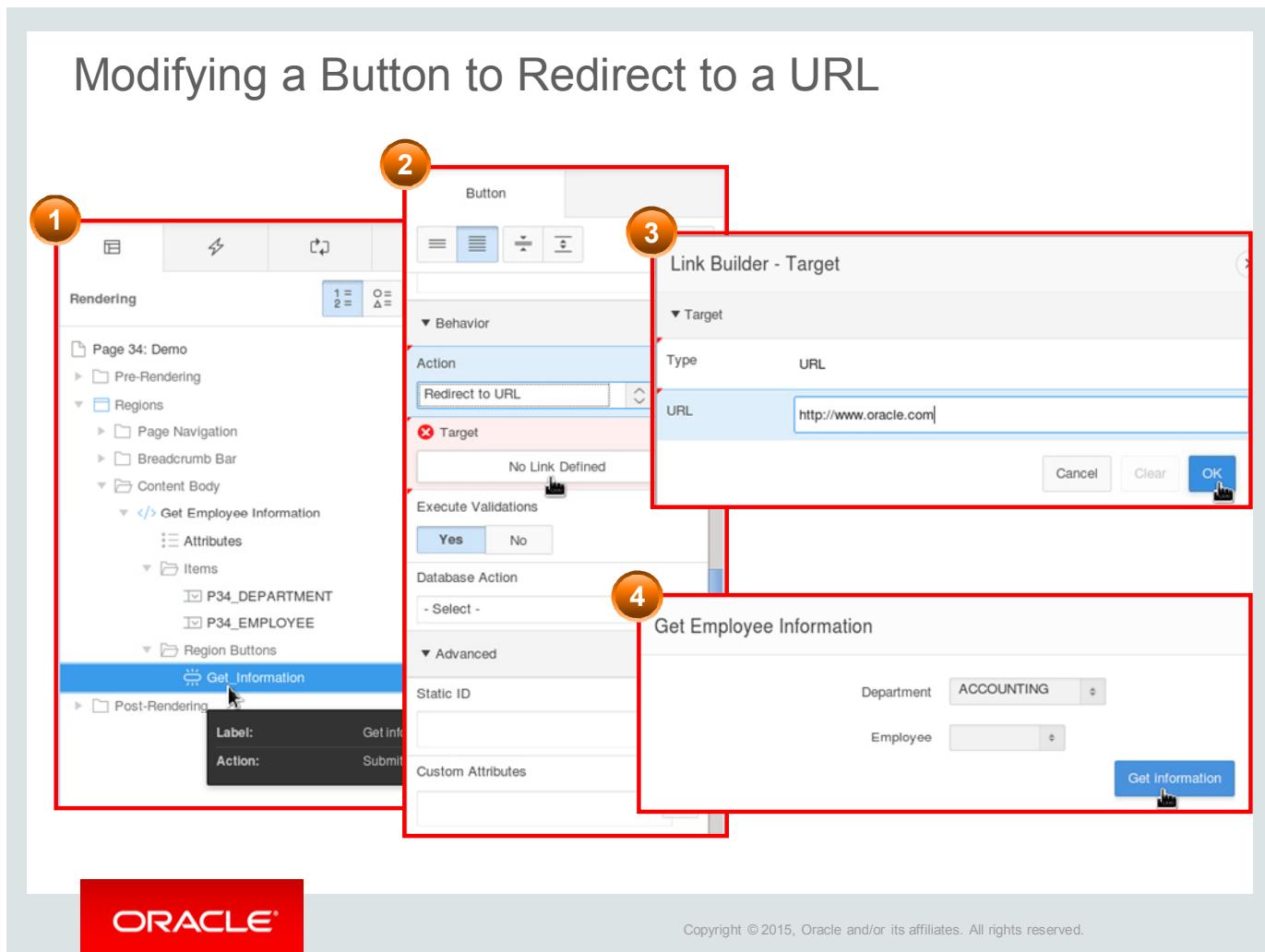
## Editing Button Attributes



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After you create a button, you can edit its attributes. To edit the attributes of a button, select the button in the Rendering pane of the Page Designer. As soon as you select the button, the Property Editor (the right pane), loads the attributes of the button. You can then edit the attributes from this pane.

Save and run the page to verify that the changes to the attributes have been committed.



To edit a button, navigate to the Page Definition and perform the following steps:

1. In the Rendering pane, select the button name.
2. In the Property Editor pane, scroll down to the Behavior tab. Select Redirect to URL for Action and click the No Link Defined button under Target.
3. Enter the URL in the text area. In the slide example, the URL that is entered is <http://www.oracle.com> and click OK.

Save and Run the page to check if redirect works when the button is clicked.

## Quiz



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

- a. You can place a button in any position defined in the region template.
- b. A button cannot be edited once created.
- c. You can edit the button attributes on the Property Editor pane.
- d. You can create more than one button in a page.

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**Answer: a, c, d**

## Practice 8-1 Overview: Adding Items and Buttons

This practice covers the following topics:

- Creating a blank page
- Creating and adding items to pages
  - Date Picker
  - Text Area
  - Text Field
- Creating and adding Submit and Cancel buttons to the page



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## Practice 8-2 Overview: Manipulating Items

This practice covers the following topics:

- Editing item and button attributes
- Modifying the mobile form page to include some HTML5 item types



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## Summary

In this lesson, you should have learned how to:

- Identify the different types of items
- Create items and edit item attributes
- Create and use lists of values
- Create buttons and edit button attributes



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In this lesson, you learned about items and buttons. You learned how to create items and buttons, as well as how to edit their attributes.

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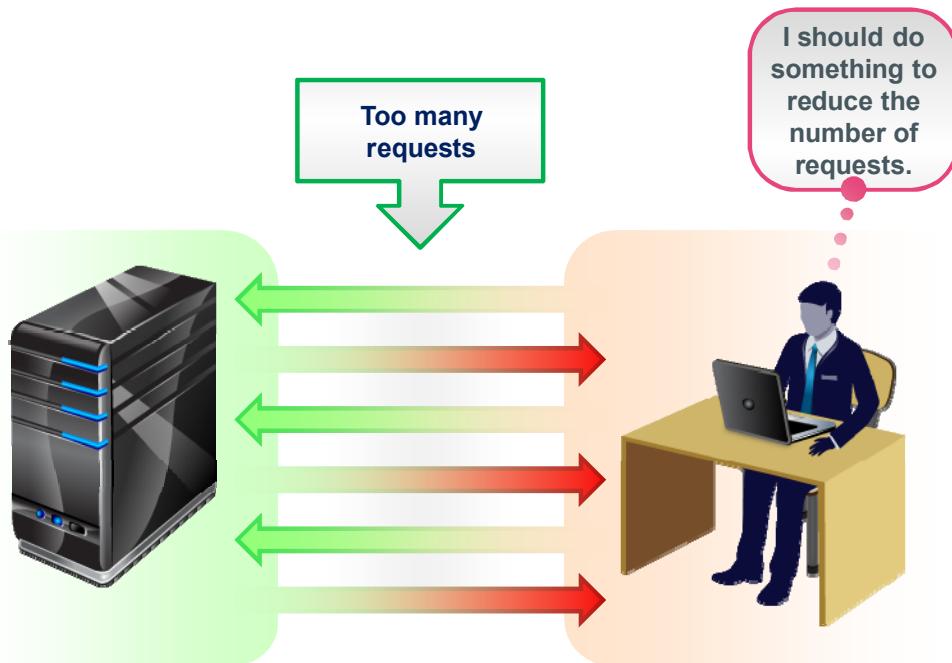
Oracle University and Error : You are not a Valid Partner use only

# Understanding Session State

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## Jack Understands Session State



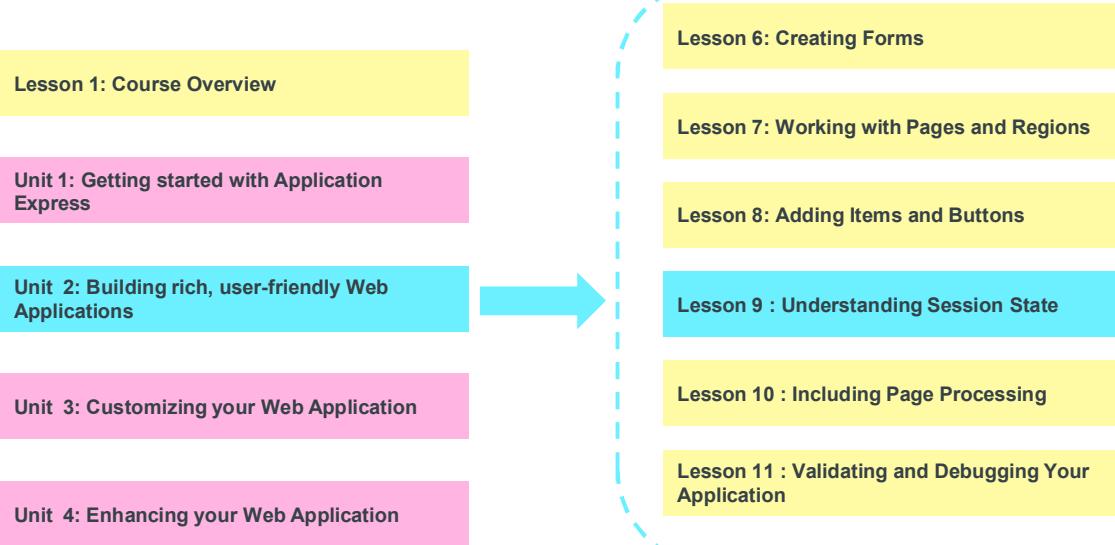
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Jack has the forms, reports, interfaces, and pages for the PTS ready and functional. At this point, each time any data is fetched from the server, the application sends a request to the server, thereby increasing the number of requests.

He is now looking for options in APEX that can help him in maintaining the application state information so that the number of requests is reduced and values can be fetched from the session.

# You Are Here in This Course



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## Objectives

After completing this lesson, you should be able to:

- Define a *session state*
- Explain how Oracle Application Express implements session state
- View session state values
- Reference a session state value
- Clear the session state



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This lesson shows you how Oracle Application Express manages the session state of an application.

## Lesson Agenda

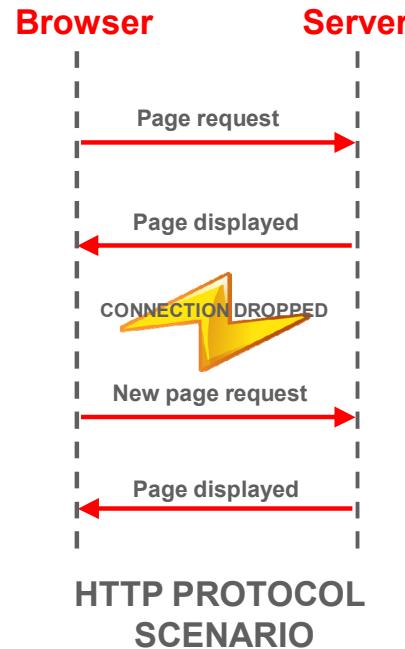
- Understanding Session State in Oracle Application Express
  - What Is a Session State?
  - What Is a Session ID?
  - What Is Session Timeout?
  - How Does Oracle Application Express Implement Session State?
  - Identifying the Parts of an Oracle Application Express URL
- Using Session State in Oracle Application Express



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## What Is a Session State?

- HTTP protocol is:
  - Used to transfer data across the web
  - Stateless
- A *session* is a series of browser requests and server responses within a specified time.
- A *session state* is the state or value of an item in a session.



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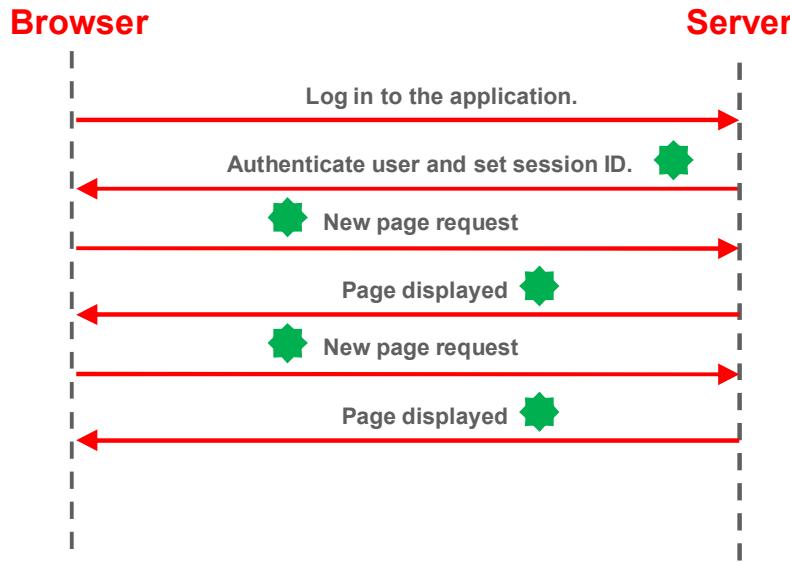
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To understand what a session state is, you must first understand what HTTP is and how it works. HTTP is the protocol that is used to transfer data across the web. HTTP is a stateless protocol. It means that each page request from a browser is treated as an independent request by the server. There is no memory or saved state between the requests.

In a web application scenario, such as an online shopping application, it is essential to maintain application state information. For example, a user fills out a web form for ordering products, then adds the items to be purchased, and finally submits the form. In this scenario, it is necessary to store the list of items in the shopping cart, and then present this list when required, such as when confirming the order. In addition, the user information must also be retrievable when necessary. To access the values that are entered on one page from a different page, some sort of management is required. A series of requests that originate from the same user by using the same web browser to a web server is called a *session*. The value of the page item during the session length is called the *session state* of the item.

## Session ID

A session ID is a unique identifier that is assigned to each new session in an application.



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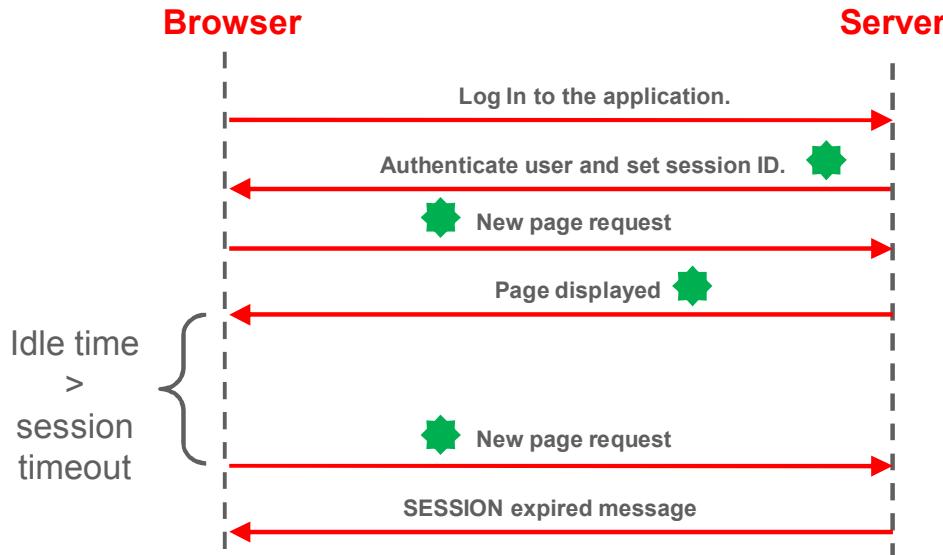
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To manage sessions and to store session state information, each session should be uniquely identifiable by the server and the browser. This is done by using session IDs. A session ID is a unique identifier for each session created in an application. For each new session that is initiated by the browser, the server assigns a session ID. This session ID is associated with subsequent page requests, establishing a session.

In the graphic in the slide, a user logs in to an application. The server authenticates the user and starts a new session. A session ID (depicted by a green symbol) is assigned to the session. Each time the browser makes a request to the server, the session ID is also sent to the server. The server uses this session ID to identify the user and maintain the session state for the user.

## Session Timeout

Session timeout is the time period a session can be idle before the server terminates the session.



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Session timeout is the time period set for an application session. If the user does not request a new page or refresh the current page within the time period, the server automatically terminates the session. By configuring the Session Timeout attributes, you can reduce your application's exposure. By setting the session and idle timeout, users are automatically logged out of their application after the specified timeout.

Session Timeout attributes include:

- **Maximum Session Length in Seconds:** Enter a positive integer to control how many seconds a session exists and is used by this application.
- **Session Timeout URL:** Enter an optional URL to redirect to when the maximum session lifetime has been exceeded.
- **Maximum Session Idle Time in Seconds:** Enter a positive integer to control the seconds of inactivity or idle time for sessions used by this application. The idle time is the time between one page request and the next one.
- **Idle Timeout URL:** Enter an optional URL to be redirected to when the maximum session idle time has been exceeded.

# Setting Session Timeout

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

The screenshot shows the 'Session Management' tab selected within the 'Security' tab of the Application Properties interface. The configuration includes:

- Rejoin Sessions: Enabled for Public Sessions
- Deep Linking: Enabled
- Maximum Session Length in Seconds: 28800
- Session Timeout URL: (empty)
- Maximum Session Idle Time in Seconds: (empty)
- Session Idle Timeout URL: (empty)

A note at the bottom states: "When Maximum Session Idle Time is not set, the workspace level or instance level value will be used (currently, 3600 seconds).".



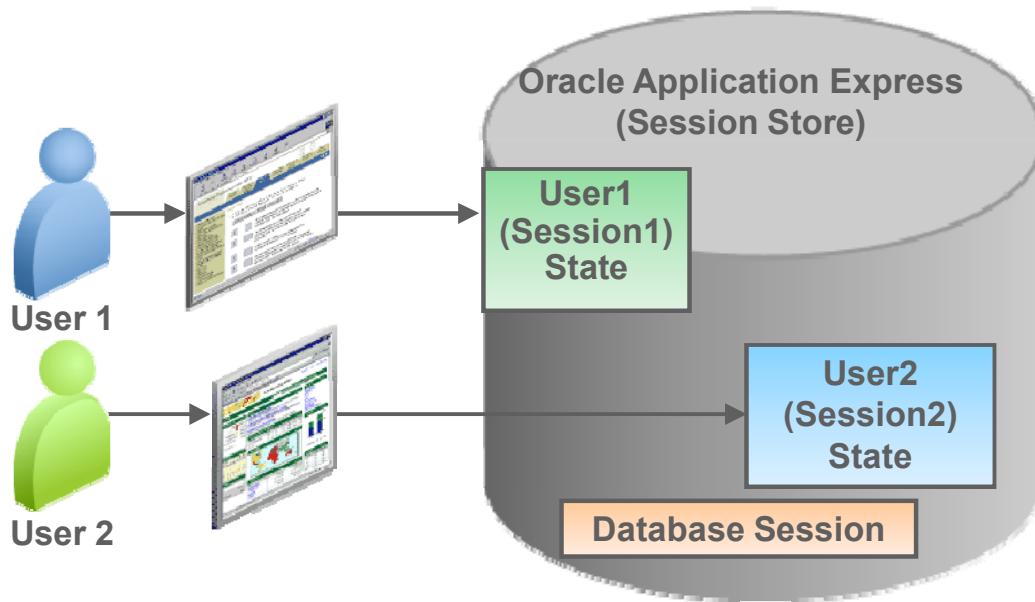
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In Oracle Application Express, you can declaratively specify session timeouts for maximum idle time and maximum session duration. To set the session timeout for an application, click the Edit Application Properties button on the application home page. Click the Security tab and then the Session Management tab. Set the following attributes:

- Maximum Session Length in Seconds
- Session Timeout URL
- Maximum Session Idle Time in Seconds
- Session Idle Timeout URL

# How Does Oracle Application Express Implement Session State?

Oracle Application Express maintains session state implicitly.



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In Oracle Application Express, you do not need to write code to manage and maintain sessions or session state. Session state is maintained transparently and you can easily access session state values and manipulate them, if required.

Each time users log in to an application, Oracle Application Express assigns a unique session identifier, which is associated with users until they log out of the application. This session ID is used by the Oracle Application Express engine to store and retrieve the application's working set of data before and after each page view. This is done by comparing the session ID with the session cookie and the session record in the database. The session cookie and the session record safeguard the integrity of the session ID and the authentication status of the user.

You can view the session ID in the URL for a page request. The other visible location is on the page's HTML POST structure or in a session cookie sent by the Oracle Application Express engine during authentication and maintained for the life of the application or the browser session.

Multiple sessions can exist in the database at the same time, because Oracle Application Express treats each session independently. The session information persists in the database until it is purged. Therefore, as long as the client's session has not expired, a user can continue running the application long after having first launched it.

Oracle Application Express uses cookies to store session state. If you turn off cookies in your browser, Application Express applications will not work properly.

The cookies hold information about the application, page, and so on. If developers run multiple instances that use the same browser on one PC when they build applications, then the different browser instances interfere with each other. When switching between the two different browser screens, the tool will exhibit strange behavior, including unexpected errors. This can be avoided by developing applications by using different browsers (such as Internet Explorer and Mozilla Firefox) because each browser tool uses its own cookies.

Oracle Application Express sessions are different from the Oracle database sessions that are used to service page requests. An end user runs an application in a single Oracle Application Express session from login to logout. For each page that is requested during that session, Oracle Application Express engine creates or reuses an Oracle database session to access the database resources. The Oracle Application Express engine uses the session ID to fetch the session state from the database.

# Identifying the Parts of an Oracle Application Express URL

Oracle Application Express URL syntax:

1	http://<servername>:<port>/pls/apex/
2	f?p=
3	App : Page : Session :
4	Request : Debug : ClearCache :
5	itemNames:itemValues :
6	PrinterFriendly

Example:

http://localhost:8080/apex/f?p=130:2:1340248669461899::NO::P2\_CUSTOMER\_ID:4

Page #      Session ID      Item Name  
↓            ↓            ↓  
Application ID      Debug      Item Value



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The slide shows the syntax of a complete URL for an application developed by using Oracle Application Express.

1. The URL starts with the address of the Oracle Application Express instance. `pls` in the URL indicates that you are using Oracle HTTP Server with `mod_plsql`. If you are using Application Express Listener or Embedded PL/SQL Gateway, `pls` is omitted.
2. `f` is the procedure that is called and `p` is the rest of the URL that is passed as parameters to the procedure.
3. `App` is the application ID or alias of the application that you want to access.  
`Page` is the page number or alias of the page that you want to access.  
`Session` is the identifier for the session assigned by Oracle Application Express when you log in to an application.

4. Request is set to the request attribute value of a button when it is clicked. For example, if you click a button called CREATE, CREATE is passed as `request` in the URL.  
Debug can be set to YES (uppercase) to switch on the debug mode for your application. Every other value turns the debugger off.  
ClearCache is used to set the session state values to null. To clear a page, specify the page number. To clear multiple pages, specify a comma-separated list of page numbers. You can also set the following values:
  - RP: To reset pagination
  - APP: To clear cache for all the pages and application-level items in the current application
  - SESSION: To clear cache for the current user session
5. `itemNames` is a comma-separated list of item names and `itemValues` is a comma-separated list of item values. Item values cannot include colons, but can contain commas if enclosed with backslashes. To pass a comma in an item value, enclose the characters with backslashes (for example, `\123,45\`).
6. `PrinterFriendly` can be set to YES to render the page by using the printer-friendly page template.

## Quiz



What does the number **29** indicate in the following URL?

`http://localhost:9001/apex/f?p=100:29:1340248669  
461899::NO::P29_ORDER_ID:4`

- a. Application name
- b. Session ID
- c. Page number
- d. Item value

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## Lesson Agenda

- Understanding Session State in Oracle Application Express
- Using Session State in Oracle Application Express
  - Viewing Session State
  - Referencing Session State
    - Referencing Session State by Using Bind Variables: Example
    - Referencing Session State in Static Text: Example
  - Clearing the Cache



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## Viewing Session State

The screenshot shows a web application window titled "Sample Database Application - Identify Customer". On the left, there's a form for creating an order, with fields for First Name, Last Name, Street Address, Line 2, City, State, and Postal Code. A radio button for "New customer" is selected. On the right, a red box highlights the session state information. It shows the application ID (100), session ID (7960947243628), user (DEMO), workspace (1880311677006146), and browser language (en). Below this is a table titled "Page Items" with two rows:

Application	Page	Item Name	Display	Item Value	Status	Encrypted
100	11	P11_BRANCH	Hidden	4	Inserted	No
100	11	P11_CUSTOMER_OPTIONS	Radio Group	EXISTING	Inserted	No

At the bottom of the page, there are navigation links: Home, Application 100, Edit Page 11, Session (which is highlighted with a red box), View Debug, Debug, Show Grid, and a Back arrow.

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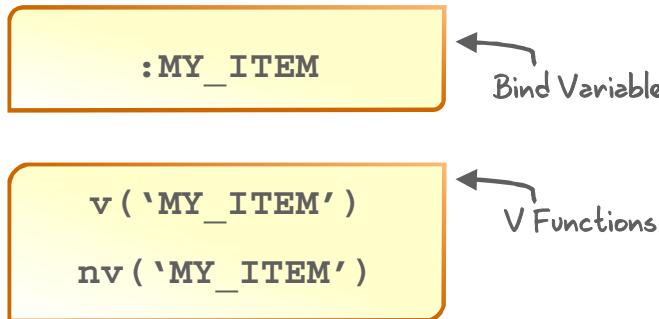
Each time you request or submit a page, Oracle Application Express automatically saves session state values. To view the session state for a page, click the Session button on the Developer toolbar. The Session State page opens in a new window and provides information about a page, such as:

- Session ID, current user, workspace ID, and the browser language
- The attributes of the page, such as the item name, how the item is displayed, the state or session ID, and the status. The status column indicates the status of the session state. The values include I (Inserted), U (Updated), and R (Reset).
- The application items that do not reside on a page. The application items are session state variables without the associated user interface properties. Application items are not used for display, but used as global variables to the application.

When you view a page for the first time, before making any changes and submitting the page, the state column on the session page displays null. After you click a button and submit the page, when you view the session page, the state column displays the item values and the status column shows that an insert operation has been performed.

# Referencing Session State

Referencing session state values in SQL and PL/SQL:



Referencing session state values in static text:

`&MY_ITEM.`

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In many situations, you may want to reference session state values of items in regions, computations, processes, validations, and branches. You can reference the session state values by using the following:

- **SQL and PL/SQL**
  - Use the standard bind variable syntax for item names that are not longer than 30 characters. You can use this syntax for references within a SQL or PL/SQL query (for example, `:MY_ITEM`).
  - Use the `v` function to reference the item value [for example, `v('MY_ITEM')`] if the item name is longer than 30 characters, or when you are coding a stored procedure.
  - Use the `nv` function to reference numeric items [for example, `nv('MY_NUMERIC_ITEM')`].
- **Static text**
  - Use `&item name` followed by a period `.` (for example, `&MY_ITEM.`).

## Referencing Session State by Using Bind Variables: Example

```
Select * from employees where  
employee_id = :P10_EMPLOYEE
```

A SQL query used to  
generate a report

```
Select first_name d, employee_id r  
from employees where  
manager_id = :P10_MANAGER  
Order by 1
```

A SQL query used  
to generate an  
LOV

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There are many scenarios where you can use bind variables to reference the session state value. For example, if you want to display a report and restrict the result based on some item values entered or selected by the user, you can use bind variables to reference the item's session state value in the WHERE clause of the SQL query. Similarly, if you want to display a list of values depending on user input, you can use a bind variable in the SQL query.

In Oracle Application Express, you can use bind variables to reference the session state in any place where you use SQL or PL/SQL. Other examples of where you can use bind variables are in computations and processes.

## Referencing Session State in Static Text: Example

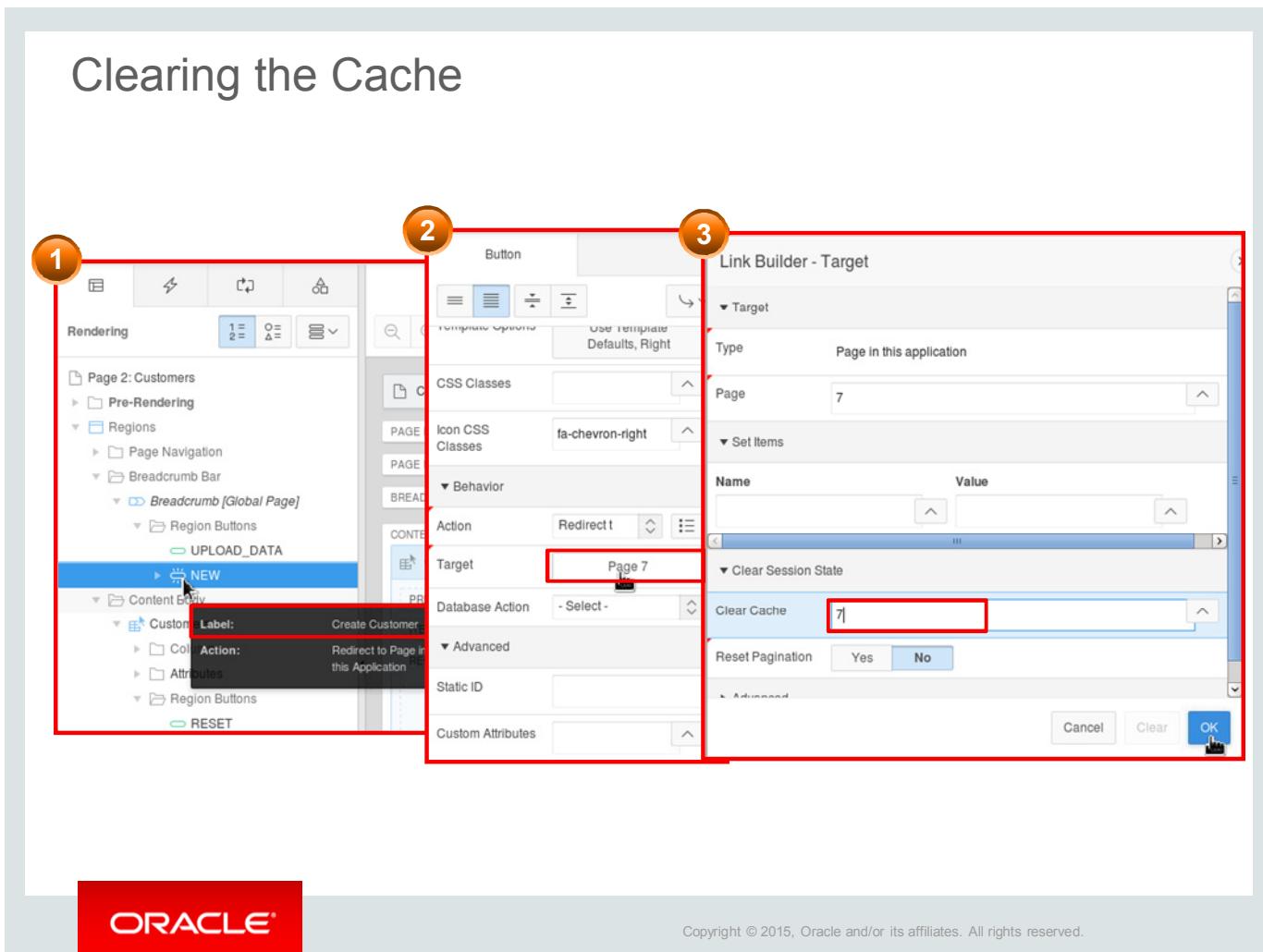
The screenshot shows the Oracle Application Express (APEX) interface. On the left, a page editor window is open, displaying the 'Identification' section with the 'Name' field set to 'Sales by State'. The 'Title' field contains the value 'Sales by State - &APP\_NAME.' The 'Page Group' field is set to 'Desktop'. A red box highlights the 'Title' field and the entire page editor area. To the right, a Mozilla Firefox browser window is displayed, showing a report titled 'Sales by State' from the 'Sample Database Application'. The browser title bar reads 'Sales by State - Sample Database Application - Mozilla Firefox'. The report page shows a bar chart for the product 'Belt' across three states: Massachusetts (green bar), New York (green bar), and Virginia (blue bar). The chart data is as follows:

State	Value
Massachusetts	Very High
New York	Very High
Virginia	Medium

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In this example, you display the name of the application appended to the **Sales by State** Title of the page. Notice the title of the page (highlighted in red).

## Clearing the Cache



You can clear the session state information by using a built-in Oracle Application Express process. For example, you want to clear cache for a page when the Create Customer button is clicked. To clear cache, perform the following steps:

1. In the Page Designer, select the button with the label Create Customer in the Rendering pane.
2. Click the page number button in the Target field under Behavior.
3. In the Clear Cache field, enter the page number of the page for which you want to clear the cache and click OK.

**Note:** To clear the cache on multiple pages, you can enter multiple page numbers in the Clear Cache field. For example, if you enter 11,17,18, the cache of pages 11, 17, and 18 are cleared.

## Quiz



What does the number **100** indicate in the following URL?

`http://localhost:9001/apex/f?p=100:29:1340248669461899::NO::P  
29_ORDER_ID:4`

- a.** Application ID
- b.** Session ID
- c.** Page number
- d.** Item value

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## Practice 9-1 Overview: Understanding Session State

This practice covers how session state variables and clearing the cache in a page work.



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## Summary

In this lesson, you should have learned to:

- Define what a session state is
- Explain how Oracle Application Express implements session state
- View session state values
- Reference a session state value
- Clear the session state



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In this lesson, you learned how Oracle Application Express manages the session state of an application. You also learned how to debug an application.

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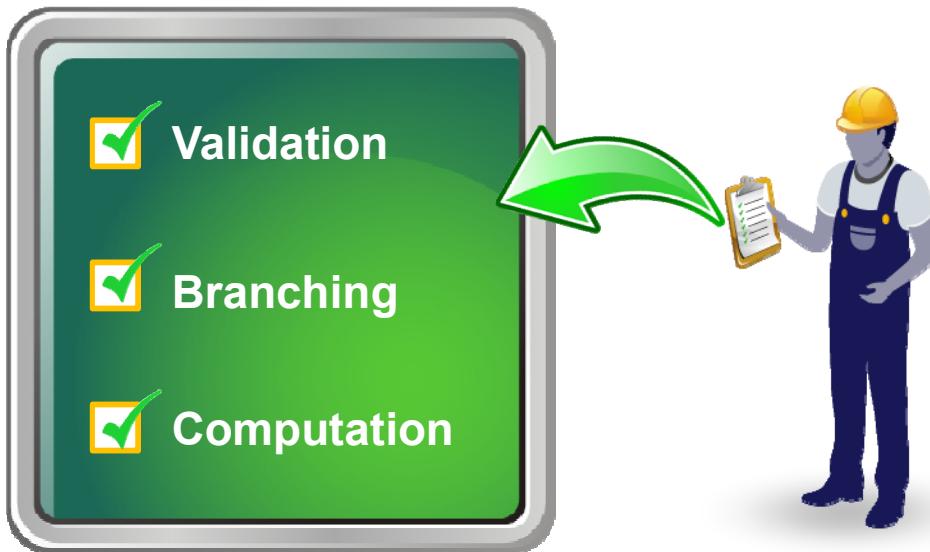
10

# Adding Page Processing



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## Jack Includes Page Processing in the Application



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The PTS application that Jack has developed so far has the following issues:

- It allows the user to enter irrelevant values in a field that expects certain type of values. (For example, entering alphabets for phone number.)
- It lacks continuity as the pages are not been linked.
- It doesn't have computational ability (that is, it doesn't perform any calculations).

Jack is looking to solve these issues in the application by using the inbuilt features of APEX.

# You Are Here in This Course

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

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Lesson 6: Creating Forms

Lesson 7: Working with Pages and Regions

Lesson 8: Adding Items and Buttons

Lesson 9 : Understanding Session State

Lesson 10 : Including Page Processing

Lesson 11 : Validating and Debugging Your Application



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

## Objectives

After completing this lesson, you should be able to:

- 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.

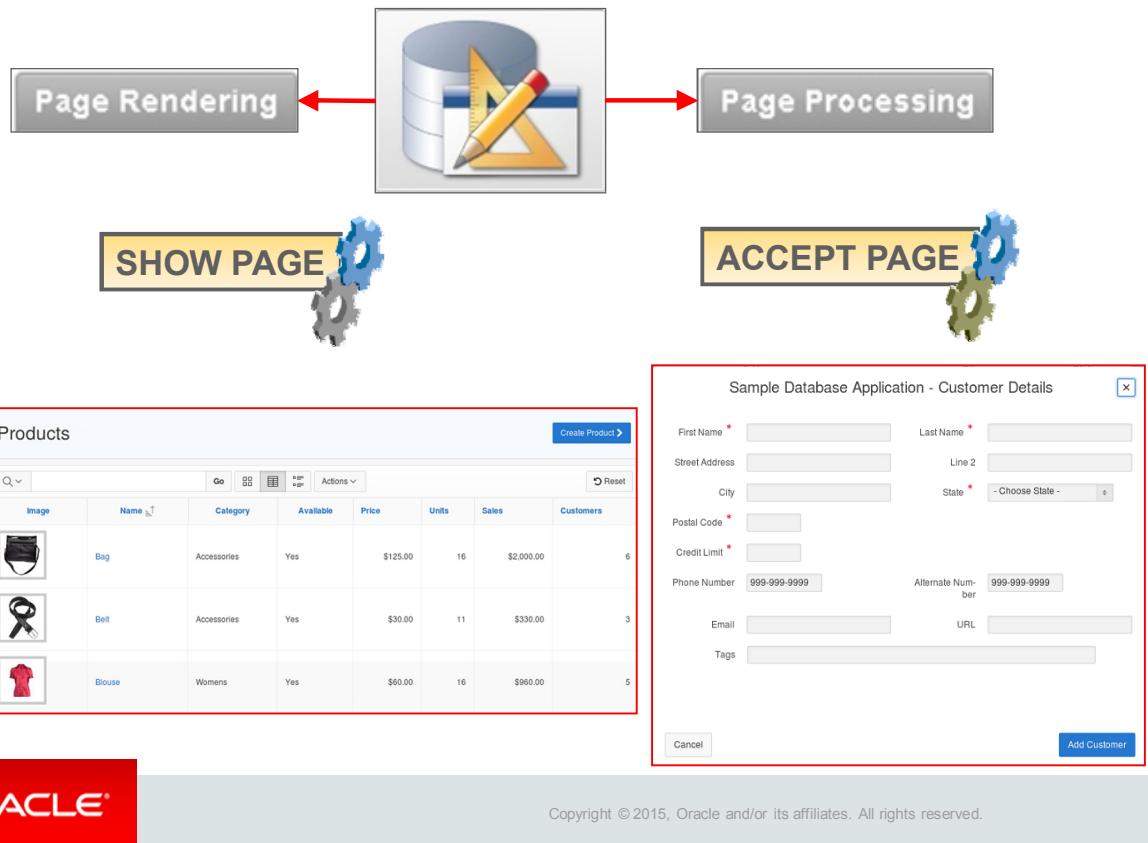
## Lesson Agenda

- 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



Oracle Application Express performs page rendering and page processing.

Page rendering occurs when the APEX engine assembles a page from the database by 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 a table of projects with columns: Project Id, Project Name, Project Type, Project Description, Project Status, Project Planned Start Date, Project Start Date, Project Planned End Date, Project End Date, and Project Created By. A red box highlights the first row, and a red arrow points from the 'Edit' icon in the first column to a detailed edit form on the right. The edit form contains fields for Project Name, Project Type, Project Description, Project Status, Project Planned Start Date, Project Start Date, Project Planned End Date, Project End Date, Project Upgrade Yn, Project Upgrade Of, Project Created By, Project Created On, Project Last Updated By, and Project Last Updated On. A 'Cancel' button is at the bottom of the form.

	Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Created By
	612	MFG Petrol Industry	304	Engineering Design Capabilities in the Petrol Industry	101	19-JUN-15	19-JUN-15	01-JUL-15	-	504
	614	NoSQL Course Testing	302	Testing Course Lessons for NoSQL	101	01-MAY-15	01-MAY-15	15-MAY-15	-	504
	604	MFG Sugar Industries	304	Engineering design Capabilities in the Sugar Industry	104	20-JAN-15				
	607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14				

Click the Edit icon to view a form page.

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 Edit Icon (pencil symbol) on the left-most column of any record, 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

**Session State**  
APEX

When you click Go, the page is submitted and the value is stored in a session.

When the same page is rendered, rows that match the session state value are displayed.

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Created By
612	MFG Petrol Industry	304	Engineering Design Capabilities in the Petrol Industry	101	19-JUN-15	19-JUN-15	01-JUL-15	-	504
614	NoSQL Course Testing	302	Testing Course Lessons for NoSQL	101	01-MAY-15	01-MAY-15	15-MAY-15	-	504
604	MFG Sugar Industries	304	Engineering design Capabilities in the Sugar Industry	104	20-JAN-15	01-FEB-15	23-MAR-15	26-MAR-15	504
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	504

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Created By
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	504
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15	15-JAN-15	15-APR-15	-	504

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 session value is used to fetch the row.

Session State  
Project ID

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

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Created By
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	504
601	APEX5.0 Course Development	302	Developing Course Lessons for APEX 5.0	102	01-JAN-15				

Manage Projects

Project Name \* APEX4.2 Course Development  
 Project Type \* 302  
 Project Description \* Developing Course Lessons for APEX 4.2  
 Project Status \* 104  
 Project Planned Start Date \* 15-DEC-14  
 Project Start Date \* 20-DEC-14  
 Project Planned End Date \* 01-APR-15  
 Project End Date \* 24-MAR-15  
 Project Upgrade Yn \* No  
 Project Upgrade Of  
 Project Created By \* 504  
 Project Created On 20-DEC-14  
 Project Last Updated By \* 504  
 Project Last Updated On 23-MAR-15

Cancel Apply Changes

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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 shows a 'Manage Projects' page with a form and a table.

**Form Fields:**

- Project Name: APEX4.2 Course Development (highlighted in yellow)
- Project Type: 302
- Project Description: Developing Course Lessons for A
- Project Status: 104
- Project Planned Start Date: 15-DEC-14
- Project Start Date: 20-DEC-14
- Project Planned End Date: 01-APR-15
- Project End Date: 24-MAR-15
- Project Upgrade Yn: \*
- Project Upgrade Of: \*
- Project Created By: \*

**Table Data:**

Project Id	Project Name	Project Type	Project Description	Project Status	Project Planned Start Date	Project Start Date	Project Planned End Date	Project End Date	Project Created By
612	MFG Petrol Industry	304	Engineering Design Capabilities in the Petrol Industry	101	19-JUN-15	19-JUN-15	01-JUL-15	-	504
614	NoSQL Course Testing	302	Testing Course Lessons for NoSQL	101	01-MAY-15	01-MAY-15	15-MAY-15	-	504
604	MFG Sugar Industries	304	Engineering design Capabilities in the Sugar Industry	104	20-JAN-15	01-FEB-15	23-MAR-15	26-MAR-15	504
607	APEX4.2 Course Development	302	Developing Course Lessons for APEX 4.2	104	15-DEC-14	20-DEC-14	01-APR-15	24-MAR-15	504

**Validation Error:** A yellow box at the top left of the form area says '3 errors have occurred' with a warning icon. The error message 'Project Name can not have special characters!' is displayed next to the Project Name field.

**Success Message:** A red X icon is overlaid on the error message. To its right, handwritten text reads: 'If you get an error, a message is displayed on the same page, and no processing or computation occurs.' Below this, another handwritten note says: 'On success, the insert row process is executed, and another page is displayed.' with a green checkmark.

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In the example in the slide, you have a forms page. You enter the form details and click the Add Customer 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.

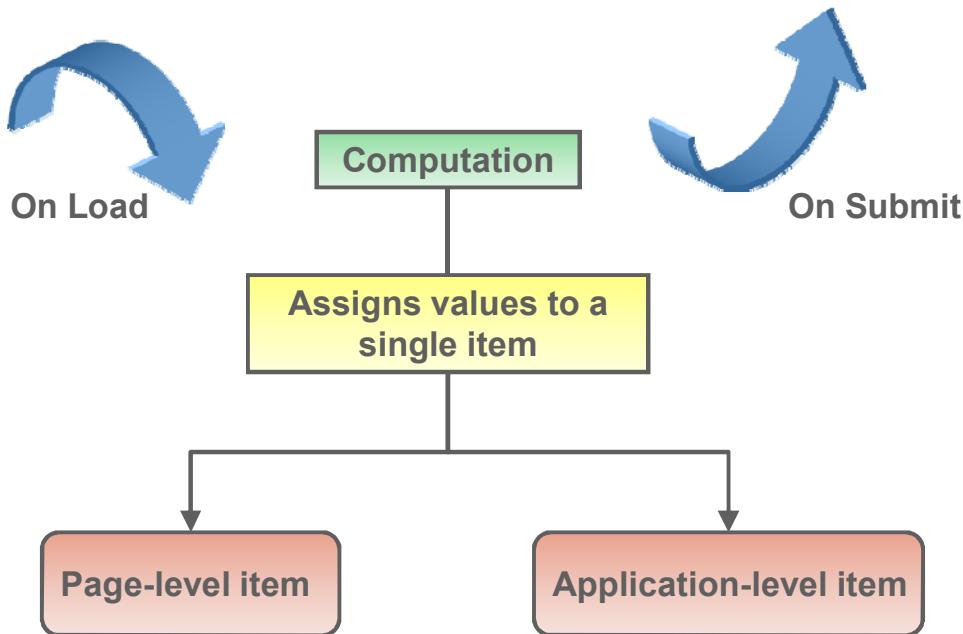
## Lesson Agenda

- 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 a 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.



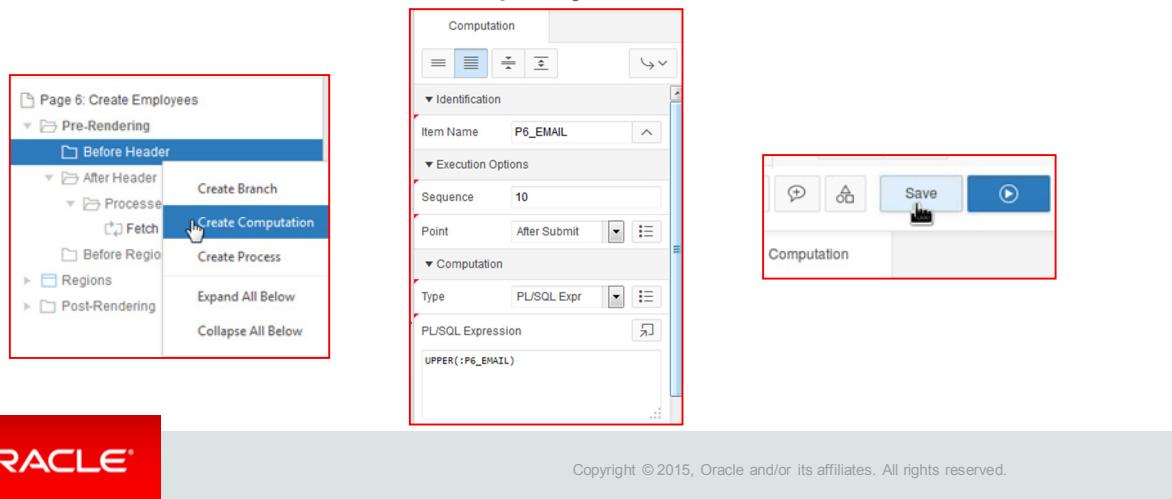
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The slide lists some scenarios when you can create page rendering or page-processing computations.

# Creating Computations

To create a page computation:

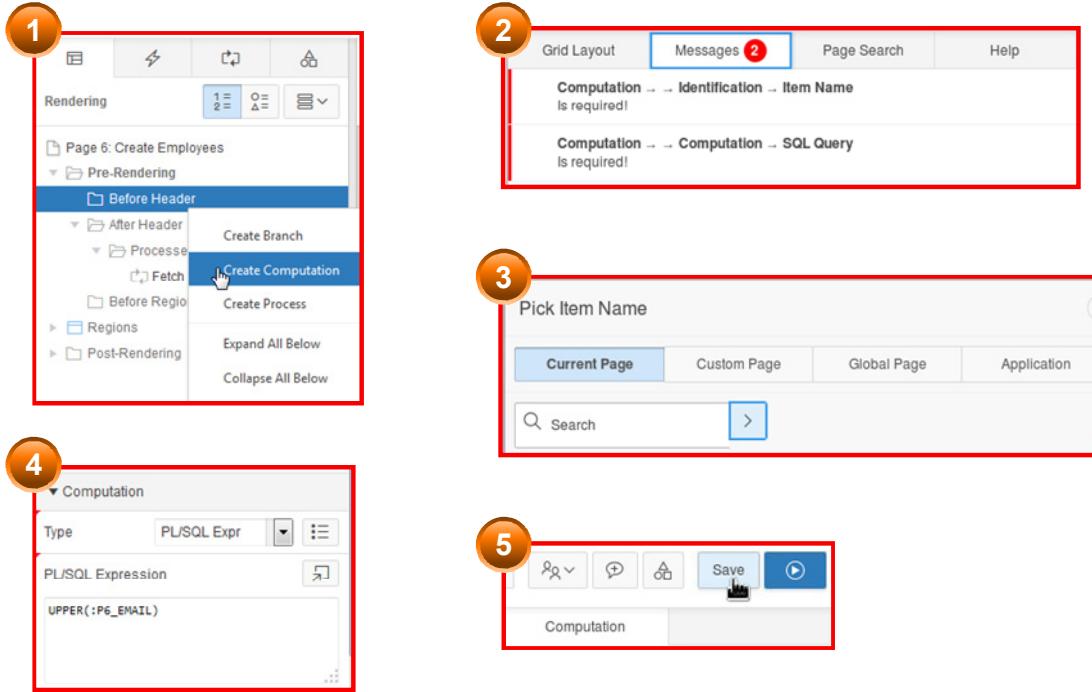
1. Navigate to the appropriate page in Page Designer.
2. In the Rendering pane, expand the Pre-Rendering or Post-Rendering node and locate where the computation should be.
3. Right-click Computation and select Create Computation.
4. Edit the attributes in the Property Editor and click Save.



To create a page computation:

1. Navigate to the appropriate page in Page Designer.
2. In the Rendering pane, expand the Pre-Rendering or Post-Rendering node and locate where the computation should be.
3. Right-click Computations and select **Create Computation**. The computation is created and the attributes of the computation is displayed in the Property Editor.
4. In the Property Editor, edit the following attributes and click **Save**.
  - Identification > Item Name: Enter the page or application item populated by this computation.
  - Execution Options > Sequence: Specify the sequence for this computation.
  - Execution Options > Point: Select at what point in page rendering or processing this computation is executed.
  - Computation > Type: Select a computation type.

# Creating a Page-Rendering Computation



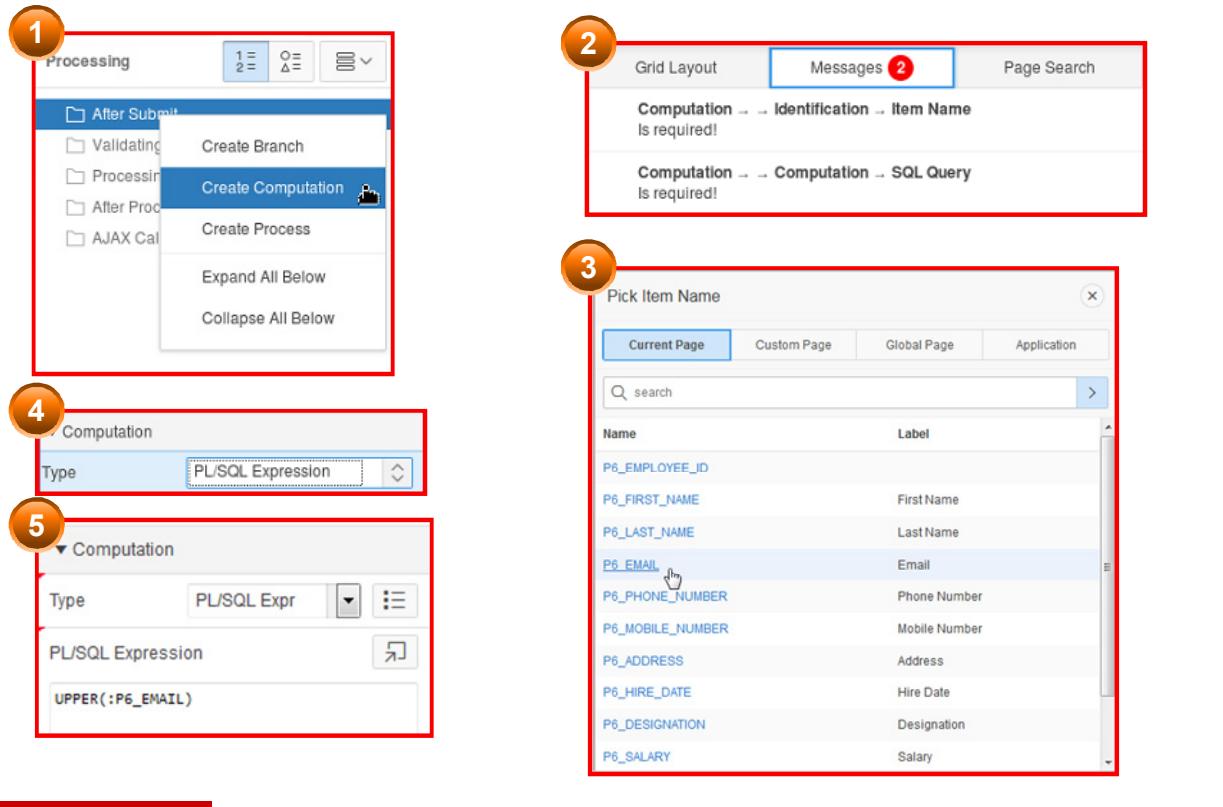
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To create this page-rendering computation, perform the following steps:

1. Right-click the Before Regions node in the Pre-Rendering section and select Create Computation.
2. Click the Messages tab to resolve the errors. You need to specify the Item Name and SQL Query
3. In the Property Editor, select the item name.
4. Specify the SQL Query.
5. Click Save.

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

# Creating a Page-Processing Computation



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

In this example, you specify that P7\_CUST\_EMAIL when entered should be stored in the database in uppercase. To create this page-processing computation, perform the following steps:

1. Right-click the After Submit node in the Processing section and click Create Computation.
2. Click the Messages tab to resolve the errors. You need to specify the Item Name and SQL Query.
3. Select P7\_CUST\_FIRST\_NAME for Compute Item.
4. Select PL/SQL Expression for Computation Type.
5. In the Computation field, enter upper (:P7\_CUST\_FIRST\_NAME). In this example, you do not want any conditions.
6. Click Save to create the computation.

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

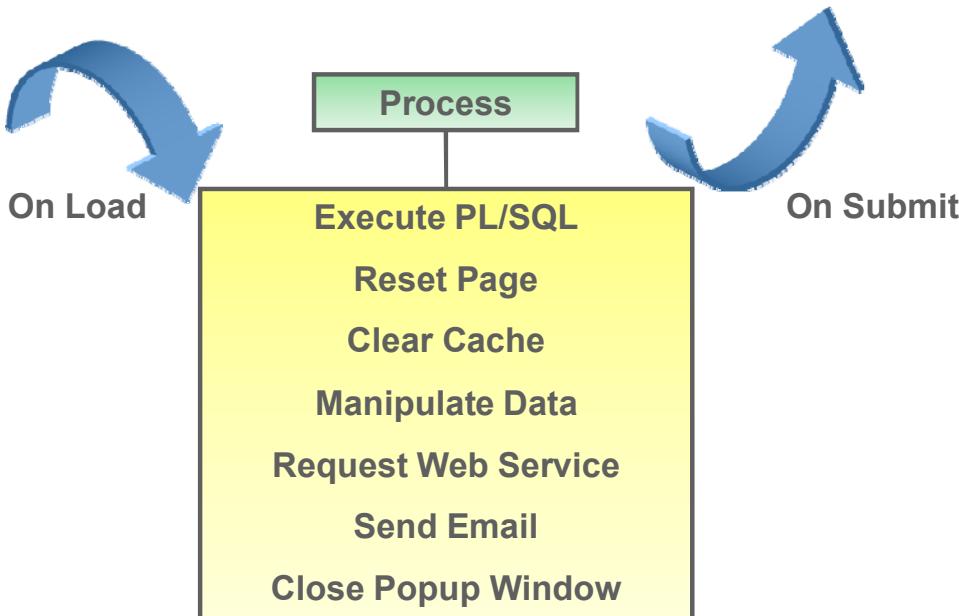
- Introducing Page Processing
- Including Computations
- Including Processes
  - What Is a Page Process?
  - Reviewing Automatically Created Processes
  - Creating an On Load Process
  - Creating an On Submit Process
  - Options to Populate Items in a Form
- Including Validations
- Including Branches



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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.



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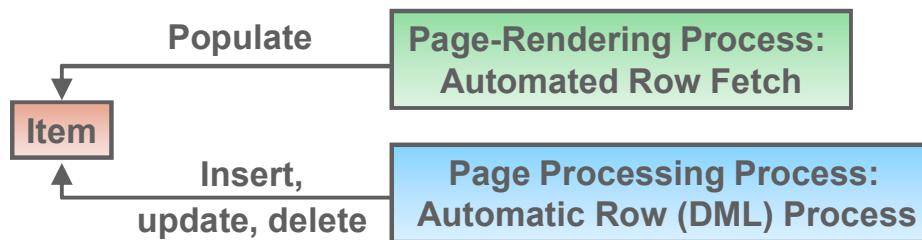
A page process is a specific event that runs when a page is loaded or submitted. You create a page process to execute some code (such as SQL or PL/SQL) or to make a call to the rendering engine. For example, you create a page process to alter data through an `INSERT`, an `UPDATE`, or a `DELETE` statement.

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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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 the `INSERT`, `DELETE`, or `UPDATE` command.

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

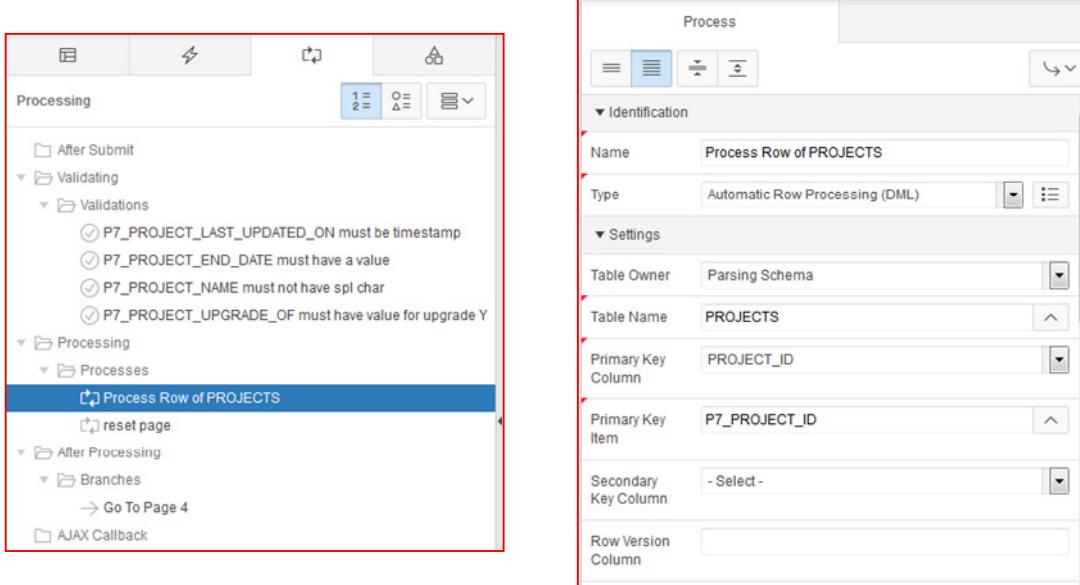
The screenshot shows the Oracle Application Express interface. On the left, the 'Pre-Rendering' section of the 'Page 7: Manage Projects' page definition is displayed. A red box highlights the 'Processes' node under 'After Header', where the 'Fetch Row from PROJECTS' process is selected. On the right, the 'Property Editor' window is open, also with a red box around it. The 'Identification' tab shows the process name is 'Fetch Row from PROJECTS' and the type is 'Automatic Row Fetch'. The 'Settings' tab displays the table owner as 'Parsing Schema', the table name as 'PROJECTS', and the primary key column as 'PROJECT\_ID'. The primary key item is listed as 'P7\_PROJECT\_ID'. The secondary key column and row version column are both set to '- Select -'. The 'Runtime Where Clause' field is empty.

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. In the Pre-Rendering section, click “Fetch Row from <table\_name>” under the After Header node.
2. You can view the process details in the Property Editor window. Under the Settings tab, the table name, item name, and column name are listed.

# Reviewing an Automatic Row (DML) Processing Process



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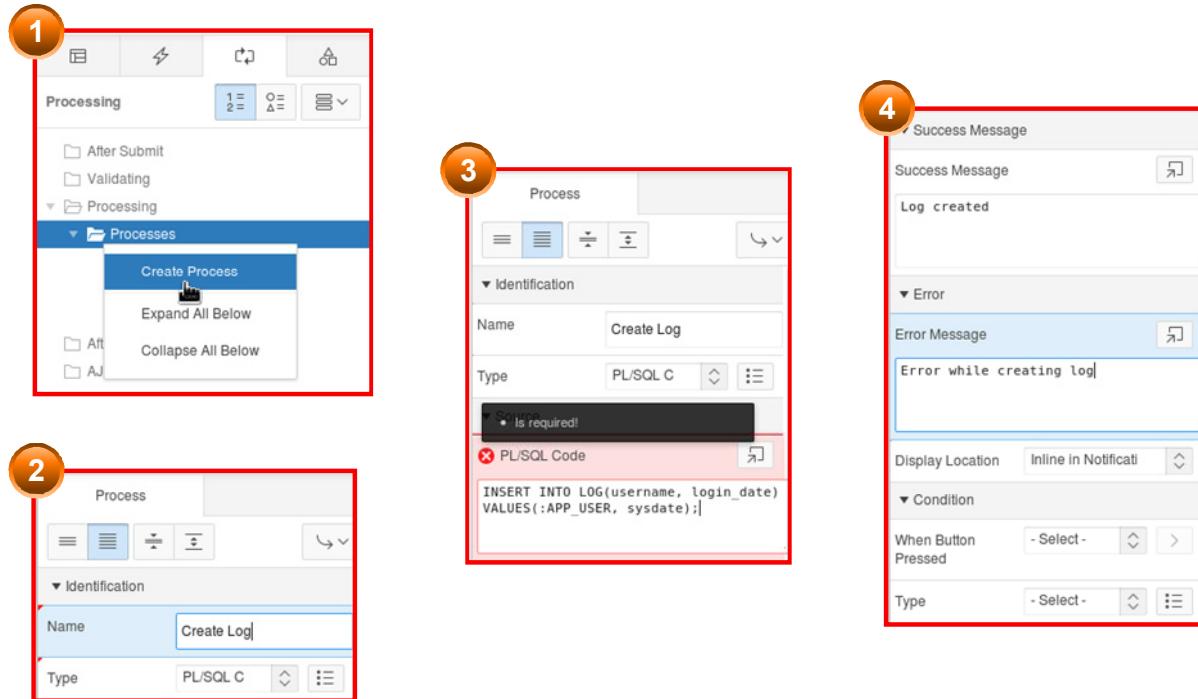
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An Automatic Row Processing (DML) process updates the database.

To view an Automated Row (DML) process, navigate to the Processing tab. Perform the following steps:

1. In the left panel of the Page Designer, click “Process Row of <table\_name>” under the Processing node.
2. You can view the process details in the Property Editor. The table name, item name, column name, and the operations that are allowed on the table are listed.

# Creating an On Submit Process

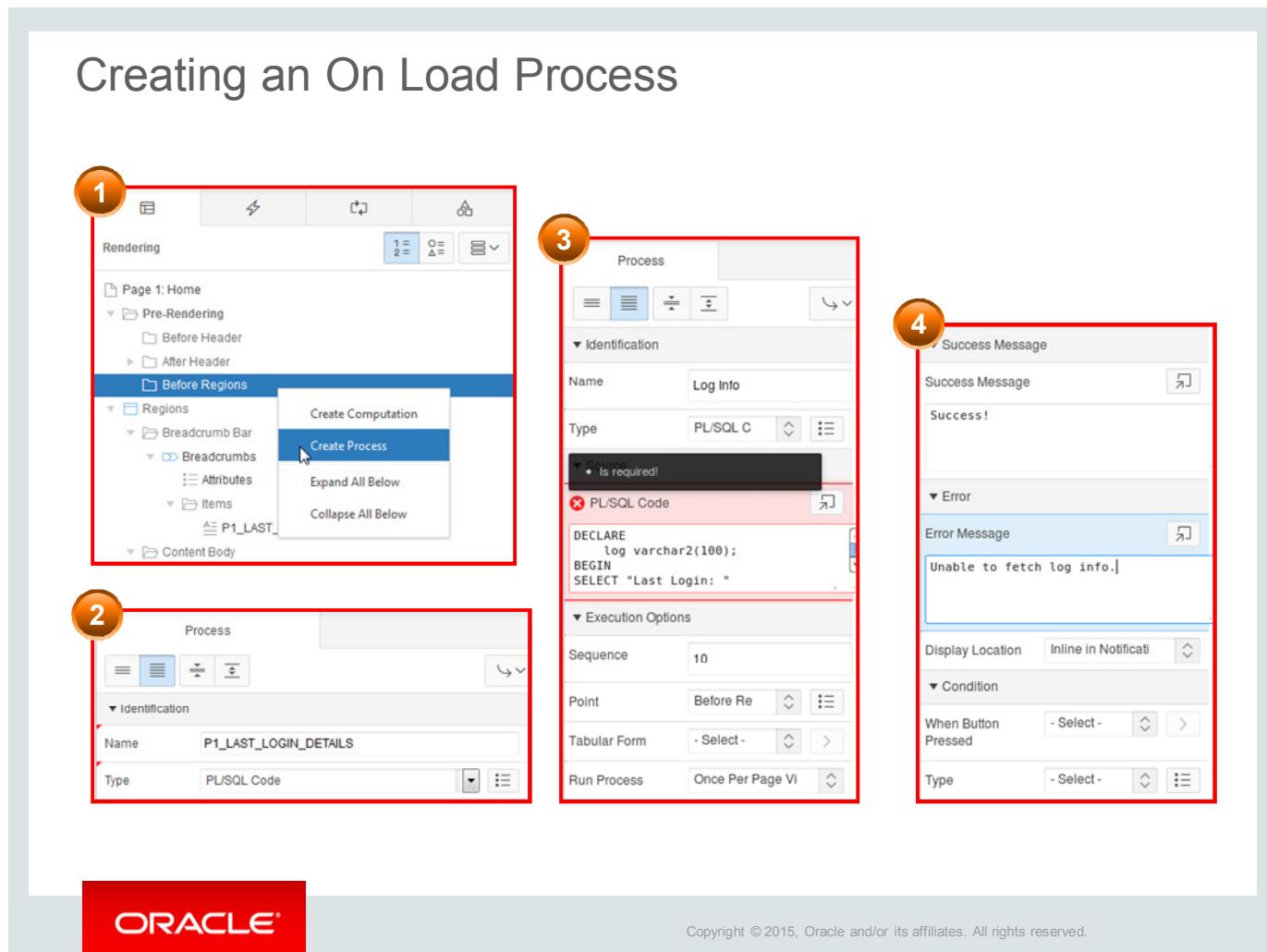


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In this example, you create an On Submit process to perform a logging function. Whenever users log in to the application, you want to store the user's name, and the login date and time in a database table. To create the page process, perform the following 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 Process.
2. In the Property Editor pane, enter a name for your process and select PL/SQL Code for Type.
3. Enter the PL/SQL Code in the text area. In this example, an `INSERT` command to enter the application username (`:APP_USER`) and the date/time information (`sysdate`) into a `LOG` table is entered.
4. Enter the Success and Failure messages. You can also specify a condition for executing the process.
5. Save the process. The process is created.



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, perform the following steps:

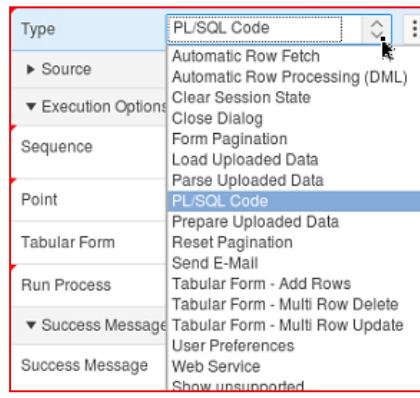
1. Navigate to the page definition for the page where you want to display the details. Right-click the Before Regions node in the Page Rendering section and select Create Process.
2. In the Property Editor, enter a name for your process and select the Type as PL/SQL Code.
3. Enter the PL/SQL code in the text area. In this example, a SELECT query to retrieve the date and time that the user last logged in is entered.
4. Enter the Success and Failure messages. Click Save. You can also specify a condition for executing the process.

The process is created.

## 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. The graphic image in the slide shows the different process types you can create.

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

## 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 'Manage Projects' page with a red border around the error message area. At the top, a yellow box displays three errors:

- Project End Date must have a value!
- Project Name can not have special characters! ([Go to error](#))
- Project Upgrade Of violates data validation! ([Go to error](#))

The form fields include:

Field	Value	Validation Status
Project Name	APEX4.2 Course Development	Validation Error: Project Name can not have special characters!
Project Type	302	Valid
Project Description	Developing Course Lessons for A	Valid
Project Status	104	Valid
Project Planned Start Date	15-DEC-14	Valid
Project Start Date	20-DEC-14	Valid
Project Planned End Date	01-APR-15	Valid
Project End Date	24-MAR-15	Valid
Project Upgrade Yn	Yes	Valid
Project Upgrade Of		Validation Error: Project Upgrade Of violates data validation!
Project Created By	504	Valid

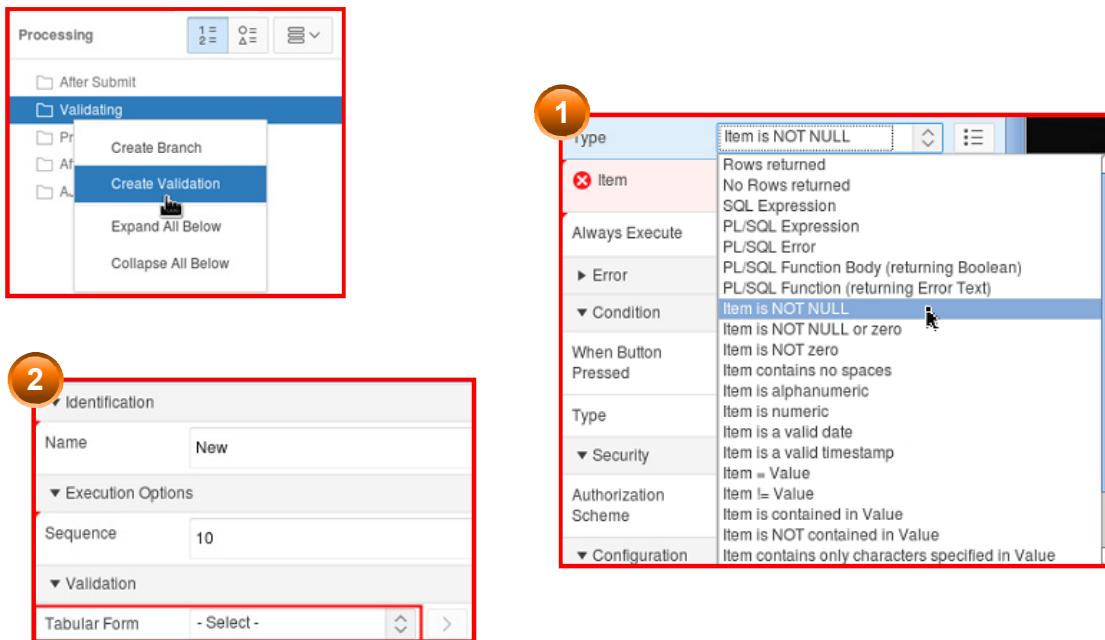
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A validation is a logical control to verify data. You create validations to ensure that an application user enters valid and accurate data. If all the validations created on the page succeed, Oracle Application Express proceeds to the next step of 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 confirm 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.

# Using the Create Validation Feature



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You can define a validation declaratively by using the Create Validation Feature. To create new validation, navigate to the page definition of the page where you want to create the validation. In the Page Processing section, right-click Validating and select Create Validation.

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. For 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 Designation is a valid value from the given list.

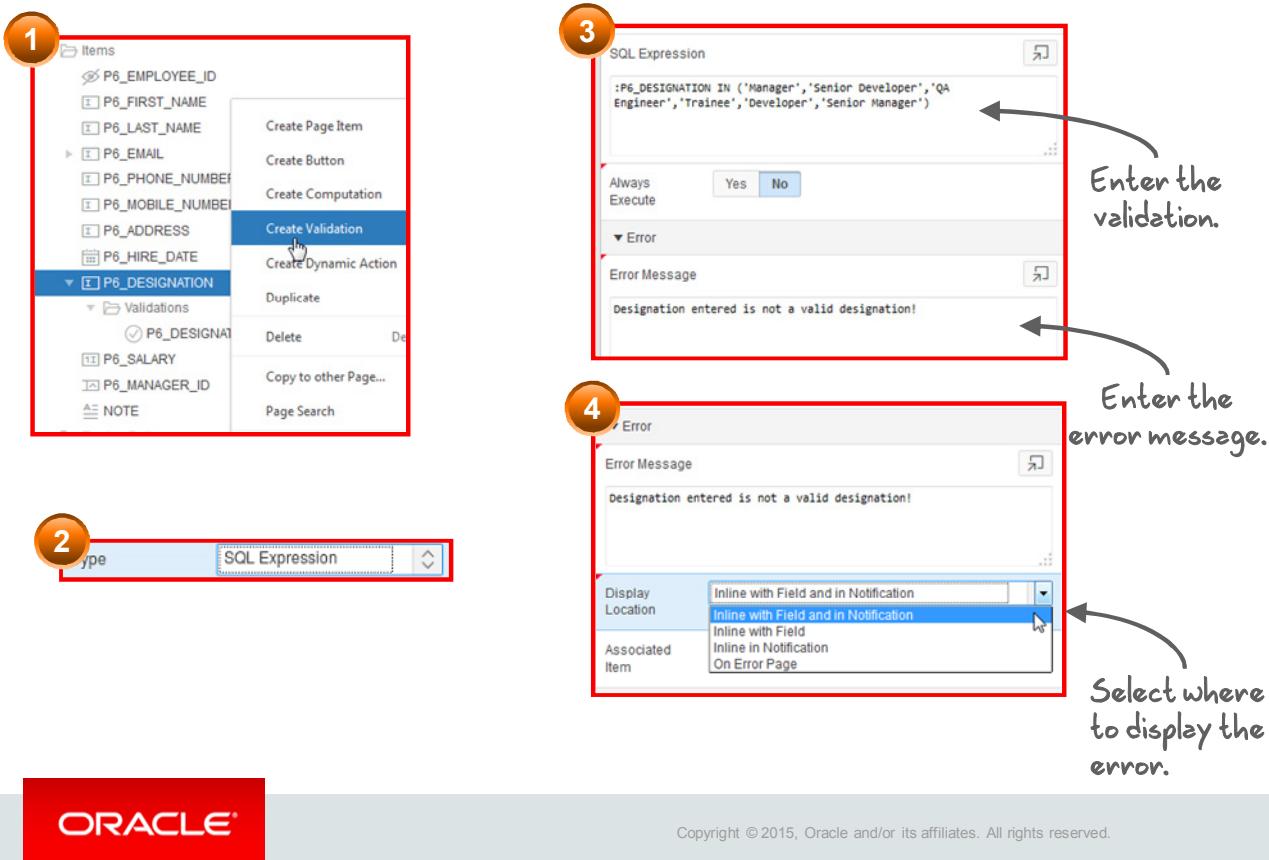
The screenshot shows a web-based form titled 'Create Employees'. The form fields include: First Name (Ronald), Last Name (Roger), Email (RR@ORACLE.COM), Phone Number (8904566754), Mobile Number (8976574567), Address (empty), Hire Date (06-Jul-15), Designation (Singer), and Salary (890765). The Manager Id dropdown is set to Frank OHare. A note at the bottom states: 'Only new employees can be created from this page. To modify existing employee details, please open 'Manage Employees' form.' A red border highlights the entire form area. At the top, a yellow notification bar displays: '1 error has occurred' and 'Designation entered is not a valid designation! (Go to error)'.

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In this example, you create a validation to ensure that the value entered in the Designation field is a valid designation. You will display the error message in the notification area and next to the Designation item.

# Creating a SQL Validation



To create a SQL validation, perform the following steps:

1. In the Rendering pane, select the item for which you want to create the validation. Right-click the item and select Create Validation.
2. In the Property Editor, select SQL Expression for Type.
3. Enter the validation expression and the error message. In this example, the value of the designation item should be a valid one. Therefore, :P6\_DESIGNATION IN ('Manager', 'Senior Developer', 'QA Engineer', 'Trainee', 'Developer', 'Senior Manager') is entered.
4. Specify the display location for the error message and click Save.

Run the form and fill in the details. Specify 'Singer' for the DESIGNATION field and click Create. You should get an error message in the notification area and next to the Designation item.

## PL/SQL Validation: Example

Create a validation to check if Project Upgrade Of field is populated when Project Upgrade YN is set to “Yes” and its not populated with any value when Project Upgrade YN is set to “No”.

The screenshot shows a form titled "Manage Projects". At the top, a yellow warning bar indicates "2 errors have occurred" with two items: "Project End Date must have a value!" and "Project Upgrade Of violates data validation! (Go to error)". The form fields include:

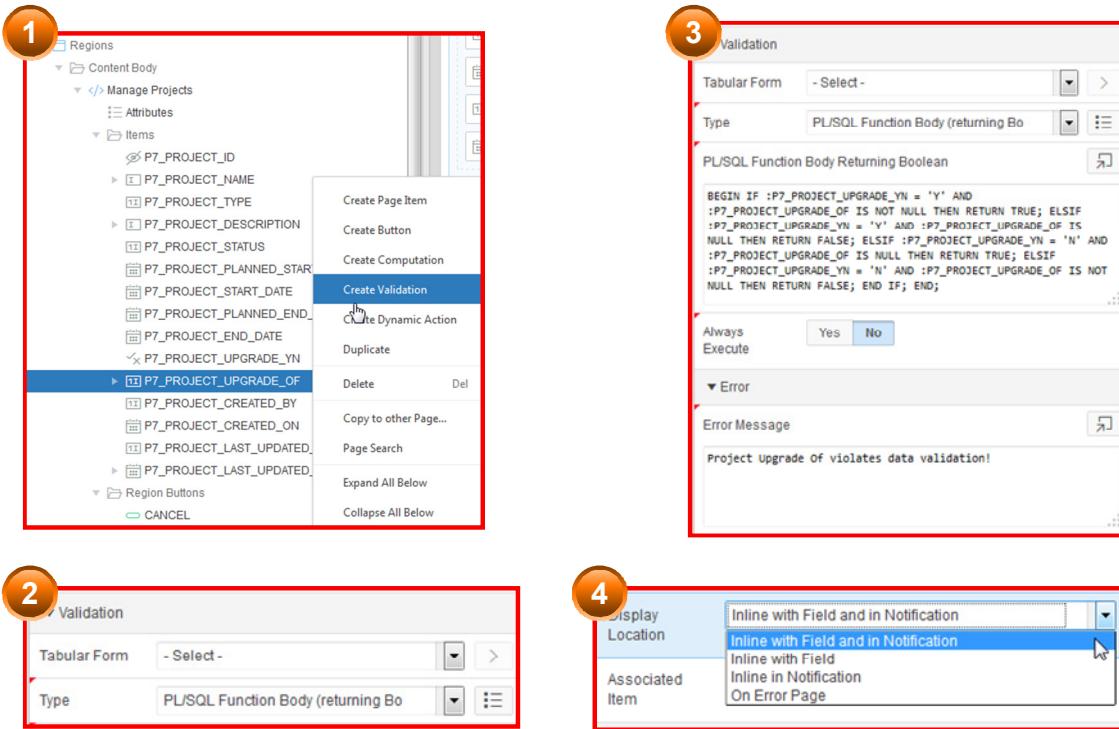
- Project Name: Course Development
- Project Type: 302
- Project Description: Course Development
- Project Status: 101
- Project Planned Start Date: 07-Jul-15
- Project Start Date: 07-Jul-15
- Project Planned End Date: 30-Jul-15
- Project End Date: (empty)
- Project Upgrade Yn: Yes (selected)
- Project Upgrade Of: (empty) with validation message "Project Upgrade Of violates data validation!"
- Project Created By: 505

A red box highlights the "Project Upgrade Yn" and "Project Upgrade Of" fields.

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In this example, you want to make sure that the Project Upgrade Of field is entered with a value whenever Project Upgrade YN item is set to “Yes” and vice versa. You will display the error message only next to the Project Upgrade Of item.

# Creating a PL/SQL Validation



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To create a PL/SQL validation, perform the following steps:

1. In the Rendering pane, select the item for which you want to create the validation. Right-click the item and select Create Validation.
2. In the Property Editor, select PL/SQL Function Body (returning Boolean) for Type.
3. Enter the validation expression and the error message. Notice that the PL/SQL Code returns either true or false. In this example, Project upgrade Of and Project Upgrade YN field values are compared against defined rules and True or False is returned accordingly.
4. Select a display location for the error. In this example, "Inline with Field" is selected.

Save and run the form, and fill in the details. Select "Yes" for Project Upgrade YN and leave the Project Upgrade Of field blank and click Apply Changes. You should get an error message next to the Project Upgrade Of item.

## Item String Comparison Validation: Example

Create a validation to ensure that Project Name is entered in the correct format.

The screenshot shows a web application form titled "Manage Projects". At the top, a yellow warning icon indicates "1 error has occurred" with the message "Project Name can not have special characters! (Go to error)". The form contains several input fields for project details:

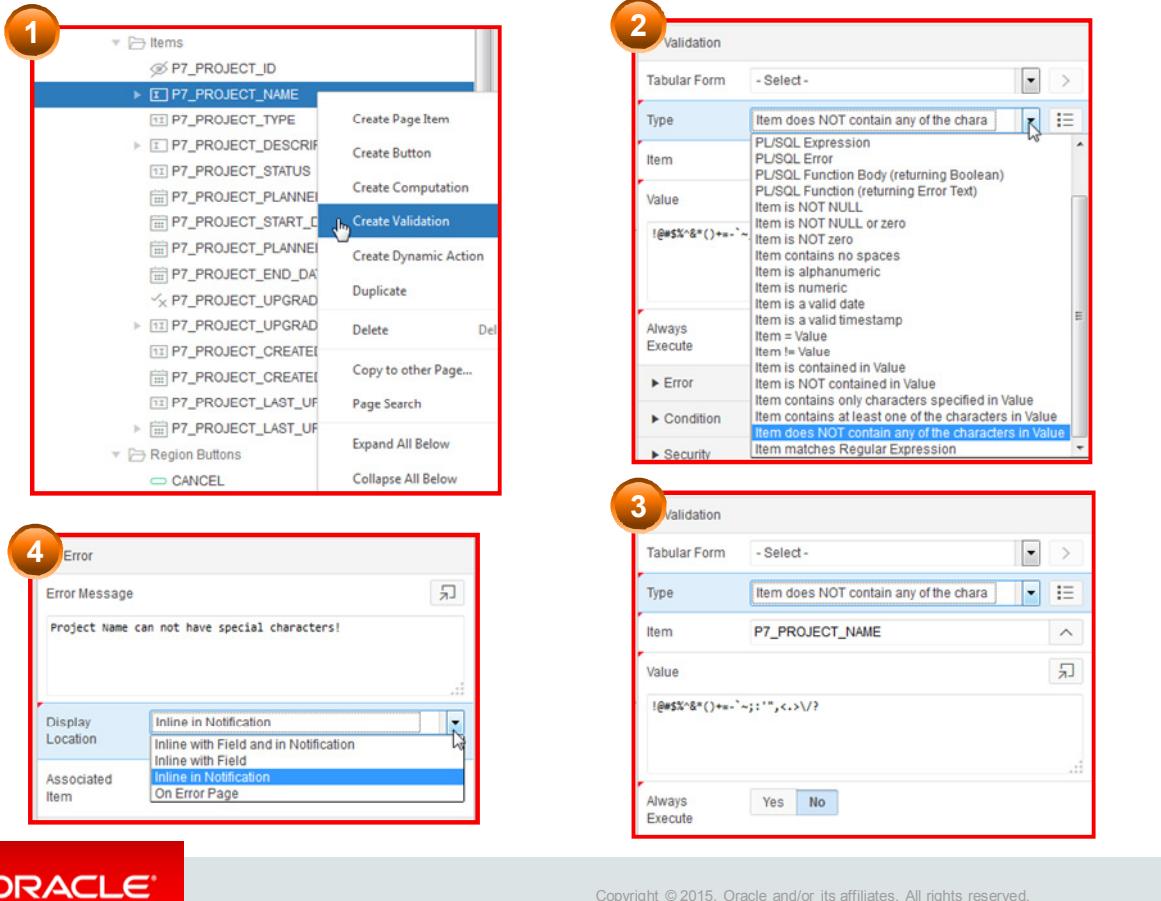
Field	Value
Project Name *	Course Development !!
Project Type *	302
Project Description *	Course Development
Project Status *	101
Project Planned Start Date *	07-Jul-15
Project Start Date *	07-Jul-15
Project Planned End Date *	31-Jul-15
Project End Date	31-Jul-15
Project Upgrade Yn *	No
Project Upgrade Of	
Project Created By *	505
Project Created On	
Project Last Updated By *	505
Project Last Updated On	06-Jul-15

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In this example, you want to make sure that the Project Name is entered in the correct format. 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, perform the following steps:

1. In the Rendering pane, select the item for which you want to create the validation. Right-click the item and select Create Validation.
2. In the Property Editor, select “Item does NOT contain any of the characters in Value” for Type.
3. Select the item and enter the Value. In this example, the P7\_PROJECT\_NAME is specified for Item and !@#\$%^&\* ()+=-`~; : ' " , < . > \/? is entered for Value.
4. Enter the error message and specify the display location.

Save and run the form and fill in the details.

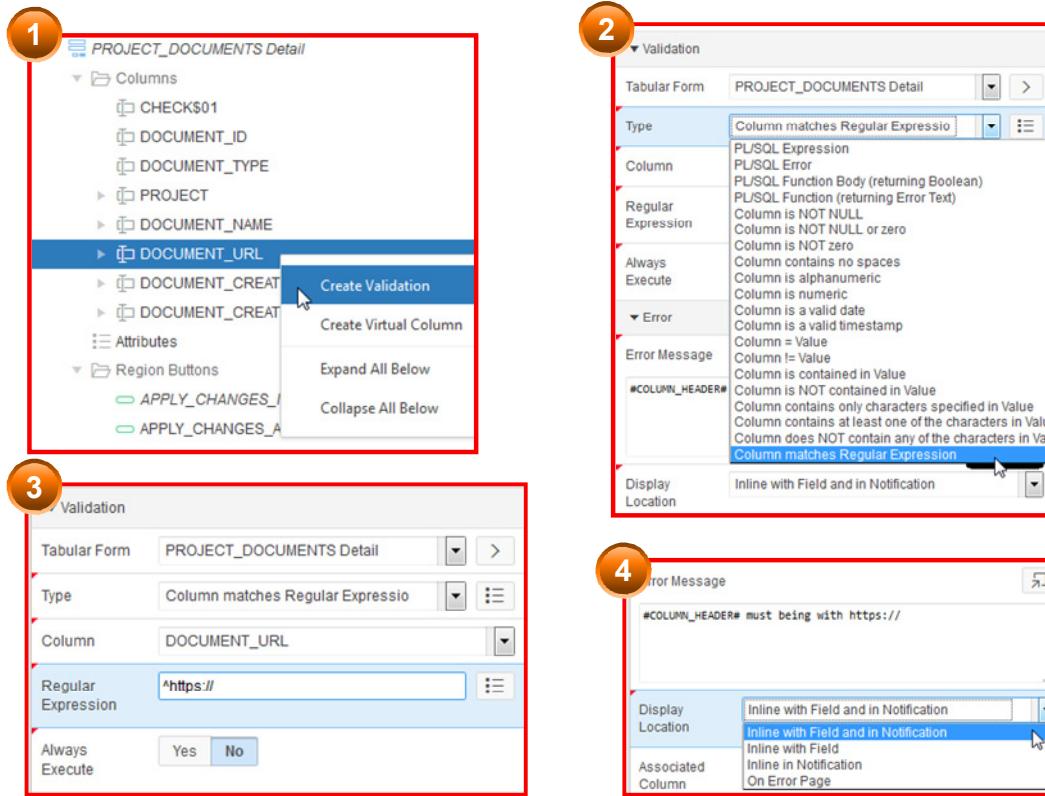
## Regular Expression Validation: Example

Create a validation to ensure that the URL for Project Documents is entered in a particular format.

The screenshot shows a web application interface. At the top, a yellow header bar indicates "1 error has occurred" with the message "Document Url must begin with https:// (Row 1)". Below this, there are sections for "Browse the Web" and "Want to search anything?", both containing links to Bing. The main content area is titled "PROJECT\_DOCUMENTS Master". It shows a table with one row selected, containing fields for "Project" (606), "Document Name" (Data Model Diagram), "Document Url" (www.stbeehive.or), "Document Created On" (10-MAR-15), and "Document Created By" (513). A "Save" button is visible at the bottom right of the table. The footer contains the Oracle logo and the copyright notice "Copyright © 2015, Oracle and/or its affiliates. All rights reserved."

In this example, you want the Project Document URL to be entered in the correct format. 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, perform the following steps:

1. In the Rendering pane, select the item for which you want to create the validation. Right-click the item and select Create Validation.
2. In the Property Editor, select “Column matches Regular Expression” for Type.
3. Select the item and enter the Regular Expression. In this example, the DOCUMENT\_URL is specified for Item and ^https:// is entered for Regular Expression.
4. Enter the error message and specify the Display Location. Click Save.

Save and run the form and fill in the details.

## 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 "Update Employees". A red box highlights the top row where an error occurred. The error message is: "1 error has occurred" followed by a bullet point: "Email must not contain spaces. (Row 1)". The table has columns: Employee Id, First Name, Last Name, Email, Phone Number, Mobile Number, and Address. The first row (Employee Id 501) has an error in the Email field, which contains "john.dulle s@pts.com". The other rows show valid email addresses without spaces.

Employee Id	First Name	Last Name	Email	Phone Number	Mobile Number	Address
501	John	Dulles	john.dulle s@pts.com	7035552143	7035558967	45020 Aviation Drive,
502	William	Hartsfield	william.harstfield@pts	4045553285	9873567899	6000 North Terminal F
503	Edward	Logan	edward.logan@pts.co	6175553295	5673459876	1 Harborside Drive, Et
504	Frank	OHare	frank.ohare@pts.com	7735557693	3157862405	10000 West OHare, C
505	Fiorello	LaGuardia	fiorello.laguardia@pts	2125553923	1235342653	Hangar Center, Third I
506	Albert	Lambert	albert.lambert@pts.co	3145554022	3157862399	10701 Lambert Intern:
507	Eugene	Bradley	eugene.bradley@pts.c	8605551835	2349872345	Schoephoester Road,
508	King	John	king.john@pts.com	3242597586	3148762983	602 Scottsdale, AZ

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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

The screenshot shows the Oracle Application Express interface with four numbered steps:

- Step 1:** In the Rendering pane, a right-click context menu is open over the 'EMAIL' column header. The 'Create Validation' option is highlighted.
- Step 2:** The Property Editor is open for the validation rule. The 'Type' dropdown is set to 'Column contains no spaces'. Other options like 'Rows returned' and 'SQL Expression' are visible.
- Step 3:** The 'Column' dropdown is open, showing various columns from the 'Update Employees' table. The 'EMAIL' column is selected.
- Step 4:** The 'Error Message' field contains the placeholder '#COLUMN\_HEADER# must not contain spaces.' The 'Display Location' dropdown is open, with 'Inline in Notification' selected.

To create a Tabular Form validation, perform the following steps:

1. In the Rendering pane, select the item for which you want to create the validation. Right-click the item and select Create Validation.
2. In the Property Editor, select “Column contains no spaces” for Type.
3. Select the Column, if not automatically selected. In this example, the EMAIL field is selected.
4. Specify the error message and the display location.

Specify a condition if necessary, and click Save and Run 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 is NOT 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?

The screenshot shows two pages from an Oracle Application Express application. On the left, the 'Create Employees' page has a red box around its form fields. A blue button labeled 'Get Manager Reportees' is highlighted with a red box and has a red arrow pointing to the right. On the right, the 'Reporting Employees' page is displayed, also enclosed in a red box. A red arrow points from the 'Get Manager Reportees' button to the reporting page.

**Create Employees**

First Name \*   
Last Name \*   
Email \*   
Phone Number \*   
Mobile Number \*   
Address   
Hire Date \*    
Designation \*   
Salary \*   
Manager Id    
Frank O'Hare, Turner Thomas

**Reporting Employees**

Reporteeid	Reporteename
530	Nag Roberts
506	Albert Lambert
507	Eugene Bradley
508	King John
509	Blake Joesph
510	Clark James
519	Adams Henry
523	Sowmya Kiran

1 - 8

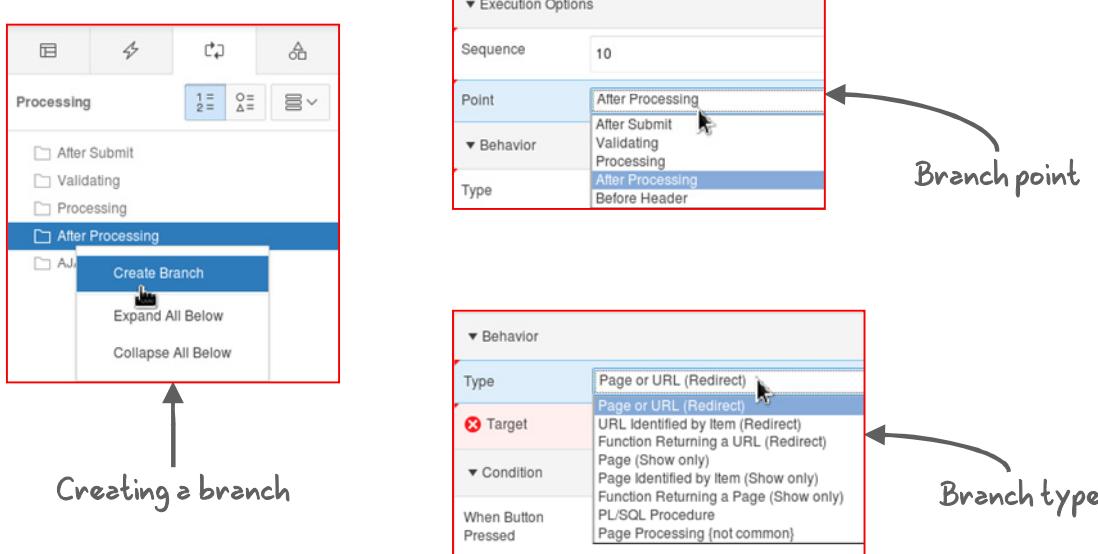
**Oracle**

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*The page is submitted and a new page is displayed. Redirected to new page.*

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 the user is redirected to another page.

# Creating a Branch

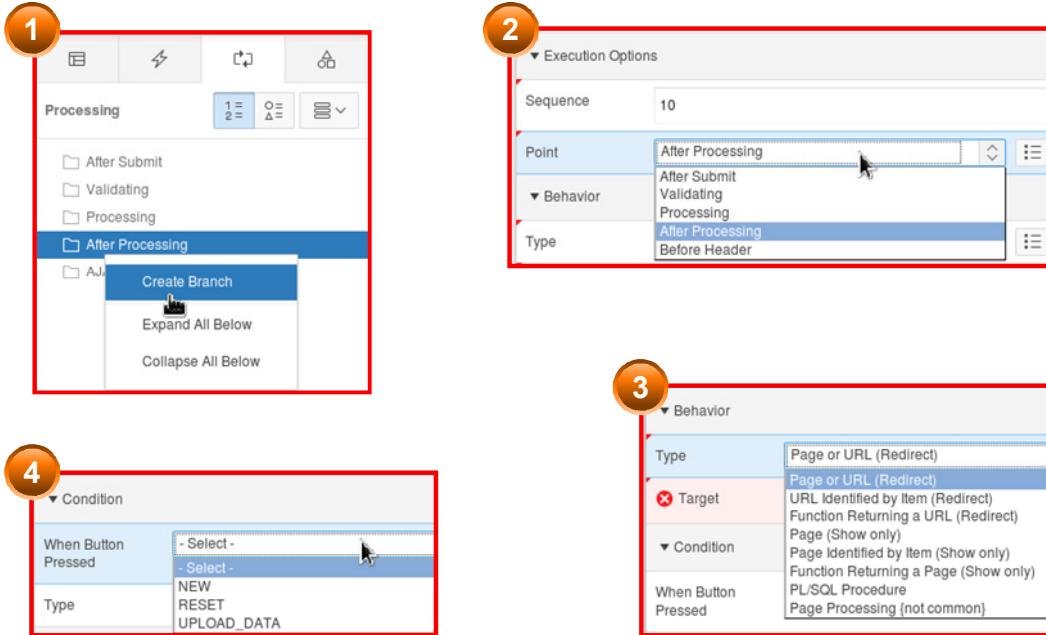


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You can create a new branch by navigating to the Processing tab and specifying the point where you want the branch created. You can specify various branch point and branch type as shown in the slide.

# Creating a Branch



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In this example, a branch to another page is created on submit, after processing. Perform the following steps:

1. Navigate to the Processing tab, select the branch point, right-click and select Create Branch.
2. In the Property Editor, specify the branch point.
3. Specify where the branch needs to redirect to by specifying the Behavior > Type and Target.
4. Specify conditions, if any. Click Save.

## Practice 10-1 Overview: Creating and Manipulating Computations, Processes, and Validations

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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## 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.

11

# Validating and Debugging Your Application

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## Jack Validates and Debugs the Application



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Jack has been trying his hands on APEX and has explored the various functionalities available. While exploring APEX, he made a few errors in the PTS application that he developed so far.

He is now trying to figure out a way by which he can discover the errors in the application and fix it accordingly.

# You Are Here in This Course

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application

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Lesson 6: Creating Forms

Lesson 7: Working with Pages and Regions

Lesson 8: Adding Items and Buttons

Lesson 9 : Understanding Session State

Lesson 10 : Including Page Processing

Lesson 11 : Validating and Debugging Your Application



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

## Objectives

After completing this lesson, you should be able to:

- Use the Advisor to verify your application
- Manage user interface defaults by using the Attribute Dictionary
- Use the Debug option to debug your application



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In this lesson, you learn how to use the Advisor to verify your application, manage user interface defaults by using Attribute Dictionary, and debug your applications using the Debug option.

## Lesson Agenda

- Using the Advisor
  - Resolving Advisor Errors/Warnings
- Managing Your Attribute Dictionary
- Using the Debug Option



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# Using the Advisor

The screenshot shows the Oracle Application Express Advisor interface. On the left, there's a sidebar titled "Checks to Perform" with sections for Errors, Filters, Security, and Warnings, each containing several checkboxes. On the right, there's a main panel titled "Filter Result" with sections for Performance, Usability, Quality Assurance, and a detailed view of selected items. A large callout arrow points from the text "A list of issues is displayed based on your selections." to the "Filter Result" panel.

**Filter Result**

The results are displayed for the checks that you performed. You can filter the result set by unchecking any category or specific Apply Filter button.

To address the issues identified, click the View link within each result. Once issues have been fixed, you can use the Perform Check button to select different checks to be performed.

<input checked="" type="checkbox"/> <b>V Function used in SQL</b>	Performance:
<input type="checkbox"/> Target Page Authorization	Usability:
<input checked="" type="checkbox"/> Associated Item or Component	Component
<input checked="" type="checkbox"/> Hardcoded Application	Quality Assurance:
<input checked="" type="checkbox"/> Report has Default Order	
<input checked="" type="checkbox"/> Page Item has Help Text	
<input checked="" type="checkbox"/> Deprecated attribute	

**Applications > 102 - PROJECT TRACKING SYSTEM > Pages > 3 - Project Status Report**

Attribute	Authorization Scheme (An authorization scheme must evaluate to TRUE in order for this page to be displayed)
Check	Authorization
Category	Security
Message	Page is not protected by an authorization scheme.
Value	
<a href="#">View</a>	

**Applications > 102 - PROJECT TRACKING SYSTEM > Pages > 3 - Project Status Report > Regions > Project Status Report**

Attribute	Region Source (Identifies the source of the region, reference Region Source Type)
Check	Report has Default Order
Category	Quality Assurance
Message	Report does not have a default order.

A list of issues is displayed based on your selections.

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Before deploying your application, you can use the Oracle Application Express Advisor (Advisor) to perform various sanity checks on your application. The Advisor checks for errors, security issues, performance bottlenecks, quality assurance, and other best practices.

The Advisor enables you to check the integrity and quality of your Oracle Application Express application. The 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 pages in your application, including programming errors, security issues, quality assurance, and other best practices.

After the Advisor is executed, your previous settings are 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 next to the violation. When there are no violations, you receive a message indicating that no errors or warnings were found.

In the example in the slide, you see that security 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).

To run the Advisor on an entire application, perform the following steps:

1. Navigate to your application.
  1. On the Workspace home page, click the Application Builder icon.
  2. Select your application.
2. Click Utilities.
3. Click Advisor.

# Resolving Advisor Errors/Warnings

Applications > 102 - PROJECT TRACKING SYSTEM > Pages > 3 - Project Status Report > Regions > Project Status Report

Attribute	Region Source (Identifies the source of the region, reference Region Source Type)
Check	Report has Default Order
Category	Quality Assurance
Message	Report does not have a default order.
Value	<pre>select PROJECTS.PROJECT_NAME as PROJECT_NAME, PROJECT_ACTIONITEMS.ACTIONITEM_ID as ACTIONITEM_ID, PROJECT_ACTIONITEMS.ACTIONITEM_NAME as ACTIONITEM_NAME, PROJECT_ACTIONITEMS.ACTIONITEM_DESCRIPTION as ACTIONITEM_DESCRIPTION, EMPLOYEES.FIRST_NAME    ' '    EMPLOYEES.LAST_NAME as ACTIONITEM_ASSIGNED_TO, STATUS.STATUS_NAME as STATUS, PROJECT_ACTIONITEMS.MILESTONE_YN as MILESTONE_YN, PROJECT_ACTIONITEMS.MILESTONE_DATE as MILESTONE_DATE, PROJECT_ACTIONITEMS.ACTIONITEM_CREATED_ON as ACTIONITEM_CREATED_ON from STATUS STATUS, EMPLOYEES EMPLOYEES, PROJECTS PROJECTS, PROJECT_ACTIONITEMS PROJECT_ACTIONITEMS where PROJECT_ACTIONITEMS.PROJECT=PROJECTS.PROJECT_ID and PROJECT_ACTIONITEMS.ACTIONITEM_ASSIGNED_TO=EMPLOYEES.EMPLOYEE_ID and PROJECT_ACTIONITEMS.ACTIONITEM_STATUS=STATUS.STATUS_ID</pre>

[View](#)

1

</> Browse the Web [Global Page]

Project Status Report

- Columns
  - ACTIONITEM\_ID
  - ACTIONITEM\_ASSIGNED\_TO
  - ACTIONITEM\_NAME**
  - ACTIONITEM\_DESCRIPTION
  - Heading: E\_YN Action
  - Type: DATE Plain
  - ACTIONITEM\_CREATED\_ON
  - PROJECT\_NAME
  - STATUS
- Attributes

Post-Rendering

3

Security (1)  
 Authorization (1)

Applications > 102 - PROJECT TRACKING SYSTEM > Pages > 3 - Project Status Report

Attribute	Authorization Scheme (An authorization scheme must evaluate to TRUE in order for this report to be displayed.)
Check	Authorization
Category	Security
Message	Page is not protected by an authorization scheme.

Specify a sort sequence for a column in your report.

2

Column

Sorting

Default Sequence	- Select -
Sortable	1
Export / Printing	2 3 4 5 6 7 8
Include In Export / Print	



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In the Advisor window, when you click the View link, the Page definition for the page is displayed in the Page Designer view. To define the sort sequence, perform the following steps:

1. In the Rendering pane, select the column you want to sort on (in this case, ACTIONITEM\_NAME).
2. In the Property Editor pane, select the Default Sequence as 1.
3. Save the page and 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**

## Practice 11-1 Overview: Using the Advisor

This practice covers the following topics:

- Running the Advisor
- Correcting the warning



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## Lesson Agenda

- Using the Advisor
- Managing Your Attribute Dictionary
  - Changing Item Properties
  - Reviewing Items/Report Columns
  - Modifying Attributes in the Dictionary
- Using the Debug Option



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# Managing Your Attribute Dictionary

Attribute Dictionary  
Manage item / column user interface defaults for a selected page.

View a list of pages that contain items and report columns.

Page	Name	Page Type	Group Name	Displayed Items	Displayed Report Columns
0	Global Page - Mobile	Global Page	Unassigned	0	0
1	Home	Home	Unassigned	1	0
2	Home	Static HTML	Unassigned	0	0
3	Project Status Report	Report	Unassigned	2	9
4	Projects Master Report	Interactive Report	Unassigned	0	15
5	Employees Report	Interactive Report	Unassigned	0	11
6	Create Employees	DML Form	Unassigned	11	0
7	Manage Projects	DML Form	Unassigned	14	0
8	Project Document Types	Report	Unassigned	0	2
9	Project Documents	DML Form	Unassigned	2	5
10	Update Employees	Tabular Form	Unassigned	0	11
11	Action Items Report	Interactive Report	Unassigned	0	10
12	Manage Action Items	DML Form	Unassigned	9	0
15	Global Page - Desktop	Global Page	Unassigned	0	0
16	Reporting Employees	Report	Unassigned	2	2
101	Login Page	Login	Unassigned	2	0

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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. 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

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

Region	Item	Will Become	Label	Format Mask	Help Text	Default	Width	Height	Data Type
<input type="checkbox"/>	Manage Projects P7_PROJECT_CREATED_BY	PROJECT_CREATED_BY	Project Created By	-	-	-	32	1	VARCHAR
<input type="checkbox"/>	Manage Projects P7_PROJECT_CREATED_ON	PROJECT_CREATED_ON	Project Created On	-	-	-	32	1	VARCHAR
<input type="checkbox"/>	Manage Projects P7_PROJECT_DESCRIPTION	PROJECT_DESCRIPTION	Project Description	-	-	-	32	-	VARCHAR
<input type="checkbox"/>	Manage Projects P7_PROJECT_END_DATE	PROJECT_END_DATE	Project End Date	-	-	-	32	1	VARCHAR
<input type="checkbox"/>	Manage Projects P7_PROJECT_LAST_UPDATED_BY	PROJECT_LAST_UPDATED_BY	Project Last Updated By	-	-	-	32	1	VARCHAR
<input type="checkbox"/>	Manage Projects P7_PROJECT_LAST_UPDATED_ON	PROJECT_LAST_UPDATED_ON	Project Last Updated On	-	-	-	32	1	VARCHAR
<input checked="" type="checkbox"/>	Manage Projects P7_PROJECT_NAME	PROJECT_NAME	Project Name	-	-	-	32	-	VARCHAR

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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 update the Attribute Dictionary with all the attributes (such as Label and Help text) for the P7\_PROJECT\_NAME item. Select the check box for the appropriate row and click Update Attribute Dictionary. The page number prefix is removed when the Attribute Dictionary entry is created. For example, P7\_PROJECT\_NAME becomes PROJECT\_NAME.

# Modifying Attributes in the Dictionary

You can modify attributes in the Attribute Dictionary using SQL Workshop utilities.

The screenshot shows two pages from the Oracle Application Express interface:

- Attribute Dictionary:** A grid view of attributes. One row is selected, showing 'PROJECT\_NAME' as the Column Name with 'Project Name' as the Label. Buttons for 'Reset', 'Grid Edit >', and 'Create >' are visible.
- Column Details:** A detailed view for the selected attribute. It shows the 'Details' tab is active, with fields for Column Name (PROJECT\_NAME), Label (Project Name), Format Mask, Default Value, and Help Text ('The name of the Project'). Other tabs include 'Synonyms', 'Form Specific Attributes', and 'Report Specific Attributes'. A large 'Apply Changes' button is prominent at the bottom right.

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User interface defaults enable you to assign default user interface properties for regions and items. The wizard enables 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. Using 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 PROJECTS table. However, use more generic defaults for CREATED\_BY in another table.

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

## Practice 11-2 Overview: Modifying the Attribute Dictionary

This practice covers the following topics:

- Adding items from a page to the Attribute Dictionary
- Updating the Attribute Dictionary for the items
- Using the user interface defaults in a new form



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## Lesson Agenda

- Using the Advisor
- Managing Your Attribute Dictionary
- Using the Debug Option
  - What Is the Debug Option?
  - Enabling and Disabling Debug Mode
  - Viewing the Debug Messages



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## What Is the Debug Option?

The Debug option is used to:

- View the processing details of a page
- Check the performance of a page



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The Debug mode is a built-in mechanism used to track down unexpected application behavior. The debug option is used at run time to view the processing of a page. It provides useful information about what is happening in the background. In addition, it can be used to check the performance of a given page so that the performance can be tuned.

## Enabling and Disabling Debug Mode

The screenshot shows two panels. The top panel is the application's home page for 'Application 100 - Sample Database Application'. It features five icons: 'Run Application', 'Supporting Objects', 'Shared Components', 'Utilities', and 'Export / Import'. The bottom panel is the 'Edit Application Properties' page for 'Application 100'. It has tabs for 'Name', 'Properties', 'Availability', 'Error Handling', 'Global Notification', 'Substitutions', and 'Build Options'. The 'Properties' tab is selected. Under 'Properties', there are fields for 'Name' (Sample Database Application), 'Application Alias' (100), 'Version' (5.0.2), and 'Application Group' (Sample Applications). Below these, under 'Properties', are dropdown menus for 'Logging' (Yes) and 'Debugging' (Yes). A red box highlights the 'Debugging' field. Step 1 is numbered '1' above the home page, and step 2 is numbered '2' above the properties page.

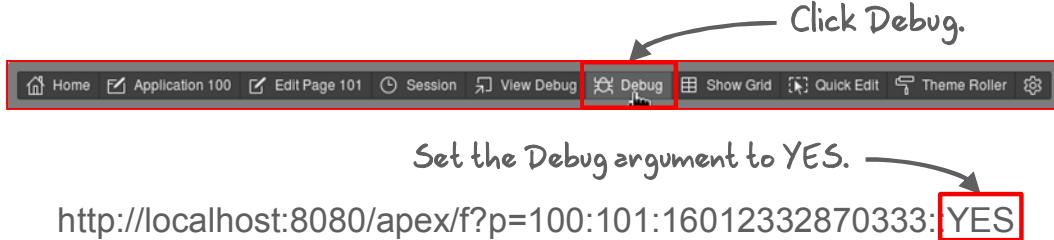
You can configure whether end users can run the application in debug mode by using the Debugging attribute on the Edit Application Properties page. Running an application in debug mode is useful when an application is under development. If the application is run from the Application Express development environment, debugging can always be enabled. A developer who is logged into the application's workspace can always run the application in debug mode. To enable or disable debugging feature in your application during development, perform the following steps:

1. On the application's home page, click the Edit Application Properties button.
2. Click the Properties tab, select Yes for Debugging, and click Apply Changes.

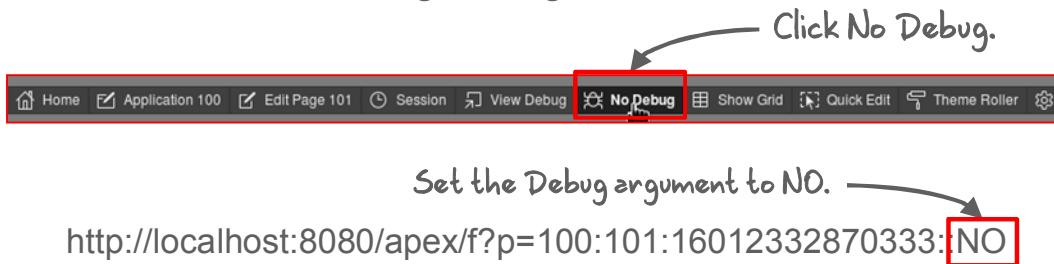
To disable the debugging option for an application, perform the same steps and set the debugging field to No.

# Debugging an Application

## Turning debug mode ON



## Turning debug mode OFF



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You can turn on debug mode for an application at run time by using one of the following methods:

- Click the Debug link on the Developer toolbar.
- Set the Debug attribute in the URL to YES.

To turn off debug mode, use one of the following methods:

- Click the No Debug link on the Developer toolbar.
- Set the Debug attribute in the URL to NO.

**Note:** To debug a page, you should click the Debug option before you make any changes in the page because the page will be reset when you do this. For example. If you make a change to a form, then click Debug. The page will be reset back to the original values in session state.

## Viewing the Debug Messages: SHOW Application

The screenshot shows the Oracle Application Express interface. At the top, there's a toolbar with various buttons like Home, Application 100, Edit Page 101, Session, View Debug (which is highlighted with a red box), No Debug, Show Grid, Quick Edit, Theme Roller, and a gear icon. Below the toolbar, the top navigation bar has tabs for Items, Pages, Queries, Tables, PL/SQL, Images, Debug (which is highlighted with a red box), Session, and Errors. The main area shows a search bar and a list of sessions. One session is selected, showing details like Session Id (92), User (APEX), Application (102), Page (3), Path Info (show), Entries (89), Timestamp (18 seconds ago), and Seconds (0.0592). Below this, a graph shows execution times for different steps. A large red box highlights the 'Elapsed' column in a table below the graph, which lists messages with their execution times. One message, 'Reset NLS settings', is highlighted with a red box.

Elapsed	Execution	Message	Level	Graph
0.00577	0.00213	Reset NLS settings	4	
0.00790	0.00064	alter session set NLS_COMP='BINARY' NLS_SORT='BINARY' NLS_CALENDAR='GREGORIAN' NLS_TERRITORY='AMERICA' NLS_LANGUAGE='AMERICAN'	4	
0.00854	0.00016	...NLS: Set Decimal separator=","	4	
0.00870	0.00003	...NLS: Set NLS Group separator=","	4	
0.00873	0.00013		4	

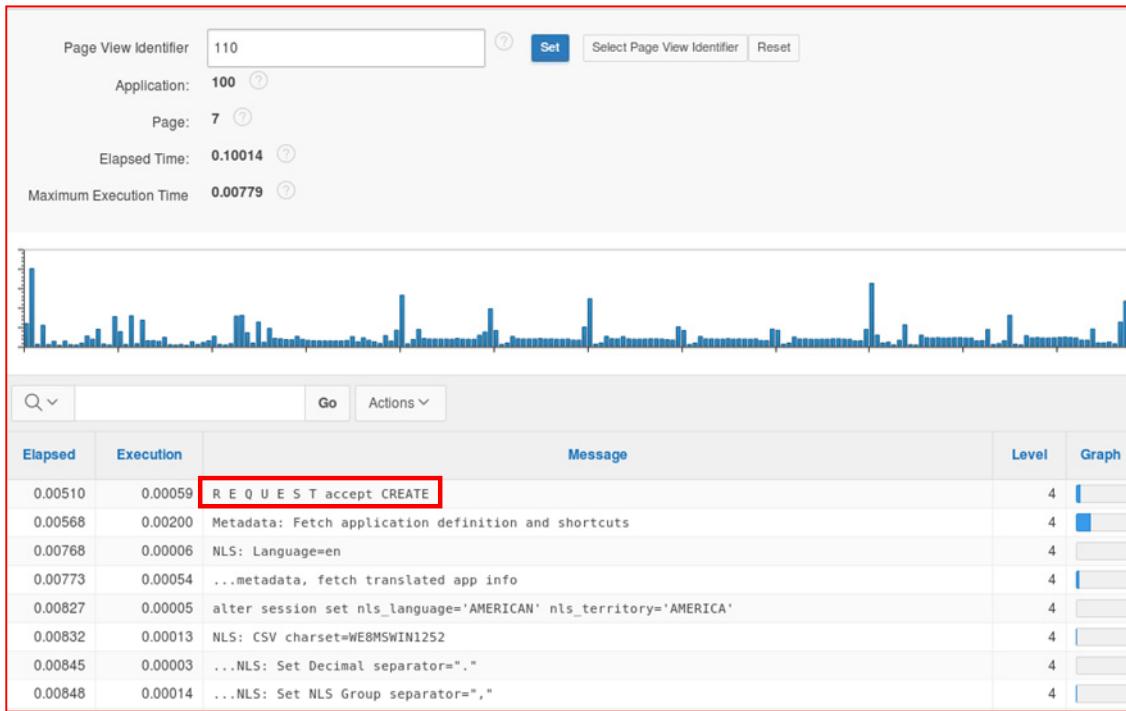
When a page is rendered, a set of messages is displayed under “SHOW application.” The messages displayed include the following (in the order in which they appear):

- NLS Language messages
- Authentication messages
- Session state messages
- BEFORE\_HEADER and AFTER\_HEADER processing messages for any branching, computations, and processes
- Region
- Item
- BEFORE\_FOOTER and AFTER\_FOOTER processing messages for any branching, computations, and processes

In addition to the preceding messages, the timing is displayed to make it clear how long each process is taking.

In the slide example, after a page is displayed, you click the View Debug button on the Developer toolbar. The Debug messages are shown. You can place the cursor over the graph to view additional details.

## Viewing the Debug Messages: ACCEPT Request



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When values in a form have been changed and submitted, ACCEPT request messages are displayed before the SHOW application. When the debug option is enabled, the following messages appear in the following order:

- NLS Language messages
- Session state messages
- ON\_SUBMIT\_BEFORE\_COMPUTATION process
- BEFORE\_COMPUTATION branch
- AFTER\_SUBMIT computation
- BEFORE\_VALIDATION branch
- BEFORE\_PROCESSING branch
- AFTER\_SUBMIT process
- AFTER\_PROCESSING branch

In the slide example, you click a CREATE button, and then click the View Debug button on the Developer toolbar. The Debug messages are displayed.

## Summary

In this lesson, you should have learned how to:

- Use the Advisor to verify your application
- Manage user interface defaults by using the Attribute Dictionary
- Use the Debug Option



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In this lesson, you learned about using the Advisor, managing user interface defaults using the Attribute Dictionary, and also using the Debug option.

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# Unit II: Building Rich, User-Friendly Web Applications

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## Unit II Road Map

Lesson 1: Course Overview

Unit 1: Getting started with Application Express

Unit 2: Building rich, user-friendly Web Applications

Unit 3: Customizing your Web Application

Unit 4: Enhancing your Web Application



Lesson 6: Creating Forms

Lesson 7: Working with Pages and Regions

Lesson 8: Adding Items and Buttons

Lesson 9 : Understanding Session State

Lesson 10 : Including Page Processing

Lesson 11 : Validating and Debugging Your Application



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In Unit 2, you completed six topics.