



**SAGE Computing Services**

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# **Oracle Application Express Workshop**

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Oracle Application Express Workshop

Edition AUSOUG Conference 2006

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# *SAGE Computing Services*

## *A Company Profile*

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### *Services*

Services provided by the company include:

- Customised Training Programs
- Post-training Mentoring
- Database Administration Services
- Complete Systems Development and Support
- Consultancy Advice
- Quality Assurance
- Tuning Reviews
- Business Analysis
- Telephone Advice and Assistance
- Database Health Checks

SAGE Computing Services Pty. Ltd. aims to provide the best Oracle technology experts to assist our clients in building, implementing and managing business solutions using Oracle software. Sage offers custom training workshops in Oracle products and a complete analysis, design, development and database administration consulting service.

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SAGE is a small company which has succeeded by adopting a partnership approach with our clients. We have a long term relationship with many of our clients which is dependent on our providing services which achieve successful outcomes.

[enquiries@sagecomputing.com.au](mailto:enquiries@sagecomputing.com.au)

# Course Descriptions

(not a full list of available courses, please see [www.sagecomputing.com.au](http://www.sagecomputing.com.au) for a full course catalogue)



All courses can be customised to suit client requirements

[enquiries@sagecomputing.com.au](mailto:enquiries@sagecomputing.com.au)

## Oracle JDeveloper 10.1.3

5 days

This course is designed to provide students with the skills and knowledge required to develop a web application using ADF Business Components and ADF Faces (JavaServer Faces) web pages within Oracle JDeveloper 10.1.3.

- |                                      |   |   |
|--------------------------------------|---|---|
| • JDeveloper Introduction            | • ADF Entity Objects                                | • ADF Input, Output and Command Components                        |
| • JDeveloper IDE                     | • ADF Associations                                  | • ADF Forms, Tables, Trees  |
| • Database Connections               | • ADF Domains                                       | • JSF Configuration, Navigation, Managed Beans and Event Handling |
| • Online Database Browser            | • ADF Application Modules                           | • Expression Language   |
| • Stored Procedure Editor            | • ADF View Objects                                  | • ADF Page Layout and Menus                                       |
| • Workspaces and Projects            | • ADF View Links                                    | • ADF Faces Skins   |
| • Offline Database Modelling Tools   | • ADF Business Component Java Classes               | • Deploying an ADF Application                                    |
| • Java Language                      | • ADF Binding Layer and the ADF Model Layer Classes | • Web Security  |
| • Application Development Framework  | • ADF Faces   | • ADF Selection, Validator, Converter and Visual Components       |
| • ADF Business Components Diagrammer | • ADF Form  | • Code Management and Source Control                              |
| • ADF Business Components            | • ADF Read-Only Table                               | • Advanced JDeveloper   |

## Oracle 10G - New Features for Developers Workshop

1 day

Aimed at developers, this course is designed to provide the student with an understanding of the new features of Oracle 10G.

- |                         |                       |                            |
|-------------------------|-----------------------|----------------------------|
| • SQL*Plus Enhancements | • New SQL Features    | • PL/SQL Packages          |
| • Flashback             | • Data Pump           | • Performance Enhancements |
| • Enhanced SQL commands | • PL/SQL Enhancements |                            |

## Application Express Workshop (previously HTMLDB)

3 days

The course is designed to provide the student with the skills and knowledge required to develop a complete application using Oracle's Application Express product. The student will develop web interfaces (including forms, reports and charts; addition of validation and customised formatting) to create a small application.

- |                       |                               |   |
|-----------------------|-------------------------------|---|
| • Product Overview    | • Regions and Items           | • Utilities and Reporting                     |
| • SQL Workshop        | • Page Processing             | • Advanced Development Techniques             |
| • Utilities           | • Shared Components           | • Administration and Deploying an Application |
| • Application Builder | • Themes and Templates        |   |
| • Creating Pages      | • Other Page and Region Types |   |

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## Oracle SQL and SQL\*Plus Workshop - Oracle 10G Rel2

4 days

This course is designed to provide the student with a basis for developing systems using the Oracle database. The SQL language is covered from simple to complex constructs. Guidelines are provided on writing SQL for optimum performance and ease of maintenance.

- The Relational Model
- The SQL Language
- SQL\*Plus and iSQL\*Plus
- Oracle SQL Developer
- More about SELECT
- Substitution Variables
- Using SQL\*Plus for Formatting Output
- Functions
- Joins
- Group and Analytical Functions
- Set Operators
- Subqueries
- Data Manipulation Language
- Database Objects
- Constraints
- Views and Sequences
- Indexes
- Clusters
- Security
- Locking and Read Consistency
- More Advanced SQL

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## PL/SQL Workshop

3 days

This course is for developers who will be designing or building applications using the Oracle server. It is relevant for developers who are using the Oracle Developer toolset, and for those using alternative front-end products accessing the Oracle database. The course covers basic PL/SQL syntax and the use of server level procedures, functions and triggers.

- PL/SQL Overview
- Basic PL/SQL Syntax
- SQL Statements in PL/SQL
- Procedural Statements - Assignment and Conditional Processing
- Procedural Statements - LOOPS
- Exceptions
- Nested Blocks and Cursors
- Tables, Arrays and Records
- Architecture Overview
- Procedures / Functions
- Execution and Error Handling
- Security and Dependency
- Packages
- More About Packages
- Supplied Packages
- Triggers
- More About Triggers
- Large Objects

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## Oracle Forms Developer Workshop

5 days

This course is designed for developers who will be designing or building applications using Oracle Form Builder. This is a practical course in which the student builds an application during a series of workshop sessions.

- Running a Form
- Forms Modules and Storage
- Working in the Builder
- Creating a Form
- Form and Data Block Properties
- Form Layout
- Items
- Introduction to Triggers
- Program Units
- Check Boxes, Radio Groups and List Items
- Other Item Types
- Visual Attributes
- Mouse Events
- Relations
- Alerts and Editors
- Lists of Values
- Record Groups
- Windows and Canvases
- Transaction Processing and Triggers
- Advanced Data Block Properties
- More Trigger Events
- Determining Form Properties
- Timers
- Integrating Multiple Forms Modules in an Application
- Forms Architecture and Java
- Integrating Forms with Reports
- PL/SQL Library Modules
- Managing Application Development
- Menu Modules

---

### Oracle Reports Workshop - 10G

4 days

This course is designed for developers who will be designing or building applications using Oracle Reports. This is a practical course in which the student builds a series of reports ranging from simple to complex.

- Product Overview
- Columns
- Displaying Files, Images and Charts
- The User Interface
- Multiple Queries and Links
- Matrices
- The Designer Interface
- The Paper Layout - Basic Objects
- Parameters
- Storage
- Standard Layouts
- PL/SQL in Reports
- Building a Paper Report
- General Paper Layout Properties
- Report Templates
- The Data Model Editor
- Advanced Paper Layout Properties
- Publishing Reports on the Web
- Other Query Types
- Web Reports

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### Oracle 10G – Database Administration Workshop

5 days

This course is designed for Database Administrators. It covers the architecture of the Oracle 10g server, and the procedures required to effectively administrate the database. The course provides a series of practical workshops in which the students can practice the database administration techniques they have learnt.

- Oracle 10g Overview
- Managing Tablespaces
- Database Tuning
- Oracle 10g Architecture
- Managing Redo Log Groups and Members
- The Multi Threaded Server
- Database Creation
- Database Storage
- Backup and Recovery
- Startup and Shutdown and Oracle Database
- Managing Undo
- Data Pump
- Oracle Enterprise Manager
- Security
- Database Structure
- Optimisation

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### Application Tuning Workshop 10g

3 days

This course is designed for Designers, Developers, and Database Administrators, and examines all aspects of tuning SQL statements and applications.

- Defining a Tuning Methodology
- Stored Outlines
- Tuning Tips
- Diagnostic Tools
- Storage Parameters
- Partitions
- Processing an SQL Statement
- Hash Clusters and Index Clusters
- Optimise using Parallelisation
- Indexes
- Optimising PL/SQL
- Tuning Tools
- Cost Based Optimisation
- Optimising Applications through Stored Procedures and Packages
- Gathering Statistics
- Data Design for Performance

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### Oracle Discoverer Workshop

2 days

This course is designed for End Users and examines all aspects of using the latest versions of Oracle Discoverer. Both the web and client server interfaces are covered.

- Oracle Discoverer Overview
- Performing Analysis
- Scheduling and Administration
- Discoverer Workbooks
- Customising Workbooks and Worksheets
- Worksheets and Conditions
- Printing and Exporting Query Results

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### Oracle Portal Workshop

3 days

This course is designed to provide the student with the knowledge and skills required to build corporate portals. The course covers the use of Oracle Portal for content management and includes recommendations and guidelines on the classification and searching of content. The standardisation and customisation of the Portal interface and styles are described. The workshop includes the use of Portal to create simple application components such as forms, reports and graphs. Finally the security management of a corporate portal is considered.

- Product Overview
- Custom Types, Parameters and Events
- Other Components
- Page Groups and Pages
- Application Components - Forms
- Security
- Styles, Navigation Bars and Templates
- Application Components - Reports
- Item Regions and Classification
- Shared Component

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### Advanced Oracle Portal Workshop

1 day

The course is designed to provide the student with the knowledge and skills required to build custom portlets. The course describes the provider and portlet structure and the integration and management of custom portlets within the product. The attendee builds a simple provider and its custom portlets based on an example. The course focuses on PL/SQL portlets to demonstrate the techniques required, but also covers web portlets. Detailed coverage of the Portal API and its use, not only in custom portlets, but to enhance other Portal components is included.

- Programmable Portlets - Concepts
- PL/SQL Portlets
- API Services – Other Utilities
- PL/SQL Providers
- API Services – Session Storage
- Web Providers

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### Oracle End User Workshop

2 days

This course is designed for End Users who require a knowledge of SQL to query the Oracle database. It commences with a description of relational concepts and continues with coverage of the SQL statements required to access information from one or more Oracle Tables. Some basic formatting is also covered.

- The Relational Model
- More About SELECT
- Joins
- Structured Query Language
- Substitution Variables
- Group Functions
- SQL\*Plus
- Using SQL\*Plus for Formatting Output
- Oracle SQL Developer
- Functions

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All our training is conducted at the client site and using the client's Oracle licences. Sage Computing Services provides all course materials which the attendees retain after the course as a reference.

All Sage trainers are consultants who are using the products in real world situations and can bring a wealth of experience to the classroom.

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## Section 1 - Overview

### The Product

#### History

Oracle Application Express (APEX) was previously known as HTMLDB (and before that as Project Marvel). It provides a wizard driven development environment for building small to medium web applications. The product is contained entirely within the Oracle database and accessed via a web browser for both development and deployment.

The product is based on the definition of meta data which is used by a series of PL/SQL packages to generate HTML pages.

#### Target

The product appears to be targeted at small to medium systems development. This allows small systems development to be better controlled, and for the data to reside in an Oracle database. The development environment is hosted centrally but provides independent workspaces in which developers can operate in a way that is isolated from other users.

### Development Approach

#### *Declarative Approach*

The majority of development is performed by entering values into a series of wizards to create the basic objects, and then adjusting the properties of the objects using definition screens. A great deal of functionality can be created in the product without performing any coding.

#### *Extending the Functionality*

The product also provides the ability to extend the native functionality using PL/SQL, HTML and JavaScript coding. This provides a more experienced developer with the opportunity to develop more sophisticated functionality with the product.

An Application Programming Interface (API) is provided to allow developers to perform more complex tasks.

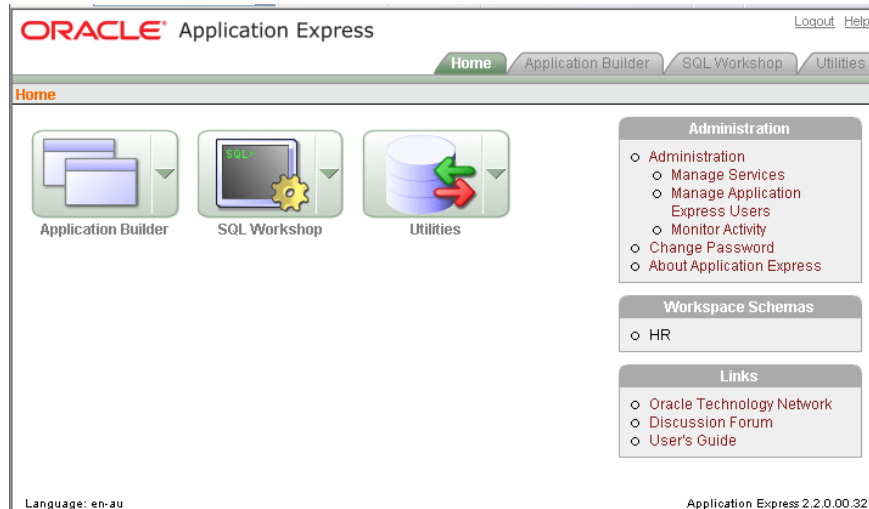
### Versions

The product is supplied on the Oracle 10g companion disk. It is designed to operate in an Oracle 10g database but can also be installed in an Oracle 9i database.

In addition to being available as a companion product to the Oracle server, Oracle Application Express is packaged with the Oracle Express Edition of the database and will be automatically installed with that product.

## Application Components

The product has three main functional areas. The grouping of the options is slightly different in the Database Express Edition of the product, however the functionality is the same.



### Application Builder

Application Builder is the main development tool. It allows the development of web applications. Each application is comprised of a number of pages and associated objects such as navigation bars, menus, list of values and templates.

### SQL Workshop

SQL Workshop provides an environment in which SQL statements can be entered and submitted, and database objects can be browsed, created, altered and dropped. It also provides utilities for importing and exporting data.

### Administration

The component provides a web based administration interface. This is used by the workspace administrator for monitoring and managing a workspace and its users.

## Workspaces

A workspace is an independent development area. Each workspace is independent from the others. It can contain multiple applications.

In Application Express 2.2 a workspace can be used by a number of developers. A workspace is accessed by entering the workspace name, and a username and password from the login page. These development usernames are stored in the APEX repository. The workspace name and username are not case sensitive. The password is case sensitive.

If you are using this version you should already have created a workspace as part of the setup steps.

In the version which is installed with Oracle Express Edition each database user has a distinct workspace.

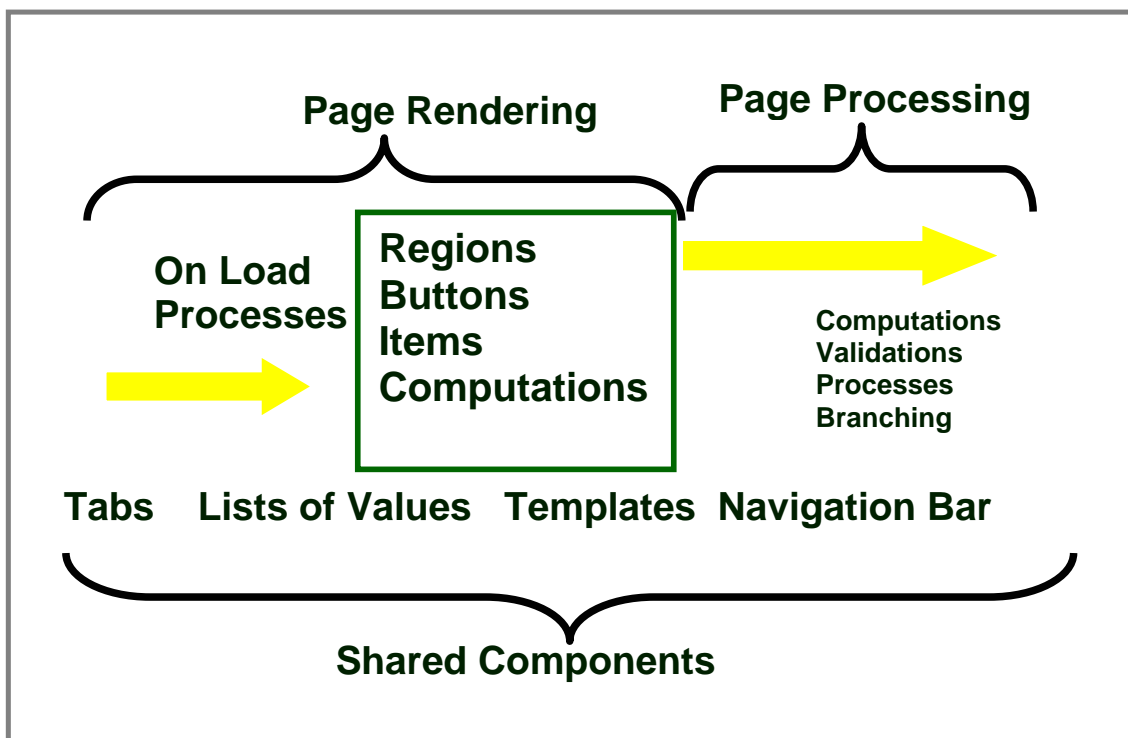
## Applications

A workspace can contain one or more Applications. An application is comprised of a set of pages and a number of shared components which may be used by one of more of the pages.

## Pages

Each page definition represents an HTML page that will be displayed to the application's users. The definition of a page comprises three main areas:

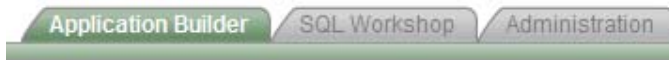
- Page Rendering
- Page Processing
- Shared Components



## Navigating in the Product

### Tabs

The three tabs displayed on each screen allow you to select any of the three major product components to work with. (Not available in the Oracle Database Express Edition version)



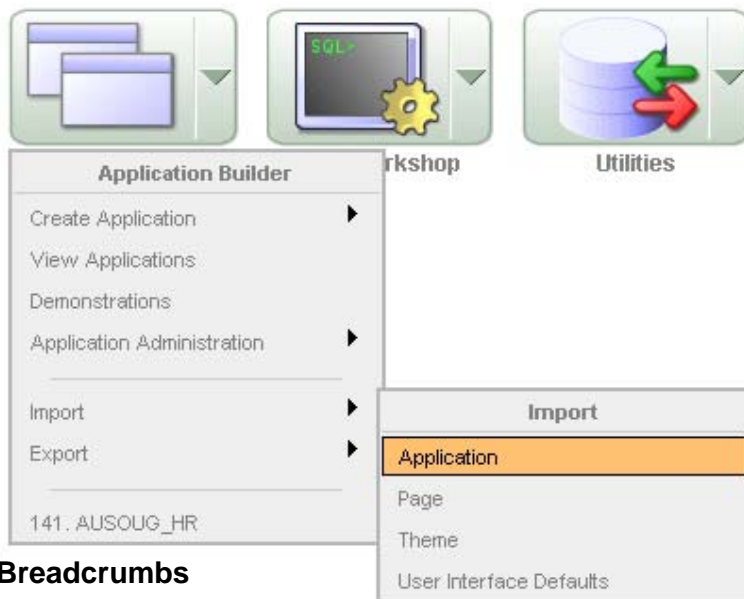
### Images

Click on an image to drill down to the next level of detail for that component. For example clicking on the Application Builder Image will display a list of available applications.



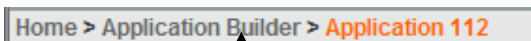
### Menus

Drop down menus can be used to navigate directly to the screen you require.



### Breadcrumbs

A breadcrumbs link is displayed below the tabs on each page. You can navigate by clicking on the required page link in the breadcrumbs display.



Click here to return to the main Application Builder page.

## Task List

Most Application Express pages display a task list on the right of the page. This provides a list of commonly performed tasks. Click on a link to perform the task.



## Detail and Icon Display

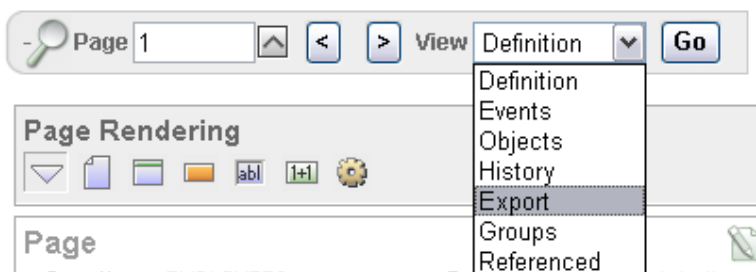
Many screens can be displayed in Icon or Detail view.

Click on Details and then the Go button to change the display view.



## Navigation List

Some pages contain a drop down list item that allows you to navigate to associated pages. For example, from the Page definition screen you can select Export from the list, and then click on the Go button to navigate to the Page Export screen.



## Buttons

Some pages provide buttons which allow you to scroll through a number of objects of the same type. For example, in the Page Definition screen you can use the Next and Previous buttons to select the Page you want to work with.

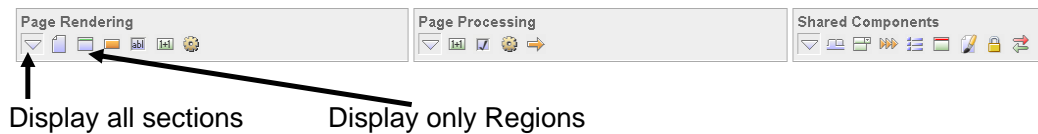
You can also enter the number of a specific page and click on the Go button.



## Navigating Within a Page

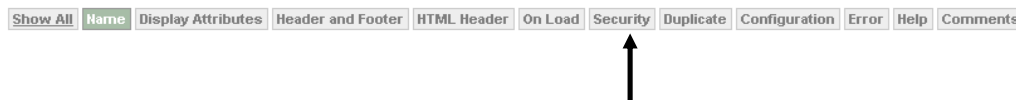
### Icons

In version 2.2 of the product, icons are provided to allow you to restrict the information displayed on the Page Definition screen.



### Buttons

Pages which contain a large amount of information display additional buttons which restrict the information displayed within a page. Clicking on a button will display only that particular section of the page.



## Help

### Page Help

The right side of some Application Express development pages contains an information panel. This provides helpful information to assist you in using the page. It also contains a checkbox that allows you to return to the current page after applying changes.

☐ Return to page


### Online Help Manual

The Help link in the navigation bar displays a Users Guide. The guide is context sensitive and has a Find facility to allow you to search for a particular topic.

### Field Level Help

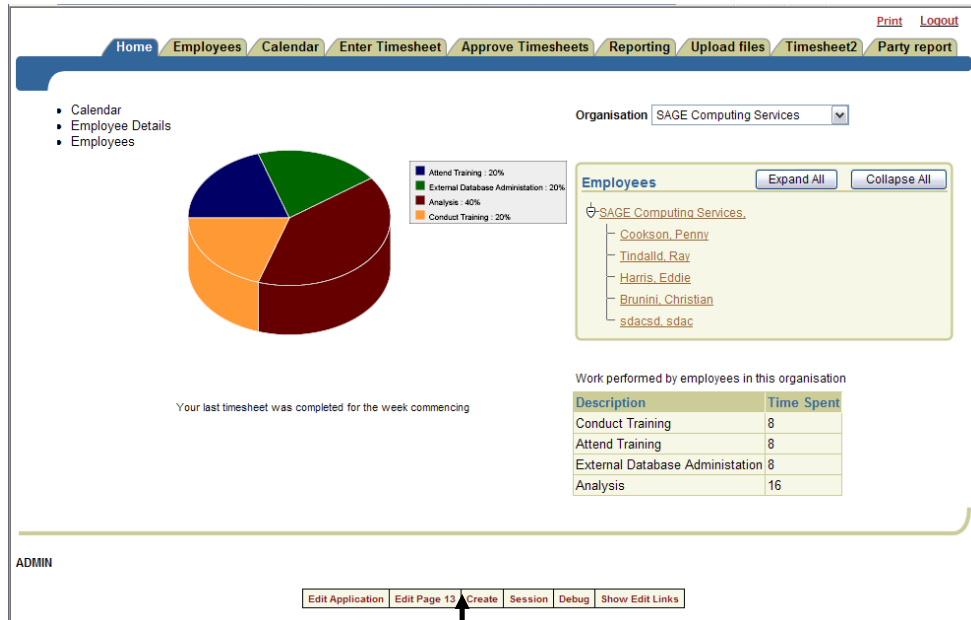
Clicking on the label of a field displays pop up context sensitive help. An asterisk is displayed next to the label of mandatory fields.

### Developer Comments

Developer comments can be added using the icon on the right of the screen. 

## An Application Express Application

An Application Express application may contain a number of pages, which can be accessed using links, menus or tabs.



If you are running the application as a user with developer privileges the development toolbar will be displayed at the bottom of the screen. This can be used to make changes to the application. Non privileged users will not see this toolbar.

## Creating an Application

There are three main methods available for creating an Application Express application.

### ➤ Create Application

This allows you to create an application from scratch, or based on the design pattern provided by an existing application.

### ➤ Create from Spreadsheet

When you create an application based on a spreadsheet, the spreadsheet data can be imported from a comma or tab delimited file or pasted into the Application Express screen.

### ➤ Demonstration Application

When you select this option a list of available demonstration applications will be displayed. Demonstration applications are designed to teach you about various techniques such as shopping cart concepts and webservices.

(An application can also be imported from an Application Express export file.)





# 1 Hands On - The Development Environment

## 1.1 Display the product home page

Note that some steps depend on which version of the product you have installed. If you are using the provided server then you are using Oracle Application Express Release 2.2.

The development environment is displayed in a web browser. Access the product as follows:

### Oracle Application Express Release 2.2

`http://server.port/pls/apex`

Example:

`http://sage4.sagecomputing.com.au:7780/pls/apex/`

OR

### Oracle Express Edition

`http://server.port/apex`

Example:

`http://127.0.0.1:8080/apex/`

or you can invoke the product from the Start menu:-

Start

Programs

Oracle10g Express Edition

Go to Database Home Page

## 1.2 Login

### Oracle Application Express Release 2.2

Login to the HR workspace with a username of HR and password of HRADMIN.

ORACLE<sup>®</sup> Application Express

---

### Login

Enter Application Express workspace and credentials.

Workspace

Username

Password

[Click here to learn how to get started](#)

### Tasks

- [Reset Password](#)
- [Request a Workspace](#)
- [Product Page](#)

## Oracle Express Edition

Login with a username of HR and password of HRADMIN. You may have to change your password when you first log in.

### ORACLE® Database Express Edition

**Database Login**

Enter your database username and password.

Username

Password

[Click here to learn how to get started](#)

**Links**

- [License Agreement](#)
- [Documentation](#)
- [Forum Registration](#)
- [Discussion Forum](#)
- [Product Page](#)

## 1.3 Display the Application Builder

For this workshop we will focus on the Application Builder part of the product.

Click on the Application Builder image.



Your screen should appear similar to the following. Note that if you are running Express Edition you will not see the tabs or sample application.

**ORACLE® Application Express** [Logout](#) [Help](#)

Home Application Builder SQL Workshop Utilities

Home > Application Builder Application: 130 Page: 0

Application  View Details Display 15 Go

Application	Name	Updated	Page Count	Updated By	Run
130	<a href="#">Sample Application</a>	4 weeks ago	21	admin	

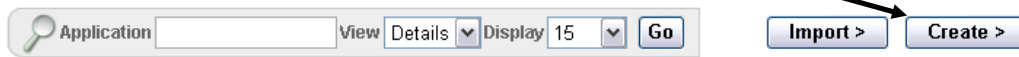
row(s) 1 - 1 of 1

Since we are focusing on the Application Builder the functionality from this point will be the same. Do not be concerned if there are slight differences in the screen layouts/contents.

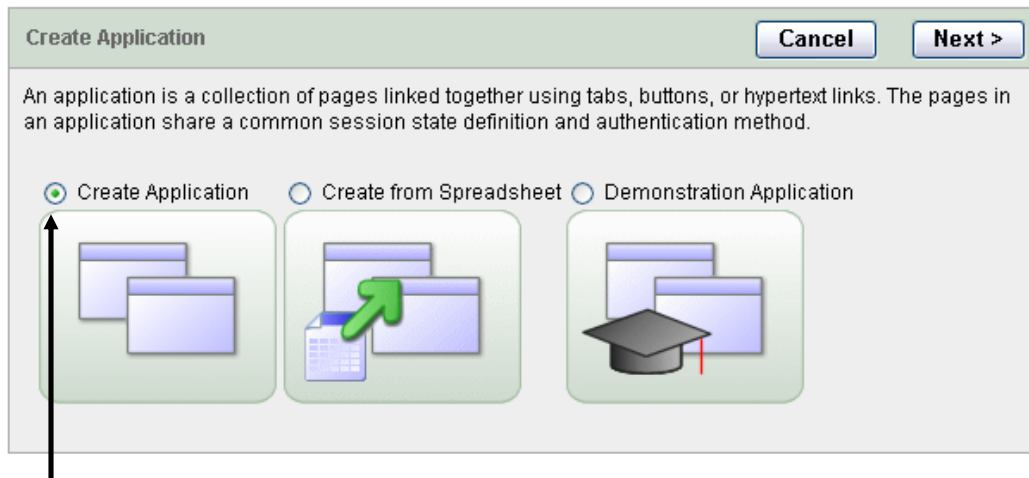


## 1.4 Hands On - Creating an Application

- 1) Click on the Create button in the main Application Builder page.

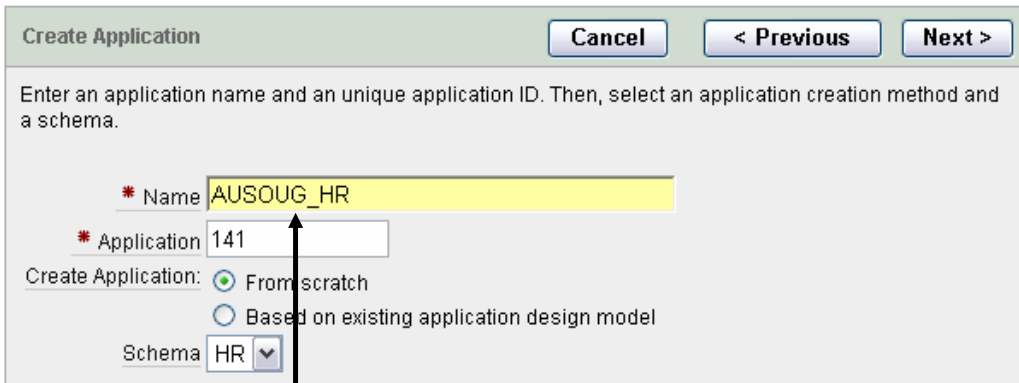


The Create Application Wizard will be displayed



- 2) Select Create Application and then click on the Next button.

The following screen will be displayed.



- 3) Enter a Name of AUSOUG\_HR. Leave the default values for the other properties. Click on the Next button.

The Create Application wizard leads you through a series of steps in which you can add pages containing various types of components to your application. The example described in this workshop creates an application based on a single table.

Initially the application contains no pages. If you select anything other than a blank page you will be prompted to enter the table or view on which the page component should be based.

If you set the Include Analysis Pages checkbox on, then additional summary reports and charts will be automatically created for you.

**Create Application** [Cancel] [< Previous] [Next >]






Add pages to your application by selecting a page type and clicking **Add Page**.

---

**Add Page** [Add Page]

Select Page Type:

☐ Blank ☐ Report ☒ Form ☐ Tabular Form ☒ Report and Form


Action: **Add blank page to application**

Page Name:

4) Click on the Report and Form image

A field will be displayed into which you can enter a table name.

Action: **Add a report with an edit form on a second page**

Table Name:  

☒ Include Analysis Pages

5) Enter a table name of EMPLOYEES and click on the Include Analysis Pages checkbox to set it on.

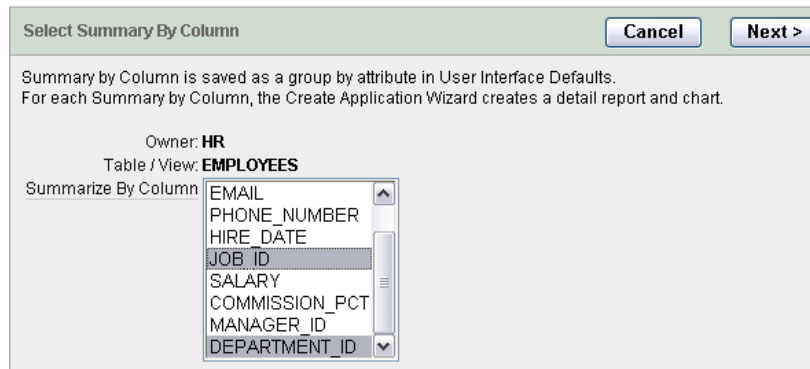
6) Click on the Add Page button

If you do not select analysis pages, the page you have specified will be created and you can continue to add additional pages.

If you set the Include Analysis Pages checkbox on you can select one or more columns that can be used as Group By columns in reports and charts

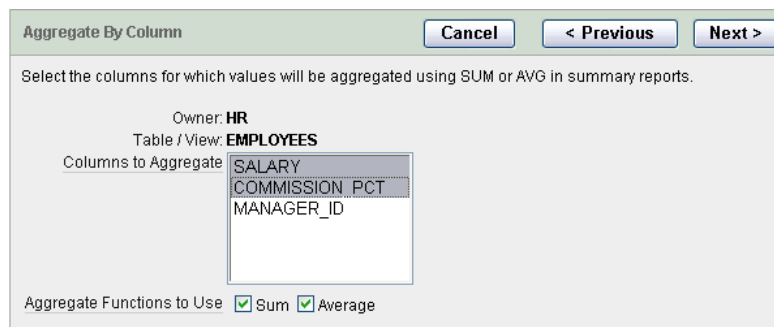
## Creating Analysis Pages

For each one of these columns the wizard will create an additional chart and report.

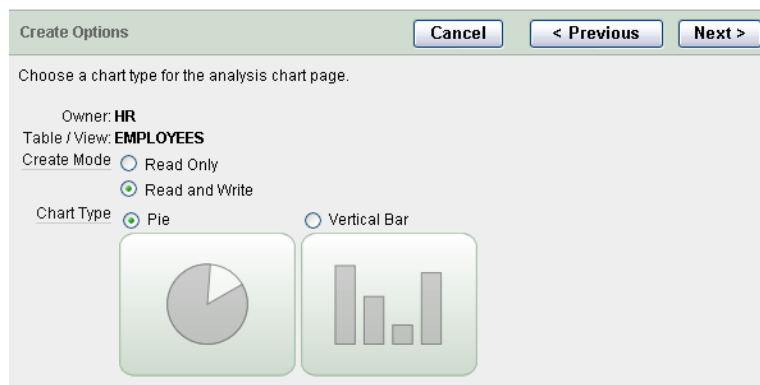


- 7) Select JOB\_ID and DEPARTMENT\_ID and then click on the Next button.

The next step allows you to specify the columns which should be aggregated, and the aggregate function to apply. You only have the choice of Sum or Average from the wizard.



- 8) Select SALARY and COMMISSION\_PCT and ensure both checkboxes are on. Click on the Next button.



- 9) Leave the Chart types as their default values. Click on the Next button.

- 10) When you click on the Next button a confirmation page will be displayed. Click on the Add Analysis Pages button to confirm your choices.

### Completing Page Creation

You will then be returned to the main Application Wizard screen. The pages which have been created so far will be displayed. You can add additional pages, or delete existing pages. Any new pages which you create can be subordinate to one of the pages that have already been created. This forms a navigation hierarchy.

Create Application					
<span>Cancel</span> <span>&lt; Previous</span> <span>Next &gt;</span>					
Page	Page Name	Page Type	Source Type	Source	Delete
1	<a href="#">EMPLOYEES</a>	Report	Table	EMPLOYEES	
2	<a href="#">EMPLOYEES</a>	Form	Table	EMPLOYEES	
3	<a href="#">EMPLOYEES Analysis</a>	Blank	-	-	
4	<a href="#">Analyze by Job Id</a>	Report	SQL Query	select "JOB_ID", cou	
5	<a href="#">Job Id Chart</a>	Pie Chart	SQL Query	select null LINK, "JOB	
6	<a href="#">Analyze by Department Id</a>	Report	SQL Query	select "DEPARTMENT_ID"	
7	<a href="#">Department Id Chart</a>	Pie Chart	SQL Query	select null LINK, "DEP	

Add Page	
<span>Add Page</span>	

You will not create any more pages at this stage.

11) Click on the Next button.

### Defining Tabs

This screen allows you to specify whether you want no tabs, one level of tabs, or two levels of tabs.

12) For this workshop select one level of tabs and then click on the Next button.

### Adding Shared Component

The next step allows you to add shared components such as Navigation bars, Themes and Templates to your application. We will cover shared components later, however it is worth noting at this stage that the addition of shared components from a standard application will assist you in developing applications that conform to your organisational standards.

13) Leave the default value of NO and click on the Next button.

### Authentication Scheme

The next step allows you to specify the authentication scheme and language options for the application.

14) If you are using Application Express 2.2 leave the default authentication scheme of Application Express and click on the Next button.

If you are using Oracle Express Edition leave the default of database.

### Theme

Themes determine the appearance of your pages. A number of prebuilt themes are available.

15) Select Theme 5 and click on the Next button

### Confirm

The final step allows you to confirm that you want the application to be created. You can also save the definitions used in this wizard to be used as a design model for future applications.

16) Click on Create to complete the creation of your application.

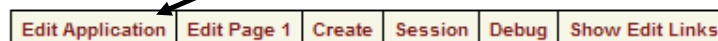
Application: 141 - AUSOUG\_HR

Page	Name	Updated	Updated By	Lock	Run
1	<a href="#">EMPLOYEES</a>	44 seconds ago	-		
2	<a href="#">EMPLOYEES</a>	43 seconds ago	-		
3	<a href="#">EMPLOYEES Analysis</a>	43 seconds ago	-		
4	<a href="#">Analyze by Job Id</a>	43 seconds ago	-		
5	<a href="#">Job Id Chart</a>	43 seconds ago	-		
6	<a href="#">Analyze by Department Id</a>	43 seconds ago	-		
7	<a href="#">Department Id Chart</a>	43 seconds ago	-		
101	<a href="#">Login</a>	44 seconds ago	-		

row(s) 1 - 8 of 8

17) Click on the Run Application image to test the application. If you are using V2.2 of the product you will need to log in. Your username/password will be HR/HRADMIN. Search for an employee, then use the Edit link to change the employee's details.

18) Click on the Edit Application Link on the Developer Toolbar to return to the development environment



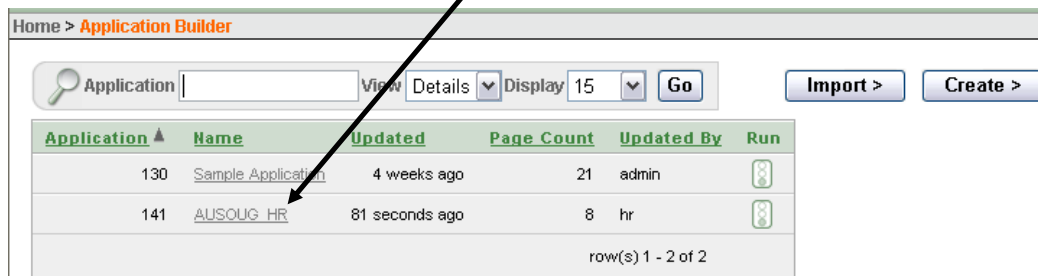
## Section 2 - Editing an Application in the Builder

### Applications and Pages

#### Applications

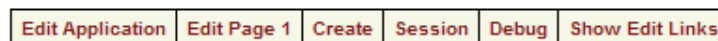
The Application Builder allows you to work with a single application at any point in time.

If you click on the Application Builder image on the home page it will display a list of all applications in your workspace. Click on the name of an application to display its details.



#### The Developer Toolbar

You can also edit an existing application from the Developer toolbar, while you are running the application.



The developer toolbar is displayed to users who have developer privileges. It provides a quick method for editing the page. The links provided are as follows:

Edit Application	Navigates to the Application property screen
Edit Page n	Allows the current page definition to be edited
Create	Displays a screen that allows new Application Express components to be displayed
Session	Displays information about session state variables
Debug	Displays the page in debug mode. This displays a list of page processing events
Show Edit Links	Displays an icon next to each page region. Clicking on the region allows the region to be edited



## Application Page

The main Application page provides links to run the application, edit the application attributes, manage shared components and export and import application components. The tasks list allows you to perform additional tasks, such as deleting the application and displaying reports for the application.

The screen also displays a list of the pages within the application.

Click on the column headings to reorder the page information

Home > Application Builder > Application 141

Application: 141 - AUSOUG\_HR

Run Application Edit Attributes Shared Components Export / Import

Page View Details Display 15 Go Create Page >

Page	Name	Updated	Updated By	Lock	Run
1	<a href="#">EMPLOYEES</a>	2 minutes ago	-		
2	<a href="#">EMPLOYEES</a>	2 minutes ago	-		
3	<a href="#">EMPLOYEES Analysis</a>	2 minutes ago	-		
4	<a href="#">Analyse by Job Id</a>	2 minutes ago	-		
5	<a href="#">Job Id Chart</a>	2 minutes ago	-		
6	<a href="#">Analyse by Department Id</a>	2 minutes ago	-		
7	<a href="#">Department Id Chart</a>	2 minutes ago	-		
101	<a href="#">Login</a>	2 minutes ago	-		

row(s) 1 - 8 of 8

Click on the page name to edit a page.

Click here to run the page

Click here to lock a page. Locking a page prevents other developers from changing it.

When running the application, you can Click on the Edit Page n link on the Developer toolbar to edit the current page.

Edit Application Edit Page 13 Create Session Debug Show Edit Links

## The Page Definition

There is an area of the Page Definition screen for each of the three sections of information. Note that if you have version 2.2 of the product the Page information is displayed in the Page Rendering section and you have additional icons for restricting the information displayed on the page. In the Express Edition, Click on the Edit Attributes button if you want to amend page properties.

Page 1 [Icons] View Definition Go [Run] [Copy] [Delete] [Create >] Last Updated: 5 minutes ago  
Page Comments: 0

**Page Rendering**

**Page**  
Page Name: EMPLOYEES Template: Application default  
Title: EMPLOYEES Header Text:  
HTML Header: Footer Text:  
On Load: Build Option:  
Help Text: No help is available for this Authorization: No

**Regions**  
Display Point: Page Template Body (3) [Icons]  
10 EMPLOYEES Report  
10 Navigation List  
Display Point: Region Position #1  
1 >>> Breadcrumbs Breadcrumb Entry

**Buttons**  
Region: EMPLOYEES [Icons]  
10 Create Redirect to page 2  
10 Reset Submit as "RESET"  
Item Submit as "Go"

**Items**  
Region: EMPLOYEES [Icons]  
10 P1 REPORT SEARCH Text Field (always submits page when Enter pressed)  
20 P1 ROWS Select List  
30 P1 GO button

**Page Processing**

**Computations**  
Validations  
Processes  
After Submit  
10 Reset Reset Pagination Conditional  
20 Reset report Clear Cache for Items (ITEM,ITEM,ITEM) Conditional  
Branches  
After Processing  
10 Go To Page\_1 Unconditional

**Shared Components**

**Tabs**  
Tab Set: TS1 [Icons]  
EMPLOYEES

**Lists of Values**  
Static Report Row Per Page

**Breadcrumbs**  
Breadcrumb

**Lists**  
Navigation

**Templates**  
Page One Level Tabs  
Region Reports Region  
Region Breadcrumb Region  
Label Optional Label with Help  
Button Button  
Button Button  
Breadcrumb Breadcrumbs Menu  
Report Standard, Alternating Row Colors  
List Vertical Unordered List without Bullets  
List Vertical Unordered List with Bullets

**Theme**  
5. Deal

**Security**

**Navigation Bar**  
200. Logout Redirect To &LO&OUT\_URL..

## Creating a Page

A page can be created using a number of methods as follows:

- Using the Application wizard.
- From the main Application page click on the Create Page button.
- From any page definition screen click on the Create button.
- From the Create link in the Developer Toolbar

You have the option of creating a single blank page, multiple blank pages, or using the wizard to create a page that contains a component such as a form or a report.

The most commonly used method is to create a page with a component. There are six types of component that can be created in the page. Each of these will result in a different set of steps to follow. You can also choose to create a login page.



## 2 Hands On - Creating a Form and Associated Report

- 1) Use the Breadcrumbs link to return to your application page.

Home > Application Builder > Application 141 > Page 1

One of the most commonly used page components is a query report on a table which is associated with a form for data manipulation. This page wizard creates two pages. These components can be created using the following steps:

- 2) Click on the Create Page button on the main Application page.

Select Form. You can just click on the image rather than using the radio button and clicking Next.



Select Form on a Table with Report.



- 3) This screen allows you to identify the schema that owns the table you want to maintain. Leave the default value of HR and click on the Next button.

Identify Table or View ▼	<b>Create Pages</b> <span>Cancel</span> <span>Next &gt;</span> This wizard builds a two page report and form combination on a single table or view. The first page enables users to specify the row to be updated. The second page provides users with ability to update the selected table or view. Select the schema owner who owns the database table or view. * Table / View Owner: <input type="text" value="HR"/> ▼
Define Report Page ▼	
Define Form Page ▼	
Confirm	

The next screen allows you to define the table or view on which the form and report should be based. You can enter the name of the table or view or select it from a list by clicking on the List icon to the right of the field.

- 4) Enter or select the table JOBS. Click on the Next button.

Identify Table or View ▼	<b>Create Pages</b> <span>Cancel</span> <span>&lt; Previous</span> <span>Next &gt;</span> Select the table or view on which you wish to base your report and form. Owner: <b>HR</b> * Table / View Name: <input type="text" value="JOBS"/> ▲
Define Report Page ▼	
Define Form Page ▼	
Confirm	

## Creating a Form and Associated Report (cont)

The first page that will be created is the report page.

The screen allows you to enter the Page Number and Name, and Region Title. You can also select the template that will be used for the region and the report displayed in the region. These will default to the values set for your application. You can also determine the number of records that will be displayed in the report. The user can scroll to additional records.

- 5) Change the Page Name, Title and Breadcrumb as follows. Click on the Next button.

The image shows two screenshots of the Oracle APEX interface. The top screenshot is the 'Create Report Page' dialog. It has a title bar with 'Create Report Page', 'Cancel', '< Previous', and 'Next >' buttons. The main area contains a description: 'The report page is used to select the rows to be edited. It also includes a button to create a new row. If the page you specify does not exist, the page will be created.' Below this, it shows 'Owner: HR' and 'Table Name: JOBS'. There are several input fields: '\* Page Number' with value '8', '\* Page Name' with value 'JOBS', '\* Region Title' with value 'Jobs', '\* Region Template' with a dropdown showing 'Reports Region', 'Report Template' with a dropdown showing 'template: 5. Standard, Alternating Rows Colors', 'Pagination Size' with a dropdown showing '15', and 'Breadcrumb' with a dropdown showing 'Breadcrumb'. The bottom screenshot is the 'Create Breadcrumb Entry' dialog. It has a title bar with 'Create Breadcrumb Entry'. It contains two input fields: 'Entry Name' with value 'Jobs' and 'Parent Entry' with value 'No parent breadcrumb entry'. Below the 'Parent Entry' field, there is a red text label '[No parent breadcrumb entry]'.

You have the option of creating a page without a tab, creating a new tab in an existing set of tabs or using an existing tab.

- 6) Use an existing tab set and create a new tab. Select the Tab Set EMPLOYEES and enter a new tab label of Jobs

The image shows a screenshot of the 'Create Report Page' dialog. It has a title bar with 'Create Report Page', 'Cancel', '< Previous', and 'Next >' buttons. The main area shows 'Page: 8'. Under 'Tab Options', there are three radio buttons: 'Do not use tabs' (unselected), 'Use an existing tab set and create a new tab within the existing tab set.' (selected), and 'Use an existing tab set and reuse an existing tab within that tab set.' (unselected). Below this, there are two input fields: '\* Tab Set' with a dropdown showing 'TS1 (EMPLOYEES)' and '\* New Tab Label' with a text box containing 'Jobs'.

## Creating a Form and Associated Report (cont)

The next step allows you to select the columns that will be included as items in the report. You can also enter a WHERE clause to restrict the data in the report.

- 7) Include all the columns except JOB\_ID. Click on the Next button.

Create Report Page

Cancel < Previous Next >

Select the columns to include in the report page. Define an optional WHERE clause to restrict the result set.

Page: 8  
Owner: HR  
Table Name: JOBS

\* Select Column(s)

- 1. JOB\_ID (Varchar2)
- 2. JOB\_TITLE (Varchar2)
- 3. MIN\_SALARY (Number)
- 4. MAX\_SALARY (Number)

Optional WHERE clause

- 8) On the next page select an Edit icon and click on the Next button.

Create Report Page

Cancel < Previous Next >

Select an edit link image. This image will function as a link for choosing a row to edit. Use image attributes to define the image height and width. Defining the height and width helps browsers display pages faster.

Report Page: 8  
Owner: HR  
Table Name: JOBS

Edit Link Image:

- ☒ [Document with Pencil Icon]
- ☐ [Document Icon]
- ☐ Edit
- ☐ Other Image

Use Other Image

Image Attributes

The next steps create the Form page. This is used to edit information in the table. The first pages are similar to those that were displayed to create the report page.

- 9) Change the Page Name, Region Title and Breadcrumb Entry as follows and Click Next.

The screenshot shows two stacked dialog boxes. The top dialog, titled 'Create Form Page', has a title bar with 'Cancel', '< Previous', and 'Next >' buttons. Its content area contains the text: 'Specify page and region information for the Form Page. The Form Page is used to insert, update, and delete rows from the selected table. If the page you specify does not exist, the page will be created.' Below this, the 'Owner' is set to 'HR' and the 'Table Name' is 'JOBS'. There are four required fields marked with a red asterisk: 'Page Number' (value: 9), 'Page Name' (value: JOBS\_DETAIL), 'Region Title' (value: Jobs Detail), and 'Region Template' (value: Form Region). The bottom dialog, titled 'Create Breadcrumb Entry', has a 'Breadcrumb' field set to 'Breadcrumb' and a 'Parent Entry' field set to 'Jobs'. The 'Entry Name' field contains the text 'Jobs Detail'.

- 10) Select the tabs for the page. In this case we are choosing to reuse an existing tab page from an existing tab set. Click Next.

The screenshot shows the 'Create Form Page' dialog box. The title bar has 'Cancel', '< Previous', and 'Next >' buttons. The 'Page' is set to '9'. Under 'Tab Options', there are three radio buttons: 'Do not use tabs', 'Use an existing tab set and create a new tab within the existing tab set.', and 'Use an existing tab set and reuse an existing tab within that tab set.' The third option is selected. Below, the 'Tab Set' dropdown is set to 'TS1 (EMPLOYEES)'.

- 11) Select the tab you want to use. Notice the Employee tab has not yet been created. Pick the EMPLOYEES tab, we will fix this later. Click Next.

The screenshot shows the 'Create Form Page' dialog box. The title bar has 'Cancel', '< Previous', and 'Next >' buttons. The 'Page' is set to '9' and the 'Tab Set' is 'TS1'. The 'Use Tab' dropdown is open, showing a list with '- Select Tab -' and 'T\_EMPLOYEES'. Below the dialog, a 'Tabs' section is partially visible.

- 12) The primary key of the table will be derived from a primary key constraint defined for the table. Leave this as the default of JOB\_ID and click Next.

**Create Form Page** Cancel < Previous Next >

Select the primary key column of the table on which this form is to be based. If the table has two columns that form the primary key, identify the second primary column.

Form Page: **9**  
 Owner: **HR**  
 Table Name: **JOBS**

\* Primary Key: **JOB\_ID**

Primary Key Column 2: **Select Primary Key 2**

The next screen allows you to identify the mechanism you want to use to supply a default value for the primary key column. You can use an existing database trigger, write a PL/SQL function or use an existing sequence.

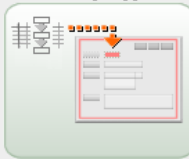


- 13) Choose to use an existing sequence JOB\_SEQ, and click Next.

**Create Form Page** Cancel < Previous Next >

Form Page: **9**  
 Owner: **HR**  
 Table Name: **JOBS**  
 Primary Key Column: **JOB\_ID**

\* Define the source for the primary key columns

☐ Existing trigger ☐ Custom PL/SQL function ☒ Existing sequence

\* Sequence: **DEPARTMENTS\_SEQ**

- 14) Select all the columns and click Next.

**Create Form Page** Cancel < Previous Next >

Select the columns to include in the form page.

Page: **9**  
 Owner: **HR**  
 Table Name: **JOBS**

\* Select Column(s): **JOB\_TITLE (Varchar2)**  
**MIN\_SALARY (Number)**  
**MAX\_SALARY (Number)**

15) Allow insert, update and delete. Click Next.

**Identify Process Options** Cancel < Previous Next >

Identify the process options for this form page. For example, to prevent users from deleting from this form page, select **No** for the delete option.

Form Page: **9**  
 Owner: **HR**  
 Table Name: **JOBS**

Insert

Update

Delete

16) The final screen presents a summary of the objects the wizard has created. Click on Finish to create the pages.

17) Click on Run Page

**Success**

The Query and Update Report and Form have been created successfully.

[Run Page](#)

[Edit Page](#)

18) Click on the Edit icon to view the details of the president

**Jobs** [Create](#)

Edit	Job Title	Min Salary	Max Salary
	President	20000	40000
	Administration Vice President	15000	30000
	Administration Assistant	3000	6000

19) Click on the Edit Page n link in the Developer toolbar to return to the page definition.

ANONYMOUS

**Jobs Detail**

Cancel Delete Apply Changes

**Job Title**

**Min Salary**

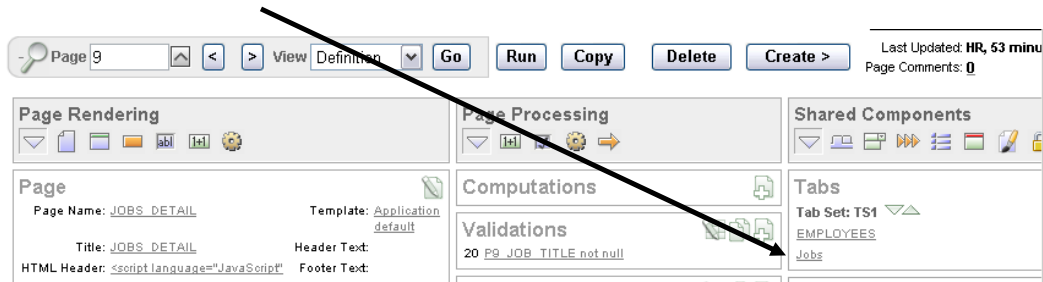
**Max Salary**

---

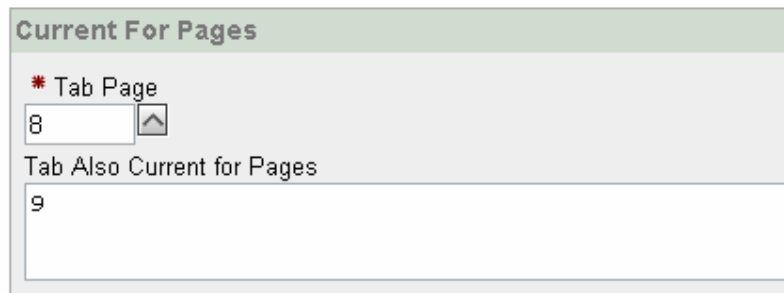
[Edit Application](#) [Edit Page 9](#) [Create](#) [Session](#) [Debug](#) [Show Edit Links](#)



20) Click on the link to the Jobs tab.



21) Set the Tab also Current for Page 9. Click on Apply Changes.



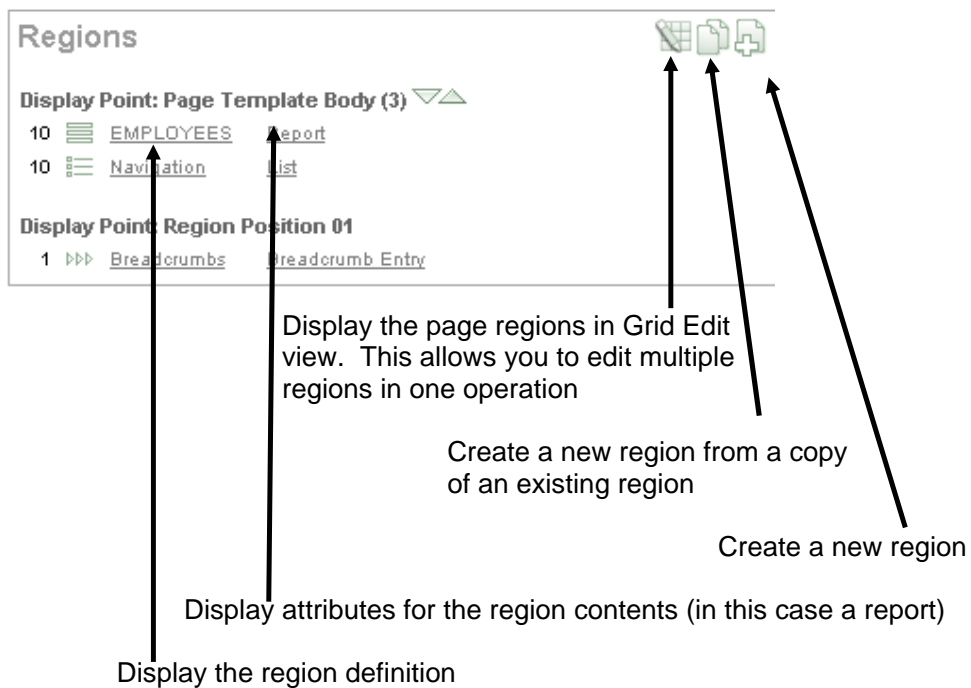
22) Click on the Application link in the Breadcrumbs to return to the application page.  
Run the application and test your new pages.



## Section 3 – Regions, Items and Validation

### Regions

Each page is made up of one or more regions. The region defines the location and appearance of items and buttons on the page. You can add a new region to an existing page.



## Report Attributes

If your region is a Report region, the Report Attributes Tab allows you to change the appearance and functionality of columns in your report.

Click here to edit the column attributes

Displays a tick if the column acts as a link

Displays a tick if the column has been edited

Column headings can be based on the column names or can be customised or hidden

Change the position of the column in the report

Customise the column heading

Align column data and headings

Add totals for the column

Sort order

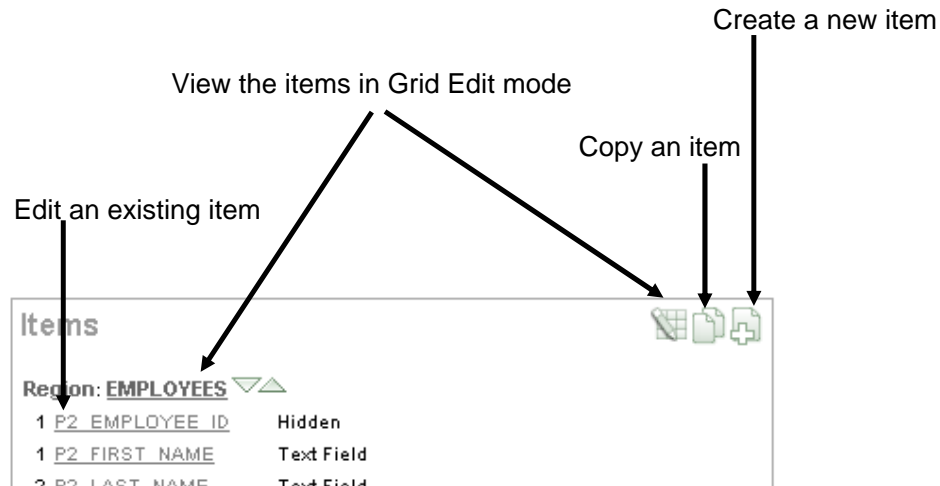
Set the checkbox off to hide a column

Set the checkbox on to allow the user to sort by this column

Alias	Link	Edit	Heading	Column Alignment	Heading Alignment	Show	Sum	Sort	Sort Sequence
EMPLOYEE_ID	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	 	right	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
FIRST_NAME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	First Name	left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
LAST_NAME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Last Name	left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-

## Creating and Modifying Items

You can modify existing items, or create new items from the Page Rendering section of the Page Definition screen.



The New Item wizard steps you through the creation of an item. The first page allows you to select an item type.

**Create Item** Cancel Next >

Page: 2 - Employees

Select Item Type:

<input type="radio"/> Check Box	<input type="radio"/> Date Picker	<input type="radio"/> Display Only	<input type="radio"/> File Browse
<input type="radio"/> Hidden	<input type="radio"/> List Manager	<input type="radio"/> Multiple Select	<input type="radio"/> Password
<input type="radio"/> Popup List of Values	<input type="radio"/> Radio	<input type="radio"/> Select List	<input type="radio"/> Text Area
<input checked="" type="radio"/> Text	<input type="radio"/> Stop and start table		

☐ Create multiple items

## Validations

Page validations allow the contents of a page to be checked against a set of business rules before the page is submitted.

**Validations**

5	<u>P2_HIRE_DATE must be date</u>	Conditional
7	<u>P2_SALARY must be number</u>	Conditional
8	<u>P2_COMMISSION_PCT must be number</u>	Conditional
9	<u>P2_MANAGER_ID must be number</u>	Conditional
10	<u>P2_DEPARTMENT_ID must be number</u>	Conditional

Click here to create a new validation

Clear here to edit an existing validation

Validation can be defined at page level, or can be associated with a particular item.

There are a number of types of validation. Some provide commonly used validation criteria which you can select from a predefined list, some require you to enter the validation code yourself.

**Create Validation** Cancel < Previous Next >

Page: **7 - Employee Details**  
 Level: **Page level validation**  
 Item:

Select a validation method:

☐ SQL
 ☐ PL/SQL
 ☐ Item Not Null

☒ Item String Comparison
 ☐ Regular Expression

SQL: **SQL**  
 PL/SQL: **PL/SQL**  
 Item Not Null: **\*\*\*\*\***  
 Item String Comparison: **\*\*\*\***  
 Regular Expression: **'\*(\*)\*'**



### 3 Hands On - Refining the Application

#### 3.1 Regions and Items

- 1) Use the Breadcrumbs link to return to your application page.
- 2) Click on the JOBS link to display the definition of the JOBS page.

Page ▲	Name	Updated	Updated By	Lock	Run
1	<a href="#">EMPLOYEES</a>	6 days ago	-		
2	<a href="#">EMPLOYEES</a>	6 days ago	-		
3	<a href="#">EMPLOYEES Analysis</a>	6 days ago	-		
4	<a href="#">Analyze by Job Id</a>	6 days ago	-		
5	<a href="#">Job Id Chart</a>	6 days ago	-		
6	<a href="#">Analyze by Department Id</a>	6 days ago	-		
7	<a href="#">Department Id Chart</a>	6 days ago	-		
8	<a href="#">JOBS</a>	3 minutes ago	hr		
9	<a href="#">JOBS DETAIL</a>	52 minutes ago	hr		
101	<a href="#">Login</a>	6 days ago	-		

- 3) Click on the Report link to display the Report Attributes.

### Regions





**Display Point: Page Template Body (3)**

10  [Jobs](#) [Report](#)

**Display Point: Region Position 01**

1  [Jobs](#) [Breadcrumb Entry](#)

- 4) Change the Column alignment of min and max salary to Right. Set Sort on for the title, min salary and max salary.

**Column Attributes**

Headings Type: ☐ Column Names ☐ Column Names (InitCap) ☒ Custom ☐ PLUSQL ☐ None

Alias	Link	Edit	Heading	Column Alignment	Heading Alignment	Show	Sum	Sort	Sort Sequence
JOB_ID	✓		Edit	left		✓			-
JOB_TITLE			Job Title	left		✓		✓	-
MIN_SALARY			Min Salary	right		✓		✓	-
MAX_SALARY			Max Salary	right		✓		✓	-

When moving the last column further down, it will show up as the first column of your report.  
When moving the first column up, it will be moved to the end of your report.

- 5) Scroll further down the Report attribute page and enable CSV output.

**Report Export**

Enable CSV output ☒ Yes ☐ No Separator  Enclosed By

Link Label

Filename

- 6) Click on the Apply Changes button. It will return you to the Page Definition screen.

- 7) Use the Next page icon to display your Jobs Detail page

Page 8    View

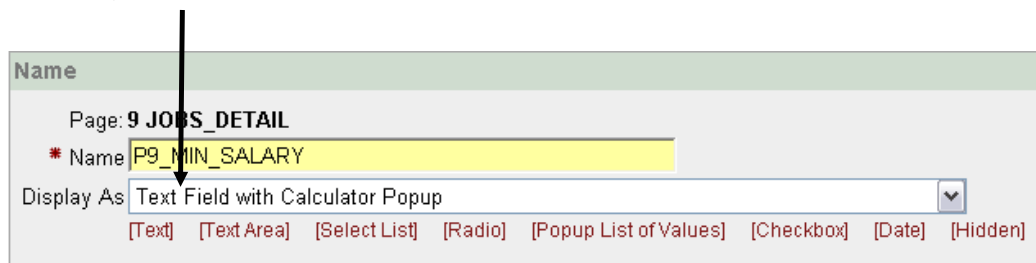
- 8) Click on P9\_MIN\_SALARY to display the item definition screen.

**Items**

Region: Jobs Detail

1	P9_JOB_ID	Hidden
20	P9_JOB_TITLE	Text Field
30	P9_MIN_SALARY	Text Field
40	P9_MAX_SALARY	Text Field

- 9) Display the field as a Text Field With Calculator Popup. Click on the Apply Changes button



**Name**

Page: **9 JOBS\_DETAIL**

\* Name: **P9\_MIN\_SALARY**

Display As: **Text Field with Calculator Popup**

[Text] [Text Area] [Select List] [Radio] [Popup List of Values] [Checkbox] [Date] [Hidden]

### 3.2 Validation

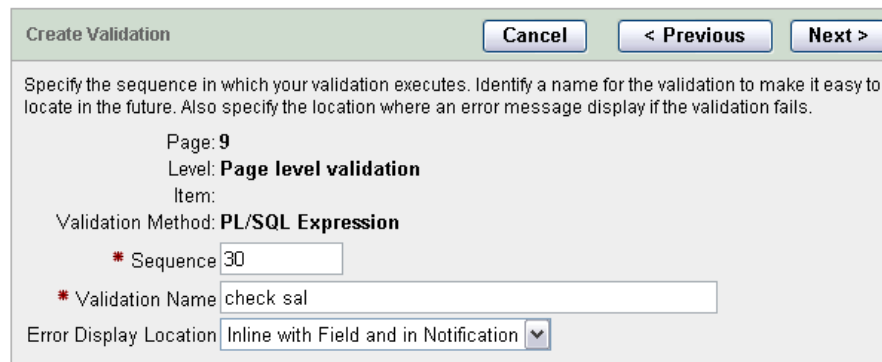
- 10) Click on the Add Validation icon.



**Validations**

20 P9\_JOB\_TITLE not null

- 11) Select Page Level Validation.
- 12) Select a validation method of PL/SQL.
- 13) Select a PL/SQL validation method of PL/SQL Expression. Click Next.
- 14) Enter a validation name of check\_sal. Click Next.



**Create Validation** [Cancel] [< Previous] [Next >]

Specify the sequence in which your validation executes. Identify a name for the validation to make it easy to locate in the future. Also specify the location where an error message display if the validation fails.

Page: **9**

Level: **Page level validation**

Item:

Validation Method: **PL/SQL Expression**

\* Sequence: **30**

\* Validation Name: **check\_sal**

Error Display Location: **Inline with Field and in Notification**



15) Enter the following validation clause and error message.

Page: 9  
Level: **Page level validation**  
Validation Method: **PL/SQL Expression**

\* Validation

TO\_NUMBER(:P9\_MIN\_SALARY) <= TO\_NUMBER(:P9\_MAX\_SALARY)

\* Error Message

Minimum salary cannot be more than maximum salary

[Error] [Value must be specified.]

16) Click on the Next Button. Leave this screen with default values then click on Create.

17) Navigate to the page definition screen of your second Employees Page (Page 2). Click on P2\_JOB\_ID to display the item definition.

Items

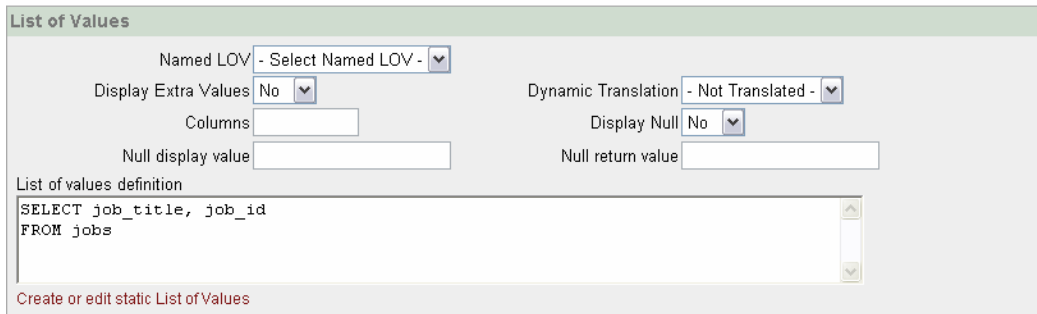
Region: **EMPLOYEES**

1	<u>P2_EMPLOYEE_ID</u>	Hidden
1	<u>P2_FIRST_NAME</u>	Text Field
2	<u>P2_LAST_NAME</u>	Text Field
3	<u>P2_EMAIL</u>	Text Field
4	<u>P2_PHONE_NUMBER</u>	Text Field
5	<u>P2_HIRE_DATE</u>	Date Picker (MM/DD/YYYY)
6	<u>P2_JOB_ID</u>	Text Field
7	<u>P2_SALARY</u>	Text Field
8	<u>P2_COMMISSION_PCT</u>	Text Field
9	<u>P2_MANAGER_ID</u>	Text Field
10	<u>P2_DEPARTMENT_ID</u>	Text Field

11 Items

18) Display the item as a Select List.

19) Scroll further down the item definition page and enter the following list of values.



Named LOV - Select Named LOV -

Display Extra Values No

Columns

Null display value

Dynamic Translation - Not Translated -

Display Null No

Null return value

List of values definition

```
SELECT job_title, job_id
FROM jobs
```

Create or edit static List of Values

(Note that we would normally create a List of values as a Shared Component.)

20) Apply your changes.

21) Display the item definition for the Hire Date and set the Display As to Date Picker (DD-MON-YYYY)

22) Apply your changes, then return to the main Application screen and run your application. Test the changes you have made.

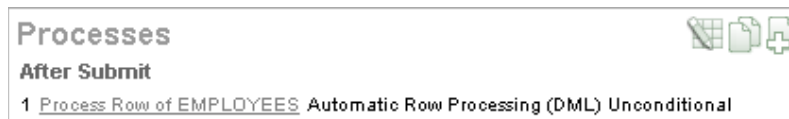
## Section 4 – More Advanced Development

### Adding Processing

#### Processes

Page processes provide a means to execute application logic associated with the page. This may be at one of a number of processing points, for example when the time the page is rendered or when the page is submitted. They can be used, for example, to populate a page from the database, or to execute a PL/SQL procedure when the page is submitted

You can create a page process from the Page Rendering or Page Processing part of the screen. The location in which the process will display is dependent on the process point



#### Branching

Branching is used to determine the location to which control will be passed when a page is submitted.



#### Example – File Upload:

In this example we need to load files into the database. Application Express handles the upload of files automatically, but if we want to store additional metadata with the files we need to code it manually. The file item is created as type File Browse...

**Employee**  
 Employee: Cookson, Penny

**Upload Client Timesheets**  
 File Name:  Browse...  
 Comments:

**Files**

ID	NAME	COMMENTS
<a href="#">Download</a>	F10942/TS_PC_2004_10_15.DOC	No comment
<a href="#">Download</a>	F4940/TS_PC_2004_10_01.DOC	Timesheet for a really difficult client
<a href="#">Download</a>	F5388/TS_PC_2004_10_08.DOC	Timesheet for a really difficult client
<a href="#">Download</a>	F6749/TS_PC_2004_10_08.DOC	Timesheet for a really lovely client

## Example – File Upload (cont):

When the user has selected a file and clicks submit the file will be uploaded to a database table.

We have created an additional process that inserts related comments information into a separate table, and also a process to clear out our comments when the screen has been submitted, ready for entry of the next file.

Processes		
After Submit		
10 <a href="#">submit_file</a>	PL/SQL anonymous block	Conditional
20 <a href="#">clear_comments</a>	Clear Cache for Items (ITEM,ITEM,ITEM)	Unconditional

Home > Application Builder > Application 143 > Page 19 > **Edit Page Process** Page 19

Process: 2 of 2 Name: **submit\_file** Cancel Delete Apply Changes <

**Show All** | Name | Process Point | Source | Messages | Conditions | Authorization | Configuration | Comments

**Name**

Page: **19 Upload timesheet**

\* Name: **submit\_file**

Type: **PL/SQL anonymous block**

**Process Point**

\* Sequence: **10**

Process Point: **On Submit - After Computations and Validations**

Run Process: **Once Per Page Visit (default)**

**Source**

\* Process: [\[Download Source\]](#)

```
insert into employee_files
values (:P19_FILE_NAME, :P19_PAR_ID, :P19_COMMENTS);
```

We only fire the code when a file name has been entered.

**Conditional Processing**

Condition Type: **Value of Item in Expression 1 Is NOT NULL**

[plsql] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

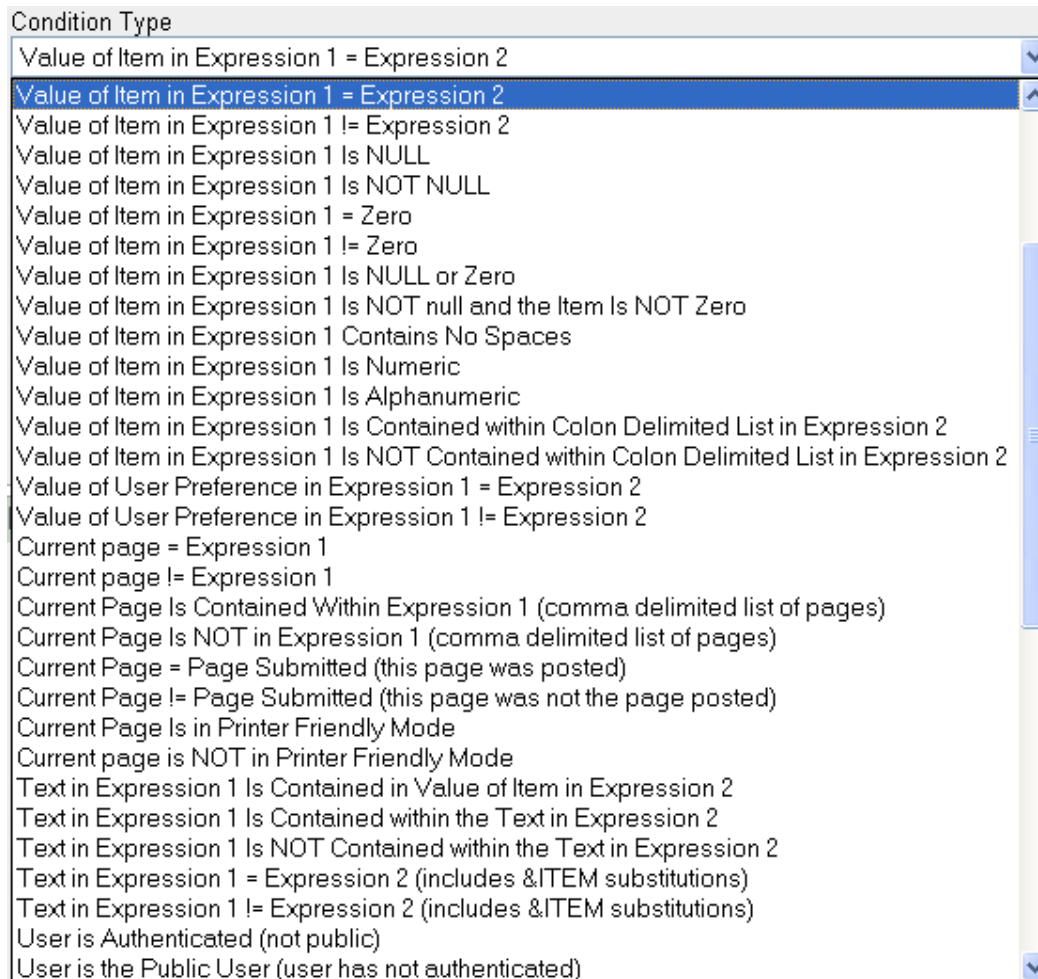
Expression 1: **P19\_FILE\_NAME**

Expression 2:

When Button Pressed (Process After Submit When this Button is Pressed): **- No Button Condition -**

## Conditionally Displaying Regions

A region can be displayed or suppressed depending on a series of conditions. You can select from a list of standard conditions in a drop down list.



This feature can be used to hide regions that are not available to a public user.

## Session State

### Referencing Session State

When you submit information in an Application Express application it is automatically saved in the session state. It can then be used in subsequent pages. You can reference items in session state as bind variables using the following syntax:

:ITEMNAME	as a bind variable in SQL
v('ITEMNAME')	in PL/SQL
&ITEMNAME	in static text

### Clearing Session State

Session state can be cleared when you call a new page. When you create a branch to a new page you can enter the page numbers for which you want to clear the cache.

#### Example:

Branch to page 400 and clear the cache for pages 400 and 401.

The screenshot shows the 'Action' configuration page in Oracle APEX. The 'Target type' is set to 'Page in this Application'. The 'Page' is set to '400'. The 'Clear Cache' field contains '400,401'. The 'Set these items' and 'With these values' fields are empty.

The settings in this page are used to create a page call that clears the cache in these pages.

You can manually create a page call that clears cache.

#### Example:

Branch to page 400, clear the cache for pages 400 and 401 and reset pagination.

f?p=&APP\_ID.:400:&APP\_SESSION.:NO:RP,400,401

### Viewing Session State

Click on the Session link in the Developer toolbar. A popup screen will display the values in the session state

## Creating Page Links

You can create links between Application Express pages using the following syntax:

```
f?p=App:Page:Session:Request:Debug:ClearCache:itemNames:itemValues:
PrinterFriendly
```

The arguments are as follows:

App	The application identifier or alias. Use the substitution string &APP_ID. in preference to hard coding these values.
Page	The ID or alias of the page you want to display
Session	The ID of the current session. Use &SESSION. to pass the current session.
Request	When a user submits a page, by default the request is set to the name of the button that was clicked. Request can also be set to a custom value.
Debug	If set to YES the page will be displayed in debug mode. A value of No will not display debug information.
ClearCache	Specifies the items for which the session state should be cleared. You can include any of the following:  A comma separated list of pages to be cleared. A comma separate list of items to be cleared. RP This causes pagination to be reset.
itemNames	A comma separated list of items which should have their values set. This syntax sets the value of the item in the session state.
itemValues	A comma separate list of the values to which the items should be set.
PrinterFriendly	Set to YES to display a printer friendly view or NO for a normal view.

The procedure call f is a PL/SQL wrapper for wwv\_flow.show.

### Examples:

Call page 1 in the current application

```
f?p=&APP_ID.:1:&SESSION.
```

Call page 10 setting the value of P10\_PAR\_ID to 89

```
f?p=&APP_ID.:10:&APP_SESSION.::::P10_PAR_ID:89
```

## Creating an Application – Standards

In order to maintain organisational standards the following techniques can be used for the creation of applications.

A STANDARD workspace should be created. This should contain a standard application:

**STANDARD\_APP** This application will contain standard objects such as Navigation Bar Entries, common Lists of Values and authentication and authorisation schemes.

When a new workspace is created the STANDARD\_APP application should be imported into the workspace.

### Copying Common Objects

You can copy the common objects into your application when you use the application creation wizard. Note that the common objects will be copied not inherited.

**Create Application** [Cancel] [< Previous] [Next >]

Shared components are common application elements that can be displayed or applied across multiple pages in an application. To save time or maintain consistency between applications, it is possible to copy the shared components from an existing application.

Copy Shared Components from Another Application:

☒ Yes  
☐ No

Copy from Application:

127 STANDARD\_APP ▼

Select Components to Import:

- ☒ User Interface Themes
- ☒ Lists of Values
- ☒ Navigation Bar Entries
- ☒ Authorization Schemes
- ☒ Authentication Schemes

**Create Application** [Cancel] [< Previous] [Next >]

A theme is a collection of templates that is used to define the user interface of an application. Select the theme you would like to use as the default.

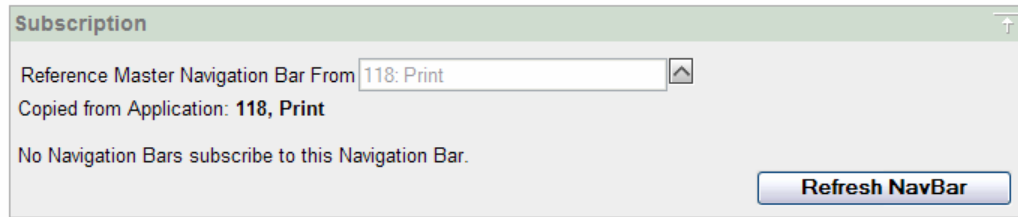
Import From Application: **127 STANDARD\_APP**

Default Theme: Centered ▼



### ***Inheriting Common Objects***

Objects can be inherited from a standard application using the Subscription facility.



When the master object is changed you can click on the Refresh button to reload its definition.

Note that objects can only be inherited from applications in the same workspace, or in a different workspace that shares the same schema.

## **Security**

There are two types of security that can be implemented in Application Express.

- Authentication
- Authorisation

### **Authentication**

Authentication is the process by which a user is validated to Application Express. The authenticated user can be referenced using :APP\_USER or v('APP\_USER'). You can choose from preconfigured authentication schemes, or build your own. Authentication schemes are managed from the Shared Components page.

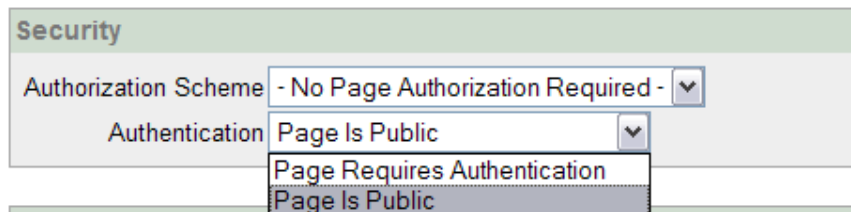
The following built in schemes are available:

- Application Express Account
- Database Authentication
- LDAP Directory
- No Authentication
- Oracle iAS Single Sign-On

When you create an application which requires authentication, a login page is automatically created for you.

## Public Pages

Pages can be specified as public using the list box in the Edit Page screen.



## Authorisation

Authorisation schemes allow you to control access at a more granular level. They are managed from the Shared Components page.

An authorisation scheme contains a condition that is applied before you can access an object. The condition can be one of a series of standard conditions or a PL/SQL expression returning a Boolean.

The authorisation code can be performed once per page view or once per session.

An authorisation scheme is applied to an object in the Security section of the objects attributes.

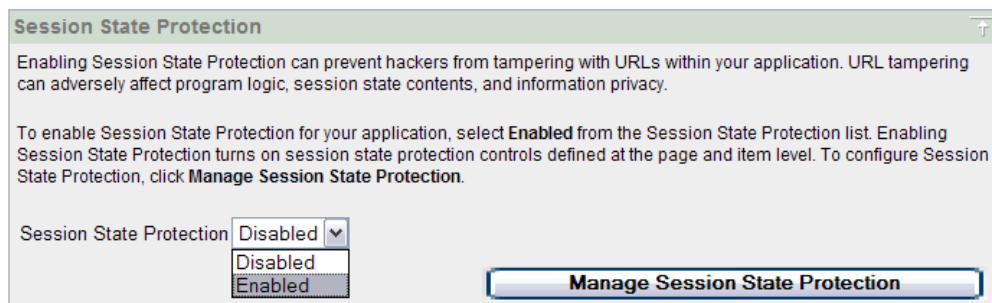
Authorisation provides additional security levels once a user is connected.

## Session State Protection

Since session state items can be referred to in a URL, it is possible for a malicious user to tamper with session state by modifying URLs. The session state protection feature is designed to prevent this from happening. It utilises checksums to prevent URL tampering.

### *Enabling Session State Protection*

By default session state protection is turned off. It can be turned on from the security section of the application attributes.



## ***Managing Session State Protection***

Once enabled, session state protection can be defined for pages, items and application items. Protection levels can be defined in the individual objects or from the session state protection wizard in shared components. Initially all objects will be unprotected. You can view the session state protection settings using the report links on the Set Application Protection page.

## **Page Zero Items**


Page 0 items appear on all pages. This can be used to display common content in your application. Page 0 is not directly displayed itself, only to add content to all pages.

You can conditionally suppress the objects when not required.



### **Example:**



Do not display the menu on pages 7 or 8

**Conditional Display**

Condition Type  
Current Page Is NOT in Expression 1 (comma delimited list of pages) 

[plsql] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

Expression 1  
7,8  

Expression 2  
 

## Themes and Templates

### Templates

Templates determine the visual characteristics of an application. They contain HTML that defines the styles, positions and text associated with the page and components of the page.

Templates are defined for a number of Application Express objects.

- Page
- Region
- Report
- List
- Label
- Breadcrumbs
- Calendar
- Button
- Popup LOV

### Themes

A theme contains a set of templates for each of the possible levels. There can be multiple templates for each object type, one of which will be defined as the default template for that type of region or component. The default will be used by the wizards if you do not specify a template, but can be overridden for individual components.

## The Application Express API

Oracle provides an application programming interface (API) for performing programming in the Application Express environment.

A number of packages are provided as follows:

- APEX\_ITEM
- APEX\_APPLICATION
- APEX\_UTIL
- APEX\_CUSTOM\_AUTH
- APEX\_COLLECTION
- APEX\_PLSQL\_JOB
- APEX\_MAIL

Note that prior to version 2.2 these APIs will be called HTMLDB\_XXXXX. The older name is still supported in version 2.2.

## Recommendations

- Take an export of your application at regular intervals.
- Use Lock Page when working on a page.
- Use an artificial, autogenerated column as a primary key.
- Load images and files into the HTMLDB repository as shared objects and reference using #WORKSPACE\_IMAGES#filename.
- Do not use hard coded APP\_ID.
- Use Fine Grained Access Control (VPD) for limiting rows a user can access
- Specify normal display characteristics as user interface defaults.
- Update/insert screens can be used for query only by setting items to read only dependent on some condition.



## 4 Hands On – More Advanced Development Techniques

### 4.1 Trees

- 1) Use the Breadcrumbs link to return to your application page.
- 2) Click on the Shared Component icon.
- 3) Click on the Trees link in the Navigation group.
- 4) Click on the Create button.
- 5) Enter Page Number 2. Enter a page name of Employee Details, and a Region name of Managed Employees. Do not use breadcrumbs on page. Click on the Next button.
- 6) Enter a tree name of Employees Tree. Start the tree with a static value. Click on the Next button.
- 7) Choose a standard tree template.
- 8) Start tree based on static value P2\_EMPLOYEE\_ID. Click on the Next button.
- 9) Include the Collapse all and Expand all buttons. Click on the Next button.
- 10) Accept a table owner of HR. Click on the Next button.
- 11) Enter a table name of EMPLOYEES. Click on the Next button.
- 12) The next screen should be changed to appear as follows:

Owner: **HR**  
 Table: **EMPLOYEES**  
 \* ID   
 \* Parent ID   
 \* Leaf Node Text   
 Link Option: ☒ Existing Application Item  
☐ Nothing

- 13) Select the link item as follows:

Create Tree Cancel < Previous Next >

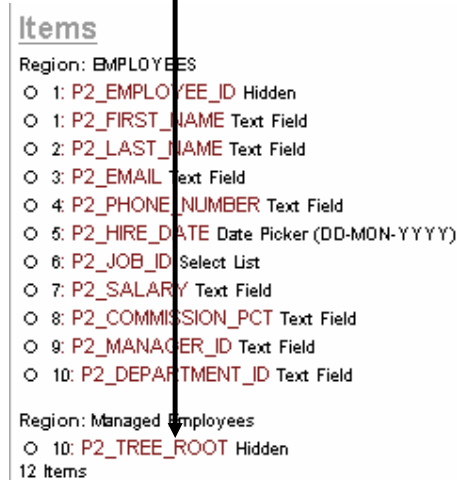
Application: **101**  
 Page: **2**  
 Owner: **HR**  
 Table: **EMPLOYEES**  
 \* Link Page   
 \* Link existing item

14) Do not include a WHERE or ORDER BY clause.

15) Click Finish to create the Region.

16) Edit Page 2.

17) Click on the hidden item P2\_TREE\_ROOT.



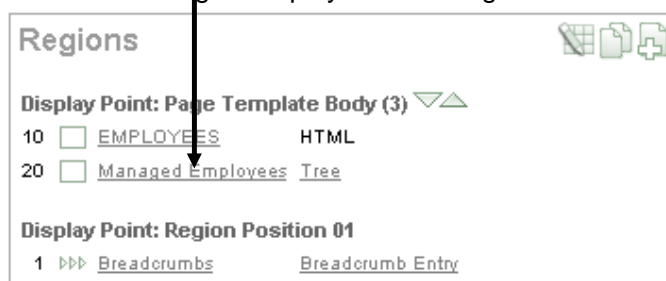
18) Scroll down to the Source section and set it as follows:

19) Run your application. Search for Stephen King. Click on the Edit icon next to his name and notice your tree displayed. Click on the name of an employee in the tree to navigate to that employee.

We do not want the Managed Employees region to display when we are creating a new Employee so we will display the region conditionally.

20) Edit Page 2 EMPLOYEES.

21) Click on the managed Employees Tree region



22) Set the Conditional Display as follows.

The screenshot shows the 'Conditional Display' dialog box. The 'Condition Type' is set to 'Value of Item in Expression 1 Is NOT NULL'. Below this, a list of conditional expressions is shown: [PL/SQL], [item=value], [item not null], [request=e1], [page in], [page not in], [exists], [none], and [never]. The 'Expression 1' field contains the text 'P2\_EMPLOYEE\_ID'.

23) Run your application. Notice that if you click on the button to Create a new employee the tree is not displayed.

## 4.2 Creating Links

In this workshop you will create a button to display the Employee's job, and conditionally return to either the Job search screen or the Employee Detail screen.

- 1) Return to your application page.
- 2) Edit Page 9 Job Detail. Create a hidden item called P9\_FROM.
- 3) Edit Page 2 EMPLOYEES.
- 4) Create a new button in the Employees region.
- 5) Choose Create a button displayed amongst the region's items.
- 6) Set the button properties as follows.

The screenshot shows the 'Create Button' dialog box. At the top, there are buttons for 'Cancel', '< Previous', and 'Create Button'. The dialog is for 'Page: 2 - EMPLOYEES' and 'Region: EMPLOYEES'. The 'Button Name' is 'P2\_JOB', 'Sequence' is '7', and 'Show' is set to 'Beginning on New Line'. The 'Label' is 'View Job' and the 'Request' is 'Job'. The 'Button Style' is 'Template Based Button', the 'Image Name' is 'go.gif', and the 'Template' is 'Button'.



- 7) Click on Create Button
- 8) Create a new Branch as follows:

**Create Branch** [Cancel] [Next >]

Page: **2 - EMPLOYEES**

\* Branch Point  
On Submit: Before Computation (Before Computation, Validation, and Processing) [v]  
[1. Before Computations] [2. Before Validations] [3. Before Processing] [4. After Processing]

\* Branch Type  
Branch to Page or URL [v]

- 9) Click on the Next button, then enter Branch to Page 9 as follows:

**Create Branch** [Cancel] [< Previous] [Next >]

Page: **2 - EMPLOYEES**

Branch Point: **On Submit: After Processing (After Computation, Validation, and Processing)**

Branch Type: **Branch to Page or URL**

Branch Target: Page in this Application [v]

\* Page 9 [v] ( [ ] reset pagination for this page ) ( [ ] include process success message )

Request [ ]

Clear Cache [ ] (comma separated page numbers)

Set these items  
P9\_JOB\_ID [v] (comma separated name list)

With these values  
&P2\_JOB\_ID. [v] (comma separated value list)

URL Target  
[ ]

- 10) Only branch when P2\_JOB button is pressed.

**Create Branch** [Cancel] [< Previous] [Create Branch]

Page: **2 - EMPLOYEES**

Branch Point: **On Submit: Before Computation (Before Computation, Validation, and Processing)**

Branch Type: **Branch to Page**

Branch Action: **f?p=&APP\_ID.:9:&SESSION.::&DEBUG.&success\_msg=#SUCCESS\_MSG#**

\* Sequence 1 [ ]

When Button Pressed \*P2\_JOB [v]

- 11) Click on the Create Branch Button

- 12) Test your application. At this point, the job will be displayed, but when you leave the Job detail screen you will be returned to the Job search screen.
- 13) Edit the branch you have just created as follows.

The 'Action' dialog box is shown with the following configuration:

- Target type:** Page in this Application
- Page:** 9 (with a 'reset pagination for this page' checkbox and an 'include process success message' checkbox)
- Request:** (empty text field)
- Clear Cache:** (empty text field, with a note '(comma separated page numbers)')
- Set these items:** P9\_JOB\_ID,P9\_FROM (with a note '(comma separated name list)')
- With these values:** &P2\_JOB\_ID.,EMP (with a note '(comma separated value list)')

- 14) Edit Page 9.
- 15) Edit the existing branch Go To Page 8 and set the Sequence to 2.
- 16) Create a new branch as follows:

The 'Create Branch' dialog box is shown with the following configuration:

- Page:** 9 - JOBS\_DETAIL
- \* Branch Point:** On Submit: Before Computation (Before Computation, Validation, and Processing) (with a dropdown menu showing options: [1. Before Computations], [2. Before Validations], [3. Before Processing], [4. After Processing])
- \* Branch Type:** Branch to Page or URL (with a dropdown menu)

- 17) Click on the Next button. Enter the next screen as follows.

The 'Create Branch' dialog box is shown with the following configuration:

- Page:** 9 - JOBS\_DETAIL
- Branch Point:** On Submit: Before Computation (Before Computation, Validation, and Processing)
- Branch Type:** Branch to Page or URL
- Branch Target:** Page in this Application
- \* Page:** 2 (with a 'reset pagination for this page' checkbox and an 'include process success message' checkbox)
- Request:** (empty text field)
- Clear Cache:** (empty text field, with a note '(comma separated page numbers)')
- Set these items:** P9\_FROM (with a note '(comma separated name list)')
- With these values:** (empty text field, with a note '(comma separated value list)')

18) Click on the Next button. Enter the next screen as follows.

**Create Branch** Cancel < Previous Create Branch

Page: **9 - JOBS\_DETAIL**  
 Branch Point: **On Submit: Before Computation (Before Computation, Validation, and Processing)**  
 Branch Type: **Branch to Page or URL**  
 Branch Action: **f?p=&APP\_ID.:2:&SESSION.::&DEBUG.::P9\_FROM:**

\* Sequence

When Button Pressed

Condition Type  
 ▼ ▲  
 [PL/SQL] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

Expression 1

Expression 2

19) Click on Create Branch,

20) Edit the Cancel button on Page 9.

**Buttons** ▼ ▲ 📄 📁 🔍

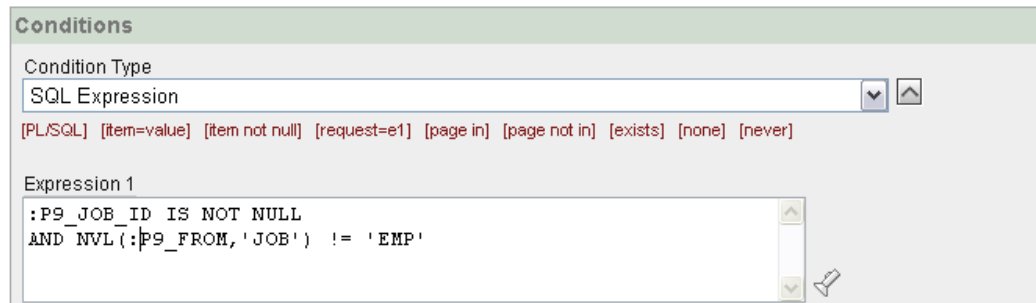
10	<a href="#">Cancel</a>	Submit as "CANCEL"	
20	<a href="#">Delete</a>	Run: javascript:confirmDelete (htmldb_delete_m	Conditional
30	<a href="#">Apply Changes</a>	Submit as "SAVE"	Conditional
40	<a href="#">Create</a>	Submit as "CREATE"	Conditional

21) Set the Optional URL Redirect to No Target

**Optional URL Redirect**

Target is a

- 22) Edit the Delete and Apply Changes buttons. Set the conditional display so that they do not display when P9\_FROM = EMP.



**Conditions**

Condition Type

SQL Expression

[PL/SQL] [item=value] [item not null] [request=e1] [page in] [page not in] [exists] [none] [never]

Expression 1

```
:P9_JOB_ID IS NOT NULL  
AND NVL(:P9_FROM, 'JOB') != 'EMP'
```

- 23) Run and test your application.

### 4.3 Themes and Templates

- 1) From your main application page click on the Shared Components image.
- 2) Click on the Themes link in the User Interface section.
- 3) Click on the Create button to create a new Theme.
- 4) Create a Theme from the Repository.
- 5) Choose Theme 1. Click on the Next button, then on the Create button to finish creating your theme.
- 6) Click on the Switch Theme button and change to your new theme.
- 7) Click on the Next button (Ignoring any warnings). Then click on the Switch Theme button.
- 8) Run your application.