## Oracle® APEX App Builder User's Guide





Oracle APEX App Builder User's Guide, Release 22.2

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# **Preface**

Oracle APEX App Builder User's Guide describes how to use the Oracle APEX development environment to build and deploy database-centric web applications. Oracle APEX turns a single Oracle database into a shared service by enabling multiple workgroups to build and access applications as if they were running in separate databases.

- Audience
- Documentation Accessibility
- · Diversity and Inclusion
- Related Documents
- Conventions

## **Audience**

Oracle APEX App Builder User's Guide is intended for application developers who are building database-centric web applications using Oracle APEX. The guide describes how to use the Oracle APEX development environment to build, debug, manage, and deploy applications.

To use this guide, you must have a general understanding of relational database concepts and an understanding of the operating system environment under which you run Oracle APEX.

# **Documentation Accessibility**

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

#### **Access to Oracle Support**

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

# **Diversity and Inclusion**

Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our



products and documentation. We are also mindful of the necessity to maintain compatibility with our customers' existing technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

# **Related Documents**

For more information, see these Oracle resources:

- Oracle APEX Release Notes
- Oracle APEX Installation Guide
- Oracle APEX End User's Guide
- Oracle APEX Administration Guide
- Oracle APEX SQL Workshop Guide
- Oracle APEX API Reference
- Oracle Database Concepts
- Oracle Database Administrator's Guide
- Oracle Database SQL Language Reference
- SQL\*Plus User's Guide and Reference

## Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.



1

# Changes in Release 22.2 for *Oracle APEX App Builder User's Guide*

All content in *Oracle APEX App Builder User's Guide* has been updated to reflect release 22.2 functionality and user interface changes.

#### **New Features and Updates**

The following are features and updates in Oracle APEX:

Application Search

Add declarative searches to an application by creating a search configuration and then a search page that displays the search results. Features include:

- Create multiple search configurations containing meta data about a searchable data source (such as tables or views, columns, search type and features, result list columns, and so on).
- Create search configurations usign an existing Oracle TEXT index, enabling developers can use this functionality and provide linguistic and fuzzy search capabilities.
- Create a new Search Page automatically using the Create Page Wizard or by adding search component manually. A Search page features a search field (or page item) which enables users to submit search terms and a Search Results region. The Search Results region contains Search Sources which map to search configurations.
- When a user types a search term at runtime search search configuration executes and returns the relevant results.
- Includes options for pagination, search-as-you-type, custom layout, page size limit, show results count, lazy loading, sorting, and custom messages for No Query Entered and No Results Found..

See Adding Search to an Application.

Invoke API Process Type

Invoke API is a new page-level process type enables the execution of procedures and functions completely declaratively, without having to write PL/SQL code.

See About Page Processes and Creating Page Processes.

Dynamic Content Region

Dynamic Content is new region type that very similar to the legacy PL/SQL Dynamic Content region type, with some key differences:

- The region source must return the HTML value as a CLOB. The value is no longer output via the HTP package.
- Dynamic Content regions are refreshable and support lazy loading.
- The region supports PL/SQL and JavaScript (MLE).

See Managing Regions and Supported Region Types.



#### Approvals Component Enhancements

The approvals component now includes a Request and Submit Information process for the task owner and task initiator to provide more information about a specific task during the approval process. Business administrators can now update due dates for tasks or renew expired tasks. When configuring the approvals component, developers can:

- Copy an existing task definition
- Customize the type of actions logged in the task history
- Set due dates dynamically using a SQL Query, Expression, or Function Body
- Set tasks to automatically renew or expire after the due date

See Managing Approvals.

Page Item Session State Data Type - CLOB

The data type CLOB is now available for the following item types:

- Display Only
- Hidden
- Markdown Editor
- Rich Text Editor
- Markdown Editor

In Page Designer, these items have a new attribute group Session State, the Data Type select list is now populated with VARCHAR2 (default) and CLOB.

See Available Item Types.

Date Picker

New Date Picker web component (a-date-picker) replaces for the Oracle JET implementation, supporting the existing functionality of the JET implementation, plus a few improvements.

- Today button of the desupported jQuery Date Picker is available again. You
  can toggle the button on or off via Component Settings or in the Item
  Attributes.
- Use HTML attributes to change the behavior of the date picker on the client side without needing to use JavaScript calls. This change improves loading performance and operation speed.
- Supports full keyboard operation, recommended by ARIA APG

See Available Item Types.

Support for Template Directives in Classic and Interactive Reports

This release includes template directives in classic reports and interactive reports for columns that have an HTML expression..

See Using Template Directives.

Vector-Based Map Support

APEX now supports Vector-Based Map Tiles in the map region. There are three layers available: OpenStreetMap Positron, OpenStreetMap Dark, and OpenStreetMap Bright. New applications use Vector Layers by default. Existing



applications continue to use Raster Layers, but you can change them to use Vector Layers by editing Shared Components, Component Settings, Map.

See Creating Maps and Configuring Vector Tile Layers for Maps.

- PWA and Mobile Enhancements:
  - You can now include screenshots when prompting users to install the Progressive Web App.
  - Shortcuts can be added to PWA for better navigation in an installed application only certain devices.

See Creating a Progressive Web App (PWA).

Naming Actions of Dynamic Actions Enhancements:

New attributes available in Page Designer when creating or editing dynamic actions:

- Identification, Name You can now specify a dynamic actions Name for better selfdocumentation in Page Designer.
- Execution, Type **Debounce** an action with a delay to execute it once after a specified time delay from the last time an event fires. **Throttle** an action immediately to execute it immediately and then in timed intervals if the event continues to fire.

You can now specify a dynamic actions Name for better self-documentation in Page Designer.

See Creating a Dynamic Action.

Drawer Modal Dialog Template

There is a new Drawer template available for Modal Dialog pages. The Drawer template is an overlay window that slides out from the viewport.

See Creating Dialog Pages.

#### **Deprecated and Desupported Features**

See Deprecated Features and Desupported Features in Oracle APEX Release Notes.



# **Quick Start**

"Quick Start" offers a quick introduction to Oracle APEX. This section explains how to access your development environment, describes the Workspace home page, the App Builder home page, and the Application home page, explains how to edit your account profile and user preferences, and how to access product documentation.



#### Tip:

If you are accessing an on-premises installation, complete the installation process before continuing. See Oracle APEX Installation Guide.

- About Accessing Your Development Environment How you sign in and access Oracle APEX depends upon your user role and where APEX resides.
- **Understanding Oracle APEX** Oracle APEX provides you with all the tools you need to build apps in a single, extensible platform, which runs as a part of Oracle Database.
- Understanding the Workspace Home Page When you sign in to Oracle APEX, the Workspace home page appears.
- **Developer Navigation Tools** Developer Navigation tools display in the header region on many Oracle APEX pages, including the Workspace home page, App Builder home page, the Application home page, Page Designer, and Shared Components.
- **Understanding App Builder** Developers use App Builder to create and manage applications and application pages.
- Changing Your Profile or Password Edit your account profile to update your profile (email address, first or last name), upload a profile photo, or change your password.
- Editing User Preferences and Enabling Dark Mode Click the Account menu to enable or disable Dark Mode or edit user preferences.
- Using Oracle APEX Documentation Oracle APEX provides a hosted online documentation library and field-level Help. You can browse or search content or download the entire library by going to the APEX Documentation page in the Oracle Help Center.
- Using the App Gallery Use the App Gallery to install Sample Apps, Starter Apps, and Custom Apps.

# 2.1 About Accessing Your Development Environment

How you sign in and access Oracle APEX depends upon your user role and where APEX resides.

Oracle APEX may reside in a local on-premises Oracle Database or in a hosted environment, such as a Oracle Cloud service. The sign in process differs depending upon the installation type.

#### **Oracle APEX On-premises**

If you are running APEX on-premises, sign in to your APEX as described in Signing In to Your Workspace in Oracle APEX Installation Guide

### **About Accessing Oracle APEX in Oracle Cloud**

In Oracle Cloud, APEX is installed and enabled in:

- Oracle APEX Application Development (APEX Service)
- Autonomous Database for Transaction Processing and Mixed Workloads
- Autonomous Database for Analytics and Data Warehousing

APEX is available in Exadata Cloud Service and Database Cloud Service in Oracle Cloud Infrastructure. However, you need to manually customize your databases to install and enable APEX by following on-premises installation process or using cloud tooling such as Terraform.

### See Also:

- Get an Environment
- Welcome to Oracle APEX Application Development Service in Getting Started with Oracle APEX Application Development
- Creating Applications with Oracle APEX on Autonomous Database in Using Oracle Autonomous Database on Shared Exadata Infrastructure

# 2.2 Understanding Oracle APEX

Oracle APEX provides you with all the tools you need to build apps in a single, extensible platform, which runs as a part of Oracle Database.

- What is Oracle APEX?
  - Oracle APEX is an enterprise low-code application platform that enables you to build scalable, secure enterprise apps.
- How Oracle APEX Works Oracle APEX provides all the tools you need to build apps in a single, extensible platform, which runs as a part of Oracle Database.
- About the Differences Between Runtime and Full Development Environments Install Oracle APEX into a runtime or a full development environment.

### 2.2.1 What is Oracle APEX?

Oracle APEX is an enterprise low-code application platform that enables you to build scalable, secure enterprise apps.



Oracle APEX is a hosted declarative development environment for developing and deploying database-centric web applications. Thanks to built-in features such as user interface themes, navigational controls, form handlers, and flexible reports, APEX accelerates the application development process.

The APEX engine renders applications in real time from data stored in database tables. When you create or extend an application, APEX creates or modifies metadata stored in database tables. When the application is run, the APEX engine then reads the metadata and displays the application.

To provide stateful behavior within an application, APEX transparently manages session state in the database. Application developers can get and set session state using simple substitutions and standard SQL bind variable syntax.

### 2.2.2 How Oracle APEX Works

Oracle APEX provides all the tools you need to build apps in a single, extensible platform, which runs as a part of Oracle Database.

Oracle APEX uses a simple 3-tier architecture where requests are sent from the browser, through a web server, to the database. All processing, data manipulation and business logic is executed in the database. This architecture guarantees zero latency data access, top performance, and scalability, out of the box.

Oracle APEX installs with your Oracle database and consists of data in tables and PL/SQL code. Whether you run the APEX development environment or run an application built using APEX, the process is the same. Your browser sends a URL request that is translated into the appropriate APEX PL/SQL call. After the database processes the PL/SQL, the results are relayed back to your browser as HTML. This cycle happens each time you either request or submit a page.

APEX does not use a dedicated database connection. Instead, each request is made through a new database session, consuming minimal CPU resources. Application session state is managed in the database tables by the APEX engine.

Behind the scenes, the APEX engine renders and processes pages. The APEX engine also performs these tasks:

- Session state management
- Authentication services
- Authorization services
- Page flow control
- Validation processing

# 2.2.3 About the Differences Between Runtime and Full Development Environments

Install Oracle APEX into a runtime or a full development environment.

When you install Oracle APEX, you can install two different environments:

**Runtime environment**. In a runtime environment users can run applications but cannot modify them. Select this option for production implementations.



 Full development environment. In a full development environment, users can develop, modify, run, and delete APEX applications. This option provides complete access to the APEX environment described in this document.

#### See Also:

- Oracle APEX Installation Guide
- Installing Exported Applications into a Runtime Environment in Oracle APEX Administration Guide

# 2.3 Understanding the Workspace Home Page

When you sign in to Oracle APEX, the Workspace home page appears.

Each Oracle APEX development instance can contain multiple workspaces. A **workspace** is a virtual private database which enables multiple users to work within the same APEX installation while keeping their objects, data and applications private. This section describes the sections that make up the Workspace home page.

- Menu Bar and Icons
   Learn about the menu bar and icons on the Workspace home page.
- Top Apps and Top Users Dashboards
   Learn about the Top Apps and Top Users regions.
- Summary and Messages Regions
   Learn about the Summary and Messages regions.
- Resources and Available Updates Regions
   Learn about the Resources and Available Updates regions.

### 2.3.1 Menu Bar and Icons

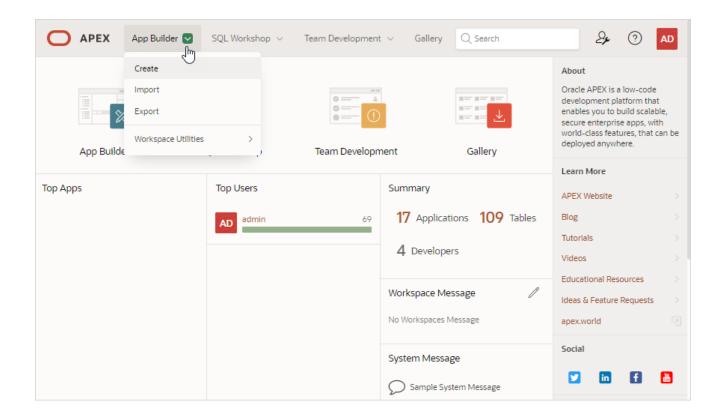
Learn about the menu bar and icons on the Workspace home page.

Use the Workspace home page to access key development components including App Builder, SQL Workshop, Team Development, and the Gallery.

#### Menu Bar

A menu bar displays at the top of the page. This menu bar displays on most App Builder pages. Click a menu to access an alternate navigation path to different components or functions within App Builder, SQL Workshop, Team Development, or Gallery. The illustration that follows shows the **App Builder** menu.





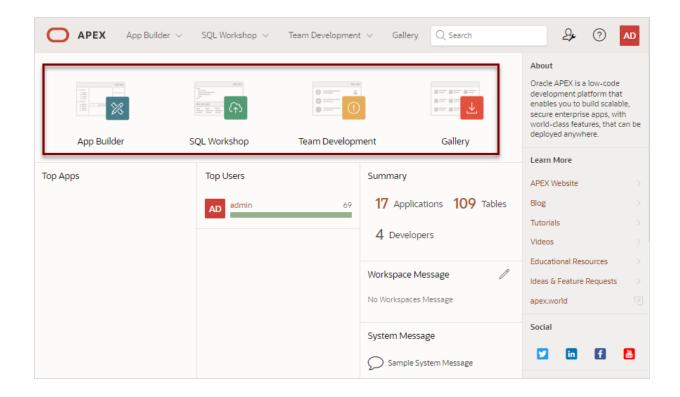
#### **Workspace Home Page Icons**

The center of the Workspace home page features the following large icons:

- App Builder Create an application, composed of a set of HTML pages, based on database objects.
- **SQL Workshop** Access tools for viewing and managing database objects.
- **Team Development** Track and manage issues in a conversational fashion. You can create templates to provide users with starter text for issues and comments. You can apply labels and label groups, assign issue owners, and set milestones.
- **Gallery** The Gallery (or App Gallery) enables you to access to Starter Apps, Sample Apps, and Custom Apps.

Starter Apps are functional apps that provide stand-alone point-solutions, designed to meet simple requirements that do not require a large and unnecessarily complex solution. You can use these apps "out of the box" or extend them with your own custom functionality. Sample Apps highlight specific functionality and are intended to serve as a developer guide on how to make use of a particular feature. Custom Apps are custom applications that can be installed on your workspace if made available by your Instance Administrator.





### See Also:

- App Builder Concepts
- Getting Started with SQL Workshop in Oracle APEX SQL Workshop Guide
- Managing Team Development
- Using the App Gallery

# 2.3.2 Top Apps and Top Users Dashboards

Learn about the Top Apps and Top Users regions.

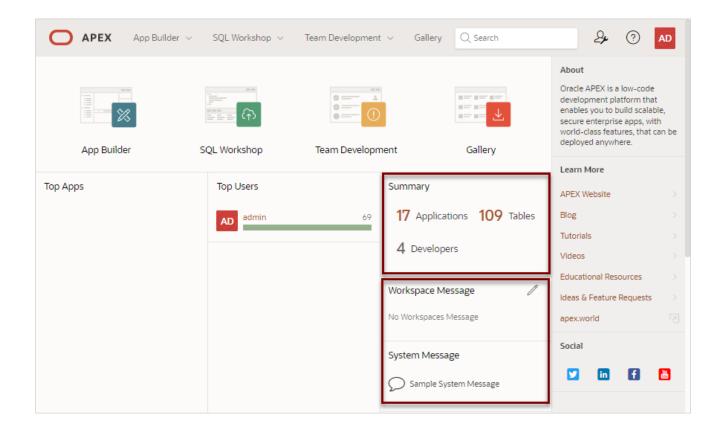
The Top Apps and Top Users regions display real time information about development activities in the current workspace. In the previous image, no apps displays in the Top Apps region, but the Top Users region displays the admin user.

# 2.3.3 Summary and Messages Regions

Learn about the Summary and Messages regions.

#### **Summary Region**

The Summary region list total applications, tables, and developers in the current workspace. In the following example, this workspace has 17 application, 109 tables, and 4 developers.



#### **Workspace Message and System Message Regions**

The Workspace Message region displays beneath the Summary region. In the previous image, no message it defined so the region reads No Workspaces Message.. Administrators can update or edit a workspace message by clicking the Edit icon.

The System Message region displays next. Instance administrator can create a System Message to communicate with other users within an instance. In the previous image, the System Message reads Sample System Message.



- Defining a Workspace Message in Oracle APEX SQL Workshop Guide
- Defining a System Message in Oracle APEX SQL Workshop Guide

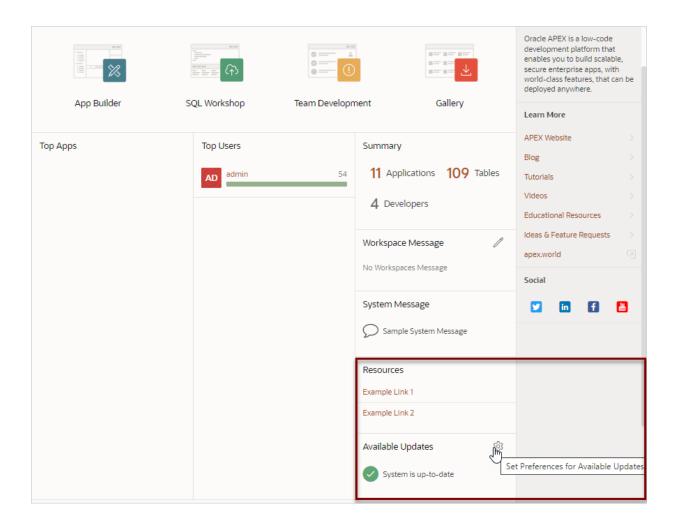


# 2.3.4 Resources and Available Updates Regions

Learn about the Resources and Available Updates regions.

#### Resources

The Resources region displays below System Message. Administrators can add links to the Resources list to communicate important user information such as training, discussion forums, and user feedback applications. The Resources region only appears if resources have been defined in Administration Services.



#### Note:

To ensure the security and performance of your development environment, this functionality is not available in Oracle APEX instances running in Oracle Cloud.





Managing the Site-Specific Resources List in Oracle APEX Administration Guide

#### **Available Updates**

The Available Updates region displays on the lower right side of the page and indicates if updates are available for APEX and Oracle REST Data Services. If your installation is current the following message displays:

System is up-to-date

To configure updates, click the **Set Preferences for Available Updates** icon which displays on the right side of the region. In the dialog, enable or disable updates by selecting **Yes** or **No** from the Check for Available Updates list and click **Apply Changes**.



#### Tip:

To perform this check, APEX transmits the version number of APEX and other system components to Oracle Corporation. In order to continuously improve our products, Oracle is interested in learning about product usage. To that end, statistics can occasionally be sent to Oracle describing the product features in use. No personally identifiable information is sent. To review Oracle's privacy policy see <a href="http://www.oracle.com/us/legal/privacy/overview/index.html">http://www.oracle.com/us/legal/privacy/overview/index.html</a>

# 2.4 Developer Navigation Tools

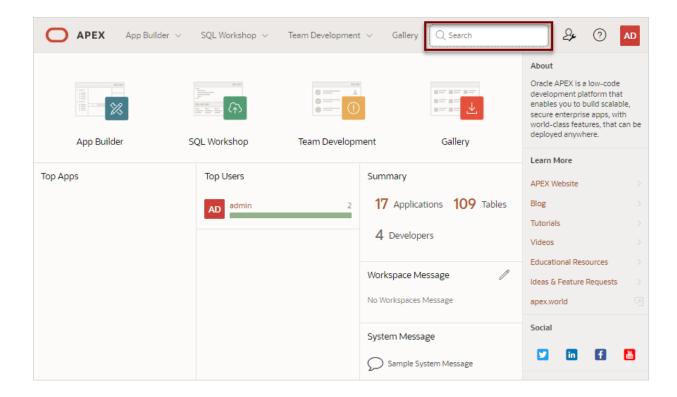
Developer Navigation tools display in the header region on many Oracle APEX pages, including the Workspace home page, App Builder home page, the Application home page, Page Designer, and Shared Components.

- Global Search
   Use Global Search to navigate App Builder.
- Help Menu
   Click the Help menu to link to documentation on Oracle Help Center, the Discussion Form, the Oracle APEX page, and the About Oracle APEX dialog.
- Account Menu
   Click the Account menu to configure appearance settings, edit your user profile or preferences, or sign out.

### 2.4.1 Global Search

Use Global Search to navigate App Builder.

The Global Search field (also known as Spotlight Search) displays in the header region.



Key features of Global Search include:

- Offers effortless navigation within a workspace enabling you to quickly find applications, pages, Shared Components, APEX menus, and so on.
- Search for component names and immediately set focus to those items in Page Designer.
- Provides a unified search experience throughout APEX.

#### **About Using Global Search**

You can activate Global Search in two ways:

- · Click the Global Search field in the in the header region
- Use the keyboard shortcut (Ctrl + Quote) (') (US Keyboards only)

Use Global Search to search all applications in the workspace no matter what your location in the current workspace. For example, if your workspace contains the Sample Reporting sample app, entering Sample will find it. Similarly, you can access global navigation menus that appear at the top window adjacent to the Oracle logo. For example, enter SQL Commands in the Global Search field to instant access SQL Commands.

To close the Global Search dialog, press the  ${\tt Esc}$  key, or click anywhere outside the results.

#### Syntax to Navigate to a Page or Search for a Regular Expression

Search by page name and page alias. With in an in-app, use a colon (:) or dash (-) between the application ID or alias and the page ID, name, or alias.



Within App Builder and on the Application home page, use the following syntax to navigate to a specific page or search for a regular expression:

```
page_ID
page_NAME
page_ALIAS
application_ID:page_ID
application_ALIAS:page_ID
application_ID-page_ID
application_ID-page_ID
application_NAME-page_ID
application_NAME-page_ID
application_ALIAS-page_ID
regexp:expression
```

#### Where:

- page ID Numeric identification number (or ID) that identifies a specific page.
- page NAME- An alphanumeric name that identifies a specific page.
- page\_ALIAS An alternate alphanumeric page identifier. You can use this identifier in place of the page name.
- application ID A numeric identification number (or ID) that identifies an application.
- application NAME is the alphanumeric name that identifies an application.
- application\_ALIAS An alternate alphanumeric application identifier. You can use this identifier in place of the application name.
- regexp: is literal text.
- expression is a regular expression to search for.

You can replace <code>page\_ID</code> for <code>page\_NAME</code> or <code>page\_ALIAS</code> when searching by <code>application\_ID</code> or <code>application\_ALIAS</code>.

The following example navigates you to page 10 of application 570:

```
10
570-10
570:10
```

You can also use this syntax to navigate to the Shared Components page of a given application:

```
application_ID:s
application ID-s
```

#### Where:

application ID is the numeric identification number (or ID) that identifies an application.

The following example demonstrates how to navigate to the Shared Components page of application 570:

```
570:s
570-s
```



#### **About Navigating Search Results**

Global Search results display in a dialog. Use the Up and Down arrows keys to navigate the results and press **Enter** to make a selection. Since the **Global Search** icon displays on nearly every page in APEX, you can continue to narrow your search until you find the app, page, or component (such as the item, button, or region) which contains the keyword.

Other available shortcuts change depending on where you are in App Builder, for example:

- In Page Designer To search for a page, press Ctrl + 4.
- In App To search within an application, press Ctrl + 3.
- All Apps To search all applications, press Ctrl + 2.
- Current Workspace To search a workspace, press Ctrl + 1.



#### Tip:

Some browsers map these Ctrl key shortcuts for quick tab navigation. In that case, the shortcut does not work as described above. Instead, they simply activate a particular open browser tab.

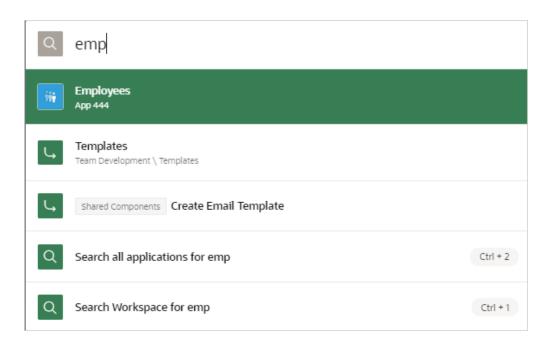
#### **Example 2-1** Search Example

Suppose you need to find an application called  $\it Employees$  which includes interactive grid built on the EMP table.

#### 1. Find the application.

- a. On the Workspace home page, click the Global Search field and enter emp.
   Global Search would return the results:
  - Employees (App)
  - Templates
  - Create Email Template
  - Search all applications for emp (Ctrl + 2)
  - Search Workspace for emp (Ctrl + 1)







Templates and Create Email Template appear because they contain the text string  $\ensuremath{\mathsf{emp}}$ .

**b.** Select **Employees** to view that application.

The Employees application appears.

#### Search the application.

- a. On the Application home page, click the Global Search field and enter EMP.
   Global Search returns the results that include numerous pages and other items.
- Select the option the includes a page reference.
   The page appears in Page Designer.

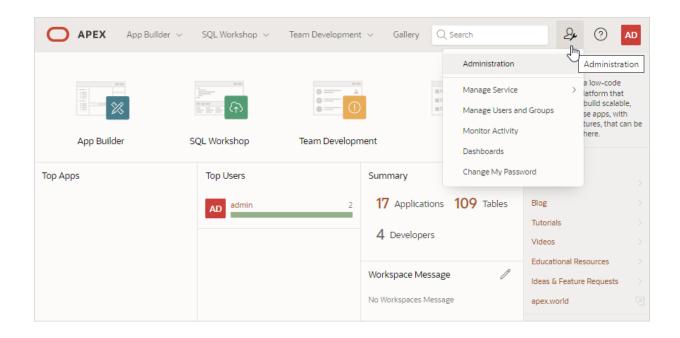
#### 3. Search the page.

- a. In Page Designer, find the Global Search field and enter EMP again.
   Global Search returns the results that include numerous components.
- b. Select a component (such as a process, column, region, and so on).

# 2.4.2 Administration Menu

Click the Administration menu to access Workspace Administration pages such as Manage Service, Manage Users and Groups, Monitor Activity, Dashboards, or to change your password.

The Administration menu displays to the right of the Global Search field and features an outline person with a wrench.



Clicking the Administration menu displays the following options:

- Administration links to the Workspace Administration page. To access the Oracle APEX development environment, users sign in to a shared work area called a workspace. Workspace administrators monitor and administer a workspace. Common workspace administration tasks include managing service requests, configuring workspace preferences, creating workspace announcements, managing session state, creating user accounts, and managing groups.
- Manage Service displays a submenu of options on the Manage Service page.
   Administrators use the Manage Service page to manage service requests, configure workspace preferences, edit workspace announcements, and view workspace utilization reports.
- Manage Users and Groups links to Manage Users and Groups page. Workspace administrators can create new user accounts, manage existing user accounts, and change user passwords.
- Monitory Activity links to the Monitor Activity page. Use this page to monitor changes to page views, developer activity, page view analysis, and active sessions. It also shows reports on such information as login attempts and external click counts.
- Dashboards links to the Dashboard page. Use this page to view details about the current workspace and monitor users, activity, developer activity, performance, application development, and view database details.
- Change My Password links to the Change Password section of the Edit Profile dialog box.



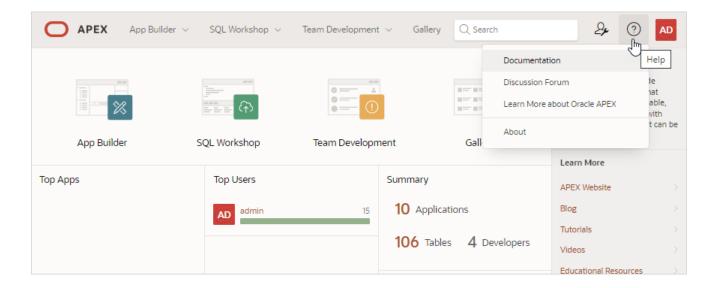
### See Also:

- Workspace and Application Administration in Oracle APEX Administration Guide
- Manage Service Page in Oracle APEX Administration Guide
- Managing Users in a Workspace in Oracle APEX Administration Guide
- Monitoring Activity Within a Workspace in Oracle APEX Administration Guide
- Viewing Workspace Dashboards in Oracle APEX Administration Guide
- Changing Your Profile or Password

# 2.4.3 Help Menu

Click the Help menu to link to documentation on Oracle Help Center, the Discussion Form, the Oracle APEX page, and the About Oracle APEX dialog.

The **Help** menu features a question mark enclosed with a circle.



Click the Help menu to access the following menu items:

- **Documentation** links to Oracle APEX, Oracle Help Center.
- Discussion Forum links to the Categories page where you can access APEX Discussions.
- Learn More about Oracle APEX links to the Oracle APEX page.
- **About**. Links to the About APEX dialog. This dialog includes information about the APEX instance and the database version.



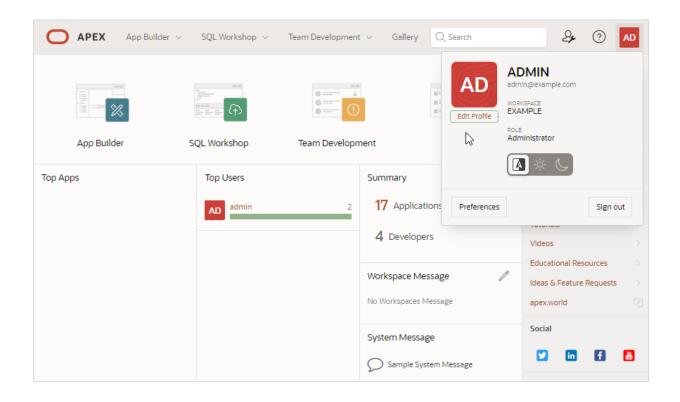


**Using Oracle APEX Documentation** 

### 2.4.4 Account Menu

Click the Account menu to configure appearance settings, edit your user profile or preferences, or sign out.

The Account menu displays in the upper right corner of the page. Open the Account menu by clicking on the User icon in the header.



The Account menu displays your username, email address, the current workspace, and your user role. If Single Sign On (SSO) is enabled, the link **Change Workspace** also appears.



#### Tip:

If you are using Single Sign-on authentication, **Change Workspace** also displays. Click **Change Workspace** to view a list of workspaces you have access to.

Key controls on Account menu include:



- Edit Profile. Click Edit Profile to edit the options. Click Apply Changes to save your changes.
  - Profile Details:
    - \* Email Address Specifies the email address for use with general correspondence, notifications about resetting passwords, and so on.
    - \* First Name Specify the first or given name to further identify the user. This optional field is used for informational purposes only.
    - \* Last Name Specify the last or family name to further identify the user. This optional field is used for informational purposes only.
  - Profile Photo Select a photo to further identify the user. This optional field is used for informational purposes only.
  - Password If you wish to change your password, enter a new password. Otherwise, leave the password fields empty and the current password will not be changed.
    - \* Enter Current Password Enter your current password. Do not enter a password unless you want to change the current password.
    - \* Enter New Password The password used to log in to the system. Do not enter a password unless you want to change the current password.
    - \* Confirm Password Enter the password again. Do not enter a password unless you want to change the current password.
- **Appearance**. Configure how the Oracle APEX user interface displays. Options include:
  - Automatic (default) detects the appropriate setting based on existing system or browser settings.
  - Light Mode renders the user interface using dark-colored text, icons, and graphical user interface elements on a lighter background.
  - Dark Mode renders the user interface using light-colored text, icons, and graphical user interface elements on a darker background.
- Preferences. Click Preferences to configure the options. Click Apply Changes to save your changes.
  - Default Scheme Specifies the default schema used for data browsing, application creation, and SQL script execution.
  - Default Date Format Specify the default Oracle date format for the user. This
    option controls the default date format within SQL Workshop.
  - Unicode CSV Downloads Specify whether to provide SQL Workshop CSV downloads in Unicode. This only affects SQL Workshop and not custom applications.
  - Run application in new window Specify how Oracle APEX manages windows or tabs when running applications from the App Builder when using Mozilla Firefox and Microsoft Internet Explorer.
  - Use single window to run all applications Specify whether different applications reuse the same application runtime window or tab.
- Sign Out. Click Sign Out to log out of the current workspace.



### See Also:

- Changing Your Profile or Password
- Editing User Preferences and Enabling Dark Mode

# 2.5 Understanding App Builder

Developers use App Builder to create and manage applications and application pages.

The App Builder home page displays all installed applications in the current Oracle APEX instance. When a developer selects an application to edit, the Application home page appears. Use the Application home page to run, edit, import, export, copy, or delete applications.

- Accessing App Builder
  - Access App Builder by clicking the App Builder icon on the Workspace home page.
- Understanding the App Builder Home Page
   Use App Builder to create new applications, select an application to edit, import previously exported applications, view the Dashboard, or access workspace utilities.
- Understanding the Application Home Page
  Use the Application home page to run, edit, import, export, copy, or delete
  applications.

### See Also:

- Quick Start
- App Builder Concepts

# 2.5.1 Accessing App Builder

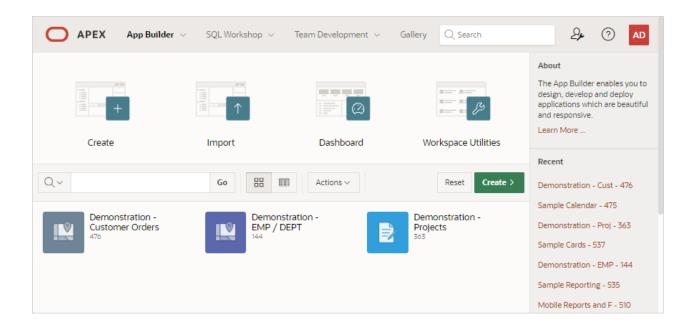
Access App Builder by clicking the App Builder icon on the Workspace home page.

To access App Builder:

- 1. Sign in to Oracle APEX.
- 2. On the Workspace home page, click the App Builder icon.

The App Builder home page appears.





Use the App Builder home page create new applications, select an application to edit, import previously exported applications, view the Dashboard, or access workspace utilities. In the above image, currently installed applications display as large icons at the bottom of the page.

### Tip:

In a new workspace, the bottom of the page displays two additional regions. Click **Create a New App** to access the Create Application Wizard and create a new application. Click **Install a Starter or Sample App** to access the Gallery and install sample apps, plug-ins, and pre-built apps you can use as is or customize.

### See Also:

- Understanding the App Builder Home Page
- Creating Applications

# 2.5.2 Understanding the App Builder Home Page

Use App Builder to create new applications, select an application to edit, import previously exported applications, view the Dashboard, or access workspace utilities.



### Tip:

In a new workspace, the bottom of the page displays two additional regions. Click **Create a New App** to access the Create Application Wizard and create a new application. Click **Install a Productivity and Sample Apps** to access the App Gallery page and install a Productivity and Sample App and load sample data. Once you create an application or install a sample or productivity application, these regions no longer appear.

- App Builder Home Page Icons and Navigation Bar
   Learn about using the icons and navigation bar on the App Builder home page.
- Reset and Create Buttons
   Learn about the App Builder home page Reset and Create buttons.
- Recent List and Tasks List Learn about the App Builder home page Recent and Tasks regions.

### See Also:

- Accessing App Builder
- Developer Navigation Tools

### 2.5.2.1 App Builder Home Page Icons and Navigation Bar

Learn about using the icons and navigation bar on the App Builder home page.

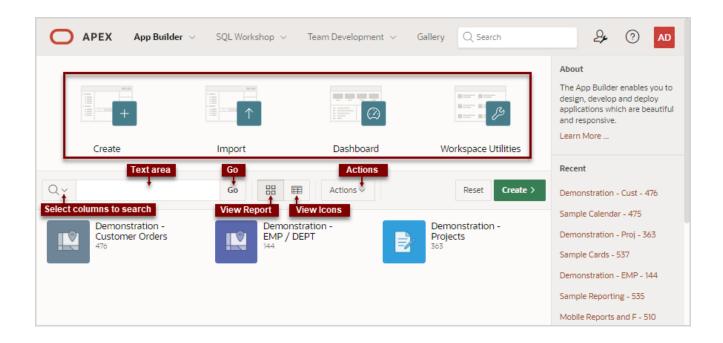
The App Builder home page features four large icons (Create, Import, Dashboard, and Workspace Utilities) and the bottom of the page displays all currently installed applications.

#### **About App Builder Home Page Icons**

The top of App Builder home page contains four large icons:

- Create. Launches the Create Application Wizard. Use the Create Application
  Wizard to build a complete application containing multiple pages. See Creating
  Applications.
- **Import**. Launches the Import Wizard. Use this wizard to import export files from the export repository. See Importing Export Files.
- **Dashboard**. Links to the App Builder Dashboard which displays metrics about applications in the current workspace.
- Workspace Utilities. Use the Workspace Utilities page to access REST Enabled SQL Services, Remote Servers, Application Groups, Web Credentials, Workspace Themes, Export, Oracle APEX Views, Manage Backups, and REST Source Catalog. See Using Workspace Utilities.





#### **About the Navigation Bar**

The bottom of App Builder home page displays all installed applications. You can customize how the applications display using the navigation bar in the center of page.

Available controls include:

- Select columns to search This control features a magnifying glass button. Click this button to narrow your search to only specific columns. To search all columns, select All Columns.
- Text area Enter case insensitive search criteria (wildcard characters are implied) and click Go.
- Go button Executes a search or applies a filter.
- **View Icons** (default) Displays each application as a large icon identified by the application name.
- **View Report** Displays each application as a line in a report. Each line includes the application ID, the application name, when the application was last updated, the page count, and who last updated the application.
- **Actions menu** Displays the Actions menu. Use this menu to customize the report view. For example, display additional columns by selecting **Actions**, **Columns**.



#### Tip:

In a new workspace, the bottom of the App Builder home page displays two regions: **Create a New App** and **Install a Starter or Sample App**. Follow the onscreen instructions. Once you create or install an application, these region disappear.



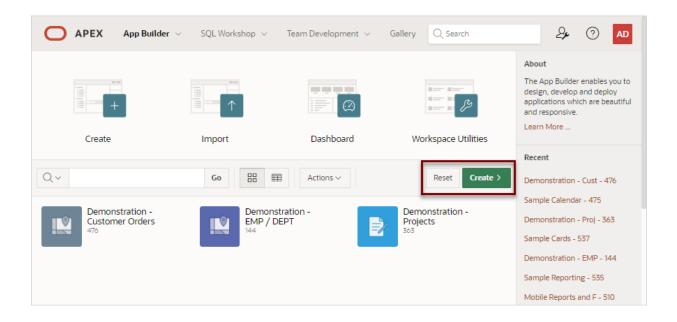
### See Also:

- Choosing the Application Type
- Importing Export Files
- About the Actions Menu

### 2.5.2.2 Reset and Create Buttons

Learn about the App Builder home page Reset and Create buttons.

The Reset and Create buttons display in the center of the page to the right of the navigation bar.



Use the **Reset** and **Create** buttons as follows:

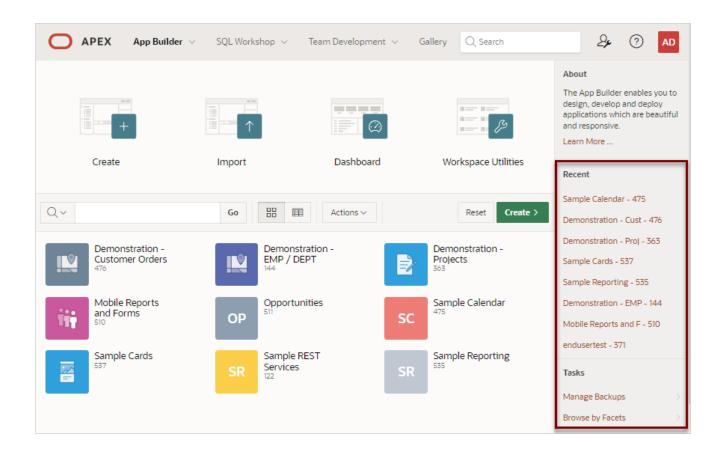
- Click Reset to return the page to the default display.
- Click Create to create a new application, create an application from a file, install a starter app, launch Quick SQL, or copy an application.

### 2.5.2.3 Recent List and Tasks List

Learn about the App Builder home page Recent and Tasks regions.

The App Builder home page feature two regions on the right side of the page: Recent and Tasks.





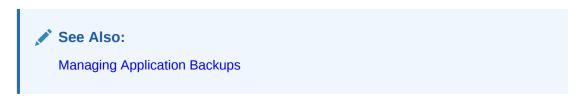
#### Recent

The **Recent** region contains links to recently viewed applications. Click an application name to view it on Application home page.

#### **Tasks**

The **Tasks** region displays next and features the following links:

- Manage Backups Links to the Manage Backups page.
- Browse by Facets Links to the Search Applications page. Use Search Applications find applications in the current workspace.



# 2.5.3 Accessing the Application Home Page

Access the Application home page by clicking the App Builder icon on the Workspace home page and then selecting an application.

Use the Application home page to run, edit, import, export, copy, or delete applications.

To access the Application home page:

Sign in to Oracle APEX.

The Workspace home page appears.

2. Click the App Builder icon.

The App Builder home page appears.

3. Select an application on the Application home page.

The Application home page appears.



Understanding the Application Home Page

# 2.5.4 Understanding the Application Home Page

Use the Application home page to run, edit, import, export, copy, or delete applications.

When a developer selects an application on the App Builder home page, the Application home page appears.

- Edit Application Definition Button
  Learn how to identify the application ID and name and edit the application
  definition.
- Application Home Page Icons
   Learn about the icons on the Application home page.
- Create Page Button
   Learn about Create Page button on the Application home page.
- Application Home Page Navigation Bar Learn about navigation bar on the Application home page.
- Application Home Tasks List Learn about Application home page Tasks list.
- Recently Edited Pages
   Learn about Application home page Recently Edited Pages region.

### See Also:

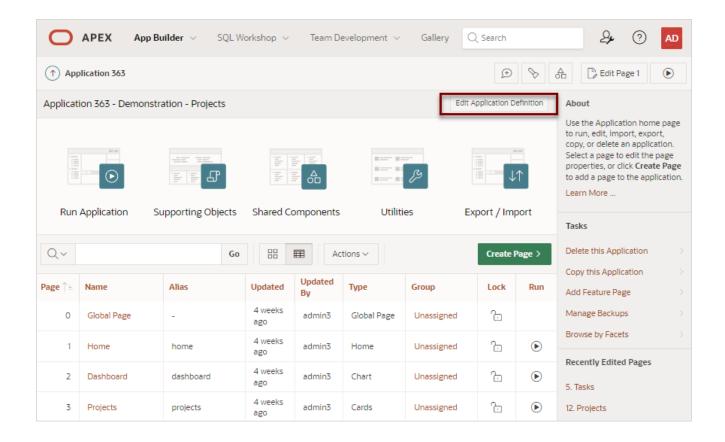
- Accessing App Builder
- Developer Navigation Tools



## 2.5.4.1 Edit Application Definition Button

Learn how to identify the application ID and name and edit the application definition.

The application ID and the application name display at the top of the Application home page. The application ID also displays in the breadcrumb at the top of the page.



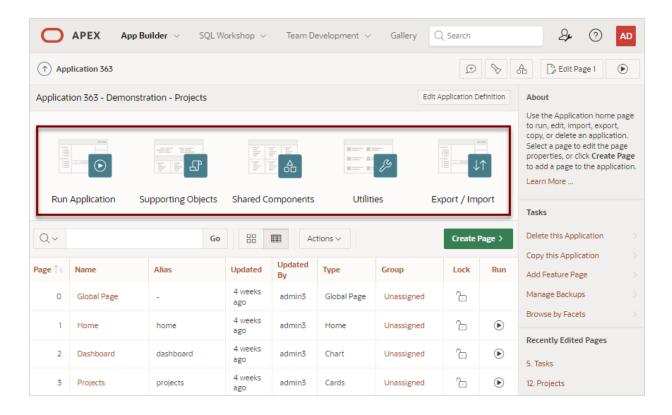
The **Edit Application Definition** button displays to the right of the application ID and name. Click **Edit Application Definition** to edit the application definition, including the application Name and Application Alias.





### 2.5.4.2 Application Home Page Icons

Learn about the icons on the Application home page.



The following large icons appear beneath the application ID and application name:

- **Run Application** submits the home page in the current application to the Oracle APEX engine to render viewable HTML.
- **Supporting Objects** links to the Supporting Objects page. Use Supporting Objects to define database object installation scripts that are invoked when importing an application. You can also define deinstallation scripts to drop objects when deleting an application.
- **Shared Components** links to the Shared Components page. Shared components can display or be applied to any page within the application.
- **Utilities** links to the Utilities page. Use this page to monitor developer activity, view dashboards, run Advisor, and view numerous other reports.
- Export/Import links you to the Export/Import Wizard. Use this wizard to import
  and export an entire application and related files such as cascading style sheets,
  images, static files, script files, themes, user interface defaults, and workspace
  users.

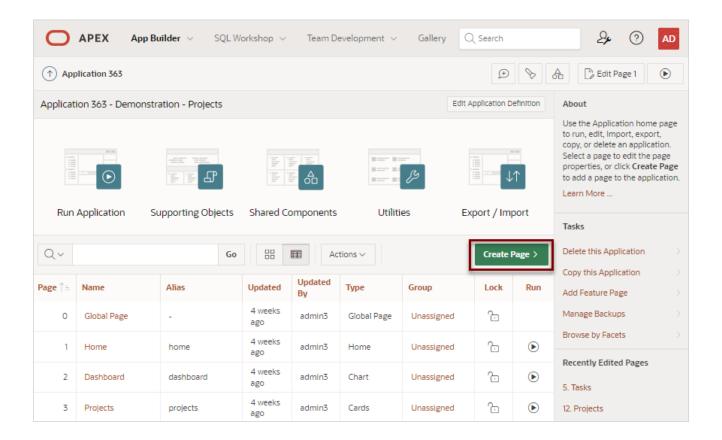


### See Also:

- Running an Application or Page
- How to Create a Custom Application
- Managing Shared Components
- Using Application Utilities
- Exporting Workspaces, Applications, and App Components

### 2.5.4.3 Create Page Button

Learn about Create Page button on the Application home page.



Clicking the **Create Page** button launches a wizard that walks you through creating a page in an application.



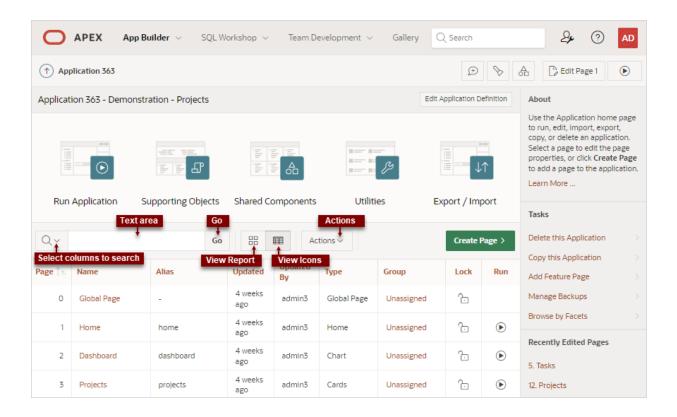


Adding a New Page to an Application

### 2.5.4.4 Application Home Page Navigation Bar

Learn about navigation bar on the Application home page.

A navigation bar displays in the center of the Application home page. You can use the navigation to search for pages or customize the appearance of the page.



The Application home page navigation bar contains the following controls:

- Select columns to search This field contains a magnifying glass icon. Click this
  icon to narrow your search to only specific columns. To search all columns, select
  All Columns.
- Text area Enter case insensitive search criteria (wildcard characters are implied) and click Go.
- Go button Executes a search or applies a filter.
- View icons. Use these icons to toggle between two views:
  - View Icons (default) Displays each page as a large icon identified by the page name.

To view a page, click the page icon.



 View Report - Displays each page as a line in a report. Each line includes the page number (ID), the page name, when the page was last updated and by whom, the page type, any associated group, the user interface, and lock status.

To view a page, click the page name. Click the **Lock** icon to prevent conflicts during application development. Click the **Run** icon to run the associated page and render viewable HTML.

• Actions menu - Displays the Actions menu. Use this menu to customize the report view.

#### See Also:

- App Builder Home Page Icons and Navigation Bar
- Locking and Unlocking a Page

### 2.5.4.5 Application Home Tasks List

Learn about Application home page Tasks list.

A Tasks list displays on the right side of the Application home page.

The Tasks list contains the following links:

- Delete this Application deletes the current application. See Deleting an Application.
- Copy this Application creates a copy of the current application. See Copying an Application from the Application Home Page.
- Add Feature Page launches the Feature page of the Create Page Wizard enabling you to add features to an existing application. See Adding Features to an Existing App.
- Manage Backups Links to the Manage Backups page. See Managing Application Backups.
- Browse by Facets Links to the Search Applications page. Select a Page Type to filter the view.

### 2.5.4.6 Recently Edited Pages

Learn about Application home page Recently Edited Pages region.

Recently Edited Pages region contains links to recently edited pages within the current application. To link to specific page, click the page ID and name.

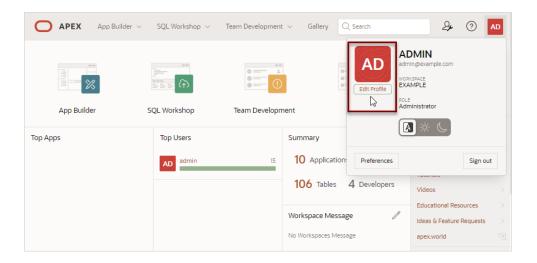
# 2.6 Changing Your Profile or Password

Edit your account profile to update your profile (email address, first or last name), upload a profile photo, or change your password.

To edit your account profile:

- Click the Account menu in the header region.
- Click Edit Profile.





The Edit Profile dialog appears.

- 3. Under Profile Details, edit the following:
  - Email Address Enter the email address used for general correspondence and notifications about resetting passwords.
  - Email Address Enter the first or given name to further identify the user. This
    optional field is used for informational purposes only.
  - Last Name Enter the last or given name to further identify the user. This
    optional field is used for informational purposes only.
- 4. Under Profile Photo, add, change, or remove your photo.
- 5. Under Change Password, enter a new password.
- 6. Click Apply Changes.



#### Tip:

You can also reset your password and recover your workspace name from the Sign In page. See Resetting Your Password from the Sign In Page and Recovering Your Workspace Name in *Oracle APEX Installation Guide*.

# 2.7 Editing User Preferences and Enabling Dark Mode

Click the Account menu to enable or disable Dark Mode or edit user preferences.

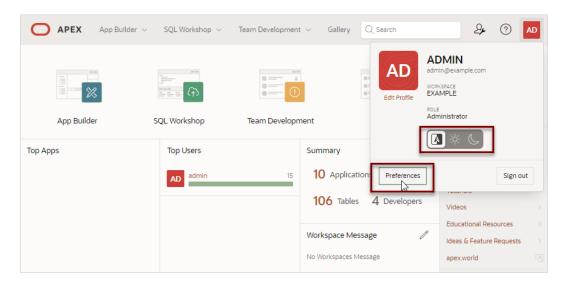
Configure the **Appearance** switch to determine if the Oracle APEX user interface displays in **Dark Mode**, **Light Mode**, or **Automatic Mode**.

Click **Preferences** to change your default schema, default date format, configure whether SQL Workshop CSV downloads are in Unicode, and control how windows display when App Builder runs applications.

To enable Dark Mode or edit preferences:

To configure the **Appearance** switch or user Preferences:





1. Click the **Account** menu in the header region.

- 2. Configure the Appearance switch to determine if the APEX user interface displays in Dark Mode or Light Mode. Options include:
  - Automatic detects the appropriate setting based on existing system or browser settings.
  - Light Mode renders the user interface using the standard color scheme.
  - **Dark Mode** renders the user interface using an inverted color scheme, applying light-colored text, icons and graphical user interface elements on a darker background.
- 3. To configure Preferences, click **Preferences**. In the Preferences dialog, edit the following:
  - Default Schema Specifies the default schema used for data browsing, application
    creation, and SQL script execution. When using workspaces that have more than one
    schema available, this schema is the default for creating applications, performing
    SQL queries, and so on. This feature does not control security, only the user's
    preference.
  - Default Date Format Specify the default Oracle date format for the user. This
    option controls the default date format within SQL Workshop.
  - Unicode CSV Downloads Specify whether to provide SQL Workshop CSV downloads in Unicode. This does only affect SQL Workshop and not custom applications.
  - Run application in new window Specify how APEX manages windows or tabs
    when running applications from App Builder when using Mozilla Firefox and Microsoft
    Internet Explorer. This setting has no effect when using other browsers, such as
    Google Chrome and Apple Safari.
    - If set to **On**, the default, browser preferences are ignored and a new window always opens. If set to **Off**, the runtime application opens in a new window or tab based on Browser preferences. Mozilla Firefox and Microsoft Internet Explorer generally do not set focus to another tab in the same window, except when that tab is first launched.
  - Use single window to run all applications Specify whether different applications reuse the same application runtime window or tab.
     If set to On, applications run from the App Builder reuse the window or tab used for running the previous application. If set to Off, applications you run display in its own window or tab.



#### 4. Click Apply Changes.

# 2.8 Using Oracle APEX Documentation

Oracle APEX provides a hosted online documentation library and field-level Help. You can browse or search content or download the entire library by going to the APEX Documentation page in the Oracle Help Center.

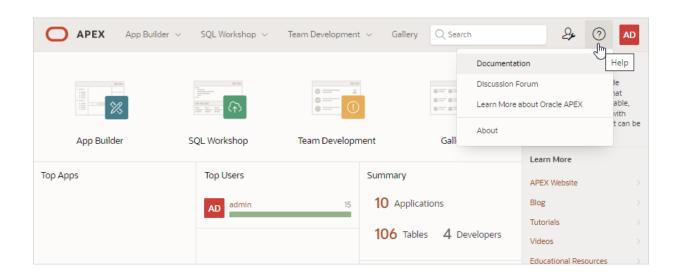
- Accessing Oracle Help Center
   Access Oracle Help Center from by clicking Documentation on the Help menu.
- Searching the Oracle Help Center
   Search Oracle Help Center by book, product, category, or all publications.
- Downloading the Documentation Library
   Download a ZIP file of the online documentation library.
- Redirecting the Help Menu
  Redirect the Help menu at the instance-level.
- Viewing Field-level and Page Designer Help Learn about field-level Help and Help in Page Designer.

## 2.8.1 Accessing Oracle Help Center

Access Oracle Help Center from by clicking Documentation on the Help menu.

Oracle Help Center publishes a comprehensive library of publications for each Oracle APEX release. Whether you are new to APEX or an advanced user, you can find useful information about building stunning, scalable, secure apps with Oracle APEX.

Access Oracle Help Center by either clicking the Help menu and selecting **Documentation**, or clicking **Learn More...** links in the product UI.



When the Oracle Help Center appears, you can:

- Select a release (if applicable).
- Browse topics by selecting a subject area.



- View all publications in the library:
  - In the left navigation menu, select Books.
  - Find and select the appropriate publication.
- Download the library locally:
  - In the left navigation menu under Books, select Download.

### 2.8.2 Searching the Oracle Help Center

Search Oracle Help Center by book, product, category, or all publications.



#### Tip:

Searching a specific publication tends to yield the best results.

To search a specific publication:

- Access Oracle Help Center:
  - a. Click the Help menu in the upper right corner. The Help menu features a question mark enclosed with a circle.
  - b. Select Documentation.

Oracle Help Center appears, displaying documentation for the current release.

- 2. Locate the publication:
  - a. From the left navigation menu, select **Books**.
  - **b.** Locate the publication and click the **HTML** link.

The publication appears.

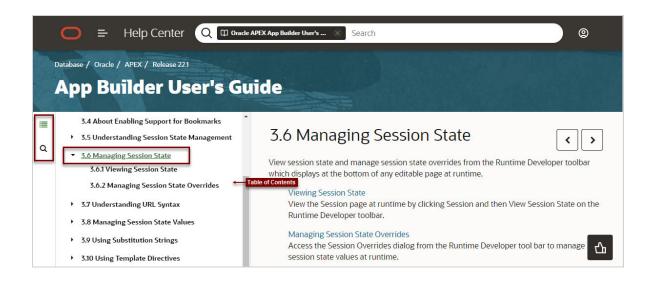
Note that the Search bar at the top of page displays the title of the selected publication.



- To search the publication, enter keywords in the Search bar and press Enter. Search results appear.
- 4. Select a topic to review.

The topic appears and the table of contents highlights the selected topic.





The following icons display to the left side of the table of contents:



**Table of Contents** - Click the **Table of Contents** icon to show or hide the table of contents.

Q

Search - Click the Search icon to search the book, product, or category.

## 2.8.3 Downloading the Documentation Library

Download a ZIP file of the online documentation library.

To download the online documentation library:

- 1. Access Oracle Help Center:
  - a. Click the **Help** menu in the upper right corner. The **Help** menu features a question mark enclosed with a circle.
  - b. Select Documentation.

Oracle Help Center appears, displaying documentation for the current release.

- 2. Under Books, select Download.
- 3. Save the ZIP file locally.
- 4. Download the ZIP file and extract it locally.
- 5. Open the extracted folder and click **Readme.html**.
- 6. Click Start Here.

## 2.8.4 Redirecting the Help Menu

Redirect the Help menu at the instance-level.

Administrators can redirect the Help menu at the instance-level in **Manage Instance**, **Instances Settings** in the Oracle APEX Administration Services application. APEX

Administration Services is a separate application that enables an Instance administrator to manage an entire APEX hosted instance. This functionality is not available to some customers who are using a hosted instance.



Configuring the Help Menu in Oracle APEX Administration Guide

# 2.8.5 Viewing Field-level and Page Designer Help

Learn about field-level Help and Help in Page Designer.

Most select lists, checkboxes, items, and fields within APEX include field-level Help. Page Designer also includes Help for all Property Editor attributes.

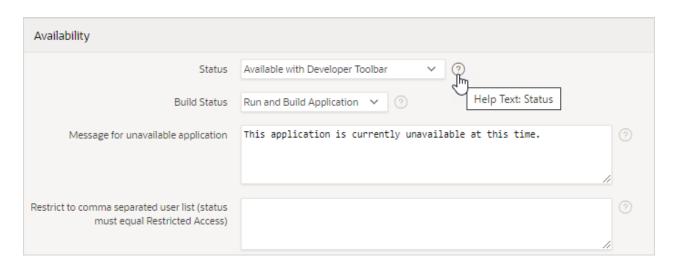
- Viewing Field-level Help in Oracle APEX
- · Viewing Help in Page Designer

### 2.8.5.1 Viewing Field-level Help in Oracle APEX

Most select lists, checkboxes, items, and fields within Oracle APEX include field-level Help. To view field-level help:

1. Navigate to the attribute you need information about.

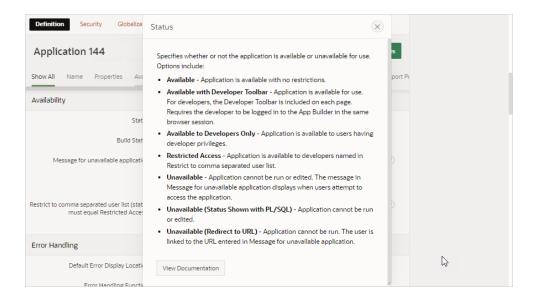
Most attributes in APEX include field-level Help. Attributes with field-level Help have a light gray icon that resembles a question mark (?). Passing your cursor over the icon displays the tooltip, **Help Text: ....** 



2. To view field-level Help, click the **Help Text** icon.

A Help window appears.







#### Tip:

To access field-level help with the keyboard, focus on the correct field and then press **Alt+F1**.



**Accessing Oracle Help Center** 

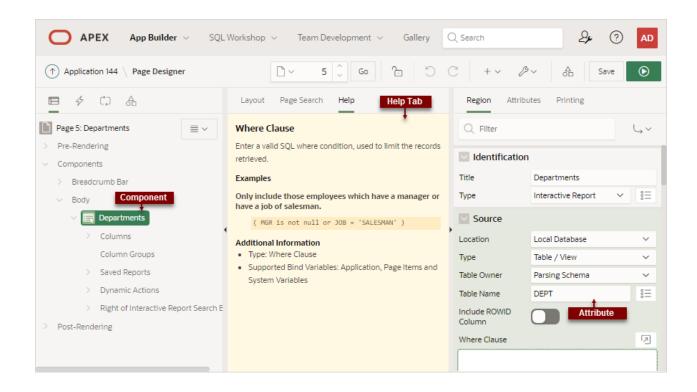
### 2.8.5.2 Viewing Help in Page Designer

Page Designer includes Help for all attributes in the Property Editor.

To view Help in Page Designer:

- 1. Access Page Designer.
  - Page Designer appears.
- 2. Select a component or control in either the left pane or the central pane.
  - As you change focus in either view, the Property Editor automatically updates to reflect the currently selected component.
- In the Property Editor, select an attribute.
- 4. To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.





Once you activate the Help pane, the content that displays changes every time you select another attribute.



# 2.9 Using the App Gallery

Use the App Gallery to install Sample Apps, Starter Apps, and Custom Apps.

- About Sample Apps, Starter Apps, and Custom Apps
   Sample Apps and Starter Apps are available with every Oracle APEX workspace.
   Custom Apps are only available if your instance administrator has enabled them.
- About the Oracle APEX GitHub Repository
   The Oracle APEX GitHub repository contains Starter Apps, Sample Apps, sample code, and plug-ins you can use in your workspace.
- Installing Apps from the Gallery
   Install Sample and Starter Apps directly from the Gallery by clicking Install.

Uninstalling Apps from the Gallery
 Uninstall Sample and Starter Apps directly from the Gallery by clicking the Remove App icon.

### 2.9.1 About Sample Apps, Starter Apps, and Custom Apps

**Sample Apps** and **Starter Apps** are available with every Oracle APEX workspace. **Custom Apps** are only available if your instance administrator has enabled them.

You can access the Gallery from the top menu or by typing Gallery in the spotlight search. The Gallery includes three types of applications:

- **Sample Apps** built with sample data that highlight specific functionality. You can use them as a developer guide for how particular features work.
- Starter Apps fully functional apps that provide standalone solutions for simple requirements. You can use them as is or extend them with custom functionality.
- Custom Apps specific to your workspace. They are only available if your instance administrator has enabled them.

You can install Sample Apps, Starter Apps, and Custom Apps directly from the Gallery. You can also download Sample Apps and Starter Apps from GitHub to import into your workspace.

#### See Also:

- Importing an Application, Page or Component Export
- Configuring the Gallery in Oracle APEX Administration Guide

## 2.9.2 About the Oracle APEX GitHub Repository

The Oracle APEX GitHub repository contains Starter Apps, Sample Apps, sample code, and plug-ins you can use in your workspace.

Navigating the GitHub Repository
 Use the GitHub repository to access documentation, license information (if applicable), and installation files for Sample and Starter Apps.

### 2.9.2.1 Navigating the GitHub Repository

Use the GitHub repository to access documentation, license information (if applicable), and installation files for Sample and Starter Apps.

The Oracle APEX GitHub repository can be accessed at https://github.com/oracle/apex. The repository contains information you can use to customize apps:

- docs contains the installation source file.
- plugins contains examples for APEX plug-ins.
- sample-apps contains the sample apps found in the Gallery.
- sample-code contains code examples for APEX functionality.



starter-apps contains the starter apps found in the Gallery.

To access GitHub from an APEX workspace:

- Navigate to the Workspace home page.
- 2. Click the Gallery icon.

The **Gallery** page opens, displaying cards for **Sample Apps**. **Starter Apps**, and **Custom Apps**.

- 3. Choose either Sample Apps or Starter Apps.
- 4. Click the More Info button to access GitHub.

The GitHub directory for the app opens.

5. All files associated with the app including the README, licenses (if applicable), and installation files are available for viewing.

The README contains instructions for installing the app.

6. Download the files you need.

You can now install the app.

## 2.9.3 Installing Apps from the Gallery

Install Sample and Starter Apps directly from the Gallery by clicking Install.

Sample and Starter Apps can be installed from the Gallery. Custom Apps can be installed from the Gallery if they have been enabled by your instance administrator.

To install apps from the Gallery:

- 1. Navigate to the Workspace home page.
- 2. Click the Gallery icon.

The **Gallery** page opens, displaying cards for Sample Apps, Starter Apps, and Custom Apps.

3. Choose Sample Apps or Starter Apps.

The apps are listed as cards. Each card has an **Install** button unless the app has already been installed. If the app is already installed, it has a **Remove App** icon and a **Run** icon.

- 4. Click **Install App** to install the app.
- 5. (Optional) Expand the **Advanced Settings** section.
  - a. Specify whether the Application ID will be assigned automatically (default) or manually.
  - b. Modify the Parsing Schema.
- 6. Click **Install Application** to complete the installation.

The installed app opens in the Application home page.



#### See Also:

- Importing an Application, Page or Component Export
- · Editing Pages in Page Designer

## 2.9.4 Uninstalling Apps from the Gallery

Uninstall Sample and Starter Apps directly from the Gallery by clicking the **Remove App** icon.

Sample and Starter Apps can be easily uninstalled from the Gallery.

Only apps that were installed from the Gallery can be uninstalled this way. Apps that were downloaded from GitHub and imported will not display an uninstall icon and must be deleted to be removed from the workspace.

### Important:

Any customizations that were made to the app will be lost after the app is uninstalled. These customizations will not be restored if the app is reinstalled.

To uninstall apps from the Gallery:

- 1. Navigate to the Workspace home page.
- 2. Click the Gallery icon.

The **Gallery** page opens, displaying cards for Sample Apps, Starter Apps, and Custom Apps.

3. Choose Sample Apps or Starter Apps.

Any apps that were installed directly from the Gallery will display a **Remove** icon and a **Run** icon.

- 4. Click **Remove** to uninstall the app.
- 5. On the confirmation screen, click **Remove**.

The app is uninstalled. It can be reinstalled if needed.



**Deleting an Application** 



# App Builder Concepts

To efficiently use App Builder, developers must understand some key concepts including managing user interface design, viewing rendered application pages, understanding page processing and rendering, managing session state, understanding URL syntax, managing session state values, and using built-in substitution strings.

#### Understanding Applications

An Oracle APEX application is an HTML interface that exists on top of database objects such as tables or procedures.

#### Running an Application or Page

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

#### How Does Page Processing and Page Rendering Work?

Learn how the Oracle APEX engine renders and processes pages, when APEX issues implicit commits, how conditional rendering and processing works, and how to verify user identity or control access to controls and components.

#### About Enabling Support for Bookmarks

Developers can assist users who bookmark application pages by either using zero as the session ID, or enabling **Rejoin Sessions**.

#### Understanding Session State Management

Oracle APEX transparently maintains session state and provides developers with the ability to get and set session state values from any page in the application.

#### Managing Session State

View session state and manage session state overrides from the Runtime Developer toolbar which displays at the bottom of any editable page at runtime.

#### Understanding URL Syntax

Oracle APEX applications support two types of URL syntax: **Friendly URL Syntax** and **f?p Syntax**.

#### Managing Session State Values

Manage session state to store and retrieve values for a user as the user navigates between different application pages.

#### Using Substitution Strings

Use substitution strings within templates, region source, or any attribute to pass information and replace a character string with another value.

#### Using Template Directives

Use template directives to control how attributes that support substitution strings are processed.



See Also:

**Understanding App Builder** 

# 3.1 Understanding Applications

An Oracle APEX application is an HTML interface that exists on top of database objects such as tables or procedures.

#### **About Applications**

An application is a collection of pages linked together using navigation menus, tabs, buttons, or hypertext links. Application pages share a common session state and authentication.

To create an application, a developer runs the Create Application Wizard to declaratively assemble pages and navigation. Individual pages are organized using containers called regions. Regions can contain text, custom PL/SQL, reports, charts, maps, calendars, web service content, or forms. Forms are made up of fields (called items) which can be selected from the multitude of built-in types (such as text fields, text areas, radio groups, select lists, checkboxes, date pickers, and popup list of values).

Developers can also create their own custom item types using plug-ins. Session state (or application context) is transparently managed and the user interface presentation is separated from the application logic enabling developers to manage the look and feel of an application by simply selecting a different theme.

#### What Is an Application Page?

A page is the basic building block of an application. Every application consists of one or multiple pages. Each page can have buttons and fields (called **items**) which are grouped into containers called **regions**. Pages can include application logic (or processes). You can branch from one page to the next using conditional navigation; perform calculations (called **computations**); perform validations (such as edit checks); and display reports, calendars, and charts. You view and edit a page in Page Designer.

#### See Also:

- Creating Applications
- Understanding App Builder
- Editing Pages in Page Designer



# 3.2 Running an Application or Page

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

- Run Application and Run Page Buttons
   Learn how to run pages individually, or run an entire application.
- How Your Browser Impacts the Way Applications Run
  Learn about what determines if a running application displays in a new tab or new
  browser window.
- Running an Application from the App Builder Home Page Run an application from the App Builder home page.
- Running an Application from the Application Home Page Run an application from the Application home page.
- Running a Page on the Application Home Page
   Run an application page from the Application home page.



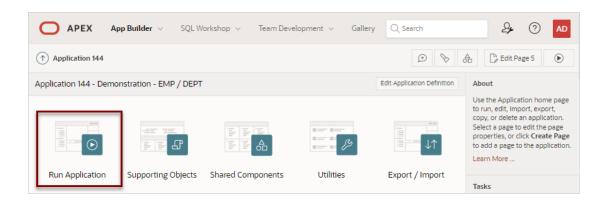
Running a Page from Page Designer

# 3.2.1 Run Application and Run Page Buttons

Learn how to run pages individually, or run an entire application.

#### **Run Application Button**

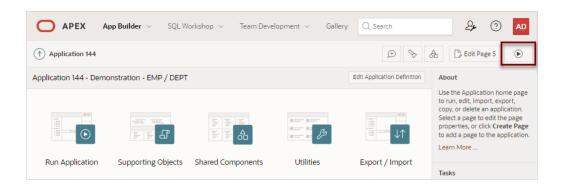
The **Run Application** button displays on the Application home page and features with a large run (or play) button. To run the application from the application home page, click **Run Application**.





#### **Run Page Button**

The Run Page button resembles a small, black play button and displays in the upper right corner of many pages within App Builder. Clicking the **Run Page** button runs the current page or the last selected page.



## 3.2.2 How Your Browser Impacts the Way Applications Run

Learn about what determines if a running application displays in a new tab or new browser window.

When you run an application, the application displays in a new window. Whether that new window is a new tab or new browser windows depends upon how you have configured your web browser. If you are using Google Chrome or Apple Safari, the running application displays in a new tab by default. If you are using Microsoft Edge or Mozilla Firefox, the application displays in a new browser window by default. You can further control how Oracle APEX manages tabs and windows when running an application by editing your account preferences.



Editing User Preferences and Enabling Dark Mode

## 3.2.3 Running an Application from the App Builder Home Page

Run an application from the App Builder home page.

To run an application from the App Builder home page:

- 1. On the Workspace home page, click App Builder.
- You can customize the App Builder home page by selecting the following icons in the navigation bar:
  - View Icons (default)
  - View Report
- To run the application in Icon View:



a. On the navigation bar, click the **View Icons** icon:

Each application displays as a large icon identified by the application name.

- **b.** Click **Run Application** at the top of the page.
- 4. To run the application in Report View:
  - a. On the navigation bar, click the **View Report** icon:

Each application displays as a line in a report. Each line includes the application ID, the application name, when the application was last updated, the page count, and who last updated the application.

b. Click Run Page in the far right column.



How Your Browser Impacts the Way Applications Run

## 3.2.4 Running an Application from the Application Home Page

Run an application from the Application home page.

To run an application from the Application home page:

- On the Workspace home page, click App Builder.
   The App Builder home page appears.
- Select an application.
- 3. Click Run Application in the middle of page.

The application displays in a new window.



How Your Browser Impacts the Way Applications Run

### 3.2.5 Running a Page on the Application Home Page

Run an application page from the Application home page.

To run a page from the Pages list:

- 1. On the Workspace home page, click **App Builder**.
- 2. Select an application.
- Click the View Report icon.

Selecting **View Report** displays each page as a line in a report. Each line includes the page number, the page name, when the page was last updated, who last updated the page, the page type, the selected user interface, a lock icon, and a Run button.



- 4. Locate the page you want to run.
- 5. Click **Run Page** in the far right column.

The application displays in a new window.



Locking and Unlocking a Page and How Your Browser Impacts the Way Applications Run

# 3.3 How Does Page Processing and Page Rendering Work?

Learn how the Oracle APEX engine renders and processes pages, when APEX issues implicit commits, how conditional rendering and processing works, and how to verify user identity or control access to controls and components.

- How the APEX Engine Renders and Processes Pages
   The Oracle APEX engine dynamically renders and processes pages based on data stored in Oracle database tables.
- About Implicit Commit Points
   Learn about when Oracle APEX issues implicit commits.
- Understanding Conditional Rendering and Processing
   Use conditions in an application to control how pages and page components display and when processes, computations, and validations execute.
- About Verifying User Identity
   Authentication is the process of establishing users' identities before they can access an application.
- About Controlling Access to Controls and Components
   Learn about controlling access to controls and components.

## 3.3.1 How the APEX Engine Renders and Processes Pages

The Oracle APEX engine dynamically renders and processes pages based on data stored in Oracle database tables.

To view a rendered version of your application, you request it from the APEX engine with a URL. When you run an application, the APEX engine relies on two processes:

- Show Page Show Page is a page rendering process that assembles all the page attributes (including regions, items, and buttons) into a viewable HTML page.
   When you request a page using a URL, the engine is running Show Page.
- Accept Page Accept Page performs forms page processing, including computations, validations, processes, and branching. When you submit a page, the APEX engine is running Accept Page or performing page processing during which it saves the submitted values in the session cache and then performs any computations, validations, or processes.



## 3.3.2 About Implicit Commit Points

Learn about when Oracle APEX issues implicit commits.

Oracle APEX issues implicit commits at the following points:

- On load, after a page finishes rendering
- · On submit, before branching to another page
- On submit, if one or more validations fail, before re-rendering the page
- After a computation
- After changing the value of an item, for example after a PL/SQL process that modifies a bind variable value or when APEX UTIL.SET SESSION STATE is called.
- When APEX MAIL.PUSH QUEUE is called



SET\_SESSION\_STATE Procedure and PUSH\_QUEUE Procedure in *Oracle APEX API Reference* 

# 3.3.3 Understanding Conditional Rendering and Processing

Use conditions in an application to control how pages and page components display and when processes, computations, and validations execute.

A condition is a small unit of logic that helps you control the display of regions, items, buttons, and tabs and the execution of processes, computations, and validations. For example, when you apply a condition to a button, the rendering engine evaluates the condition during the rendering (or Show Page) process. Whether the condition passes or fails determines if the button displays.

You specify a condition by selecting a condition type. You can select a condition type when you first create the control or component, or later when editing the control or component.

Depending upon the type of condition you select, you enter the appropriate values in the fields provided. The condition evaluates to true or false based on the values you enter. Click the select list to view a complete list of all available conditions for a given component or control.



Available Conditions for a detailed listing of available condition types



#### Example 3-1 Current Page is NOT in comma delimited list

Current Page is NOT in comma delimited list evaluates to true if the current page number is contained within the comma-delimited list of pages provided. For example:

3,100,203

If the current page is 100, then this condition evaluates to true and the condition passes.

#### **Example 3-2 PLSQL Expression**

Use PLSQL Expression to specify an expression in valid PL/SQL syntax that evaluates to true or false. For example:

```
NVL(:MY ITEM,'NO') = 'YES'
```

If the value of :MY\_ITEM is YES, as in the previous example, then the condition evaluates as true. If the value of :MY\_ITEM is anything other than YES, then the condition evaluates as false.

#### **Example 3-3** Rows returned

Rows returned expressed as a SQL query. If the query returns one or more rows, then the condition evaluates as true. For example:

```
SELECT 1 FROM employees WHERE department id = :P101 DEPTNO
```

This example references item  $P101\_DEPTNO$  as a bind variable. You can use bind variables within application processes and SQL query regions to reference items from session state. If one or more employees are in the department identified by the value of  $P101\_DEPTNO$ , then the condition evaluates as true.

See Also:

Referencing Session State Using Bind Variable Syntax

### 3.3.4 About Verifying User Identity

Authentication is the process of establishing users' identities before they can access an application.

Authentication may require a user to enter a user name and password, or may involve the use of a digital certificate or a secure key.

Oracle APEX supports modular authentication, making it easy to switch authentication methods when needed. You can establish a user's identity by selecting from several built-in authentication methods, or by using a wizard to create your own custom authentication approach.



See Also:

Establishing User Identity Through Authentication

## 3.3.5 About Controlling Access to Controls and Components

Learn about controlling access to controls and components.

While conditions control the rendering and processing of specific controls or components on a page, authorization schemes control user access. Authorization is a broad term for controlling access to resources based on user privileges.

Authorization schemes use the identities established by authentication to grant privileges on applications and objects within them. You can specify an authorization scheme for an entire application, a page, or a specific page control such as a region, item, or button. For example, you could use an authorization scheme to selectively determine which tabs, regions, or navigation bar entries a user sees.

See Also:

**Providing Security Through Authorization** 

# 3.4 About Enabling Support for Bookmarks

Developers can assist users who bookmark application pages by either using zero as the session ID, or enabling **Rejoin Sessions**.

In previous releases, if the pages within an application were public and did not require authentication, you could assist users in bookmarking pages by using zero as the session ID. Although this approach is still supported, Oracle APEX now includes a new feature called **Rejoin Sessions** that enables developers to control this type of support at the page, application, or instance-level.

See Also

**About Rejoin Sessions** 

# 3.5 Understanding Session State Management

Oracle APEX transparently maintains session state and provides developers with the ability to get and set session state values from any page in the application.

What is Session State?
 Session state enables developers to store and retrieve values for a user as the user navigates between different application pages.

#### About Session IDs

A session ID is a unique number assigned a specific user for the duration of that user's visit (or session).

What Is a Session?

A session is a logical construct that establishes persistence (or stateful behavior) across page views.

### 3.5.1 What is Session State?

Session state enables developers to store and retrieve values for a user as the user navigates between different application pages.

Hypertext Transfer Protocol (HTTP), the protocol over which HTML pages are most often delivered, is a stateless protocol. A web browser is only connected to the server for as long as it takes to download a complete page. Each page request is treated by the server as an independent event, unrelated to any page requests that happened previously or that may occur in the future. To access form values entered on one page on a subsequent page, the values must be stored as session state. Oracle APEX transparently maintains session state and provides developers with the ability to get and set session state values from any page in the application.

### 3.5.2 About Session IDs

A session ID is a unique number assigned a specific user for the duration of that user's visit (or session).

The Oracle APEX engine establishes the identity of the user for each page request and the session ID to fetch session state from the database. The most visible location of the session ID is in the URL for a page request. The session ID displays as the third parameter in the URL:

f?p URL Syntax:

https://apex.example.com/ords/f?p=392:3:13766599855150

Friendly URL Syntax:

https://apex.example.com/ords/mycompany/r/hr-app/update-employees?session=13766599855150

In both examples, the session ID is 13766599855150.

Another visible location is in the page's HTML POST data and indirectly in the contents of a session cookie. This cookie is sent by the APEX engine during authentication and is maintained for the life of the application (or browser) session.

APEX assigns new session IDs during authentication processing, records the authenticated user's identity with the session ID, and continually checks the session ID in each page request's URL or POST data with the session cookie and the session record in the database. These checks provide users with flexibility and security.

While the session ID is the key to session state, the session cookie and the session record safeguard the integrity of the session ID and the authentication status of the user.



**✓** See Also:

**Understanding URL Syntax** 

### 3.5.3 What Is a Session?

A session is a logical construct that establishes persistence (or stateful behavior) across page views.

Each session is assigned a unique identifier. The Oracle APEX engine uses this identifier (or session ID) to store and retrieve an application's working set of data (or session state) before and after each page view. Because sessions are entirely independent of one another, any number of sessions can exist in the database at the same time. A user can also run multiple instances of an application simultaneously in different browser programs.

Sessions are logically and physically distinct from Oracle database sessions used to service page requests. A user runs an application in a single APEX session from sign in to sign out with a typical duration measured in minutes or hours. Each page requested during that session results in the APEX engine creating or reusing an Oracle database session to access database resources. Often these database sessions last just a fraction of a second.

See Also:

Viewing Active Sessions in Oracle APEX Administration Guide

# 3.6 Managing Session State

View session state and manage session state overrides from the Runtime Developer toolbar which displays at the bottom of any editable page at runtime.

- Viewing Session State
  - View the Session page at runtime by clicking Session and then View Session State on the Runtime Developer toolbar.
- Managing Session State Overrides
   Access the Session Overrides dialog from the Puntime Developer too

Access the Session Overrides dialog from the Runtime Developer tool bar to manage session state values at runtime.



#### See Also:

- Runtime Developer Toolbar
- Understanding Page Items
- Managing Application Items
- About Using Collections
- Using Substitution Strings for information about referencing item values

### 3.6.1 Viewing Session State

View the Session page at runtime by clicking Session and then View Session State on the Runtime Developer toolbar.

The Session page provides valuable information about the session in which the application is currently running. Must of the behavior of an Oracle APEX application is driven by values in session state. For example, a button may display conditionally based on the value of an item session state. This section describes how to view session state for a page.

To view the Session page:

- 1. Run the application as a developer.
- 2. Locate the Runtime Developer toolbar. By default, the Runtime Developer toolbar displays at the bottom of the page.



3. On the Runtime Developer toolbar, click **Session** and then **View Session State**.

The Session page appears and displays the following information displays at the center of the page.

- Application Identifies the application name.
- Session Displays the session ID for the current session.
- User Identifies the current user.
- Workspace Displays the current workspace ID.
- Browser Language Identifies the current browser language.
- 4. Configure the fields at the top of the page and click **Set** to alter the display:
  - Page Locate a page. Enter a page number.
  - **Find** Enter a case insensitive query. Use Find to search item name and item value, or collection name (depending upon your view).
  - Rows Select the number of items to display.
  - View Select a session state report to view.



## 3.6.2 Managing Session State Overrides

Access the Session Overrides dialog from the Runtime Developer tool bar to manage session state values at runtime.

The **Enable Session Overrides** switch eanbles you to enable or disable all session values. Likewise, every session value has a switch that enables you control session state value overrides.

For example, if you need to translate an application you can change the Application Language attribute. Another common use case for session overrides is to change the file path values such as #APP\_FILES#. This type of change would redirect the URL to somewhere else, like localhost:PORT for local development.

To access the Session Overrides dialog:

- 1. Run the application as a developer.
- 2. Locate the Runtime Developer toolbar. By default, the Runtime Developer toolbar displays at the bottom of the page.
- 3. On the Runtime Developer toolbar, click **Session** and then **Session Overrides**.
- 4. In the Session Overrides dialog:
  - a. Enable Sessions Overrides Use this switch to enable or disable all session values.
  - **b.** Globalization:
    - Application Language Change the language of the current application for the current user.
    - Document Direction- Change the document direction (Left to Right, Right to Left) of the current application for the current user
    - Timezone Change the timezone of the current application for the current user.

You can also edit these attributes in Globalization attributes. See Configuring Globalization Attributes.

#### c. File Paths:

 APEX Files #APEX\_FILES# - Enable this option to change the value of #APEX\_FILES# to point to another location. #APEX\_FILES# determines the virtual path the Web server uses to point to the static files when using the #APP\_FILES# substitution string.

You can also edit this attribute in User Interface, Advanced. See Editing User Interface Attributes.

Application Files #APP\_FILES# - Enable this option to change the value of #APP\_FILES# to point to another location. #APP\_FILES# determines the virtual path the web server uses to point to the images directory distributed with App Builder. During installation, the virtual path is configured as /i/. If you are unsure, contact your administrator.

You can also edit this attribute in User Interface, Advanced. See Editing User Interface Attributes.

Workspace Files #WORKSPACE\_FILES# - Enable this option to change the value of #WORKSPACE\_FILES# to point to another location. #WORKSPACE\_FILES# references



uploaded images, JavaScript, and cascading style sheets that are shared over many applications within a workspace.

 Theme Files #THEME\_FILES# - Enable this option to change the value of #THEME\_FILES# to point to another location. Use the #THEME\_FILES# to reference files which are stored with your theme definition

#### d. Additional Files:

 JavaScript URLs - Load additional JS file URLs to this application for the current user.

You can also edit this attribute in User Interface, JavaScript. See Editing User Interface Attributes.

 CSS URLs - Load additional CSS file URLs to this application for the current user.

You can also edit this attribute in User Interface, CSS. See Editing User Interface Attributes.

#### 5. Exit the dialog:

- Click Save to save your changes.
- Click Reset to undo any changes.
- Click Cancel to exist dialog without making any changes.

# 3.7 Understanding URL Syntax

Oracle APEX applications support two types of URL syntax: **Friendly URL Syntax** and **f?p Syntax**.



#### Tip:

Applications created using Application Express release 20.1 or later use **Friendly URL Syntax**. You can change existing applications to use Friendly URLs by editing the Friendly URLs attribute in the application definition. See **Enabling or Disabling Friendly URL Syntax**.

#### Understanding Friendly URL Syntax

Friendly URL Syntax creates a URL structure that identifies the address of Oracle APEX, the application, the page, and uses standard web parameter syntax.

#### Understanding f?p URL Syntax

f?p URL Syntax is a legacy syntax that creates a unique URL structure that identifies the address of Oracle APEX, the application ID, page number, and session ID.

Hiding the Session ID on Public Pages
 Hide the session ID in a URL by making a page public.

## 3.7.1 Understanding Friendly URL Syntax

Friendly URL Syntax creates a URL structure that identifies the address of Oracle APEX, the application, the page, and uses standard web parameter syntax.



#### Note:

The Friendly URL Syntax described in this section is different from a vanity URL or custom domain name. Configuring a vanity URL (or custom domain name) for your APEX instance is typically done at the web server or load balancer-level and is not discussed in this publication.

#### 0

#### Tip:

Applications created using Application Express release 20.1 or later use Friendly URL Syntax. You can revert to f?p Syntax by disabling the Friendly URLs attribute.

- About Friendly URL Syntax
  - Friendly URL Syntax uses a standard URL hierarchy and passes parameters in a similar fashion to other web applications.
- Enabling or Disabling Friendly URL Syntax
   Determine if an application uses Friendly URL Syntax or f?p Syntax by enabling or disabling the Friendly URLs attribute.
- Customizing a Friendly URL
   Customize a Friendly URL by editing the Path Prefix, Application Alias, or Page Alias.

### 3.7.1.1 About Friendly URL Syntax

Friendly URL Syntax uses a standard URL hierarchy and passes parameters in a similar fashion to other web applications.

#### Friendly URL Hierarchy and Syntax

Friendly URL Syntax creates a URL with the following directory hierarchy and syntax:

https://hostname:port/ords/r/path prefixapp alias/page alias?parameters

#### Friendly URL Example

https://hostname:port/ords/r/mycompany/hr-app/update-employees?session=13766599855150

#### Where:

- https: stands for HyperText Transfer Protocol and operates at the application layer.
- hostname is the domain name of the server. It can also include a port number or an IP address.
- port is the port number assigned when configuring Oracle REST Data Services.
- ords is the service name defined when configuring Oracle REST Data Services.
- r is the router shortcut. This value is a constant and should never be changed.



- mycompany is the path\_prefix which is URI path prefix used to access RESTful Services. When you create a workspace, this value defaults to workspace name. You can customize the URI path prefix by editing the Path Prefix attribute in Administration, Manage Service, Workspace Preferences, SQL Workshop.
- hr-app is the app\_alias. In a new application, the Application Alias defaults to the application Name. You can edit the Application Alias in the application Definition. The Application Alias must be unique within the workspace.
- update-employees is the page\_alias. In a new application, the Page Alias defaults
  to the page Name. You can edit the Page Alias in Page Designer. Page aliases
  must be unique within the application. When creating a new page, if a Page Name
  is already used as a Page Alias, then a numeric value is appended to the new
  Page Alias to make it unique.
- ?session=13766599855150 identifies the session ID. When you run an application, the Oracle APEX engine generates a session number that serves as a key to the user's session state.

#### **About URL Parameters**

The part of the URL after /? can list parameters.

```
http://hostname:port/ords/r/path_prefix/app_alias/page_alias?
parameters (Such as -
```

p7\_customer\_id=377&clear=7&session=1247058356345&cs=3MdkfQa9NLmkyHAbwGPg3U-nmA7XIw5sWjU2rMzSvOy wP1 z7BBI-Gbh2JgvffARgcYJy8id4VtL3d0l1tYm0w)

#### Supported parameters include:

- session
- request
- clear
- debug
- application/page items
- printerFriendly
- trace
- timezone
- lang
- territory
- cs
- dialogCs
- x01



### See Also:

- Understanding Session State Management
- · About Publishing an Application URL

### 3.7.1.2 Enabling or Disabling Friendly URL Syntax

Determine if an application uses Friendly URL Syntax or f?p Syntax by enabling or disabling the Friendly URLs attribute.

Applications created using Oracle APEX release 20.1 or later use Friendly URL Syntax. You can revert to f?p Syntax by disabling the Friendly URLs attribute.

To enable Friendly URL Syntax:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.

The Application home page appears.

- 3. Navigate to the Edit Application Definition page. Navigation options include:
  - Click the Edit Application Definition button.
  - From Shared Components:
    - Click Shared Components.
    - Under Application Logic, click Application Definition.

The Definition page appears.

- 4. Under Properties, configure the **Friendly URLs** attribute:
  - On If set to On, application uses Friendly URLs Syntax in which the URL consists of a directory structure based on the Application Alias, Page Alias, and standard web parameter syntax.
  - Off If set to Off, the application uses f?p= Syntax.
- 5. Click **Apply Changes** to save your changes.

### 3.7.1.3 Customizing a Friendly URL

Customize a Friendly URL by editing the Path Prefix, Application Alias, or Page Alias.

Friendly URL Syntax creates a URL with the following directory hierarchy and syntax:

https://hostname:port/ords/r/path\_prefix/app\_alias/page\_alias?parameters

You can customize the follow parts of Friendly URL:

Path Prefix - path\_prefix is URI path prefix to be used to access RESTful Services.
 When you create a workspace, this value defaults to workspace name. You can customize the URI path prefix by editing Path Prefix attribute in Workspace Administration.



- Application Alias app\_alias is an alternate alphanumeric application identifier
  called the Application Alias. In a new application, the Application Alias defaults to
  the application Name. You can edit the Application Alias in the application
  Definition.
- Page Alias page\_alias is an alphanumeric alias for this page called the Page
  Alias. In a new application, the Page Alias defaults to the page Name. You can edit
  the Page Alias in Page Designer.

#### Friendly URL Customization Example

Suppose you have an application with the following URL:

http://hostname:port/ords/r/example/355/2?session=13766599855150

#### Suppose you want to make the following changes:

- path prefix Change example to mycompany.
- app\_alias Change 355 to myapp.
- page alias Change 2 to myinfo.

#### The revised URL will display as:

http://hostname:port/ords/r/mycompany/myapp/myinfo? session=13766599855150

To customize a Friendly URL by editing the Path Prefix, Application Alias, or Page Alias:

- 1. Sign in to Oracle APEX.
- 2. To change the Path Prefix:
  - **a.** Navigate to the Workspace Administration page. At the top of the Workspace home page, click the **Administration** menu and select **Administration**.
  - **b.** On the Workspace Administration home page, click **Manage Service** and then click **Set Workspace Preferences**.
  - c. Scroll down to SQL Workshop.
  - d. In **Path Prefix**, enter a new Path Prefix. In a new workspace, Path Prefix defaults to the workspace name. For example change the Path Prefix to mycompany.



#### Tip:

Path Prefix only displays if **Enabled RESTful Services** is set to **Yes**.

- e. Click Apply Changes to save your changes.
  - Manage Service page appears.
- f. Return to the Workspace home page. Click the APEX logo (Oracle APEX Home) in the upper left corner.
- 3. To change the Application Alias:



- a. On the Workspace home page, click the **App Builder** icon.
- **b.** Select the application.
- c. On Application home page, click the **Edit Application Definition** button.

The application Definition page appears.

- d. Under Name, edit the **Application Alias** attribute. For example, enter myapp.
- e. Click Apply Changes to save your changes.
- 4. To change the Page Alias:
  - a. View the page in Page Designer.
  - **b.** In either the Rendering tab, select the page name.
  - c. In the Property Editor, find the Identification group.
  - d. Under Identification, Page Alias attribute Enter an alphanumeric alias for this page. For example, enter myinfo.
  - e. To save your changes, click Save or Save and Run Page.
- 5. Run the page. Click or **Save and Run Page**.

The revised URL displays as:

http://hostname:port/ords/r/mycompany/myapp/myinfo?session=13766599855150



Enabling RESTful Services and Defining a Path Prefix for a Workspace in *Oracle APEX Administration Guide* 

## 3.7.2 Understanding f?p URL Syntax

f?p URL Syntax is a legacy syntax that creates a unique URL structure that identifies the address of Oracle APEX, the application ID, page number, and session ID.

- About f?p URL Syntax
  - f?p URL Syntax creates a unique URL structure that identifies the location and address of Oracle APEX, the application ID, page number, and session ID.
- About Using f?p Syntax to Link Pages
   Create links between application page using f?p syntax.
- Calling a Page Using an Application Alias or Page Alias
   Use URL syntax to call a page using an application alias and/or page alias.
- Calling a Page from a Button URL
   Use URL syntax to call a page from a button URL.



### 3.7.2.1 About f?p URL Syntax

f?p URL Syntax creates a unique URL structure that identifies the location and address of Oracle APEX, the application ID, page number, and session ID.

#### f?p URL Structure and Syntax

f?p URL Syntax creates a URL with the following structure and syntax:

https://hostname:port/ords/f?p=app id:page number:session id

#### f?p URL Example

https://hostname:port/ords/f?p=392:3:13766599855150

#### This example indicates:

- https: stands for HyperText Transfer Protocol and operates at the application layer.
- hostname is the domain name of the server. It can also include a port number or an IP address.
- port is the port number assigned when configuring Oracle REST Data Services.
- ords is the service name defined when configuring Oracle REST Data Services.
- f?p=is a prefix used by Oracle APEX to route the request to the correct engine process.
- 392 is the ID of the application being called. The application ID is a unique number that identifies each application.
- 3 is the number of the page within the application. Page number must be unique within the application.
- 13766599855150 is the session number. When you run an application, the APEX engine generates a session number that serves as a key to the user's session state.

#### See Also:

- Understanding Session State Management
- About Publishing an Application URL

### 3.7.2.2 About Using f?p Syntax to Link Pages

Create links between application page using f?p syntax.

App Builder includes many wizards that automatically create these references for you. However, you may have to create the syntax yourself in some situations.



To create links between pages in an application, use the following f?p syntax:

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

The following table describes the arguments you can pass when using f?p syntax.

Table 3-1 f?p Syntax Arguments

Syntax	Description
App	Indicates an application ID or alphanumeric application alias.
	An <b>application alias</b> is a unique alternate alphanumeric application identifier that developers can use in place of the application ID. You define an Application Alias editing the Application Definition.
	See Also: Managing Application Attributes
Page	Indicates a page number or alphanumeric page alias.
	A <b>page alias</b> is a unique alternate alphanumeric for a page number. Developers can use a page alias in place of the page number ID. You define a Page Alias by editing the page attributes.
	See Also: Managing Page Attributes
Session	Identifies a session ID. You can reference a session ID to create hypertext links to other pages that maintain the same session state by passing the session number. You can reference the session ID using the syntax:
	<ul> <li>Short substitution string: &amp;SESSION.</li> </ul>
	• PL/SQL: V('SESSION')
	• Bind variable: :APP_SESSION
Request	Sets the value of REQUEST. Each application button sets the value of REQUEST to the name of the button which enables accept processing to reference the name of the button when a user clicks it. You can reference REQUEST using the syntax:
	Substitution string: &REQUEST.
	• PL/SQL: V('REQUEST')
	Bind variable: :REQUEST
Debug	Displays application processing details. Valid values for the DEBUG flag include:
	• YES.
	• LEVEL <i>n</i>
	• NO
	Setting this flag to YES displays details about application processing. Setting this flag to LEVEL $n$ (where $n$ is between 1 and 9) controls the level of debug detail that displays. The value of YES equals LEVEL4.
	You can reference the Debug flag using the following syntax:
	Short substitution string: &DEBUG.
	• PL/SQL: V('DEBUG')
	Bind variable: :DEBUG
	See Also: Debugging an Application



Table 3-1 (Cont.) f?p Syntax Arguments

Syntax	Description
ClearCache	Clears the cache. This sets the value of items to null.
	To clear cached items on a single page, specify the numeric page number. To clear cached items on multiple pages, use a comma-separated list of page numbers. Clearing a page's cache also resets any stateful processes on the page. Individual or comma-separated values can also include collection names to be reset or the keyword RP, which resets region pagination on the requested page. The keyword APP clears cache for all pages and all application-level items in the current application and removes sort preferences for the current user. The keyword SESSION achieves the same result as the APP keyword, but clears items associated with all applications that have been used in the current session.
	See Also: Clearing Session State
itemNames	Comma-delimited list of item names used to set session state with a URL.
itemValues	List of item values used to set session state within a URL. To pass a comma in an item value, enclose the characters with backslashes. For example:
	\123,45\
	Every character sequence except <code>backslash comma(<math></math>)</code> can be enclosed with <code>backslash</code> .
PrinterFriendly	Determines if the page is being rendered in printer friendly mode. If PrinterFriendly is set to Yes, then the page is rendered in printer friendly mode. The value of PrinterFriendly can be used in rendering conditions to remove elements such as regions from the page to optimize printed output. You can reference the printer friendly preference by using the following syntax:
	V('PRINTER_FRIENDLY')
	When referenced, the page displays using a printer friendly template. The APEX engine displays all text within HTML form fields as text. The printer friendly template does not need to have the #FORM_OPEN# or #FORM_CLOSE# tags. The objective is to be able to display information with few tables and in a format suitable for printing.

## 3.7.2.3 Calling a Page Using an Application Alias or Page Alias

Use URL syntax to call a page using an application alias and/or page alias.

Application and page aliases must consist of valid Oracle identifiers, cannot contain any whitespace, and cannot be case-sensitive. The following example calls a page from within an application using an application alias and a page alias. This example runs the page <code>home</code> of the application <code>myapp</code> and uses the current session ID.

f?p=myapp:home:&APP\_SESSION.

Application aliases must be unique within a workspace. If an application in a different workspace has the same application alias, use the &c argument to specify the workspace name. For example:

f?p=common alias:home:&APP SESSION.&c=WORKSPACE A



### 3.7.2.4 Calling a Page from a Button URL

Use URL syntax to call a page from a button URL.

When you create a button, you can specify a URL to redirect to when the user clicks the button. This example runs page 6001 of application 6000 and uses the current session ID.

f?p=6000:6001:&APP SESSION.

Note that this is only one approach to using a button. This method bypasses page submission and acts as a hyperlink on the page. You can also have a button click submit a page. In that approach, clicking the button submits the page for processing, allowing forms to be submitted and session state to be saved.



Managing Buttons and APP\_SESSION

## 3.7.3 Hiding the Session ID on Public Pages

Hide the session ID in a URL by making a page public.

By default, all pages require Authentication. However, if a page is public and the user has not signed in, the page URL will not display the session ID.



#### Tip:

For security reasons, Oracles recommends that administrators disable Rejoin Sessions unless they implement workspace isolation by configuring the Allow Hostname attribute at the workspace or instance-level. See About Isolating Workspaces.

To specify a page as public:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- **3.** At the Application-level, edit the **Rejoin Session** attribute:
  - a. Click the Edit Application Definition button.

The Application Definition appears.

- b. Click Security.
- c. Session Management, Rejoin Sessions Select Enabled for Public Sessions.
- d. Click **Apply Changes** to save your changes.
- 4. At the page-level, edit the Authentication attribute:
  - a. View the page in Page Designer.

The Application Definition appears.



- b. In the Rendering tab, select the page name.
- c. Security, Authentication Select Page is Public.
- d. Click Apply Changes to save your changes.

#### See Also:

- About Rejoin Sessions
- About Enabling Support for Bookmarks
- Session Management
- Configuring Rejoin Sessions for a Page
- Configuring Rejoin Sessions for an Instance in Oracle APEX Administration Guide

# 3.8 Managing Session State Values

Manage session state to store and retrieve values for a user as the user navigates between different application pages.

When building interactive, data-driven web applications, the ability to access and manage session state values is critical. In Oracle APEX, session state is automatically managed for every page and easily referenced in static HTML or logic controls such as processes or validations.

#### About Referencing Session State

Reference item values stored in session state in regions, computations, processes, validations, and branches. An item can be a field, a text area, a password, a select list, or a checkbox.

#### About Setting Session State

Set session state using form submissions, bind variables, computations, or f?p syntax. Session state can also be set using the APEX SESSION STATE.SET APIs.

#### Clearing Session State

Clearing a cached value resets the value to null. You can clear the cached value for specific items, all items on a page, all pages in an application, or the current user session.

#### Referencing Session State Using Bind Variable Syntax

Use bind variable syntax anywhere where you are using SQL or PL/SQL to reference session state of a specified item.

#### About Session Cloning

Use session cloning to open a new browser window in an Oracle APEX application and have it generate a new distinct session identifier and copy the session values from the original APEX session to the new one.





Understanding Session State Management and Referencing Item Values

# 3.8.1 About Referencing Session State

Reference item values stored in session state in regions, computations, processes, validations, and branches. An item can be a field, a text area, a password, a select list, or a checkbox.

The following table describes the supported syntax for referencing item values.

Table 3-2 Syntax for Referencing Item Values

_		
Туре	Syntax	Description
SQL	Standard item syntax: :MY_ITEM  Syntax for items containing special characters: :"MY_ITEM"	For items whose names are no longer than 30 characters, precede the item name with a colon (:). Use this syntax for references within a SQL query and within PL/SQL.  To reference page items containing special, multibyte, or unicode characters, wrap the page item name in double quotation marks.
		The data type of the bind variable is the Session State Data Type of the item. Most items are VARCHAR2 by default, but certain item types can be set to CLOB.
PL/SQL	V('MY_ITEM') or APEX_SESSION_STATE.GET_V ARCHAR2('MY_ITEM')	Use PL/SQL syntax to reference an item value using the V function. You can use the shorthand, V function, in place of APEX_SESSION_STATE.GET_VARCHAR2.
		Use this syntax when utilizing Oracle APEX variables directly within an Oracle database object, such as a function, trigger, or Oracle Data Redaction policy.
		Tip: When using V('MY_ITEM'),
		<pre>apex_session_state.get_clob('MY_ITEM') or similar in a SQL query, Oracle recommends using Fast Dual functionality =&gt; (select v('my_item') from dual) to improve performance.</pre>
PL/SQL	APEX SESSION STATE.GET C	This function returns the value of a CLOB page item.
	LOB("MY_CLOB_ITEM')	Tip: When using V('MY_ITEM'), apex_session_state.get_clob('MY_ITEM') or similar in a SQL query, Oracle recommends using Fast Dual functionality => (select v('my_item') from dual) to improve performance.
PL/SQL	APEX_SESSION_STATE.GET_N UMBER('MY_NUMERIC_ITEM')	This function returns the value of a page item as a <code>NUMBER</code> . The item's Format Mask is used to perform the conversion. <b>Tip:</b> When using <code>V('MY_ITEM')</code> , apex_session_state.get_clob('MY_ITEM') or similar in a SQL query, Oracle recommends using Fast Dual functionality => (select <code>v('my_item')</code> from dual) to improve performance.



Table 3-2 (Cont.) Syntax for Referencing Item Values

Туре	Syntax	Description
PL/SQL	APEX_SESSION_STATE.GET_T IMESTAMP('MY_NUMERIC_ITE M')	This function returns the value of a page item as a TIMESTAMP. The item's Format Mask is used to perform the conversion.
		<pre>Tip: When using V('MY_ITEM'), apex_session_state.get_clob('MY_ITEM') or similar in a SQL query, Oracle recommends using Fast Dual functionality =&gt; (select v('my_item') from dual) to improve performance.</pre>
Static text (exact)	Standard item syntax:  &MY ITEM.	For static text or an exact substitution, use the convention &ITEM NAME followed by a period (.).
Syntax for items containing special characters:  &"MY_ITEM".	To reference page items containing special, multibyte, or unicode characters, wrap the page item name in double quotation marks.  Page items of Session State Data Type CLOB cannot be references via this syntax. A different output mechanism must be used to fotch their values, such as a page item in Page.	
		be used to fetch their values, such as a page item in Read Only mode, a Display Only page item, or its manual output using a Dynamic Content region.



Changes in Oracle APEX API Reference in Oracle APEX API Reference

# 3.8.2 About Setting Session State

Set session state using form submissions, bind variables, computations, or f?p syntax. Session state can also be set using the APEX SESSION STATE.SET APIs.



Changes in Oracle APEX API Reference in Oracle APEX API Reference

#### **Methods for Setting Session State**

You can set the value of a page item in your application and therefore set session state using the following methods:

- · Form submission. See the next section.
- Bind variable. See Referencing Session State Using Bind Variable Syntax.
- Computation. See Understanding Application Computations.
- f?p syntax. See About Using f?p Syntax to Link Pages.

#### **About Setting Session State with a Form Submission**

When a user submits a page, the Oracle APEX engine automatically stores values typed into fields (items) in session state. For example, suppose you have an application containing two pages. The first page of the application contains a form in which a user can enter a phone number. You defined this form by creating an item named P1\_PHONENO. On the second page, you want to display the information the user enters in the form.

When the page is submitted, APEX captures the value entered in the phone number field and stores the value for future use. On the second page, the phone number entered by the user can then be retrieved from session state using the name P1\_PHONE\_NO with the appropriate syntax from Table 3-2.

#### **About Controlling How Items Write Session State**

You can control whether a page item writes its session state into persistent (disk) session state or just into memory by configuring the item attribute, **Maintain Session State**. Available Maintain Session State options include:

- **Per Request (Memory Only)** Do not save state in the database. State is only available when processing the current request. When AJAX requests need to use an item, make sure to pass the item name using the Page Items To Submit attribute.
- **Per Session (Disk)** Maintain for each session by storing the value in the database, to access it across requests.
- Per User (Disk) Value is saved in a user attribute repository and it is also available for later APEX sessions.



When creating database items that work with a Form region (for example as part of a wizard), **Per Request (Memory Only)** is the default. Per **User (Disk)** is not available for these items.



Controlling How Page Items Write Session State

### 3.8.3 Clearing Session State

Clearing a cached value resets the value to null. You can clear the cached value for specific items, all items on a page, all pages in an application, or the current user session.

- About Clearing Cache for an Item
   View examples for clearing cache for a single item.
- About Clearing Cache for All Page Items
   View examples for clearing cache for all page items.
- About Clearing Report Regions
   Learn about clearing report cache.



- Clearing Cache for an Entire Application
   View an eample of clearing cache for an application.
- About Resetting an Application Completely Learn about resetting an application completely.
- About Clearing Cache for the Current User Session
   View an example of clearing application cache for the current user session.

### 3.8.3.1 About Clearing Cache for an Item

View examples for clearing cache for a single item.

Clearing cache for a single item resets the value of the item to null. For example, you might use this approach to make sure a specific item's value is null when a page is prepared for rendering.

#### Example 3-4 Example: Clearing Cache for an Item

The following example uses standard f?p syntax to clear the cache for an item. This example calls page 5 of application 100. Placing MY\_ITEM in the ClearCache position of the f?p syntax resets the value of MY ITEM to NULL.

```
f?p=100:5:&APP_SESSION.::NO:MY_ITEM
```

The following example resets the value of the items THE EMPNO and THE DEPTNO:

```
f?p=100:5:&APP SESSION.::NO:THE EMPNO, THE DEPTNO
```

### 3.8.3.2 About Clearing Cache for All Page Items

View examples for clearing cache for all page items.

Caching application items is an effective way to maintain session state. However, there are occasions when you may want to clear the cache for all items on a page. For example, suppose you needed to clear all fields on a page when a user clicks a link that creates a new order. By clearing the cache for an entire page, you set the value of all items on the page to null.

#### Example 3-5 Example: Clearing Cache for Two Pages and Resetting Pagination

This example clears the session cache for two pages and resets pagination.

```
f?p=6000:6003:&APP_SESSION.::NO:RP,6004,6014
```

#### This example:

- Runs page 6003 of application 6000 and uses the current session ID.
- Indicates to not show debug information (NO).
- Clears all values maintained by the current session's cache for items of pages 6004 and 6014.
- Resets region pagination (RP) on page 6003 (the requested page).

#### Example 3-6 Example: Clearing Cache on a Page and Passing an Item Value

This example shows how to implement an update form. It clears existing information and sets the item's value (typically a primary key).

```
f?p=6000:6003:&APP_SESSION.::NO:6003:MY_ITEM:1234
```



#### This example:

- Runs page 6003 of application 6000 and uses the current session ID
- Indicates to not show debug information (NO)
- Clears all values maintained by the current session's cache for items on page 6003
- Sets the session state of an item called MY ITEM to the value 1234

# Example 3-7 Example: Clearing Session Cache on a Page and Passing Values to Multiple Items

This example demonstrates how to implement an update form. It clears existing information, sets the item's value (typically a primary key), and passes values to multiple items.

```
f?p=6000:6004:&APP SESSION.::No:6003:MY ITEM1,MY ITEM2,MY ITEM3:1234,,5678
```

#### This example:

- Runs page 6004 of application 6000 and uses the current session ID
- Clears the current session's cache for items on page 6003
- Indicates to not show debug information (NO)
- Sets the value of MY\_ITEM1 to 1234, sets the value of MY\_ITEM2 to null (indicated by the comma used as placeholder), and sets the value of MY\_ITEM3 to 5678

## 3.8.3.3 About Clearing Report Regions

Learn about clearing report cache.

Report settings can be cached. Depending on the report types, different settings are cached. Use the following to clear report cache settings:

- RR Resets interactive report, interactive grids, or classic report and also resets report
  pagination. If the target page contains interactive report or interactive grids, the report is
  returned to the default report settings specified by the developer or saved by the user. If
  the target page contains classic report, the report sorting resets to developer defined
  sorting.
- CR This applies only to interactive report. CR clears interactive report and resets report
  pagination. This clears all of the session report settings such as control break, aggregate,
  flashback, chart, number of rows to display, filter, highlight, computation, group by, and
  pivot.
- RP Resets interactive report or classic report pagination.

#### **Example 3-8 Resetting Report Settings and Pagination**

This example resets report settings and pagination of the target page report regions:

```
f?p=6000:6003:&APP SESSION.::NO:RR
```



Starting with Oracle APEX release 2.1, you do not need to define separate clear cache syntax to reset report and reset pagination. RR will handle both.



### 3.8.3.4 Clearing Cache for an Entire Application

View an eample of clearing cache for an application.

This example clears the application's cache by using f?p syntax and creating a Clear Cache argument using the keyword APP.

f?p=App:Page:Session::NO:APP

### 3.8.3.5 About Resetting an Application Completely

Learn about resetting an application completely.

Resetting the cache for an entire application does not restore the application to a completely reset state. For example, if an application includes on-new instance computations or on-new instance processes, the Oracle APEX engine runs these computations and processes when the application session is created. Then, it processes the clear cache request and displays the requested page.

To reset an application completely without a session ID (if no cookie is used to track the session ID), you must request it using a URL without a session ID, or by calling APEX\_UTIL.CLEAR\_APP\_CACHE from another application. If the session ID is tracked using a cookie, you must logout to reset the state.

### 3.8.3.6 About Clearing Cache for the Current User Session

View an example of clearing application cache for the current user session.

Another approach to clearing an application's cache is to create a Clear Cache argument using the keyword SESSION. For example:

f?p=6000:6004:12507785108488427528::NO:SESSION

## 3.8.4 Referencing Session State Using Bind Variable Syntax

Use bind variable syntax anywhere where you are using SQL or PL/SQL to reference session state of a specified item.

- About Using Bind Variable Syntax Learn about bind variable syntax.
- About Using Bind Variables in Regions Based on a SQL Query or LOV
   Learn about using bind variables in regions defined as a SQL Query, SQL Query
   (plsql function body returning SQL query), or list of values (LOV).
- About Using Bind Variables in Regions Based on PL/SQL Learn about using bind variables in regions based on PL/SQL.

### 3.8.4.1 About Using Bind Variable Syntax

Learn about bind variable syntax.

In the following example, the search string is a page item.

SELECT \* FROM employees WHERE last\_name like '%' || :SEARCH\_STRING || '%'



If the region type is defined as SQL Query, you can reference the value using standard SQL bind variable syntax. Using bind variables ensures that parsed representations of SQL queries are reused by the database, optimizing memory usage by the server.

When using bind variable syntax, remember the following rules:

- Bind variable names must correspond to an item name.
- Bind variable names are not case-sensitive.
- Bind variable names cannot be longer than 30 characters (that is, they must be a valid Oracle identifier).

Although page item and application item names can be up to 255 characters, if you intend to use an application item within SQL using bind variable syntax, the item name must be 30 characters or less.

The data type of bind variables is always VARCHAR2. When a bind variable semantically
contains a datetime or numeric value, you must perform an explicit conversion to the
appropriate data type. For example:

```
SELECT * FROM employees WHERE start_date < to_date(:DATE_STRING, 'DD-MON-
YYYY')</pre>
```

## 3.8.4.2 About Using Bind Variables in Regions Based on a SQL Query or LOV

Learn about using bind variables in regions defined as a SQL Query, SQL Query (plsql function body returning SQL query), or list of values (LOV).

If your region type is defined as a SQL Query, SQL Query (plsql function body returning SQL query), or list of values (LOV), you can reference session state using the following syntax:

```
:MY_ITEM
```

One common way to do this is to incorporate a session state variable in a where clause. The following example shows how to bind the value of the item  $\mathtt{THE\_DEPTNO}$  into a region defined from a SQL Query.

```
SELECT last_name, job_id, salary
FROM employees
WHERE department id = :THE_DEPTNO
```



About Regions for information about creating regions

## 3.8.4.3 About Using Bind Variables in Regions Based on PL/SQL

Learn about using bind variables in regions based on PL/SQL.

For region types, processes, computations, validations, conditions, and so on that are defined as PL/SQL dynamic content, regions are constructed using PL/SQL anonymous block syntax. In other words, the beginning and ending keywords are used to enclose the PL/SQL block. For example:

```
IF :P1_JOB IS NOT NULL THEN
   INSERT INTO employees (employee_id, first_name, job_id)
   VALUES (:P1_EMP_ID, :P1_NAME, :P1_JOB)
end if:
```

In this example, the values of the <code>employee\_id</code>, <code>first\_name</code>, and <code>job\_id</code> are populated by the values of P1 EMP ID, P1 NAME, and P1 JOB.

## 3.8.5 About Session Cloning

Use session cloning to open a new browser window in an Oracle APEX application and have it generate a new distinct session identifier and copy the session values from the original APEX session to the new one.

In previous releases, opening multiple windows (or browser tabs) in the same APEX application resulted in a number of issues. Typically, all the browser tabs shared the same session and session state which resulted in unpredictable and undesirable results.

To use session cloning, the developer must provide a method for end user to open a new browser tab and specify the REQUEST value of APEX\_CLONE\_SESSION. The following is an example URL:

```
f?p=&APP ID.:&APP PAGE ID.:&APP SESSION.:APEX CLONE SESSION
```

#### **Best Practices When Using Session Cloning**

When using this session cloning, developers should remember:

- The idle time associated with the Oracle APEX session would be affected by any
  of the APEX sessions, original or cloned ones.
- When a user logs out of one session (original or cloned), all other associated sessions will be logged out.
- The maximum session duration would be a function of the original APEX session and when it was created.
- An administrative user can enable or disable this feature using the procedure:

```
apex_instance_admin.set_parameter(
    p_parameter => 'CLONE_SESSION_ENABLED',
    p_value => 'Y');
```

See Also:

Oracle APEX API Reference

# 3.9 Using Substitution Strings

Use substitution strings within templates, region source, or any attribute to pass information and replace a character string with another value.



If an attribute supports substitutions, Page Designer help includes the section called **Additional Information** which describes the supported substitution strings. See Viewing Help in Page Designer.

- About Using Substitution Strings
   Learn about using substitution strings.
- Controlling Output Escaping in Substitution Strings
   Learn about controlling output escaping in substitution strings.
- About Determining Substitution String Usage within Templates
   Learn about determining substitution string usage within templates.
- Using Built-in Substitution Strings
   Learn about built-in substitution strings available in App Builder.

## 3.9.1 About Using Substitution Strings

Learn about using substitution strings.

You can use substitution strings in App Builder in the following ways:

- Include a substitution string within a template to reference component values
- Reference page or application items using &ITEM. syntax
- Use built-in substitution strings

### **Substitution Strings within Templates**

Special substitution strings available within a template are denoted by the number symbol (#). For example:

#ABC#



### Tip:

You can also use JavaScript API apex.util.applyTemplate to evaluate templates on the client side. See applyTemplate in *Oracle APEX JavaScript API Reference*.

#### **Substitution Strings for Page or Application Items**

To reference page or application items using substitution variables:

- Reference the page or application item in all capital letters.
- 2. Precede the item name with an ampersand (&).
- **3.** Append a period (.) to the item name.

For example, you would refer to an application item named F101\_X in a region, a region title, an item label, or in any of numerous other contexts in which static text is used, for example:

&F101 X.





#### Tip:

Notice the required trailing period. When the page is rendered, APEX engine replaces the value the substitution string with the value of the item  ${\tt F101\_X}$ .

#### Substitution Strings for Interactive Grid, Cards, and Map Columns

To reference columns in an interactive grid, cards page, or map page using substitution variables:

- 1. Reference the column name in all capital letters.
- 2. Precede the column name with an ampersand (&).
- **3.** Append a period (.) to the item name.

For example, to reference the interactive grid column ENAME:

&ENAME.

#### **Substitution Strings for Other Report Columns**

To reference columns in other reports using substitution variables:

- 1. Reference the column name in all capital letters.
- 2. Precede the column name with a pound sign (#).
- **3.** Append a pound sign (#) to the item name.

For example, to reference the interactive or classic report column ENAME:

#ENAME#

#### Using Double Quotation Marks for Special Characters or Case Sensitivity

Enclose items or columns with double quotation marks if the name contains special characters or is case sensitive. For example:

```
&"ITEM-OR-COLUMN-NAME".
```

#### Use the following syntax:

```
&"<name>"[!<format>].
```

#### Where:

- "<name>" is an application item or page item or column name. If not quoted, then it must be in set A-Z-0-9 \$#
- "<name>" is APP\_TEXT\$ < message-name>
   Where < message-name> is an APEX text message name.
- <format> is a predefined filter name: HTML, ATTR, JS, RAW, STRIPHTML as described in Controlling Output Escaping in Substitution Strings.



See Also:

**Translating Messages** 

# 3.9.2 Controlling Output Escaping in Substitution Strings

Learn about controlling output escaping in substitution strings.

You can escape special characters in the substitution value by appending an exclamation mark (!) followed by a predefined filter name to a page or application item name, report column, or other substitution string. Output escaping is an important security technique to avoid Cross Site Scripting (XSS) attacks in the browser. Oracle APEX already makes a best effort to automatically escape characters in a HTML or JavaScript context. With this extended syntax, developers have fine-grained control over the output.

#### **Available Escape Filters**

Available escape filters include:

- HTML escapes reserved HTML characters, for example:
  - Item:

&P1 DEPTNO!HTML.

Interactive grid column:

&ENAME!HTML.

Columns in other reports:

#ENAME!HTML#

See Also:

APEX\_ESCAPE.HTML in Oracle APEX API Reference

- ATTR escapes reserved characters in a HTML attribute context, for example:
  - Interactive grid column:

&ENAME!ATTR.

Columns in other reports:

#ENAME!ATTR#

See Also:

APEX\_ESCAPE.HTML\_ATTRIBUTE in Oracle APEX API Reference

- JS escapes reserved characters in a JavaScript context, for example:
  - Item:

&P1 DEPTNO!JS.



Interactive grid column:

&ENAME!JS.

Columns in other reports:

#ENAME!JS#



The JS escape filter is not supported by substitutions performed on the client.

✓ See Also:

APEX\_ESCAPE.JS\_LITERAL in Oracle APEX API Reference

- RAW preserves the original item value and does not escape characters, for example:
  - Item:

&P1 DEPTNO!RAW.

Interactive grid column:

&ENAME!RAW.

Columns in other reports:

#ENAME!RAW#

- STRIPHTML removes HTML tags from the output and escapes reserved HTML characters, for example:
  - Item:

&P1\_DEPTNO!STRIPHTML.

Interactive grid column:

&ENAME!STRIPHTML.

Columns in other reports:

#ENAME!STRIPHTML#

## 3.9.3 About Determining Substitution String Usage within Templates

Learn about determining substitution string usage within templates.

You can determine what template-specific substitution strings are supported in which templates by viewing the template definition. See Creating Custom Themes.

## 3.9.4 Using Built-in Substitution Strings

Learn about built-in substitution strings available in App Builder.



App Builder supports many built-in substitution strings. You can reference these substitution strings to achieve specific types of functionality.



### Tip:

Note that bind variable : USER has special meaning within the database. Also, the term **Direct PL/SQL** refers to PL/SQL that can be used in stored database objects such as procedures and functions.

- APEX\_FILES
- APEX\$ROW NUM
- APEX\$ROW\_SELECTOR
- APEX\$ROW STATUS
- APP\_ID
- APP ALIAS
- APP\_AJAX\_X01, ... APP\_AJAX\_X10
- APP\_BUILDER\_SESSION
- APP\_DATE\_TIME\_FORMAT
- APP\_FILES
- APP\_NLS\_DATE\_FORMAT
- APP NLS TIMESTAMP FORMAT
- APP\_NLS\_TIMESTAMP\_TZ\_FORMAT
- APP\_PAGE\_ALIAS
- APP PAGE ID
- APP\_REGION\_ID
- APP REGION STATIC ID
- APP\_REQUEST\_DATA\_HASH
- APP SESSION
- APP\_SESSION\_VISIBLE
- APP\_TITLE
- APP\_UNIQUE\_PAGE\_ID
- APP USER
- APP\_VERSION
- AUTHENTICATED\_URL\_PREFIX
- BROWSER LANGUAGE
- CURRENT\_PARENT\_TAB\_TEXT
- DEBUG
- HOME\_LINK



- JET\_BASE\_DIRECTORY
- JET\_CSS\_DIRECTORY
- JET\_JS\_DIRECTORY
- LOGIN\_URL
- LOGOUT\_URL
- APP\_TEXT\$Message\_Name, APP\_TEXT\$Message\_Name\$Lang
- PRINTER\_FRIENDLY
- PROXY\_SERVER
- PUBLIC\_URL\_PREFIX
- REQUEST
- Using REQUEST
- SCHEMA OWNER
- SQLERRM
- SYSDATE\_YYYYMMDD
- THEME\_DB\_FILES
- THEME\_FILES
- WORKSPACE\_FILES
- WORKSPACE\_ID



Substitutions and Establishing User Identity Through Authentication

## 3.9.4.1 APEX FILES



IMAGE\_PREFIX has been renamed to APEX\_FILES. Although the legacy name, IMAGE PREFIX, is still supported, Oracle recommends using the new name.

The value of APEX\_FILES determines the virtual path the web server uses to point to the images directory distributed with Oracle APEX. To reference uploaded images, use WORKSPACE FILES and APP FILES.

Table 3-3 APEX\_FILES Syntax

Reference Type	Syntax
Bind variable	:APEX_FILES



Table 3-3 (Cont.) APEX\_FILES Syntax

Reference Type	Syntax
Direct PL/SQL	<b>Note</b> : Direct PL/SQL is an exception. Use <code>G_IMAGE_PREFIX</code> as described in this example.
	APEX_APPLICATION.G_IMAGE_PREFIX
PL/SQL	V('APEX_FILES')
Substitution string	&APEX_FILES.
Template Substitution	#APEX_FILES#

### See Also:

- APP\_FILES
- WORKSPACE\_FILES
- · Editing the Application Definition

### 3.9.4.2 APEX\$ROW NUM

APEX\$ROW\_NUM refers the currently processed row number of a submitted tabular form data. You can use this placeholder in validations, processes, and conditions associated with a tabular form to refer to the row number of the currently processed tabular form row.

Table 3-4 APEX\$ROW\_NUM Syntax

Reference Type	Syntax
Bind variable	:APEX\$ROW_NUM
PL/SQL	V('APEX\$ROW_NUM')
Substitution string	&APEX\$ROW_NUM.

## 3.9.4.3 APEX\$ROW\_SELECTOR

Use  $APEX$ROW\_SELECTOR$  in validations, processes, and conditions associated with a tabular form to refer to the row selector checkbox in a tabular form. This placeholder returns x if the tabular form row selector checkbox of the currently processed tabular form row is checked and NULL if it unchecked.

Table 3-5 APEX\$ROW\_SELECTOR Syntax

Reference Type	Syntax
Bind variable	:APEX\$ROW_SELECTOR
PL/SQL	V('APEX\$ROW_SELECTOR')
Substitution string	&APEX\$ROW_SELECTOR.



### 3.9.4.4 APEX\$ROW STATUS

Use APEX\$STATUS in validations, processes, and conditions associated with a tabular form to refer to the row status in a tabular form. This placeholder returns the status of  ${\tt C}$  if created,  ${\tt U}$  if updated, or  ${\tt D}$  if deleted for the currently processed tabular form row.

Table 3-6 APEX\$ROW\_STATUS Syntax

Reference Type	Syntax
Bind variable	:APEX\$ROW_STATUS
PL/SQL	V('APEX\$ROW_STATUS')
Substitution string	&APEX\$ROW_STATUS.

## 3.9.4.5 APP\_ID

 ${\tt APP}\ {\tt ID}$  identifies the application ID of the currently executing application.

Table 3-7 APP\_ID Syntax

Reference Type	Syntax
Bind variable	:APP_ID
Direct PL/SQL	APEX_APPLICATION.G_FLOW_ID (A NUMBER)
PL/SQL	NV('APP_ID')
Substitution string	&APP_ID.
SYS_CONTEXT variable	SYS_CONTEXT('APEX\$SESSION', 'APP_ID')

#### **Substitution String Reference Example**

The following is an example of a substitution string reference:

```
f?p=&APP_ID.:40:&APP_SESSION.
```

#### SYS\_CONTEXT Variable Example

The following is a SYS CONTEXT variable example:

```
SELECT ... WHERE application id = SYS CONTEXT('APEX$SESSION', 'APP ID')
```

APEX sets up the APEX\$SESSION context when it starts to process an incoming request. For example, you can use the value of 'APP\_ID' to access the current application ID in queries and Virtual Private Database (VPD) security policies that protect your table data.

### 3.9.4.6 APP ALIAS

APP\_ALIAS is an alphanumeric name for the current application. APP\_ALIAS is different from the APP\_ID in that the APP\_ID must be unique over all workspaces and all applications hosted in one database. In contrast, APP\_ALIAS must be unique within a workspace. For example, by using the same APP\_ALIAS you can create the application, ABC, in two different workspaces. You can use APP\_ALIAS almost anywhere APP\_ID



can be used. For example, f?p syntax can use an  $APP\_ALIAS$  or an application ID as demonstrated in this example:

f?p=ABC:1:&APP\_SESSION.

This example runs application ABC, page 1 using the current session.

Table 3-8 APP\_ALIAS Syntax

Reference Type	Syntax
Bind variable	:APP_ALIAS
PL/SQL	V('APP_ALIAS')
Substitution string	&APP_ALIAS.

#### The following is an HTML example:

Click me to go to page 1 <a href="f?p=&APP\_ALIAS.:1:&APP\_SESSION."> of the current application</a>

## 3.9.4.7 APP\_AJAX\_X01, ... APP\_AJAX\_X10

APP\_AJAX\_Xnn specifies the values of the APP\_AJAX\_X01, ... APP\_AJAX\_X10 URL parameters most recently passed to or set within the show or accept modules. You typically use these variables in On Demand AJAX processes.

Table 3-9 APP\_AJAX\_Xnn Syntax

Reference Type	Syntax
Bind variable	: APP_AJAX_X01,: APP_AJAX_X10
PL/SQL	v('APP_AJAX_X01'), v('APP_AJAX_X10')
Substitution string	&APP_AJAX_X01., &APP_AJAX_X10.



 $G_X01$ , ...  $G_X10$  variables in APEX\_APPLICATION in *Oracle APEX API Reference* 

## 3.9.4.8 APP\_BUILDER\_SESSION

If the user is also logged in to the workspace as a developer, <code>APP\_BUILDER\_SESSION</code> contains the current session ID of the development environment. Otherwise, <code>APP\_BUILDER\_SESSION</code> is null.



Table 3-10 APP\_BUILDER\_SESSION Syntax

Reference Type	Syntax
Bind variable	:APP_BUILDER_SESSION
PL/SQL	V('APP_BUILDER_SESSION')
Substitution string	&APP_BUILDER_SESSION.

### 3.9.4.9 APP\_DATE\_TIME\_FORMAT

APP\_DATE\_TIME\_FORMAT is the application date time format of the application. This value reflects the format specified in the Application Date Time Format attribute of the Globalization settings of an application. If the Application Date Time Format is not set in an application, then a reference to APP\_DATE\_TIME\_FORMAT returns the database session NLS date format and the NLS time format.

Table 3-11 APP\_DATE\_TIME\_FORMAT Syntax

Reference Type	Syntax
Bind variable	:APP_DATE_TIME_FORMAT
PL/SQL	V('APP_DATE_TIME_FORMAT')
Substitution string	&APP_DATE_TIME_FORMAT.

### 3.9.4.10 APP FILES



APP\_IMAGES has been renamed to APP\_FILES. Although the legacy name, APP IMAGES, is still supported, Oracle recommends using the new name.

Use this substitution string to reference uploaded images, JavaScript, and cascading style sheets that are specific to a given application and are not shared over many applications. If you upload a file and make it specific to an application, then you must use this substitution string, or bind variable.

Table 3-12 APP\_FILES Syntax

Reference Type	Syntax
Bind variable	:APP_FILES
Direct PL/SQL	Not available.
PL/SQL	V('APP_FILES')
Substitution string	&APP_FILES.
Template substitution	#APP_FILES#



See Also:

APEX\_FILES, WORKSPACE\_FILES, and About Managing Images

### 3.9.4.11 APP NLS DATE FORMAT

APP\_NLS\_DATE\_FORMAT is the application date format of the database session. This value reflects the format specified in the Application Date Format attribute of the Globalization settings of the application. However, if the Application Date Format is not set, then APP\_NLS\_DATE\_FORMAT returns the NLS\_DATE\_FORMAT value of the database session at the start of the request to the APEX engine.

Table 3-13 APP\_NLS\_DATE\_FORMAT Syntax

Reference Type	Syntax
Bind variable	:APP_NLS_DATE_FORMAT
PL/SQL	V('APP_NLS_DATE_FORMAT')
Substitution string	&APP_NLS_DATE_FORMAT.

### 3.9.4.12 APP NLS TIMESTAMP FORMAT

APP\_NLS\_TIMESTAMP\_FORMAT is the application timestamp format of the database session. This value reflects the format specified in the Application Timestamp Format attribute of the Globalization settings of the application. However, if the Application Timestamp Format is not set, then APP\_NLS\_TIMESTAMP\_FORMAT return the NLS\_TIMESTAMP\_FORMAT value of the database session at the start of the request to the APEX engine.

Table 3-14 APP\_NLS\_TIMESTAMP\_FORMAT Syntax

Reference Type	Syntax
Bind variable	:APP_NLS_TIMESTAMP_FORMAT
PL/SQL	V('APP_NLS_TIMESTAMP_FORMAT')
Substitution string	&APP_NLS_TIMESTAMP_FORMAT.

## 3.9.4.13 APP\_NLS\_TIMESTAMP\_TZ\_FORMAT

APP\_NLS\_TIMESTAMP\_TZ\_FORMAT is the application timestamp time zone format of the database session. This value reflects the format specified in the Application Timestamp Time Zone Format attribute of the Globalization settings of an application. However, if the Application Timestamp Time Zone Format is not set, then APP\_NLS\_TIMESTAMP\_TZ\_FORMAT returns the NLS\_TIMESTAMP\_TZ\_FORMAT value of the database session at the start of the request to the APEX engine.

Table 3-15 APP\_NLS\_TIMESTAMP\_TZ\_FORMAT Syntax

Reference Type	Syntax
Bind variable	:APP_NLS_TIMESTAMP_TZ_FORMAT

Table 3-15 (Cont.) APP\_NLS\_TIMESTAMP\_TZ\_FORMAT Syntax

Reference Type	Syntax
PL/SQL	V('APP_NLS_TIMESTAMP_TZ_FORMAT')
Substitution string	&APP_NLS_TIMESTAMP_TZ_FORMAT.

### 3.9.4.14 APP PAGE ALIAS

APP\_PAGE\_ALIAS is an alphanumeric name for the current application page. A page alias is not case-sensitive and it is an optional page attribute. APP\_PAGE\_ALIAS is unique within an application. You can use APP\_PAGE\_ALIAS almost anywhere APP\_PAGE\_ID can be used.

Table 3-16 APP\_PAGE\_ALIAS Syntax

Reference Type	Syntax
Bind variable	:APP_PAGE_ALIAS
PL/SQL	v('APP_PAGE_ALIAS')
Substitution string	&APP_PAGE_ALIAS.

The following is an HTML example:

The alias of the current page is: &APP PAGE ALIAS.

### 3.9.4.15 APP PAGE ID

APP\_PAGE\_ID is the current application page ID. For example, if your application was on page 3, then the result would be 3. Using this syntax is useful when writing application components that must work generically in multiple applications.

Table 3-17 APP\_PAGE\_ID Syntax

Reference Type	Syntax
Bind variable	:APP_PAGE_ID
PL/SQL	:APP_PAGE_ID
PL/SQL and Direct PL	NV('APP_PAGE_ID')
Substitution string	&APP_PAGE_ID.

The following is an example of a substitution string reference:

f?p=&APP\_ID.:&APP\_PAGE\_ID.:&APP\_SESSION.

### 3.9.4.16 APP\_REGION\_ID

APP REGION ID identifies the ID of the current executing region.



Table 3-18 APP\_REGION\_ID Syntax

Reference Type	Syntax
Bind variable	:APP_REGION_ID
PL/SQL	v('APP_REGION_ID')
Substitution string	&APP_REGION_ID.

## 3.9.4.17 APP\_REGION\_STATIC\_ID

APP\_REGION\_STATIC\_ID identifies the static ID of the current executing region. If no static ID has been entered by a developer, NULL is returned.

Table 3-19 APP\_REGION\_STATIC\_ID Syntax

Reference Type	Syntax
Bind variable	:APP_REGION_STATIC_ID
PL/SQL	v('APP_REGION_STATIC_ID')
Substitution string	&APP_REGION_STATIC_ID.

## 3.9.4.18 APP\_REQUEST\_DATA\_HASH

APP\_REQUEST\_DATA\_HASH is a hash value of the request, item name, and item value parts in the URL. It is primarily useful to detect whether two browser requests passed different parameters to APEX.

Table 3-20 APP\_REQUEST\_DATA\_HASH Syntax

Reference Type	Syntax
Bind variable	:APP_REQUEST_DATA_HASH
PL/SQL	V('APP_REQUEST_DATA_HASH')
Substitution string	&APP_REQUEST_DATA_HASH.

## 3.9.4.19 APP\_SESSION

APP\_SESSION is the most commonly used built-in substitution strings. You can use this substitution string to create hypertext links between application pages that maintain a session state by passing the session number. Note that you can also use the substitution string SESSION in place of APP\_SESSION.

Table 3-21 APP\_SESSION Syntax

Reference Type	Syntax
Bind variable	:APP_SESSION
PL/SQL	V('APP_SESSION')



Table 3-21 (Cont.) APP\_SESSION Syntax

Reference Type	Syntax
Short PL/SQL	V('SESSION')
Substitution string	&APP_SESSION.
SYS_CONTEXT variable	SYS_CONTEXT('APEX\$SESSION', 'APP_SESSION')

### Consider the following examples:

From within an HTML region:

```
<a href="f?p=100:5:&APP_SESSION.">click me</a>
```

Using PL/SQL:

```
htf.anchor('f?p=100:5:'||V('APP_SESSION'),'click me');
```

Using a SQL query:

```
SELECT htf.anchor('f?p=100:5:'||:APP SESSION,'click me') FROM DUAL;
```

Using the SYS CONTEXT variable:

```
SELECT ... WHERE apex session id = SYS CONTEXT('APEX$SESSION', 'APP SESSION')
```

APEX sets up the APEX\$SESSION context when it starts to process an incoming request. For example, you can use the value of 'APP\_SESSION' to access the current application session in queries and VPD (Virtual Private Database) security policies that protect your table data.

## 3.9.4.20 APP\_SESSION\_VISIBLE

APP\_SESSION\_VISIBLE is similar to the built-in substitution APP\_SESSION. Use this substitution string to create hypertext links between application pages that maintain a session state by passing the session number. APP\_SESSION\_VISIBLE always returns '0' when users are not authenticated to an application and they are using the Zero Session ID feature of APEX.

Table 3-22 APP\_SESSION\_VISIBLE Syntax

Reference Type	Syntax
Bind variable	:APP_SESSION_VISIBLE
PL/SQL	V('APP_SESSION_VISIBLE')
Substitution string	&APP_SESSION_VISIBLE.

#### Consider the following examples:

From within an HTML region:

```
<a href="f?p=100:5:&APP SESSION VISIBLE.">click me</a>
```

Using PL/SQL:

```
sys.htf.anchor('f?p=100:5:'||V('APP SESSION VISIBLE'),'click me');
```

Using a SQL query:

SELECT sys.htf.anchor('f?p=100:5:'||:APP SESSION VISIBLE,'clickme') FROM DUAL;

### 3.9.4.21 APP\_TITLE

APP\_TITLE is an alphanumeric title for the current application. The title is derived from an application substitution string called APP\_TITLE. If not defined the Logo attribute will be used if it is of type text. The last fallback is the application name.

Table 3-23 APP\_TITLE Syntax

Reference Type	Syntax
Bind variable	:APP_TITLE
PL/SQL	v('APP_TITLE')
Substitution string	&APP_TITLE.

#### The following is an HTML example:

The title of the current application is: &APP TITLE!HTML.

### 3.9.4.22 APP UNIQUE PAGE ID

APP\_UNIQUE\_PAGE\_ID is an integer generated from an Oracle sequence which is unique for each page view. This number is used by applications to prevent duplicate page submissions and can be used for other purposes. For example, to make a unique URL and avoid browser caching issues, you can embed this number in the request or debug column in calls to the f procedure.

Table 3-24 APP UNIQUE PAGE ID Syntax

Reference Type	Syntax
Bind variable	:APP_UNIQUE_PAGE_ID
PL/SQL	V('APP_UNIQUE_PAGE_ID')
Substitution string	&APP_UNIQUE_PAGE_ID.

#### The following is an HTML example:

```
SELECT 'f?p=100:1:'||:APP_SESSION||':'||:APP_UNIQUE_PAGE_ID||
    ':::P1_EMPNO:'||employee_id,
    first_name,
    job_id
FROM employees
```

Note the use of the APP\_UNIQUE\_PAGE\_ID in the request column. This makes this URL unique and may avoid excessive browser caching problems.

### 3.9.4.23 APP USER

APP\_USER is the current user running the application. Depending upon your authentication model, the value of the user is set differently. If the application is running using database authentication, then the value of the user is the same as the database pseudo column USER. If the application uses an authentication scheme that requires the user to authenticate, the

value of  ${\tt APP\_USER}$  is set by the authentication scheme, usually to the user name used during authentication.

Table 3-25 APP\_USER Syntax

Reference Type	Syntax
Bind variable	:APP_USER
PL/SQL	V('APP_USER')
Substitution string	&APP_USER.
SYS_CONTEXT variable	SYS_CONTEXT('APEX\$SESSION', 'APP_USER')

#### Consider the following examples:

From within an HTML region:

Hello you are logged in as &APP\_USER.

Using PL/SQL:

htp.p('Hello you are logged in as'||V('APP\_USER'));

As a bind variable:

SELECT \* FROM some\_table WHERE user\_id = :APP\_USER

Using the SYS CONTEXT variable:

```
SELECT ... WHERE username = SYS CONTEXT('APEX$SESSION', 'APP USER')
```

APEX sets up the APEX\$SESSION context when it starts to process an incoming request. For example, you can use the value of 'APP\_USER' to access the current application user in queries and VPD (Virtual Private Database) security policies that protect your table data.



Authentication for information about the Public User attribute

### **3.9.4.24 APP VERSION**

Use  $APP\_VERSION$  to get the entered version of your application. You can use  $APP\_VERSION$  to display it in your application or append it to external static files to automatically invalidate the browser cache when the application gets updated.

Table 3-26 APP\_VERSION Syntax

Reference Type	Syntax
Substitution string	#APP_VERSION#

## 3.9.4.25 AUTHENTICATED\_URL\_PREFIX

This application-level attribute identifies a valid authenticated prefix (that is, a logged in URL prefix). You can use a relative path or a full path beginning with http. This item is

useful if your application can be run in both authenticated (logged in) and public (not logged in) modes. You can use AUTHENTICATED\_URL\_PREFIX to construct a link to an authenticated page. This item is most useful when using basic database authentication because changes to the URL can require authentication.

Table 3-27 AUTHENTICATED\_URL\_PREFIX Syntax

Reference Type	Syntax
Bind variable	:AUTHENTICATED_URL_PREFIX
PL/SQL	V('AUTHENTICATED_URL_PREFIX')
Substitution string	&AUTHENTICATED_URL_PREFIX.

### 3.9.4.26 BROWSER\_LANGUAGE

BROWSER LANGUAGE refers to the web browser's current language preference.

Table 3-28 BROWSER\_LANGUAGE Syntax

Reference Type	Syntax
Bind variable	:BROWSER_LANGUAGE
Direct PL/SQL	APEX_APPLICATION.G_BROWSER_LANGUAGE
PL/SQL	V('BROWSER_LANGUAGE')
Substitution string	&BROWSER_LANGUAGE.

### 3.9.4.27 CURRENT PARENT TAB TEXT

CURRENT\_PARENT\_TAB\_TEXT is most useful in page templates, but is only relevant for applications that use two-level tabs (that is, parent and standard tabs). Use this string to reference the parent tab label. This substitution string enables you to repeat the currently selected parent tab within the page template.

Table 3-29 CURRENT\_PARENT\_TAB\_TEXT Syntax

Reference Type	Syntax
Bind variable	Not Available.
Substitution string	&CURRENT_PARENT_TAB_TEXT.

### 3.9.4.28 DEBUG

Valid values for the <code>DEBUG</code> flag are <code>Yes</code> or <code>No</code>. Turning debug on shows details about application processing. If you write your own custom code, you may want to generate debug information only if the debug mode is set to <code>Yes</code>.



Table 3-30 DEBUG Syntax

Reference Type	Syntax
Bind variable	:DEBUG
Direct PL/SQL	APEX_APPLICATION.G_DEBUG
PL/SQL	V('DEBUG')
Substitution string	&DEBUG.

The following is an example of a substitution string reference that preserves the current value of <code>DEBUG</code>:

f?p=100:1:&APP SESSION.::&DEBUG

### 3.9.4.29 HOME LINK

HOME\_LINK is the home page of an application. The APEX engine redirects to this location if no page is given and if no alternative page is dictated by the authentication scheme's logic. You define the Home URL on the User Interface page, under **Attributes**.

Table 3-31 HOME\_LINK Syntax

Reference Type	Syntax
Direct PL/SQL	APEX_APPLICATION.G_HOME_LINK
PL/SQL	V('HOME_LINK')
Template Reference	#HOME_LINK#
Substitution String	&HOME_LINK.



Editing User Interface Attributes and Attributes

## 3.9.4.30 JET\_BASE\_DIRECTORY

Use the <code>JET\_BASE\_DIRECTORY</code> substitution string to reference the base directory of the Oracle JavaScript Extension Toolkit (JET) which ships with APEX. Supported syntax for referencing <code>JET\_BASE\_DIRECTORY</code>:

#JET\_BASE\_DIRECTORY#

## 3.9.4.31 JET\_CSS\_DIRECTORY

Use the <code>JET\_CSS\_DIRECTORY</code> substitution string to reference the base directory of the Oracle JavaScript Extension Toolkit (JET) which ships with APEX. Supported syntax for referencing <code>JET\_CSS\_DIRECTORY</code>:



**#JET CSS DIRECTORY#** 

### 3.9.4.32 JET\_JS\_DIRECTORY

Use the JET\_JS\_DIRECTORY substitution string to reference the JavaScript directory of the Oracle JavaScript Extension Toolkit (JET) components which ships with APEX. Supported syntax for referencing JET JS DIRECTORY:

**#JET JS DIRECTORY#** 

### 3.9.4.33 LOGIN URL

Use LOGIN URL to display a link to a login page for users that are not currently logged in.



Authentication and Security Page

Table 3-32 LOGIN\_URL Syntax

Reference Type	Syntax
Bind variable	:LOGIN_URL
Direct PL/SQL	APEX_APPLICATION.G_LOGIN_URL
PL/SQL	V('LOGIN_URL')
Substitution string	&LOGIN_URL.
Template Substitution	#LOGIN_URL#

### 3.9.4.34 LOGOUT URL

LOGOUT\_URL is an application-level attribute used to identify the logout URL. This is a URL that navigates the user to a logout page or optionally directly logs out a user. To create a logout navigation bar entry, add a trailing period to &LOGOUT\_URL (&LOGOUT\_URL.). If you are coding a page template, use #LOGOUT URL#.

Table 3-33 LOGOUT\_URL Syntax

Reference Type	Syntax
Bind variable	:LOGOUT_URL
PL/SQL	V('LOGOUT_URL')
Substitution string	&LOGOUT_URL.
Template substitution	#LOGOUT_URL#

### 3.9.4.35 APP\_TEXT\$Message\_Name, APP\_TEXT\$Message\_Name\$Lang

With APP\_TEXT\$Message\_Name, APP\_TEXT\$Message\_Name\$Lang built-in substitution, you can access application defined or system defined text messages, like APEX\_LANG.MESSAGE.

Message Name is the name of the text message, Message Name has to be a valid identifier (A-



Table 3-34 APP\_TEXT\$Message\_Name, APP\_TEXT\$Message\_Name\$Lang Syntax

translation, \$Lang defaults to the current language for the page request.

Reference Type	Syntax
Bind variable	:APP_TEXT\$Message_Name , :APP_TEXT\$Message_Name\$Lang
PL/SQL	<pre>V('APP_TEXT\$Message_Name') , V('APP_TEXT\$Message_Name\$Lang')</pre>
Substitution string	&APP_TEXT\$Message_Name. , &APP_TEXT\$Message_Name\$Lang.

The following is an example for the default and the French text message MY\_MESSAGE, using HTML escaping:

```
Default text: &APP_TEXT$MY_MESSAGE!HTML.
Pardon my French: &APP TEXT$MY MESSAGE$FR!HTML.
```

### 3.9.4.36 PRINTER\_FRIENDLY

The value of PRINTER\_FRIENDLY determines if the APEX engine is running in print view mode. This setting can be referenced in conditions to eliminate elements not desired in a printed document from a page.

Table 3-35 PRINTER\_FRIENDLY Syntax

Reference Type	Syntax
Direct PL/SQL	APEX_APPLICATION.G_PRINTER_FRIENDLY (VARCHAR2 DATATYPE)
PL/SQL	V('PRINTER_FRIENDLY')
Substitution string	&PRINTER_FRIENDLY.

## 3.9.4.37 PROXY\_SERVER

PROXY\_SERVER is an application attribute. The attribute may be used by regions whose source comes from a URL. The following is the correct syntax for a direct PL/SQL reference used when you are writing PL/SQL to access remote web servers from within the database (for example, when using the utl\_http package shipped with the database).

APEX APPLICATION.G PROXY SERVER

### 3.9.4.38 PUBLIC URL PREFIX

PUBLIC\_URL\_PREFIX is an application-level attribute that identifies a URL to toggle out of a logged in mode to a public view.



Table 3-36 PUBLIC\_URL\_PREFIX Syntax

Reference Type	Syntax
Bind variable	:PUBLIC_URL_PREFIX
PL/SQL	V('PUBLIC_URL_PREFIX')
Substitution string	&PUBLIC_URL_PREFIX.
Template substitution	#PUBLIC_URL_PREFIX#

### 3.9.4.39 REQUEST

Each application button sets the value of REQUEST to the name of the button or to the request value attribute associated with the button, enabling accept processing to reference the name of the button when a user clicks it. In the f?p syntax, REQUEST may be set using the fourth argument.

REQUEST is typically referenced during Accept processing (that is, the processing that occurs when you post a page).

Table 3-37 REQUEST Syntax

Reference Type	Syntax
Bind variable	:REQUEST
Direct PL/SQL	APEX_APPLICATION.G_REQUEST
PL/SQL	V('REQUEST')
Substitution string	&REQUEST.



### 3.9.4.40 Using REQUEST

REQUEST is typically referenced during Accept processing (that is, the processing that occurs when you post a page). This section describes additional information about how to use the REQUEST substitution string.

- About Scope and Value of REQUEST for Posted Pages
- About the When Button Pressed Attribute
- About Referencing REQUEST Using Declarative Conditions
- About Using REQUEST for Show Processing
- About Using BRANCH TO PAGE ACCEPT





### 3.9.4.40.1 About Scope and Value of REQUEST for Posted Pages

When you post a page, you initiate Accept processing. Accept processing consists of computations, validations, processes, and branches. The value of REQUEST is available during each phase of the Accept processing. Once an application branches to a different page then REQUEST is set to NULL.

The value of REQUEST is the name of the button the user clicks, or the name of the tab the user selects. For example, suppose you have a button with a name of CHANGE, and a label Apply Change. When a user clicks the button, the value of REQUEST is CHANGE.

#### 3.9.4.40.2 About the When Button Pressed Attribute

Validations, processes, and branches have a When Button Pressed attribute. This attribute displays as a select list and contains the names of buttons that exist on the current page. If you make a selection from When Button Pressed, you associate the button's REQUEST value with the validation, process, or branch.

When you use a button to submit a page, the REQUEST value is passed to the page. The Accept processing logic evaluates each validation, process, and branch that uses a When Button Pressed attribute to determine whether the component should run (or fire). When one of these components runs, do not assume that a user actually clicked the associated button and caused the page to be submitted. Keep in mind, that another button using the same request value may have submitted the page. Similarly, JavaScript on the page can also submit the page and pass in a request value.

### 3.9.4.40.3 About Referencing REQUEST Using Declarative Conditions

Many developers reference REQUEST using conditions. For example, you may want to reset pagination when a user clicks  $\mathbf{Go}$  on a report page. You can reset pagination by creating an on-submit page process. The page process can be made conditional using the condition Request = Expression 1.

To conditionalize an on-submit page process:

- **1.** Under Condition, select the condition type **Request = Expression 1**.
- 2. In Expression 1, enter GO.

### 3.9.4.40.4 About Using REQUEST for Show Processing

You can also use REQUEST for Show processing when navigating to a page using f?p syntax. For example:

f?p=100:1:&APP SESSION.:GO

Remember that the fourth argument in the f?p syntax is REQUEST. This example goes to application 100, page 1 for the current session, and sets the value of REQUEST to GO. Any process or region can reference the value of REQUEST using Show processing.



The following is a similar example using PL/SQL:

```
IF V ('REQUEST') = 'GO' THEN
  htp.p('hello');
END IF;
```

Note that htp.p('hello') is a call to a PL/SQL Web Toolkit package to print the specified text string.



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### 3.9.4.40.5 About Using BRANCH TO PAGE ACCEPT

You can use a special request  $BRANCH_TO_PAGE_ACCEPT$  for Show processing to automatically submit the page. For example:

```
f?p=100:1:&APP SESSION.:BRANCH TO PAGE ACCEPT|SAVE:::P1 DATA:value
```

Using BRANCH\_TO\_PAGE\_ACCEPT is the same as navigating to page 1, entering a value into the item P1 DATA, and clicking a button that submits the page with a SAVE request.

### **3.9.4.41 SCHEMA OWNER**

If you are generating calls to applications from within your PL/SQL code, you must reference the owner of the APEX schema. The following describes the correct syntax for a direct PL/SQL reference:

```
APEX_APPLICATION.G_FLOW_SCHEMA_OWNER
```

You may also use #FLOW\_OWNER# to reference this value in SQL queries and PL/SQL (for example, in a region or a process).

### 3.9.4.42 SQLERRM

SQLERRM is a template substitution only available in the Applications Region Error Message. Supported syntax for a region template substitution reference:

#SQLERRM#

## 3.9.4.43 SYSDATE\_YYYYMMDD

SYSDATE\_YYYYMMDD represents the current date on the database server, with the YYYYMMDD format mask applied. You may use this value instead of repeated calls to the SYSDATE() function. The following list describes the supported syntax for referencing SYSDATE YYYYMMDD.

Bind variable

```
:SYSDATE YYYYMMDD
```

PL/SQL

```
V('SYSDATE YYYYMMDD')
```

#### Direct PL/SQL

APEX APPLICATION.G SYSDATE (DATE DATATYPE)

#### Table 3-38 SYSDATE\_YYYYMMDD Syntax

Reference Type	Syntax
Bind variable	:SYSDATE_YYYYMMDD
Direct PL/SQL	APEX_APPLICATION.G_SYSDATE (DATE DATATYPE)
PL/SQL	V('SYSDATE_YYYYMMDD')

### 3.9.4.44 THEME DB FILES



THEME\_DB\_IMAGES has been renamed to THEME\_DB\_FILES. Although the legacy name, <code>THEME\_DB\_IMAGES</code>, is still supported, Oracle recommends using the new name.

Use the <code>THEME\_DB\_FILES</code> substitution string to always reference files which are stored with your theme definition in the database, regardless of the "File Prefix" setting of your theme. Supported syntax for a template substitution:

#THEME\_DB\_FILES#

## 3.9.4.45 THEME\_FILES



THEME\_IMAGES has been renamed to THEME\_FILES. Although the legacy name, THEME\_IMAGES, is still supported, Oracle recommends using the new name.

Use the  $\tt THEME\_FILES$  substitution string to reference files which are stored with your theme definition. Supported syntax for a template substitution:

#THEME FILES#

### 3.9.4.46 WORKSPACE\_FILES



WORKSPACE\_IMAGE has been renamed to WORKSPACE\_FILES. Although the legacy name, WORKSPACE\_IMAGE, is still supported, Oracle recommends using the new name.

Use this substitution string to reference uploaded images, JavaScript, and cascading style sheets that are shared over many applications within a workspace.

Table 3-39 WORKSPACE\_FILES Syntax

Reference Type	Syntax
Bind variable	:WORKSPACE_FILES
Direct PL/SQL	Not available
PL/SQL	V('WORKSPACE_FILES')
Substitution string	&WORKSPACE_FILES.
Template substitution	#WORKSPACE_FILES#

✓ See Also:
APP\_FILES and APEX\_FILES

## 3.9.4.47 WORKSPACE\_ID

Use this substitution string to reference the workspace ID.

Table 3-40 WORKSPACE\_ID Syntax

Reference Type	Syntax
Bind variable	:WORKSPACE_ID
PL/SQL	V('WORKSPACE_ID')
Substitution string	&WORKSPACE_ID.
SYS_CONTEXT variable	<pre>SELECT WHERE workspace_id = SYS_CONTEXT('APEX\$SESSION', ''WORKSPACE_ID')</pre>

#### Consider the following examples:

From within an HTML region:

Hello your workspace id is &WORKSPACE ID.

Using PL/SQL:

htp.p('Hello your workspace id is '||V('WORKSPACE\_ID'));

Using a bind variable:

SELECT \* FROM some\_table WHERE workspace\_id = :WORKSPACE\_ID

Using the SYS\_CONTEXT variable:

```
SELECT ... WHERE workspace_id = SYS_CONTEXT('APEX$SESSION', 'WORKSPACE_ID')
```

APEX sets up the APEX\$SESSION context when it starts to process an incoming request. For example, you can use the value of 'WORKSPACE\_ID' to access the current workspace ID value in queries and VPD (Virtual Private Database) security policies that protect your table data.

# 3.10 Using Template Directives

Use template directives to control how attributes that support substitution strings are processed.

Template directives are only supported by specific attributes of the cards, interactive grid, classic report, interactive report regions, and email templates. These directives are processed as part of client side substitutions. To determine if an attribute supports template directives, Page Designer Help includes the text "Supports Template Directives." See apex.util.applyTemplate in *Oracle APEX JavaScript API Reference* for more details on directive syntax.



Syntax descriptions text in square brackets is optional. You do not actually type the square brackets. Upper case text represents something as described in the description.

#### If Condition Directives

Use the  ${\tt if}$  directive to conditionally show text based on if an item or column has a value.

#### Case Condition Directives

Use the case directive to show text based on the value of an item or column.

#### Loop Directives

Use the loop directive to repeat text once for each item in a multi-value (character delimited) item or column value.

### 3.10.1 If Condition Directives

Use the  ${\tt if}$  directive to conditionally show text based on if an item or column has a value.

#### **Syntax**

```
{if [!]NAME/}
TRUE_TEMPLATE_TEXT
{elseif [!]NAME2/}
ELSE_TRUE_TEMPLATE_TEXT
{else/}
FALSE_TEMPLATE_TEXT
{endif/}
```

The NAME is an item or column name. If the value of the column or item is true then the following text is output. The value is false if it is an empty string or 'F', 'N', or '0'. Any value that is not false is true. If the NAME is proceeded by exclamation point (!) then the following text is output if the value is false rather than true.



There can be zero or more <code>elseif</code> directives. The <code>else</code> directive is optional. The text after the first <code>if</code> or <code>elseif</code> directive that is true is output. If no <code>if</code> or <code>elseif</code> is true then the text after the <code>else</code> directive, if any, is output.

#### **Example**

A cards report contains a column named DESCRIPTION. The following HTML Expression attribute will display the description if it is not null (empty string) and "No description." otherwise.

```
{if DESCRIPTION/}&DESCRIPTION.{else/}No description.{endif/}
```

### 3.10.2 Case Condition Directives

Use the case directive to show text based on the value of an item or column.

#### **Syntax**

```
{case NAME/}
{when STRING1/}
TEMPLATE_TEXT1
{when STRING2/}
TEMPLATE_TEXT2
{otherwise/}
TEMPLATE_TEXT
{endcase/}
```

The NAME is an item or column name. The value is compared with the strings after each when directive and if they are equal then the following text is output. If no when directive matches then the text after the otherwise directive, if there is one, is output. The value and each string is trimmed of leading and trailing spaces before comparison. The comparison is case sensitive.

### **Example**

This example using the sample EMP table displays the compensation differently depending on the Job. For sales people it shows both the salary and commission. For the president it shows "--" rather than salary and for all other jobs it shows just the salary.

```
{case JOB/}
{when SALESMAN/}
&SAL. (&COMM.)
{when PRESIDENT/}
--
{otherwise/}
&SAL.
{endcase/}
```



# 3.10.3 Loop Directives

Use the loop directive to repeat text once for each item in a multi-value (character delimited) item or column value.

#### **Syntax**

```
{loop ["SEP"] NAME/}
TEMPLATE_TEXT
{endloop/}
```

The NAME is an item or column name that has multiple values separated by the character given by SEP. The default separator is ":". If SEP is more than one character it is treated as a regular expression.

The template text within the loop can use these substitution symbols:

- APEX\$ITEM This is the value of the current item in the list.
- APEX\$I This is 1 based index of the current item in the list.

### **Example**

The following example takes a column called  ${\tt TAGS}$  that contains a comma (,) separated list of tags such as "apples,cherries,pears" and turns it into an HTML list that can be nicely styled with CSS.

```
{loop "," TAGS/}
    &APEX$ITEM.
{endloop/}
```



4

# Managing Team Development

Use Team Development to track and manage issues in a conversational fashion. You can create templates to provide users with starter text for issues and comments. You can apply labels and label groups, assign issue owners, and set milestones.

#### Getting Started with Team Development

Access Team Development, complete the setup process, and learn about the Team Development toolbar.

### · Creating and Updating Issues

Create and update issues by either updating issues one at a time, or performing bulk updates of multiple issues at once.

### · Viewing Your User Profile

Click the Notifications icon on the Team Development toolbar view and manage your own notifications and view all issues you own.

#### Managing Labels

Create and update label groups and labels to classify issues.

### Managing Milestones

Create and update issues milestones to track events.

### Managing Templates

Create and update templates for issues and issue comments.

### Using Team Development Utilities

Use Utilities page to manage deleted issues, manage templates, milestones, and labels, view uploaded files, purge data, reassign issues to another user, reassign issue owners, remove a milestone or label from all issues, and manage user notifications.

#### Managing Feedback

Feedback provides a mechanism for end users to post general comments for application administrators and developers.

# 4.1 Getting Started with Team Development

Access Team Development, complete the setup process, and learn about the Team Development toolbar.

### Accessing Team Development

Access Team Development by clicking the Team Development menu, or by clicking the Team Development icon on the Workspace home page.

#### Setting Up Team Development

Complete the setup process by installing sample labels, sample templates, sample milestones, and selecting a default language.

### Team Development Toolbar

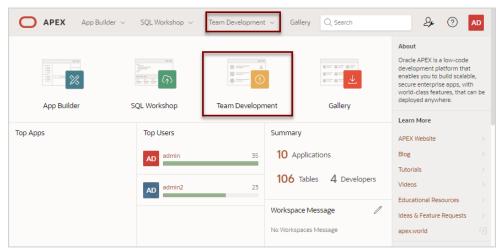
Use the toolbar at the top of the most Team Development pages to link to notifications, jump to other pages, or create a new issue.

## 4.1.1 Accessing Team Development

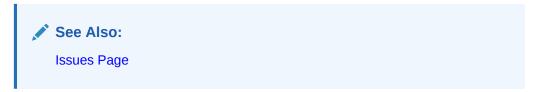
Access Team Development by clicking the Team Development menu, or by clicking the Team Development icon on the Workspace home page.

You can access Team Development in two ways:

- Click the Team Development menu at the top of most pages in Oracle APEX.
- On the Workspace home page, click the Team Development icon.



The Issues page appears.



## 4.1.2 Setting Up Team Development

Complete the setup process by installing sample labels, sample templates, sample milestones, and selecting a default language.

When you access Team Development for the first time in a new workspace, a welcome screen appears. Oracle recommends you follow the on-screen instructions and completing the setup process.

To setup Team Development:

- Access Team Development.
  - The Team Development Welcome page appears.
- For Install Sample Labels, Install Sample Templates, and Install Sample Milestones, select Yes.
- 3. From Sample Data Language, select a language.
- 4. Click Complete Setup.

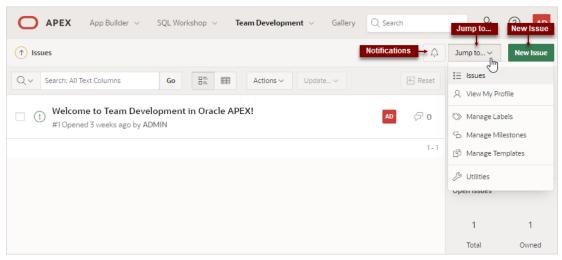
The Issues page appears.



## 4.1.3 Team Development Toolbar

Use the toolbar at the top of the most Team Development pages to link to notifications, jump to other pages, or create a new issue.

### **Team Development Toolbar**



The Team Development toolbar contains the following controls:

- Notifications Links the Notifications page where you can view or clear notifications for all issues which you own or are monitoring. See Viewing Your Notifications.
- Jump to... Access other Team Development pages. Available links include:
  - Issues Links to the Issues page. See Issues Page.
  - View My Profile Links to the User Profile page where you can view a report of all issues you own or are monitoring. See Viewing Your Issues.
  - Manage Labels Links to the Labels page. Use labels and label groups to classify issues. See Managing Labels.
  - Manage Milestones Links to the Milestones page. Create milestones to track events. See Managing Milestones.
  - Manage Templates Links to the Templates page. Templates provide starter text for issues and issue comments. See Managing Templates.
  - Utilities Links to the Team Development Utilities page. See Using Team Development Utilities.

# 4.2 Creating and Updating Issues

Create and update issues by either updating issues one at a time, or performing bulk updates of multiple issues at once.

- Issues Page
   Use the Issues page to view issues.
- Creating an Issue
   Create new issues on the Issues page by clicking the New Issue button.



Updating Multiple Issues at Once

Update status, assignees, labels, and milestones for multiple issues at once by selecting the issues on the Issues page and then selecting options from the Update menu.

Updating an Issue

Update an issue by viewing the Issue Details and then updating the Issue Timeline.

## 4.2.1 Issues Page

Use the Issues page to view issues.

The Issues page displays all issues being tracked in Team Development.

### **Navigation Bar**



A navigation bar displays at the top of the Issues page and contains the following controls.

- Select columns to search This control features a menu with a magnifying glass.
   Click this menu to narrow your search to only specific columns. To search all columns, select All Text Columns.
- Search: All Text Columns Enter case insensitive search criteria (wildcard characters are implied) and click Go.
- Go button Executes a search or applies a filter.
- View icons. Use these icons to toggle between two views:
  - Cards (default) Displays issue details as card.
  - Grid Displays issues in an interactive grid report.

To view issue details, click the issue title. To update status, assignees, labels, or milestones in either view, select the issue and then appropriate option on the Update menu.

- Actions menu Use the Actions menu to customize the report.
- **Update**. Update multiple issues at once by selecting them and then selecting an option from the Actions menu. Update menu options include:
  - Status Apply a status (Open or Closed) to all selected issues.
  - Assignees Add or remove assignees for all selected issues.



- Labels Assign or remove labels for all selected issues.
- Milestones Assign or remove milestones for all selected issues.



### Tip:

To view or edit an issue (including adding issue comments), click issue title.

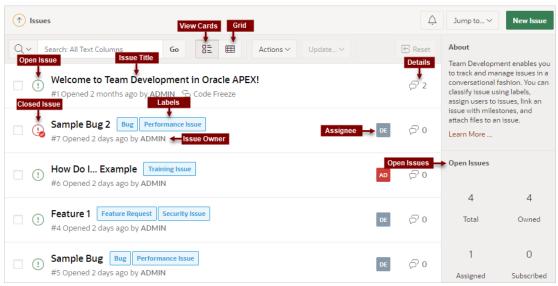
Reset - Click the Reset button to remove any customizations, such as filters or sorting,
 Select this option to reload the report definition from the server.



**Team Development Toolbar** 

#### List of Issues

Issues appear next and can be viewed as Cards or as an interactive grid. Click the **View Cards** and **Grid** icons to change the display. This example shows **View Cards**.



Key features of the Cards view include:

- Issue Title Click the issue title to view and update details.
- Open Issue/Closed Issue icons Displays the status of the issue. The Open Issue icon
  appears as a green circle around an exclamation point. The Closed Issue icon displays
  as a red circle around an exclamation point and a check mark.
- Issue Owner Displays beneath the issue title.
- **Labels** Assigned labels display to the right of the issue title. The color indicates the associated label group.
- Assignee The assignees or an issue appear to the right of the labels.
- Issue Details Click the Comment icon/number on the far right to link to the Issue Details. The number indicates the number of issue comments.



#### **Open Issues and Feedback Regions**

Summary regions display on the right-side of the page. The **Open Issues** summary region includes the following:

- Total Total issues in the workspace.
- Owned Total issues owned by the current user.
- Assigned Total issues assigned to the current user.
- Subscribed Total issues to which the current user subscribes.

The **Feedback** summary region displays on the bottom right of the page and includes the following:

- Total Total feedback entries.
- Open Total open feedback entries.

### See Also:

- · Creating and Updating Issues
- Team Development Toolbar
- Managing Feedback

## 4.2.2 Creating an Issue

Create new issues on the Issues page by clicking the New Issue button.



### Tip:

To create a new issue, you must select a template. Templates provide starter text for issues and issue comments. Use the sample templates provided when you completed Team Development setup, or create your own. See Managing Templates.

To create an issue:

- Click the Team Development menu.
- 2. On the Issues page, click **New Issue**.
- In the New Issues dialog:
  - Select a template, or select Continue without a template. Templates provide users with starter text for issues and comments.
  - b. Title Enter a descriptive title.
  - **c.** Issue Text Enter a description of the issue. Use the Markdown tools above the field to add formatting.
  - d. To preview the HTML, click Preview.



#### 4. Click Create Issue.

### See Also:

- Adding Issue Comments or Attaching a File
- Managing Templates

# 4.2.3 Updating Multiple Issues at Once

Update status, assignees, labels, and milestones for multiple issues at once by selecting the issues on the Issues page and then selecting options from the Update menu.

To update multiple issues at once:

1. Click the **Team Development** menu.

The Issues page appears.

- Select the issues to update by clicking the checkbox to the left the issue title.
- 3. To update status:
  - a. From the Update menu, select Status.
  - b. Status Select a new status (that is, **Open** or **Closed**).
  - c. Click Apply Changes.
- To update assignees:
  - a. From the Update menu, select Assignees.
  - b. For each assignee, select Assign or Remove.
  - c. Click Apply Changes.
- 5. To update labels:
  - a. From the Update menu, select Labels.
  - **b.** For each label, select **Assign** or **Remove**.
  - c. Click Apply Changes.
- 6. To update milestones:
  - a. From the Update menu, select Milestones.
  - **b.** For each milestone, select **Assign** or **Remove**.
  - c. Click Apply Changes.

## 4.2.4 Updating an Issue

Update an issue by viewing the Issue Details and then updating the Issue Timeline.

Only an issue owner or an administrator can update an issue title or description, or delete an issue.

Issue Details Page
 Use the Issue Details page to update issues.



### Updating the Issue Title

View an issue and then update the issue title.

#### Updating the Issue Description

View an issue and update the issue description (also known as the Issue Text).

### Managing Comments

Add or edit issue comments on the Issue Details page.

### Setting Assignees

View an issue and then set assignees.

#### Setting Labels

View an issue and then set labels.

#### Setting Milestones

View an issue and then set milestones.

### Associating an Issue with an App and Page

View an issue and then associate it with an application and page.

### · Marking an Issue as Duplicate

View an issue and then mark it as duplicate.

#### Closing an Issue

Close an issue on the Issues Details page.

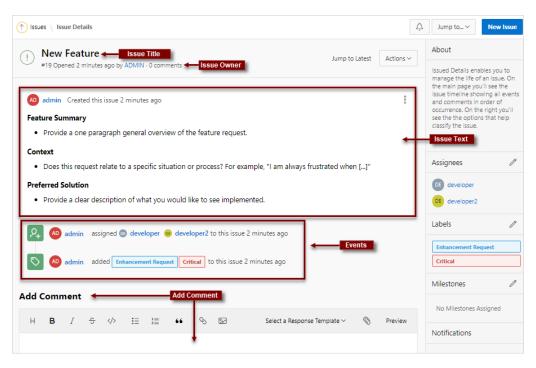
### Managing Deleted Issues

Issue owners or administrators can delete an issue on the Issue Details page. Manage deleted issue (that is, delete them forever or reinstate them) by navigating to Utilities, Manage Deleted Issues.

### 4.2.4.1 Issue Details Page

Use the Issue Details page to update issues.

#### **Issues Timeline**

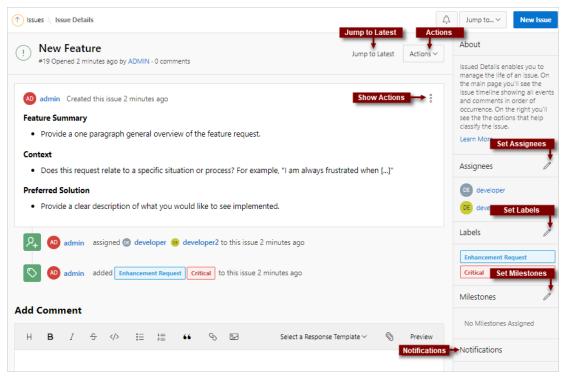




The Issue Details page contains an **Issue Timeline**. Updates to the Issue Timeline are called **events**. Newer events display at the top of the timeline. The Issue Timeline is divided into the following sections:

- Issue Title Displays at the top of the page.
- Issue Text field The text that describes the issue.
- Events Each update to the Issue Timeline is logged as an event. Events displays after the Issue Text.
- Add Comment Displays at the bottom of the Issue Timeline. Use this field to record
  comments about the issue. The Add Comment region includes formatting tools, enables
  you to select a Response Template, and Preview the text.

#### **Issue Details Controls**



General controls on the Issue Details page include:

- Jump to Latest Links to the Add Comment section at the bottom of the page.
- Actions Use Actions menu options to update the issue. Actions menu options include:
  - Edit Title
  - Edit Issue Text
  - Set Assignees
  - Set Labels
  - Set Milestones
  - Associate App or Page
  - Mark as Duplicate
  - Delete Issue



#### Close Issue



Only an issue owner or an administrator can update an issue title or description, or delete an issue.

- Show Actions Shortcut menu containing two options: Edit and Delete Issue.
   Edit functions the same as Edit Issue Text on the Actions menu.
- Set Assignees Shortcut menu in the right region that functions the same as Set Assignees on the Actions menu.
- Set Labels Shortcut menu in the right region that functions the same as Set Labels on the Actions menu.
- **Set Milestones** Shortcut menu in the right region that functions the same as **Set Milestones** on the Actions menu.
- Notifications Enable Subscribe to receive notifications regarding updates to the current issue.
- Attachments Click Attachments to view attachments associated with this issue.

### 4.2.4.2 Updating the Issue Title

View an issue and then update the issue title.

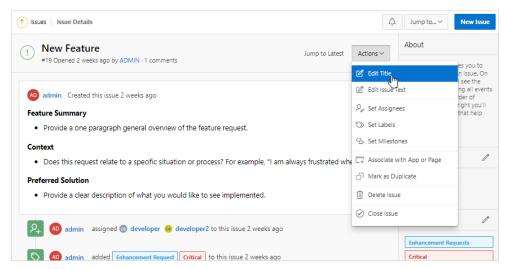
Only an issue owner or an administrator can update an issue title.

To update the issue title:

- 1. View the issue:
  - a. Click the **Team Development** menu.
  - b. Click the issue title.

The Issue Details page appears.

2. From the Actions menu, select Edit Title.



3. In Edit Issue Title dialog:



- a. Issue Title Update the title.
- b. Click Apply Changes.

## 4.2.4.3 Updating the Issue Description

View an issue and update the issue description (also known as the Issue Text).

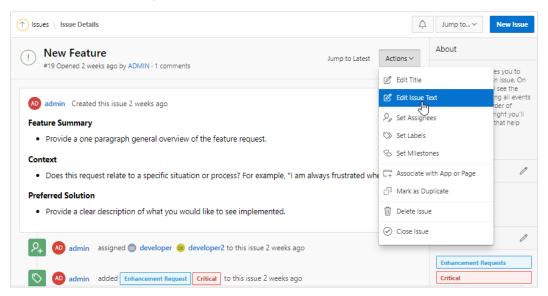
Only an issue owner or an administrator can update an issue description (or text).

To update the Issue Text:

- 1. View the issue:
  - a. Click the Team Development menu.
  - b. Click the issue title.

The Issue Details page appears. You can update an Issue Text by either selecting **Edit Issue Text** from the Actions menu, or by clicking **Show Actions**, **Edit**.

2. From the Actions menu, select Edit Issue Text.



- 3. In the Edit Issue dialog:
  - Update the description of the issue. Use the Markdown tools above the field to add formatting.
  - b. Click **Preview** to preview the HTML.
  - c. Click Apply Changes.

## 4.2.4.4 Managing Comments

Add or edit issue comments on the Issue Details page.

- Adding Issue Comments or Attaching a File View an issue and then add comments.
- Editing Issue Comments
   View an issue to edit, hide, or delete existing comments.



### 4.2.4.4.1 Adding Issue Comments or Attaching a File

View an issue and then add comments.

To add issue comments:

- 1. View the issue:
  - a. Click the **Team Development** menu.
  - b. Click the issue title.

The Issue Details page appears.

2. Scroll down to Add Comment.



#### Tip:

You can also click the Jump to Latest button adjacent to the issue title

- Enter a comment. Under **Add Comment**:
  - a. Select a Response Template Select a template if appropriate.
  - **b.** Enter comments in the field provided.
  - c. To add formatting (such as bold or italic), click the icons in the toolbar. To preview the rendered HTML, click the **Preview** button.
- 4. Attach a file. Under Add Comment, click Attach Files.



### Tip:

The Attach Files icon does not appear unless you have enabled the workspace-level attribute, Enable Issue File Repository.

- To save your changes:
  - If the issue is open:
    - Click Comment to save your changes.
    - Click Comment and Close to save your changes and close the issue.
  - If the issue is closed:
    - Click Comment to save your changes.
    - Click **Comment and Close** to save your changes and close the issue.

### See Also:

- Closing an Issue
- Configuring Team Development in an Existing Workspace in Oracle APEX Administration Guide



### 4.2.4.4.2 Editing Issue Comments

View an issue to edit, hide, or delete existing comments.

To edit issue comments:

- **1.** View the issue:
  - a. Click the **Team Development** menu.
  - b. Click the issue title.

The Issue Details page appears.

- 2. Scroll down to the comment.
- 3. Find the **Show actions** menu which resembles three stacked circles. Click the **Show actions** menu and select one of the following:
  - Edit Only available for administrators or the comment creator.
  - Hide/Unhide Only available for administrators.
  - Delete- Only available for administrators or the comment creator.
- 4. To save your changes, click Apply.
- 5. To exit without saving your changes, click the **Close** icon (that is, the "X" enclosed with a circle) in the upper right.



Closing an Issue

### 4.2.4.5 Setting Assignees

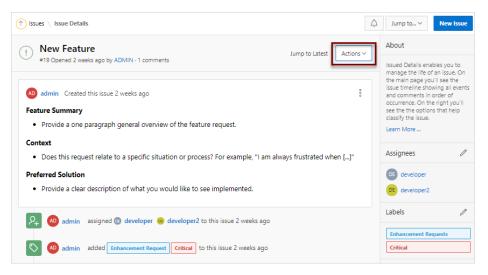
View an issue and then set assignees.

Assignees are users in the Oracle APEX workspace. To create a new assignee, a workspace administrator or Instance administrator must create a new user.

To set assignees:

- 1. View the issue:
  - a. Click the **Team Development** menu.
  - b. Click the issue title.





2. From the Actions menu, select Set Assignees.

You can also click the **Set Assignees** icon on far right side of the page.

- 3. In the Assignees dialog:
  - a. Select assignees to add to the issue.
  - b. Click Apply Changes.

A new event is added to the Event Timeline and the new assignees display under **Assignees** in the far right region.



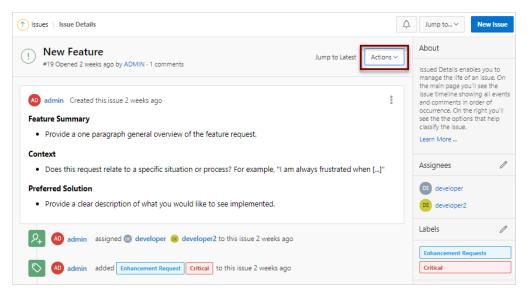
Managing Users in a Workspace and Managing Users Across an APEX Instance in *Oracle APEX Administration Guide* 

## 4.2.4.6 Setting Labels

View an issue and then set labels.

To set labels:

- 1. View the issue.
  - a. Click the **Team Development** menu.
  - b. Click the issue title.



2. From the Actions menu, select Set Labels.

You can also click the **Set Labels** icon on far right side of the page.

- 3. In the Labels dialog:
  - a. Select labels to add to the issue.
  - b. Click Apply Changes.

A new event is added to the Event Timeline and the new labels display under **Labels** in the far right region.



## 4.2.4.7 Setting Milestones

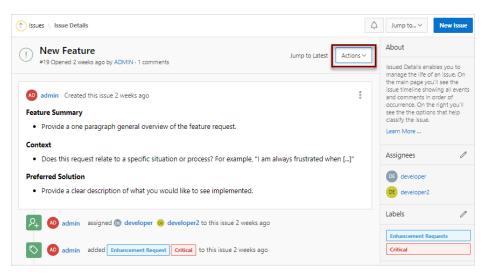
View an issue and then set milestones.

Use Milestones to track events. You can assign one or more milestones to an event.

To set milestones:

- 1. View the issue:
  - a. Click the **Team Development** menu.
  - **b.** Click the issue title.





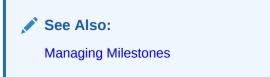
2. From the Actions menu, select Set Milestones.

You can also click the **Set Milestones** icon on far right side of the page.

- 3. In the Milestones dialog:
  - a. Select milestones to add to the issue.
  - b. Optionally select Show Closed Milestones.
  - c. Click Apply Changes.

A new event is added to the Event Timeline and the new milestones display under **Milestones** in the far right region. The color of the milestone indicates the following:

- Red The milestones date is in the past.
- Yellow The milestones date is within two weeks.
- Green The milestones date is more than two weeks 2 weeks in the future.



# 4.2.4.8 Associating an Issue with an App and Page

View an issue and then associate it with an application and page.

To associate an issue with an application and page:

- View the issue:
  - a. Click the **Team Development** menu.
  - **b.** Click the issue title.

- 2. From the Actions menu, select Associate with App and Page.
- In the Associate App/Page dialog:



- a. Application & Page Search Select an application
- b. Page Select a page.
- c. Comments Enter any comments.
- d. Click Apply.

A new event is added to the Event Timeline.

### 4.2.4.9 Marking an Issue as Duplicate

View an issue and then mark it as duplicate.

To mark an issue as duplicate:

- **1.** View the issue:
  - a. Click the **Team Development** menu.
  - b. Click the issue title.

The Issue Details page appears.

- 2. From the Actions menu, select Mark as Duplicate.
- 3. In the Mark Duplicate dialog:
  - a. Duplicate Issue Select the duplicate issue.
  - b. Click Apply.

A new event is added to the Event Timeline identified by a an icon which resembles two green pages.

### 4.2.4.10 Closing an Issue

Close an issue on the Issues Details page.

- Closing an Issue
  - View an issue and then close it.
- Viewing or Reopening a Closed Issue
   View or reopen a closed issue on the Issues page.

### 4.2.4.10.1 Closing an Issue

View an issue and then close it.

To close an issue:

- 1. View the issue:
  - a. Click the Team Development menu.
  - **b.** Click the issue title.

The Issue Details page appears.

2. From the **Actions** menu, select **Close Issue**.

The icon adjacent to the issue title changes from green to red and contains a red check mark. In addition, a new event is added to the Event Timeline which reads:

set status for this issue to CLOSED Now



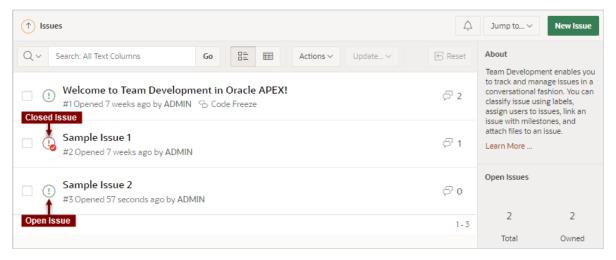
### 4.2.4.10.2 Viewing or Reopening a Closed Issue

View or reopen a closed issue on the Issues page.

To view or reopen a closed issue:

1. Click the **Team Development** menu.

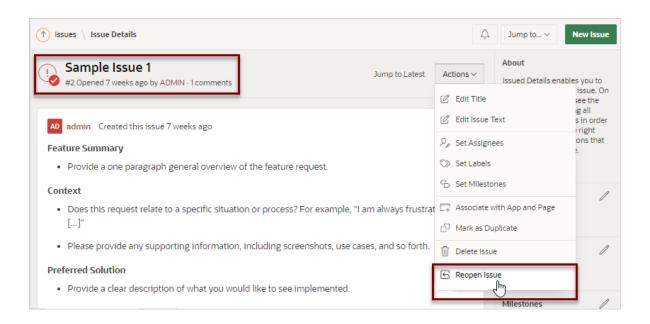
The Issues page appears. Open issues have a green icon and closed issues have a red icon and check mark.



2. Find the closed issue and click the issue title.

The Issue Details page appears.

3. From the **Actions** menu, select **Reopen Issue**.



The icon adjacent to the issue title changes from red to green and the red check mark disappears.

#### A new event is added to the Event Timeline which reads:

set status for this issue to OPEN Now

### 4.2.4.11 Managing Deleted Issues

Issue owners or administrators can delete an issue on the Issue Details page. Manage deleted issue (that is, delete them forever or reinstate them) by navigating to Utilities, Manage Deleted Issues.

Deleting an Issue

Issue owners or administrators can delete an issue.

Reinstating Deleted Issues

Reinstate deleted issues on the Manage Deleted Issues Page.

Permanently Remove Deleted Issues
 Permanently remove deleted issues on the Manage Deleted Issues page.

### 4.2.4.11.1 Deleting an Issue

Issue owners or administrators can delete an issue.

To delete an issue:

- 1. View the issue:
  - a. Team Development menu.
  - **b.** Click the issue title.

The Issue Details page appears.

2. From the Actions menu, select Delete Issue.

A confirmation page appears asking if you are sure you want to delete the issue.

3. On the confirmation page, click **OK**.

### 4.2.4.11.2 Reinstating Deleted Issues

Reinstate deleted issues on the Manage Deleted Issues Page.

To reinstate a deleted issue:

- 1. From the **Team Development** menu, select **Utilities**.
- 2. Click Manage Deleted Issues.
- **3.** Select the issue.
- 4. From the Update menu, select Reinstate Selected.

Confirm your selection, and click Apply.

### 4.2.4.11.3 Permanently Remove Deleted Issues

Permanently remove deleted issues on the Manage Deleted Issues page.

To permanently remove deleted issues:

1. From the **Team Development** menu, select **Utilities**.



- 2. Click Manage Deleted Issues.
- Select the issue.
- 4. To permanently delete selected issue:
  - a. Select the issues to be removed.
  - From the Update menu, select Permanently Delete Selected.
     Confirm your selection, and click Apply.
- 5. To purge all deleted issues, click **Purge All**.

# 4.3 Viewing Your User Profile

Click the Notifications icon on the Team Development toolbar view and manage your own notifications and view all issues you own.

- Viewing Your Issues
   View the User Profile, Issue page to view a report of all issues you own or are monitoring.
- Viewing Your Notifications
   View and manage your notifications on the Notifications page.

## 4.3.1 Viewing Your Issues

View the User Profile, Issue page to view a report of all issues you own or are monitoring.

To view issues you own:

- 1. Click the **Team Development** menu.
- 2. On the Issues page, click the **Notifications** icon on the toolbar at the top of the page.

The User Profile, Notifications page appears displaying notifications.

3. Click the Issues tab.

The Issues page appears displaying all issues you own or are monitoring.

- 4. To view an issue, click the issue title.
- To configure the type and frequency of your notifications, click Notification Preferences.



Editing Your Own Notification Preferences



# 4.3.2 Viewing Your Notifications

View and manage your notifications on the Notifications page.

Whenever a users interacts with an issue, Team Development creates an event. For example, an **event** can be creating issue or involve updating the issue. **Notifications** are a record of these events.

To view your own user notifications:

- 1. Click the **Team Development** menu.
- On the Issues page, click the **Notifications** icon on the toolbar at the top of the page.
   The User Profile, Notifications page appears displaying notifications for all issues you own or are monitoring.
- 3. To delete all notifications, click Clear Notifications
- 4. To configure the type and frequency of your notifications, click **Notification Preferences**.



**Editing Your Own Notification Preferences** 

# 4.4 Managing Labels

Create and update label groups and labels to classify issues.

If you completed the setup process, you can view sample labels and label groups by going to **Team Development**, **Utilities**, **Manage Labels**.

- About Labels Groups and Labels
   Use label groups and the associated labels to classify issues.
- Creating Label Groups
   Create label groups clicking Create on the Labels page.
- Editing Label Groups
   Edit label groups on the Manage Labels page.
- Adding Labels
   Create labels on the Manage Labels page.
- Editing or Deleting Labels
   Edit labels on the Manage Labels page.





## 4.4.1 About Labels Groups and Labels

Use label groups and the associated labels to classify issues.

#### **Label Groups and Labels**

**Labels** are organized into label groups and enable you to classify issues. For example, the Label Group **Level of Effort** could contain the labels **Easy Fix**, **Moderate Effort**, and **Large Development Effort**.

Each **label group** has an identifying color to enable you to quickly identify labels associated with the same group. You can define label groups as exclusive or non-exclusive. In **exclusive** label groups, only one label from the group may be assigned to an issue at a time. Applying another label from the same exclusive group removes any current label from that group. In **non-exclusive** label groups, you can assign multiple labels to an issue from the same label group.

#### Sample Label Groups and Labels

The following are two sample label groups and labels included in Team Development when you complete the setup process and install Sample Labels:

- Importance (Label Group)
  - Critical (Label)
  - Important (Label)
  - Normal (Label)
  - Backlog (Label)
  - Will Not Address (Label)

This Label Group is **exclusive** meaning that only one label can be applied to an issue.

- Functional Area (Label Group)
  - Bug (Label)
  - Enhancement Request (Label)
  - Feature Request (Label)
  - Security Issue (Label)
  - Performance Issue (Label)
  - Documentation Issue (Label)
  - Training Issue (Label)

This Label Group is **non-exclusive** meaning that only one label can be applied one or more labels.

If you completed the setup process, you can view the other sample label groups and labels by clicking the **Team Development** menu and selecting **Labels**. To view the labels within a label group, click a label group name.



### Tip:

You also access Labels page from the Utilities page. Click the **Team Development** menu and select **Utilities** and then **Manage Labels**.

# 4.4.2 Creating Label Groups

Create label groups clicking Create on the Labels page.

To create a label group:

1. Click the **Team Development** menu and then select **Labels**.

The Labels page appears.

- 2. On the Labels page, click Create.
- 3. In Create/Edit Label Group dialog:
  - a. Group Name Enter a unique name for the label group.
  - b. Group Label Color Select a color to display all labels within the group.
  - **c.** Values are Exclusive Determines if the values of the group are exclusively assigned to an issue. Options include:
    - On Only one label from the group can be assigned to an issue at any given time.
    - Off Multiple labels from the same group may be assigned to an issue.
  - d. Group Description Enter a description of the group.
- 4. Click Create.

## 4.4.3 Editing Label Groups

Edit label groups on the Manage Labels page.

Use label groups to classify labels.

To edit a label group:

1. Click the **Team Development** menu and then select **Labels**.

The Labels page appears.

Note that each a label group has an identifying color making it and the associated labels easier to identify.

2. On the Labels page, select the label group name.

The Manage Labels page appears, displaying labels in the current group.

Click Edit Group.

The Create/Edit Label Group dialog appears.

- **4.** To edit the label group, edit the following attributes:
  - a. Group Name Enter a unique name for the label group.
  - b. Group Label Color Select a color to display all labels within the group.



- **c.** Values are Exclusive Determines if the values of the group are exclusively assigned to an issue. Options include:
  - **On** Only one label from the group can be assigned to an issue at any given time.
  - Off Multiple labels from the same group may be assigned to an issue.
- d. Group Description Enter a description of the group.
- e. Click Apply Changes.
- 5. To delete the label group, click **Delete** in the Create/Edit Label Group dialog.

# 4.4.4 Adding Labels

Create labels on the Manage Labels page.

To add a new label to a label group:

- 1. Click the **Team Development** menu and then select **Labels**.
- 2. On the Labels page, select the label group name.

The Manage Labels page appears, displaying labels in the current group.

- 3. On the Manage Labels page, click **Add Row**.
  - A new row appears.
- 4. In the new row, enter the Sequence, Label Name, Label Slug, and Label Desc.
- 5. Click Save.

## 4.4.5 Editing or Deleting Labels

Edit labels on the Manage Labels page.

To edit existing labels:

- 1. Click the **Team Development** menu and then select **Labels**.
- 2. On the Labels page, select the label group name.

The Manage Labels page appears, displaying an editable interactive grid of labels in the current group.

- 3. To edit a single cell:
  - a. Double-click the cell you want to edit.
  - b. Enter your changes and click **Save**.
- 4. To edit a multiple rows:
  - **a.** Select rows by selecting checkboxes in the checkbox column.



### Tip:

To select all rows, click the checkbox in the column. With all rows selected, click it again to deselect all rows.

**b.** Select the cells you wish to edit and enter your changes.



- c. Click Save.
- 5. To delete multiple rows:
  - a. Select the rows to be deleted.
  - b. Click the Actions menu and then select Selection, Delete Rows.



### Tip:

To delete a single row, click **Row Actions** icon (to the right of the checkbox) and select **Delete Row**.

c. Click Save.



Using an Editable Interactive Grid in Oracle APEX End User's Guide

# 4.5 Managing Milestones

Create and update issues milestones to track events.

If you completed the setup process, you can view sample milestones clicking the **Team Development** menu and selecting **Milestones**.

- Creating Milestones
   Create milestones by clicking Create on the Milestones page.
- Editing and Deleting Milestones
   Edit or delete an existing milestone by selecting the milestone name on the Milestones page.



**Setting Milestones** 

# 4.5.1 Creating Milestones

Create milestones by clicking Create on the Milestones page.

To create a milestone:

- 1. Click the **Team Development** menu and then select **Milestones**.
- 2. On the Milestones page, click **Create Milestone**.
- 3. On the Milestone page:
  - a. Milestone Name Enter a unique name for the milestone.



- b. Slug A unique string identifier for the milestone that will be used in URLs.
- c. Date Select a date for the milestone.
- d. Milestone Status Select Open or Closed.
- e. **Description** Enter a description of the milestone.
- 4. Click Create.

### 4.5.2 Editing and Deleting Milestones

Edit or delete an existing milestone by selecting the milestone name on the Milestones page.

To edit or delete a milestone:

1. Click the **Team Development** menu and then select **Milestones**.

The Milestones page appears.

- 2. To edit a milestone:
  - a. On the Milestones page, click the milestone name.
  - b. Click Edit Milestone.
  - c. On the Milestone page:
    - Milestone Name Enter a unique name for the milestone.
    - Slug A unique string identifier for the milestone that will be used in URLs.
    - Date Select a date for the milestone.
    - Milestone Status Select Open or Closed.
    - Description Enter a description of the milestone.
  - d. Click Apply Changes.
- 3. To delete a milestone:
  - a. On the Milestones page, click the milestone name.
  - b. Click Edit Milestone.
  - c. Click Delete.
  - **d.** In the confirmation dialog, confirm the deletion by clicking **OK**.

# 4.6 Managing Templates

Create and update templates for issues and issue comments.

Templates enable you to provide users with starter text for issues and comments. Once you create a new template, you can select it when you create a new issue or add a comment.

If you completed the setup process, you can view sample template by going to **Team Development**, **Utilities**, **Manage Templates**.

- Creating Issue Templates
   Create an issue template by clicking Create on the Templates page.
- Editing or Deleting Issue Templates
   Edit existing templates by selecting the template title on the Templates page.



## 4.6.1 Creating Issue Templates

Create an issue template by clicking Create on the Templates page.

The text of a template defines the outline of what a user should enter.

To create an issue template:

- 1. Click the **Team Development** menu and then select **Manage Templates**.
- 2. On the Templates page, click Create Template.
- 3. On Edit Template page:
  - a. Template Name Enter a unique name for the template.
  - Template Description Describe the purpose of template, including what it should be used for.
  - c. Template Type Select a template type:
    - Issue Select Issue when creating a new issue from scratch.
    - Response Select Response when entering a comment.
  - d. Enter the template text and provide an outline of what a user should enter.

Use the Markdown tools above the field to add formatting. Click **Preview** to preview the HTML.

4. Click Create.

## 4.6.2 Editing or Deleting Issue Templates

Edit existing templates by selecting the template title on the Templates page.

To edit or delete a template:

- 1. Click the **Team Development** menu and then select **Manage Templates**.
- 2. On the Templates page, click the template name.
- 3. Click Edit Template.

The Edit Template page appears.

- 4. Edit the template attributes:
  - a. Template Name Enter a unique name for the template.
  - Template Description Describe the purpose of template, including what it should be used for.
  - c. Template Type Select a template type:
  - d. Enter the template in the field provided. To add formatting (such as bold or italic), click the icons in the toolbar. To preview the rendered HTML, click the Preview button.
  - e. Click Apply Changes.
- **5.** To delete the template:
  - a. Click Delete.
  - **b.** In the confirmation dialog, confirm your selection and click **OK**.



# 4.7 Using Team Development Utilities

Use Utilities page to manage deleted issues, manage templates, milestones, and labels, view uploaded files, purge data, reassign issues to another user, reassign issue owners, remove a milestone or label from all issues, and manage user notifications.

- Team Development Utilities
   Access the Utilities page by selecting Team Development, Utilities.
- Managing Uploaded Files
   View and delete uploaded files attached to issues in the workspace.
- Purging Data
   Users with administrator privileges can purge data for selected components.
- Reassigning Issues to Another Assignee
   Users with administrator privileges can reassign issues from one assignee to another for all issues, or only issues having an Open status.
- Reassigning the Issue Owner
   Users with administrator privileges can reassign the issue owner.
- Removing a Milestone for All Issues
   Users with administrator privileges can emove a specific milestone from all issues.
- Removing Labels for All Issues
   Users with administrator privileges can remove specific labels for all issues.
- Managing Notification Preferences
   Enables administrators to manage notification preferences.

## 4.7.1 Team Development Utilities

Access the Utilities page by selecting Team Development, Utilities.

User with administrator rights can see the following links on the Utilities page:

- Manage Deleted Issues Purge or reinstate issues that have been deleted. See Managing Deleted Issues.
- Manage Templates Manage templates for issues and comments. See Managing Templates.
- **Manage Milestones** Create and update issues milestones used to track events. See Managing Milestones.
- Manage Labels Manage Label Groups and Label used to classify issues. See Managing Labels.
- View Files View and delete uploaded files attached to issues in the workspace.
   See Managing Uploaded Files.
- Purge Data Purge all data for selected components. See Purging Data.
- Update Assignments Perform bulk reassignment of issues to a given user. See Reassigning Issues to Another Assignee.
- Reassign Owner Perform bulk reassignment of issue owners to a given user.
   See Reassigning the Issue Owner.



- Remove Milestone from All Issues Remove a milestone from all issues. See Removing a Milestone for All Issues.
- Remove Labels from all Issues Remove a label from all issues. See Removing Labels for All Issues.
- Manage User Notifications Preferences Manage issue notification preferences of all users within the workspace. See Managing Notification Preferences.

### 4.7.2 Managing Uploaded Files

View and delete uploaded files attached to issues in the workspace.

The Issues Files page displays a report of uploaded files. Each file displays on a separate row and includes the file name, associated issue, file size, date the file was added, and the associated user.

To view and delete uploaded files:

- From the **Team Development** menu, select **Utilities**.
- Click View Files.

The Issues Files page appears.

- 3. On the Issues Files page you can:
  - **Download the File** Under Name, click the file name.
  - **Link to the Issue** Click the **Issue Title** to link to the Issue Details page.
  - Delete the File (Administrators only) Select the file and click Delete Checked.

## 4.7.3 Purging Data

Users with administrator privileges can purge data for selected components.



### WARNING:

Purging data removes all the data for the selected component.

To purge data:

- 1. From the **Team Development** menu, select **Utilities**.
- Click **Purge Data**.
- 3. On the Purge Data page you can:
  - a. Select the components for which you wish to purge data.
  - b. Click **Delete**.

## 4.7.4 Reassigning Issues to Another Assignee

Users with administrator privileges can reassign issues from one assignee to another for all issues, or only issues having an Open status.

To reassign issues:



- 1. From the **Team Development** menu, select **Utilities**.
- 2. Click Update Assignees.

The Update Assignees page appears.

- 3. On Update Assignee:
  - a. Change From Select current assignee that you wish to reassign. Users marked as **Orphan** are current assignees whose related APEX user has been removed.
  - b. Change To Select the new assignee.
  - For Open Issues Only? Choose whether assignments should be changed for Open issues only, or for all issues.
- 4. Click Next.

A report appears detailing the issues to be reassigned.

5. Click Change Assignee.

### 4.7.5 Reassigning the Issue Owner

Users with administrator privileges can reassign the issue owner.

To reassign the issue owner:

- 1. From the **Team Development** menu, select **Utilities**.
- 2. Click Reassign Owner.

The Reassign Owner page appears.

- 3. On Reassign Owner:
  - a. Change From Select current owner that you wish to reassign. Users marked as Orphan are current assignees whose related APEX user has been removed.
  - **b.** Change To Select the new owner.
  - **c.** For Open Issues Only? Choose whether assignments should be changed for Open issues only, or for all issues.
- Click Next.

A report appears detailing the issues to be reassigned.

5. Click Change Owner.

### 4.7.6 Removing a Milestone for All Issues

Users with administrator privileges can emove a specific milestone from all issues.

To remove a specific milestone from all issues:

- 1. From the **Team Development** menu, select **Utilities**.
- 2. Click Remove Milestone from All Issues.

The Remove Milestone page appears.

- 3. On Remove Milestone:
  - Milestone Select the milestone that you wish to disassociate from the selected issues.



- **b.** For Open Issues Only? Choose whether the disassociation should occur for Open issues only, or for all issues.
- 4. Click Next.

A report appears detailing the issues to be reassigned.

Click Remove Milestone.

## 4.7.7 Removing Labels for All Issues

Users with administrator privileges can remove specific labels for all issues.

To remove specific labels for all issues:

- 1. From the **Team Development** menu, select **Utilities**.
- Click Remove Labels from All Issues.

The Remove Labels page appears.

- 3. On Remove Labels:
  - a. Label Select the Label or Label Group to be removed.
  - **b.** For Open Issues Only? Choose whether Labels should be removed for Open issues only, or for all issues.
- 4. Click Next.

A report appears detailing the issues to be reassigned.

5. Click Remove Labels.

## 4.7.8 Managing Notification Preferences

Enables administrators to manage notification preferences.

Whenever a users interacts with an issue, Team Development creates an event. For example, an **event** can be creating an issue, closing an issue, or adding a comment. **Notifications** are a record of these events. Users can view their own notifications on the **User Profile**, **Notification** page. Administrators can configure user notifications preferences by going to **Utilities**, **Manage User Notification Preferences**.

- Editing Your Own Notification Preferences
   Edit your own notification preferences.
- Adding User Notification Preferences
   Users with administrator privileges can add notification preferences for any user.
- Editing Notification Preferences for Other Users
  Users with administrator privileges can edit notification preferences for other users.

### 4.7.8.1 Editing Your Own Notification Preferences

Edit your own notification preferences.

To edit your notification preferences:

- 1. Click the Team Development menu.
- 2. On the Issues page, click the **Notifications** icon.



The Notifications page appears displaying notifications for all issues you own or are monitoring.

Click Notification Preferences to specify which notifications you would like to receive.

The Notification Preferences dialog appears.

- 4. On Notification Preferences:
  - For Receives Emails? Choose whether the user receives emails for subscribed events.
  - **b.** Frequency If the user has opted to receive emails, this setting determines how often emails are sent. Select a Frequency:
    - Immediately
    - Hourly Summary
    - Daily Summary
  - Receive Notifications When Select the types of notifications the user is interested in.

If the user is receiving emails, the selected notifications are sent at the selected Frequency. If the user has opted not to receive emails, notifications are viewable using the user's profile page.

5. Click Save Settings.

### 4.7.8.2 Adding User Notification Preferences

Users with administrator privileges can add notification preferences for any user.

To add user notification preferences for any user:

- 1. From the **Team Development** menu, select **Utilities**.
- 2. Click Manage User Notification Preferences.

The Manage Notification Preferences page appears.

- 3. To add a new notification, click Add Preference for User.
- On Manage Notification Preference:
  - a. Add User Indicates the user whose notification preferences are being added. Only users who do not already have notification preferences set will appear in this list.
  - b. For Receives Emails? Choose whether the user receives emails for subscribed events.
  - c. Frequency If the user has opted to receive emails, this setting determines how often emails are sent. Select a Frequency:
    - Immediately
    - Hourly Summary
    - Daily Summary
  - Receive Notifications Select the types of notifications the user is interested in.



If the user is receiving emails, the selected notifications are sent at the selected Frequency. If the user has opted not to receive emails, notifications are viewable using the user's profile page.

Click Save Settings.

### 4.7.8.3 Editing Notification Preferences for Other Users

Users with administrator privileges can edit notification preferences for other users.

To user notification preferences for other users:

- 1. From the **Team Development** menu, select **Utilities**.
- 2. Click Manage User Notification Preferences.

The Manage Notification Preferences page appears.

- 3. Select a user to edit.
- 4. On Manage Notification Preference:
  - a. Edit User Displays the current user.
  - For Receives Emails? Choose whether the user receives emails for subscribed events.
  - **c.** Frequency If the user has opted to receive emails, this setting determines how often emails are sent. Select a Frequency:
    - Immediately
    - Hourly Summary
    - Daily Summary
  - d. Receive Notifications When Select the types of notifications the user is interested in.

If the user is receiving emails, the selected notifications are sent at the selected Frequency. If the user has opted not to receive emails, notifications are viewable using the user's profile page.

5. Click Save Settings.

# 4.8 Managing Feedback

Feedback provides a mechanism for end users to post general comments for application administrators and developers.

About Feedback

Adding Feedback enables you to gather and track real-time comments, enhancement requests, and bugs from application users. Feedback enhances communication between the user community and the application owners.

- Adding Feedback Using the Create Application Wizard
   Add a Feedback page when running the Create Application Wizard.
- Adding Feedback Using the Create Page Wizard
   Use the Create Page Wizard to add Feedback to an existing application.
- Submitting Feedback Within a Running Application
  Users can submit feedback by clicking the Feedback navigation bar icon in the upper
  right of a running application.



- Reviewing Feedback Within an Application
   View feedback within a running application by clicking User Feedback on the Administration page.
- Configuring Feedback to Support Attachments
   Configure feedback to add support for attachments.
- Tracking Feedback
   Track all feedback within a workspace on the Feedback page.

### 4.8.1 About Feedback

Adding Feedback enables you to gather and track real-time comments, enhancement requests, and bugs from application users. Feedback enhances communication between the user community and the application owners.

Feedback provides a mechanism for end users to post general comments for application administrators and developers. The posts include useful session state information to help developers determine where the end user sent the feedback from. Providing such an easy feedback loop enhances communication between the user community and the application owners, which leads to greatly improved end user satisfaction.

#### Creating Feedback:

- Adds a Feedback navigation bar icon in the running application which users can click to leave feedback.
- Creates an report for viewing and triaging feedback.
- Captures the application name, page ID and name, feedback comments, date and time, and user information.

#### **Choosing How to Add Feedback**

You can create a Feedback page automatically using a wizard when you create a new application, or by adding a page to an existing application. In both the Create Application Wizard and the Create Page Wizard, you simply select the Feature, **Feedback**.

#### **How Customers Submit Feedback**

Users can submit feedback by clicking the **Feedback** navigation bar icon in the upper right of a running application. In the Feedback window, they can rate their user experience by selecting an emoji, entering feedback comments, or uploading files.

### Viewing Feedback within an Application

Administrators and developers can track and manage Feedback at the application level by running the application and accessing the Feedback region on the Administration page. To control whether users can upload attachments, click **Feedback Settings**. To view feedback entries, select **User Feedback** to view the Manage Feedback report.

#### **Tracking Feedback in Team Development**

Administrators and developers can track all feedback within a workspace in Team Development, Feedback. Each feedback entry tracks the application and page ID and



name, displays any feedback comments. Administrators and developers can assign a status and create an issue.

## 4.8.2 Adding Feedback Using the Create Application Wizard

Add a Feedback page when running the Create Application Wizard.

To create an application which includes a Feedback page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- Click Application.
- 4. For Name, enter the name used to identify the application to developers.
- **5.** For Appearance, accept the default Theme Style and menu layout (Vita, Side Menu) or change it by clicking the **Set Appearance** icon adjacent to the Appearance field.
- 6. To add a new page (such as a blank page, calendar, chart, form, report, and so on), click **Add Page** and select the desired page type.
- 7. Under Features, select Feedback.
- **8.** Under Settings, specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 9. Click Create Application.



Understanding Page Types, Features, and Settings

# 4.8.3 Adding Feedback Using the Create Page Wizard

Use the Create Page Wizard to add Feedback to an existing application.



### Tip:

This section describes how to create a feedback by running the Create Page Wizard from the Application home page. You can also run this wizard in Page Designer by clicking the **Create** menu and selecting **Page**.

To add a feedback page:

- 1. On the Workspace home page, click **App Builder**.
- 2. Select an application.

The Application home page appears.

- 3. Click the Create Page button.
- 4. For Create a Page:
  - a. Page Type Select **Feature** and then **Feedback**.



#### Tip:

**Component** pages provides page-level functionality and can be added multiple times within a given application such as reports, forms, charts, or calendars. **Feature** pages provide application-level functionality and can only be added once per application.

The Create Feedback Page appears.

- b. Click Next.
- 5. On the Create Feedback Pages:
  - a. Starting Page Number Enter an unused starting page number. This feature will create multiple pages starting with the number specified.
  - b. Page Group Identify the name of the page group to associate with this page. Page groups help developers manage the pages within an application. To use an existing page group, select the name from the list.
  - c. Build Option The listed build option(s) to be created to support this feature.
  - **d.** Include in Navigation Bar Select **On** to create a navigation bar entry within the current application to invoke your new feedback page.
  - e. Navigation Bar Label Enter the name of the new navigation bar entry used to access the new feedback page.
  - **f.** Administration Page Preference Specify the administration page to which a list will be added for this feature.

Options include:

- Create a new page
- Identify an existing page

Depending upon your selection, the UI changes.

- g. Follow the on-screen instructions.
- 6. Click Create.

### 4.8.4 Submitting Feedback Within a Running Application

Users can submit feedback by clicking the Feedback navigation bar icon in the upper right of a running application.

To submit feedback managed with the application:

- 1. Run the application for which you want to submit feedback.
- 2. Click the **Feedback** navigation bar icon in the upper right corner.

A Feedback window appears.

- 3. In Feedback:
  - a. Experience Select an emoji that reflects your user experience (**Positive**, **Neutral**, or **Negative**).
  - b. Feedback Enter a comment.



c. Attachment - Click Choose File to upload an attachment.



### Tip:

Administrators can enable and disable attachments by selecting **Administration** and editing **Feedback Settings**.

4. Click Submit Feedback.

# 4.8.5 Reviewing Feedback Within an Application

View feedback within a running application by clicking User Feedback on the Administration page.

To view feedback within an application:

- Run the application.
- 2. Click **Administration** in the left navigation bar.
- 3. Click User Feedback.

The Manage Feedback page displays an interactive report.

- 4. Click the Edit icon adjacent to the entry you wish to view.
- 5. On the Feedback page:
  - a. Review the user feedback.
  - b. Response Respond to the feedback.
  - c. Status Select one of the following:
    - No Action
    - Acknowledged
    - Open
    - Closed
- 6. To delete the feedback, click **Delete**.
- 7. To save your changes, click **Apply Changes**.

# 4.8.6 Configuring Feedback to Support Attachments

Configure feedback to add support for attachments.



For this feature to work, an administrator must set **Enable Feedback File Repository** to **Yes** for the workspace. See Configuring Team Development in an Existing Workspace in *Oracle APEX Administration Guide*.

Developer and administrators can also configure Feedback Settings to enable support for attachments.



To configure Feedback Settings:

- 1. Run the application.
- 2. Click **Administration** in the left navigation bar.
- 3. Click Feedback Settings .

Feedback Settings appears.

- For Enable Attachments, select On to enable users to upload attachments or Off
  to disable this functionality.
- 5. To save your changes, click Apply Changes.

## 4.8.7 Tracking Feedback

Track all feedback within a workspace on the Feedback page.

Administrators and developers can track all feedback within a workspace in Team Development. Each feedback entry tracks the application and page ID and name, user, user email, and user comments. Administrators and developers can review the feedback, assign a type, create an issue and assign a status.

- · Viewing the Feedback Dashboard
- · Viewing the Feedback Report
- Viewing Feedback by Filing User
- Viewing the Feedback Calendar

### 4.8.7.1 Viewing the Feedback Dashboard

To access the Feedback report:

1. Click the **Team Development** menu and select **Feedback**.

The Feedback Dashboard appears.

2. Click the Report tab.

The Feedback Dashboard appears.

- To link from the Feedback Dashboard:
  - Open Feedback, Feedback Users, or Feedback Entries Click the number enclosed by a circle to link to the appropriate page or report.
  - By Status, By Application, or By Filer Lists feedback details. Click the link to view more details.
  - **Summary** Summaries feedback entries. Click the number above to summary entry to link the appropriate report or page.

### 4.8.7.2 Viewing the Feedback Report

To access the Feedback report:

Click the Team Development menu and select Feedback.

The Feedback Dashboard appears.

2. Click the Report tab.



The Feedback Report appears.

To customize the report, use the Actions menu in Search bar at the top of the page. Click **Reset** to return the report to the default view.

3. Select a number in the Feedback column.

The View/Edit Feedback dialog appears.

- 4. On View/Edit Feedback:
  - a. Review the user feedback.
  - b. Type Classify the feedback. Select one of the following:
    - General Comment
    - Enhancement Request
    - Bug
  - c. Disposition Select one of the following:
    - Log as Bug
    - Log as To Do
    - Log as Feature
    - Log as Issue
- **5.** For Status, select a status of the feedback entry:
  - 0. No Status
  - 1. Acknowledged
  - 2. Additional information requested
  - 3. Open Processing Feedback
  - 4. Closed
- 6. To delete a feedback entry, click **Delete**.
- 7. To save your changes, click Apply Changes.

### 4.8.7.3 Viewing Feedback by Filing User

To view feedback by filing user:

1. Click the **Team Development** menu and select **Feedback**.

The Feedback Dashboard appears.

2. Click the **By Filing User** tab.

The By Filing User report appears.

To customize the report, use the Actions menu in Search bar at the top of the page. Click **Reset** to return the report to the default view.

3. To view the feedback, click the user in Filing User column.

### 4.8.7.4 Viewing the Feedback Calendar

To view the Feedback Calendar:

1. Click the **Team Development** menu and select **Feedback**.



The Feedback Dashboard appears.

2. Click the Calendar tab.

The Calendar appears.



# **Creating Applications**

An application is a collection of pages linked together using navigation menus, tabs, buttons, or hypertext links. Application pages share a common session state and authentication.

To create an application, a developer runs wizards to declaratively assemble pages and navigation. Individual pages are organized using containers called **regions**. Once created, developers can modify an application by editing application attributes and add new pages using the Create Page Wizard. Developers can further manage the development process by creating page groups, locking and unlocking pages, adding developer and application comments, and accessing a variety of application, page, and cross page utilities and reports.

### About the Create Application Wizard

Learn about using the Create Application Wizard to design and quickly create Oracle APEX applications.

#### Creating an Application Based on a Table or Query

Run the Create Application Wizard and select **New Application** to create an application containing multiple pages based on a table you select, or by providing a valid SQL query.

#### Creating an Application from a File

Run the Create Application Wizard and select **From a File** to upload a file and then create an application on the uploaded data.

#### Using Application Blueprints

Each iteration of the Create Application Wizard saves an application blueprint which you can use to start adding pages to an application, or edit the application definition as a JSON document.

#### Copying an Application

Create a copy of an existing application.

#### Creating Applications for Mobile Devices

Build applications for mobile devices with mobile-specific design patterns that can provide an optimal user experience for small screens.

#### Deleting an Application

You can delete an application from the Application home page, or while editing application attributes.

#### Managing Application Attributes

Application attributes control the behavior of an entire application and are divided into the categories: Definition, Security, Globalization, User Interface, and Progressive Web App.

#### Managing Application Logos

Add and update an application logo in an Oracle APEX application.

#### Managing Application Icons

Add and update the icon that displays as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon in Oracle APEX applications.

### Adding Developer Comments

Add comments to an application, a page, or a group of pages using the Developer Comment, Bug, or To Do button. You can use developer comments to communicate application changes, report issues, or record developer suggestions.

### Using the Find Icon

Click the Find icon to search for items, pages, queries, tables, PL/SQL code, view debug reports, view session state, and view errors.

#### Adding Application Comments

Use Application Comments to describe an application or track developers involved in the application development.

#### Managing Application Groups

Organize applications by assigning them to application groups. To use application groups, first create a group and then assign applications to it.

#### Using Application Utilities

Access the Utilities page to view useful application summaries and reports.

#### Using Workspace Utilities

Use the Workspace Utilities page to access REST Enabled SQL Services, Remote Servers, Application Groups, Web Credentials, Workspace Themes, Export, Oracle APEX Views, Manage Backups, and REST Source Catalogs.

# 5.1 About the Create Application Wizard

Learn about using the Create Application Wizard to design and quickly create Oracle APEX applications.

- Overview of Creating a New Application
   Learn about how the Create Application Wizard works.
- Create Application Wizard Use Cases
   Review common use cases when using the Create Application Wizard.
- Choosing the Application Type
   Running the Create Application Wizard prompts you to choose the type of
   application you want to create.
- Understanding Page Types, Features, and Settings
   Learn about the supported page types, features, and configurable settings available in the Create Application Wizard.

## 5.1.1 Overview of Creating a New Application

Learn about how the Create Application Wizard works.

Creating a new application with the Create Application Wizard is a multiple step process. Once you specify the application name and appearance, you add pages. Applications can contain multiple pages that include various components such as calendars, cards, charts, dashboards, forms, interactive grids, master detail or editable grids, and reports. Once created, you can edit the page names, alter the page order, and delete them.

**Features** provide application-level functionality and can only be added once per application. Available features include an Application About page, role-based user authentication, end user activity reports, configuration options to enable or disable specific functionality, a feedback mechanism to gather end user comments, and a Customize button to enable end users to choose their own theme style.

Then, you configure **Settings**. Settings are used in the generation of the application and include the application ID, the database schema, Advanced Settings (such as the

application definition, security, and globalization attributes), and application authentication.

After you create an application using the Create Application Wizard, you can modify pages and add additional pages using the Create Page Wizard. You can also take advantage of application blueprints. Each time you run the Create Application Wizard, it saves an application blueprint which you can use to start adding pages to an application, or edit the application definition as a JSON document.

### See Also:

- · Running the Create Application Wizard
- · Managing Pages in an Application

# 5.1.2 Create Application Wizard Use Cases

Review common use cases when using the Create Application Wizard.

Common use cases when using the Create Application Wizard include:

- Create an app from existing data. Create an application and set of initial pages based
  on existing data from a table or a query. Then, select application features, specify a
  theme, and configure options. These initial pages can be used as is, or function as a
  blueprint for creating a similar set of pages in the future. See Running the Create
  Application Wizard and Using Application Blueprints.
- Create an app and add pages. Create an application and then add pages one at a time
  using the Create Page Wizard. See Running the Create Application Wizard and Adding a
  New Page to an Application.
- Create an app from a file. Create an application from a file by uploading a CSV, XLSX, XML, or JSON file, or by copying and pasting data directly into the wizard. See Creating an Application from a File.
- Create an app based on a script. Create an application containing many pages from a saved script in SQL Scripts. See Creating an Application from a Script in Oracle APEX SQL Workshop Guide.
- Create an app based on a dataset. After you install a sample data set, you have the option to create an application containing multiple pages on that dataset. See Installing a Sample Dataset in Oracle APEX SQL Workshop Guide.



Copying an Application

## 5.1.3 Choosing the Application Type

Running the Create Application Wizard prompts you to choose the type of application you want to create.

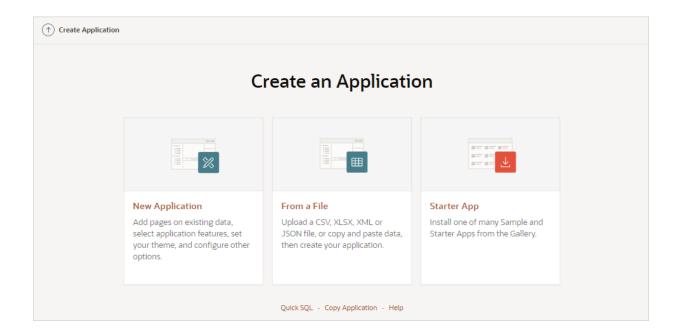
To run the Create Application Wizard, click the **Create** button on the App Builder home page.





#### Tip:

The first time you access the App Builder home page, a grey box labeled **Create a New App** appears. Clicking **Create New App** is a shortcut to accessing the Create Application Wizard.



The wizard prompts you to choose the type of application you want to create. Options include:

- New Application. Create a fully functional application based on tables you select or by providing a valid SQL. You can add pages that include various components including calendars, cards, charts, dashboards, forms, interactive grids, master detail or editable grids, and reports. Add application-level features such as an Application About page, role-based user authentication, end user activity reports, configuration options to enable or disable specific functionality, a feedback mechanism to gather end user comments, and a Customize button to enable end users to choose their own theme style. See Running the Create Application Wizard
- From a File. Upload a CSV, XLSX, XML, or JSON file, or copy and paste data and then create your application. See Creating an Application from a File.
- Starter App. Links to the Gallery. The Gallery enables you to access to Starter Apps, Sample Apps, and plug-ins available in the Oracle APEX GitHub Repository. Follow the on-screen instructions.
- Quick SQL. Generate the SQL required to create a relational data model from an
  indented text document. Quick SQL is designed to reduce the time and effort
  required to create SQL tables, triggers, and index structures. See Using Quick
  SQL in Oracle APEX SQL Workshop Guide.
- Copy Application. Create a copy of an existing application. See Copying an Application.

Help. Links to this page in Oracle Help Center.

# 5.1.4 Understanding Page Types, Features, and Settings

Learn about the supported page types, features, and configurable settings available in the Create Application Wizard.

- Available Page Types in the Create Application Wizard
   Learn about available page types when running the Create Application Wizard.
- Available Features in the Create Application Wizard
   Learn about available features when running the Create Application Wizard. Features
   provide application-level functionality and can only be added once per application.
- Available Settings in the Create Application Wizard
   Learn about Settings available when running the Create Application Wizard. Settings are
   used in the generation of the application and include the application ID, the database
   schema, Advanced Settings (such as the application definition, security, and globalization
   attributes), and application authentication.
- About Removing Features Created with the Create Application Wizard Remove features created with a wizard using build options.



- · Running the Create Application Wizard
- Creating Applications for Mobile Devices

### 5.1.4.1 Available Page Types in the Create Application Wizard

Learn about available page types when running the Create Application Wizard.

**Available Page Types** 

Table 5-1 Create Application Wizard - Available Page Types

Page Type	Description	To Learn More
Blank	Creates a page with no built-in functionality. Once you create the application, you can create regions on the page in Page Designer.	See online Help when creating this page.
Calendar	Generates a calendar with monthly, weekly, and daily views.	See Creating Calendars



Table 5-1 (Cont.) Create Application Wizard - Available Page Types

Page Type	Description	To Learn More
Cards	A <b>cards</b> page features an orderly layout of information tiles. Developers choose between three layouts: Grid, Float, or Horizontal (Row).	See: Managing Cards
	Features:	
	<ul> <li>Customize every aspect of a cards region's UI (including layout, appearance, icon, badge, and media).</li> </ul>	
	<ul> <li>Declaratively create links from a cards page by adding actions. Action types include Button, Full Card, Title, Subtitle, or Media.</li> </ul>	
	<ul> <li>Supports advanced HTML expressions including template directives for client-side conditional formatting.</li> </ul>	
Chart	Creates a new page containing a chart. Supported chart types include area, bar, box plot, bubble, combination, status meter gauge, donut, funnel, gantt, line, line with area, pie, polar, pyramid, radar, scatter, and stock charts.	See Creating Charts
Dashboard	Creates a dashboard page. Choose from four different chart layouts which you can easily customize in Page Designer. Available chart layouts include <b>Primary and 2 secondary charts</b> , <b>Grid of 4 charts</b> , <b>Primary and 3 secondary charts</b> , and <b>Grid of 6 charts</b> .	See online Help when creating this page.
Faceted Search	A <b>faceted search</b> page displays and filters data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region). Displays search results as cards or a classic report.	See: Managing Faceted Search
	Features:	
	<ul> <li>Select options from facets in the left Search region to narrow down search results.</li> </ul>	
	<ul> <li>Set filters using facets that show possible values together with the occurrence count within the result set.</li> </ul>	
	Built-in search capability.	
	<ul> <li>Optionally include a chart for any facet.</li> </ul>	
	<ul> <li>Toggle between a bar chart (which is the default) and pie chart type.</li> </ul>	
	<ul> <li>Create facet groups for data models having multiple flag columns.</li> </ul>	



Table 5-1 (Cont.) Create Application Wizard - Available Page Types

Page Type	Description	To Learn More
Smart Filters	A <b>smart filters</b> page features single search field at the top of the page and a search results report (classic report, cards, map, or calendar). While a Smart Filter behaves similarly to faceted search, it features a more space efficient layout.	See: Managing Smart Filters
	Features:	
	<ul> <li>Includes a search field at the top of the page with filters that display as suggestion chip.</li> <li>The Search Results can display as a classic report, cards, map, or calendar.</li> <li>Clicking a filter name displays a list of values.</li> <li>Clicking to right of a suggestion chip changes it to an applied filter chip and moves to the Applied Filters Area. Clicking the applied filter chip again displays a list.</li> </ul>	
	Built-in search capability.	
Form	Create a page containing a form which enables end users to maintain data. Select the table on which to build the form and specify whether or not to include a report.	See: Creating a Form



Table 5-1 (Cont.) Create Application Wizard - Available Page Types

Page Type	Description To Learn More
Interactive Grid	An <b>interactive grid</b> presents data in a searchable, customizable report. Includes similar customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.
	Features:
	<ul> <li>Extensive customization capabilities using menus or inline editing.</li> </ul>
	<ul> <li>Turn editing on or off using the region Attribute, Edit, Enabled.</li> </ul>
	Built-in search capability.
	<ul> <li>For both editable and non-editable reports, users can change the report layout and create private reports:         <ul> <li>Column Heading menu - Change the report layout with Control Break, Aggregations, Freeze, Hide, and Filter.</li> <li>Actions menu:</li></ul></li></ul>
	Private or Alternative reports.  * Download - Download or email the report as
	a CSV, HTML, PDF, or Excel file
	If editable, users can edit the data directly:
	<ul> <li>Row Actions menu - Single Row View, Add Row,         Duplicate Row, Delete Row, Refresh Row, Revert         Changes.</li> <li>Add Rows - Add new rows by clicking the Add         Row button.</li> </ul>
	<ul> <li>Edit Rows - Edit a row by selecting or double- clicking a cell with the mouse, editing the content, and clicking the <b>Save</b> button.</li> </ul>



Table 5-1 (Cont.) Create Application Wizard - Available Page Types

Page Type	Description	To Learn More
Interactive Report	An <b>interactive report</b> page features a searchable, easily customizable report.	See: Managing Interactive Reports
	Features:	
	<ul> <li>Report can display as a standard application page or as a modal dialog.</li> </ul>	
	• Enable the <b>Include Form</b> option to create a report and update form combination.	
	Built-in search capability.	
	Change the report layout and create private reports	
	using menus:	
	<ul> <li>Column Heading menu: Change the report layout with Sort Ascending, Sort Descending, Hide Column, Control Break, and Filter.</li> </ul>	
	<ul> <li>Actions menu:</li> </ul>	
	<ul> <li>Columns - Configure the columns to show or hide.</li> </ul>	
	* Filters - Create filters to alter the display.	
	* Data - Sort, Aggregate, Compute, Flashback.	
	* Format - Control Break, Highlight, Rows Per	
	Page.	
	<ul><li>* Chart - Create a chart.</li></ul>	
	<ul> <li>Group By - Group sets of results by one or more columns with Group By.</li> </ul>	
	<ul> <li>Pivot - Pivot reports transpose rows into columns to generate results in a cross tab format.</li> </ul>	
	<ul> <li>Report - Create, edit, and manage saved Named reports.</li> </ul>	
	<ul> <li>Download - Download or email the report as a CSV, HTML, Excel, or PDF.</li> </ul>	
	<ul> <li>Subscription - Subscribe to report updates in CSV, HTML, Excel, or PDF format.</li> </ul>	
Мар	The map component consists of a background map and spatial geometry objects (or layers) sourced from data in a local table. Supported spatial geometry objects (or layers) include: Points, Lines, Polygons, Heat Map, or Extruded Polygons. Spatial geometry objects can be either:	See Creating Maps
	<ul> <li>Geometry Column - Supported datatypes include SDO_GEOMETRY, VARCHAR2, or CLOB. VARCHAR2 and CLOB columns must contain geometry information in GeoJSON format.</li> </ul>	
	<ul> <li>Two Numeric Columns - These columns must contain longitude and latitude values. This option only applies to Point and Heat Map layers.</li> </ul>	



Table 5-1 (Cont.) Create Application Wizard - Available Page Types

Page Type	Description	To Learn More
Master Detail	A master detail reflects a one-to-many relationship between two tables in a database. Master detail forms enable users to insert, update, and delete values from two tables or views. Master Detail options include:	See Creating Master Detail Forms
	<ul> <li>Stacked - Creates a single page master detail with editable interactive grids. Users select a row in the master grid to update the detail grids.</li> </ul>	
	Side by Side - Create a single page master detail utilizing side by side layout and report regions with modal edit windows. The left side contains a master list to navigate to the master record. The right side contains the selected master record and the associated detail report.	
	<ul> <li>Drill Down - Creates a two page (or Drill Down) master detail. The first page contains an interactive report for the master table. The second page features a standard form for the master and interactive grids for the detail.</li> </ul>	
Additional Pages,	Expand the <b>Additional Pages</b> region to view this option.	See: Managing Classic Reports
Classic Report	A <b>classic report</b> features a simple report page based on the formatted result of a SQL query.	
	Features:	
	<ul> <li>Report can display as a standard application page or as a modal dialog.</li> </ul>	
	<ul> <li>Enable the <b>Include Form</b> option to create a report and update form combination.</li> </ul>	
	<ul> <li>Enable column sorting in Page Designer by selecting a column and configuring Column, Sorting attributes.</li> </ul>	
	<ul> <li>The most versatile report as it is template-driven.</li> <li>Choose from the predefined report templates, including Media List, Comments, Timeline, Badge List, Value Attributes Pairs, and so on. Or, create your own template to customize and visualize data.</li> </ul>	
	<ul><li>Download the report as a CSV, HTML, Excel, or PDF.</li><li>Supports Report Layouts to format PDF exports.</li></ul>	
Additional Pages, Multiple Reports	Creates multiple report pages containing an interactive report with form. For each page, you choose a table on which to build the interactive report with form. Click <b>Edit</b> to change the default options (such as providing a custom <b>SQL Query</b> ), specifying another report type (such as, selecting <b>Classic Report</b> instead of <b>Interactive Report</b> ).	See: Managing Interactive Reports See online Help when creating this page.
	Select <b>Include Form</b> to include a form page for creating or updating records.	
Additional Pages,	Expand the <b>Additional Pages</b> region to view this option.	See online Help when creating this
Timeline	Create a page which displays a timeline. Especially useful for displaying updates.	page.
Additional Pages, Wizard	Create a collection of pages to be used as a wizard. Generally wizards are used for entering data across multiple steps.	See online Help when creating this page.



# 5.1.4.2 Available Features in the Create Application Wizard

Learn about available features when running the Create Application Wizard. Features provide application-level functionality and can only be added once per application.

This table lists available Features when running the Create Application Wizard.

Table 5-2 Create Application Wizard — Features

Page Type	Description	To Learn More
Install Progressive Web App	Progressive Web Applications (PWA) are designed to be capable, reliable, and installable. A Progressive Web App feels like a platform-specific application. Enabling this option:  Adds a new navigation bar entry, Install App  Enables users to install the app on devices	See Creating a Progressive Web App (PWA)
About Page	Include an About page in the application which displays the application description.	See online Help when creating feature.
Access Control	Incorporate role-based user authentication within your application. Users can be defined as Administrators, Contributors, or Readers. You can then readily define different access to different roles for various components throughout your application, such as pages, menu entries, regions, columns, items, buttons and so forth.	See Controlling Access to Applications, Pages, and Page Components
Activity Reporting	Include numerous reports on user activity for your application such as the most active users, the most used pages, the performance of pages, and errors raised. Includes the following:  Top Users report  Application Error Log report  Page Performance, activity and performance by page  Application activity by page report  Page Views detail report  Automations Log (if the application contains	Not applicable.
Configuration Options	automations)  Enables application administrators to enable or disable specific functionality within the application. This feature is useful if you select features that need additional development effort before they can be used by end users. This feature can also be expanded to application-specific features. If developers define additional build options and associate them with specific functionality throughout the application, then they can be added to the configuration settings for administrators. For example, within the <i>Customer Tracker</i> productivity app, administrators can turn on or off such features as Contacts, Data Loading, Geography, and more.	



Table 5-2 (Cont.) Create Application Wizard — Features

Page Type	Description	To Learn More
Feedback	Feedback provides a mechanism for end users to post general comments for application administrators and developers. The posts include useful session state information to help developers determine where the end user sent the feedback from.	See Managing Feedback
	Creating Feedback:	
	<ul> <li>Creates a Navigation bar icon which users can click to leave feedback.</li> </ul>	
	<ul> <li>Creates a report for viewing and updating feedback.</li> </ul>	
	<ul> <li>Captures the application and page ID, feedback comments, date and time, and user information.</li> </ul>	
Theme Style Selection	Enables administrators to select a default color scheme (theme style) for the application.  Administrators determine whether end users can choose their own theme style by enabling and disabling Allow End Users to choose Theme Style is enabled.	Not applicable.
	If enabled, end users simply click on the <b>Customize</b> link at the bottom of the home page and select from the available theme styles. For example, users with visual impairment may prefer to utilize the Vita theme style which has a much higher color contrast	

See Also:

About Removing Features Created with the Create Application Wizard

### 5.1.4.3 Available Settings in the Create Application Wizard

Learn about Settings available when running the Create Application Wizard. Settings are used in the generation of the application and include the application ID, the database schema, Advanced Settings (such as the application definition, security, and globalization attributes), and application authentication.

This table lists available Settings when running the Create Application Wizard.

Table 5-3 Create Application Wizard — Settings

Page Type	Description	To Learn More	
Application ID	Unique, numeric identifier for your application. This field contains an automatically generated identifier by default.	Not applicable.	



Table 5-3 (Cont.) Create Application Wizard — Settings

Page Type	Description	To Learn More	
Schema	Select the database schema which stores the database objects you want to use in this application.		
Language	Select the primary language for this application.	Not applicable.	
Authentication	Select how you want users to authenticate into your application.	See Establishing User Identity Through Authentication	



Table 5-3 (Cont.) Create Application Wizard — Settings

Page Type	Description	To Learn More
Advanced Settings	Set additional definition, security, and globalization settings. These settings can be applied when creating the application and can be edited post application creation.	Not applicable.
	<b>Tip</b> : To learn more about these attributes, see field-level Help.	
	User Interface Attributes:	
	<ul> <li>Apply User Interface Defaults - Select On to have attribute defaults based on existing User Interface Defaults defined within this workspace.</li> </ul>	
	<ul> <li>Copy from Existing Apps - Select On to have attribute defaults to be based on existing Form pages, based on the same table, in current applications defined within this workspace.</li> </ul>	
	<ul> <li>Table Prefixes - Enter table prefixes currently used by existing database tables on which pages are based. These prefixes may be different from the framework table prefix (for database objects created by this application when generated).</li> </ul>	
	Description:	
	<ul> <li>Short Description - Enter text to be displayed as a subtitle, under the application name on the home page.</li> </ul>	9
	<ul> <li>Description - Enter text to be displayed on the About This Application page, accessed from the help icon in the navigation bar.</li> </ul>	
	Settings:	
	<ul> <li>Add "Built with APEX" to Footer - When set to On, Oracle APEX adds the text "Built with Love using Oracle APEX" to the footer of every page.</li> </ul>	
	<ul> <li>Version - Enter the application version. The version is displayed by default on the bottom of each page.</li> </ul>	
	<ul> <li>Logging - Determines whether or not user activity is recorded in the activity log. When set to On, every page view is logged, enabling an administrator to monitor user activity for each application.</li> </ul>	
	Disabling logging may be advisable for high volume applications	
	Note: You can only modify this attribute if the feature configuration Application Activity Logging in Oracle APEX Internal Administration is set to Use Application Setting.	
	Debugging - Determines whether debug mode	•

**On** enables the application to enable debug mode using the browser at runtime. **Off** 



Table 5-3 (Cont.) Create Application Wizard — Settings

Page Type	Description	To Learn More
	disables the application from er from the browser.	nabling in debug
	Debug can be enabled program regardless of this debug setting application is run from the APE environment, debugging can alrenabled.	g. If the X X development
	Security:	
	<ul> <li>Deep Linking - Enables or pre- linking to an application.</li> </ul>	vents deep
	If <b>On</b> , the URL to a specific page redirects there, possibly after the logged in. If <b>Off</b> , the URL does valid session ID, APEX redirect application's home page.	ne user has to not contain a
	<ul> <li>Maximum session length in s         Defines how long (in seconds) exist and be used by this applic     </li> </ul>	sessions can
	<ul> <li>Maximum session idle time in Defines the time between the la and the next page request.</li> </ul>	
	Globalization:	
	<ul> <li>Document Direction - Set doc left-to-right or right-to-left.</li> </ul>	eument direction
	<ul> <li>Date Format - Determines the be used in the application.</li> </ul>	date format to
	<ul> <li>Date Time Format - Specify th format to be used in the applica</li> </ul>	
	<ul> <li>Timestamp Format - Determine timestamp format to be used in</li> </ul>	nes the
	<ul> <li>Timestamp with Timezone For Determines the timestamp with format to be used in the application</li> </ul>	ormat - time zone

### 5.1.4.4 About Removing Features Created with the Create Application Wizard

Remove features created with a wizard using build options.

When you add a feature using a wizard, the wizard creates one or more pages and other components and processes to seamlessly integrate it into your application. Each feature is associated with a build option which contains one or more components. You use the associated build option to enable, disable, or permanently remove features.

#### **Using Build Options to Include or Exclude Features**

Build options have two possible values: **Include** and **Exclude**. If you select the build option status of **Include**, then the Oracle APEX engine considers the associated components (in this case features) as part of the application definition at runtime. Conversely, if you specify the build options status as **Exclude**, then the APEX engine treats it and any associated components as if it did not exist.



#### **Removing Features Permanently**

You remove features by first removing the components associated with the build option and then deleting the build option.

### See Also:

- Including or Excluding Build Options
- Deleting Build Options and Associated Components

# 5.2 Creating an Application Based on a Table or Query

Run the Create Application Wizard and select **New Application** to create an application containing multiple pages based on a table you select, or by providing a valid SQL query.

Running the Create Application Wizard
 Use the Create Application Wizard to create an application containing multiple pages based on the tables you select, or by providing valid SQL queries.

## 5.2.1 Running the Create Application Wizard

Use the Create Application Wizard to create an application containing multiple pages based on the tables you select, or by providing valid SQL queries.

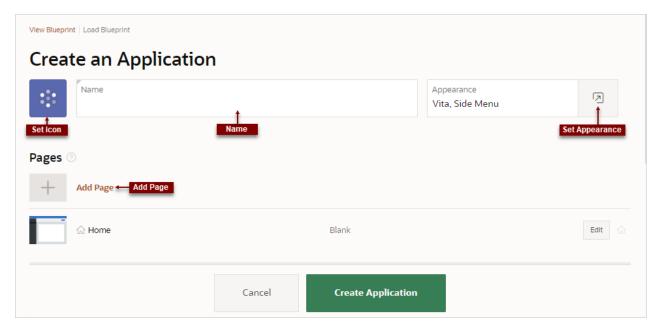
Run the Create Application Wizard by clicking **Create** on the App Builder home page, or by selecting **Create** from the App Builder menu.

To run the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- Click the Create button.
- Click New Application.

The Create an Application page appears.





- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon. In the Choose Application Icon dialog you can include:
  - **Upload an icon**. Click the plus (+) sign and navigate to the icon, or drag and drop the icon to the **Upload your own icon** region.
  - Select an icon from the library. Select the icon color and then the icon.
- 5. Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click Set Appearance to change it.
  In the Appearance dialog, configure the following:
  - Theme Style Select the default theme style used to display the application.

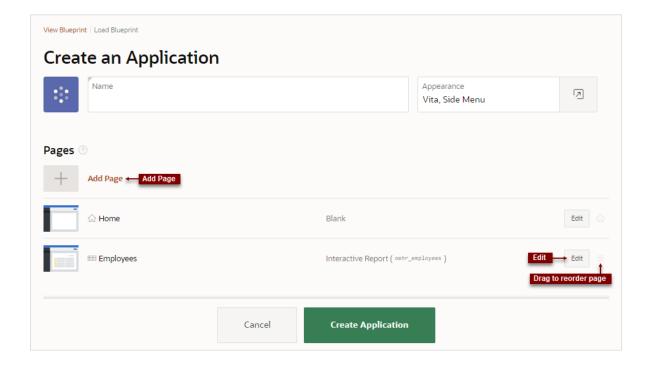


### Tip:

You can change the style to another pre-defined style, or modify it post generation. To change the style run the application and then click **Theme Roller** in the Developer toolbar.

- Navigation Select a type of navigation menu. Options include:
  - Side Menu Renders a navigation tree on the side of the screen that can be collapsed when not in use.
  - Top Menu Renders the navigation as a menu bar in the application header.
  - Mega Menu Renders the navigation in an collapsible floating panel that displays all navigation items at once.
- **Application Icon** Click **Choose New Icon** to change the icon. Your selection displays on the home page of the application.
- Click Save Changes.
- To add a page, click Add Page and select the desired page type. The user interface changes based on the selected page type.



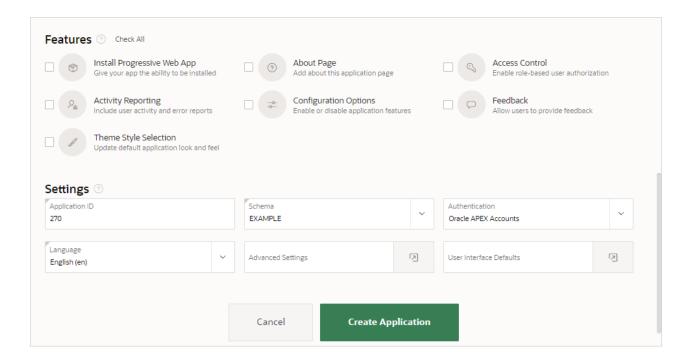


Pages you create display under Pages.

You can edit existing pages as follows:

- Change the page order. To change the order in which pages appear in your application, click and hold the Drag to reorder page icon and drag and drop it to a new location in the list.
  - The Home page always displays first and cannot be reordered. For administrative pages, the page order dictates the order they appear in the Application Administration list on the Administration page.
- Edit a page. To edit a page click Edit. In the dialog, edit the attributes and click Save Changes.
- Delete a page. To delete a page, click Edit and the click Delete .
- **8.** For Features, select features to include with your application.





Features provide application-level functionality and can only be added once per application. To learn more, see Help. To select all features, click **Check All**.

#### 9. For Settings:

- a. Application ID Enter a unique, numeric identifier for your application. This field contains an automatically generated identifier by default. Application IDs between 3000 to 9000 are reserved for internal use by Oracle APEX.
- b. Schema Select the database schema which stores the database objects you want to use in this application. Each application obtains its privileges by parsing all SQL as a specific database schema.
- c. Languages The primary language used in the app. To change the primary language, click the Select Languages icon.
- **d.** Authentication Select how you want users to authenticate into your application..
- Advanced Settings Click the icon adjacent to the Advanced Settings to edit the application definition settings and preferences and security and globalization attributes. To learn more, see Help.
- f. User Interface Defaults Click the icon to apply User Interface Defaults to this application.

#### 10. Click Create Application.



### See Also:

- Available Page Types in the Create Application Wizard
- Available Features in the Create Application Wizard
- Available Settings in the Create Application Wizard
- Managing Navigation Menus

# 5.3 Creating an Application from a File

Run the Create Application Wizard and select **From a File** to upload a file and then create an application on the uploaded data.

- About Creating an Application from a File
   Upload a CSV, XLSX, XML, TXT, or JSON file, or copy and paste CSV data and then create your application.
- Creating an Application by Uploading File
   Upload a file to the database and then create an application based on the new table.
- Creating an Application by Copying and Pasting from a File
   Copy and paste column delimited data from a CSV file, or selecting a sample and then create an application based on the new table.

## 5.3.1 About Creating an Application from a File

Upload a CSV, XLSX, XML, TXT, or JSON file, or copy and paste CSV data and then create your application.

When you run the Create Application Wizard and select **From a File**, the Load Data Wizard appears. On the Load Data Wizard, you can choose to:

- Upload a File. Select this option to load data from a CSV, XLSX, XML, TXT, or JSON file.
- Copy and Paste. Select this option to copy and paste column delimited data. You have the option of selecting a sample data set from the Select Sample list.

Once you load data into the database table, the wizard provides an option to Continue to the Create Application Wizard. When you continue, a report with form and dashboard pages based on the new table displays under **Pages**. You then finish the application creation process by naming the application.



Loading Data in Oracle APEX SQL Workshop Guide



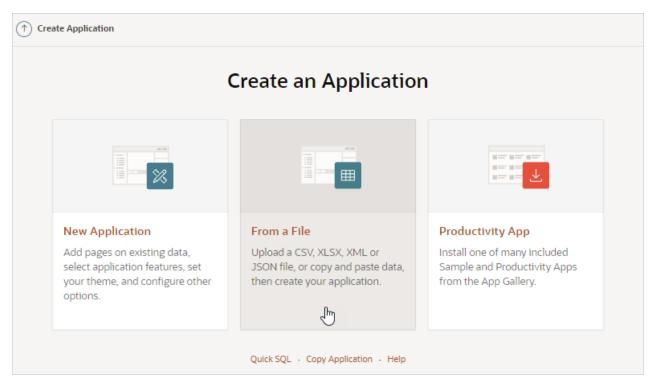
# 5.3.2 Creating an Application by Uploading File

Upload a file to the database and then create an application based on the new table.

To create an application from a file:

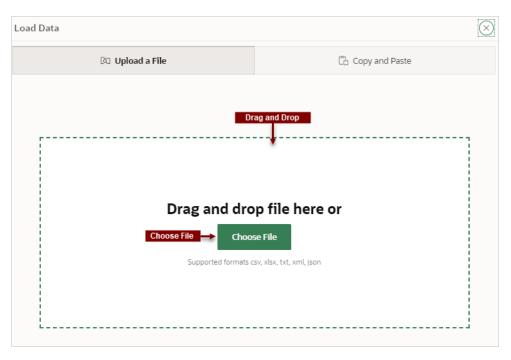
- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.

The Create Application Wizard appears.



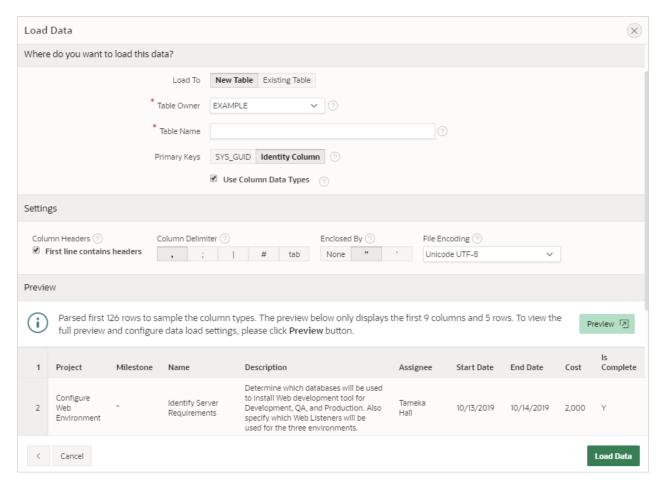
#### 3. Click From a File.

The Load Data page appears with the **Upload a File** tab selected.



- 4. In the **Upload a File** tab, you have two options:
  - **Drag and Drop** Drag and drop the file to the region in the center of the page.
  - Choose File Click Choose File and then navigate to and select the file.

The Load Data page appears containing the sections **Where do you want to load this data?**, **Settings**, **Preview**. Note that the Load Data page that appears differs slightly depending upon the selected file type.



5. Under Where do you want to load this data?, select where to load the data.

What appears next depends upon your selection.

- 6. To load data to a new table:
  - a. Load To Select New Table.
  - b. Table Owner Select the database schema.
  - **c.** Table Name Identify the table name you would like to create. By default, all table names are converted to upper case.
  - d. Error Table Name Identify the error table name you would like to save errors during data load. By default, all table names are converted to upper case. If data load succeeds without any error, this error table is dropped automatically.
  - Primary Keys Select how to set the primary key. Options include SYS\_GUID or Identity Column. To learn more, see field-level Help.
  - f. Use Column Data Types Select to use the column types parsed from the file. If unchecked, the table columns will be created as VARCHAR2(4000).
- 7. To load data to an existing table:
  - a. Load To Select Existing Table.
  - b. Table Owner Select the database schema.
  - c. Table Name Select the database table to load data.

A message appears indicating the number of columns mapped to the target table.



- d. Click **Configure** to configure any remaining columns. On Configure, under Column Mapping:
  - Rows to Sample Select the maximum number of rows to be used to sample column types.
  - Treat as Null The entered case insensitive value will be treated as NULL.
     For example, "tbd", "n/a", "unknown", "-".
  - Column Mapping Configure any additional attributes.
  - Click Save Changes.
- e. Error Table Name Identify the error table name where you would like to save errors during data load. By default, all table names are converted to upper case. If data load succeeds without any errors, this error table is dropped automatically.
- f. Update Method Options include:
  - **Append** If data already exists in the table, the wizard appends the new rows into the table. If data does not exist, the new rows are simply loaded.
  - **Replace** The entire table is replaced by deleting the table first and then loading the new rows into the table.

#### 8. Under Settings:

- Column Headers Select this option if your data contains column names in the first row.
- b. Column Delimiter Select a column delimiter character (if CSV or TXT file).
- c. Enclosed By Select a column enclosed by character (if CSV or TXT file). This character deliminates the starting and ending boundary of a data value. If you specify a delimiter character, the wizard ignores white space occurring before the starting and ending boundary of a data value.
- File Encoding (if applicable) Choose the character set in which the file is encoded.
- **9. Preview** displays a sample of columns and rows. The exact number varies based on the type of file. Click one of the following tabs:
  - **Preview** Displays a sample of columns and rows. The exact number varies based on the type of file.
  - **Column Mapping** Enables you to configure any remaining columns:
    - Rows to Sample Select the maximum number of rows to be used to sample column types.
    - Treat as Null The entered case insensitive value will be treated as NULL.
       For example, "tbd", "n/a", "unknown", "-".
    - Column Mapping Configure any additional attributes.
    - Click Save Changes.

#### 10. Click Load Data.

A confirmation page appears indicating the table and rows have been created. You have the following options:

View Table - Click View Table to exit from the current wizard and opens Object Browser so you can view the newly created table.



• Continue to the Create Application Wizard - Click Continue to the Create Application Wizard to load the Create Application Wizard.

Note that if all rows fail to load, this button does not display.

11. Click Continue to Create Application Wizard.

The Create an Application page in the Create Application Wizard appears. Report with form and dashboard pages based on the new table display under **Pages**. From here, you can edit page name or create additional pages based on the imported data.

12. Complete the Create Application Wizard.

### See Also:

- Running the Create Application Wizard
- Available Page Types in the Create Application Wizard
- · Available Features in the Create Application Wizard
- Available Settings in the Create Application Wizard

## 5.3.3 Creating an Application by Copying and Pasting from a File

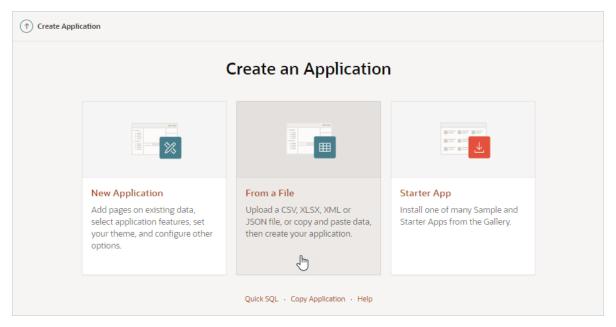
Copy and paste column delimited data from a CSV file, or selecting a sample and then create an application based on the new table.

To create an application by copying and pasting column delimited data from a CSV file, or selecting a sample:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.

The Create Application Wizard appears.

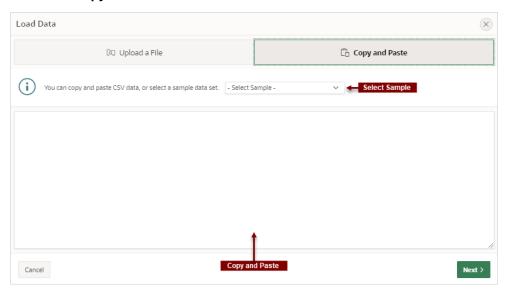




3. Click From a File.

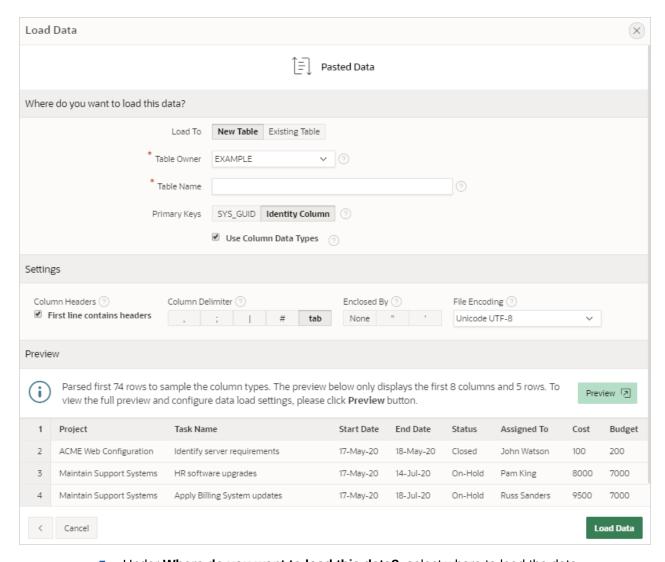
The Load Data page appears

4. Select the Copy and Paste tab.



- **5.** To load data, do one of the following:
  - Select a Sample Select a sample database from the Select Sample list.
  - Copy and Paste Copy and paste CSV data.
- 6. Click Next

The Load Data page appears.



7. Under Where do you want to load this data?, select where to load the data.

What appears next, depends upon your selection.

- 8. To load data to a new table:
  - a. Load To Select New Table.
  - b. Table Owner Select the database schema.
  - **c.** Table Name Identify the table name you would like to create. By default, all table names are converted to upper case.
  - d. Error Table Name Identify the error table name you would like to save errors during data load. By default, all table names are converted to upper case. If data load succeeds without any error, this error table is dropped automatically.
  - Primary Keys Select how to set the primary key. Options include SYS\_GUID or Identity Column. To learn more, see field-level Help.
  - f. Use Column Data Types Select to use the column types parsed from the file. If unchecked, the table columns will be created as VARCHAR2(4000).
- 9. To load data to an existing table:
  - a. Load To Select Existing Table.



- b. Table Owner Select the database schema.
- c. Table Name Select the database table to load data into.
  - A message appears indicating the number of columns that are mapped.
- d. Click **Configure** to configure any remaining columns. On Configure, under Column Mapping:
  - Rows to Sample Select the maximum number of rows to be used to sample column types.
  - Treat as Null The entered case insensitive value will be treated as NULL.
     For example, "tbd", "n/a", "unknown", "-".
  - Column Mapping Configure any additional attributes.
  - Click Save Changes.
- e. Error Table Name Identify the error table name you would like to save errors during data load. By default, all table names are converted to upper case. If data load succeeds without any error, this error table is dropped automatically.
- f. Update Method Options include:
  - **Append** If data already exists in the table, the wizard appends the new rows into the table. If data does not exist, the new rows are simply loaded.
  - **Replace** The entire table is replaced by deleting the table first and then loading the new rows into the table.

#### 10. Under Settings:

- Column Headers Enable First Line Contains if your data contains column names in the first row.
- b. Column Delimiter Select a column delimiter character.
- c. Enclosed By Select a column enclosed by character . This character deliminates the starting and ending boundary of a data value. If you specify a delimiter character, the wizard ignores white space occurring before the starting and ending boundary of a data value.
- **d.** File Encoding Choose the characterset in which the file is encoded.
- **11. Preview** displays a sample of columns and rows. The exact number varies based on the type of file. Click one o the following tabs:
  - Preview displays a sample of columns and rows. The exact number varies based on the type of file.
  - Column Mapping enables you to configure any remaining columns:
    - Rows to Sample Select the maximum number of rows to be used to sample column types.
    - Treat as Null The entered case insensitive value will be treated as NULL. For example, "tbd", "n/a", "unknown", "-".
    - Column Mapping Configure any additional attributes.
    - Click Save Changes.

#### 12. Click Load Data.

A confirmation page appears indicating the table and rows have been created. You have the following options:



- **View Table** Exits from the current wizard and opens Object Browser so you can view the newly created table.
- Continue to the Create Application Wizard

#### 13. Click Continue to Create Application Wizard.

The Create Application Wizard appears. The wizard pre-populates pages based on the new table and the pages display under **Pages**. From here you can edit the page name or create additional pages based on the imported data.

14. Complete the Create Application Wizard.

### Note:

- Running the Create Application Wizard
- Available Page Types in the Create Application Wizard
- Available Features in the Create Application Wizard
- Available Settings in the Create Application Wizard

# 5.4 Using Application Blueprints

Each iteration of the Create Application Wizard saves an application blueprint which you can use to start adding pages to an application, or edit the application definition as a JSON document.

- What Is an Application Blueprint?
   View or load an application blueprint by running the Create Application Wizard.
- Viewing an Application Blueprint
   View an application blueprint by running the Create Application Wizard and clicking the
   View Blueprint link at the top of the Create Application Wizard.
- Loading an Application Blueprint
   Load an application blueprint by running the Create Application Wizard and clicking the
   Load Blueprint link at the top of the Create Application Wizard.



To learn more about JSON, see https://www.json.org/

## 5.4.1 What Is an Application Blueprint?

View or load an application blueprint by running the Create Application Wizard.

You can view the application blueprint by running the Create Application Wizard and clicking the **View Blueprint** link at the top of the Create Application Wizard. The Application Blueprint window transforms and displays the current application definition as a JSON document. Edit the document to update application properties and then click **Apply Blueprint** to change the current application details.



If you need to create a large number of similar pages you can copy the relevant JSON code for one page, paste it numerous times, and then make small adjustments to the JSON. This approach can be significantly quicker than manually clicking the **Add Page** button for each page in the wizard.

You can also replace the blueprint with the definition from a previously generated application. Click **Load a Previous Blueprint** to replace the blueprint with the definition from a previously generated application. This approach is a simple way to iterate the application design by adding additional pages, changing the features, or tweaking the settings, before generating the application again.

## 5.4.2 Viewing an Application Blueprint

View an application blueprint by running the Create Application Wizard and clicking the View Blueprint link at the top of the Create Application Wizard.

To view an application blueprint:

- 1. On the Workspace home page, click the **App Builder** icon.
- Click the Create button.
- 3. Click New Application.
- 4. At the top of the page, click the View Blueprint link.

The Application Blueprint window appears displaying the application definition in JSON format.

```
Application Blueprint
                 Q \leftrightarrow
                                                                                                                                                          (A)
     "application": {
       "appShortDescription": "",
       "appDescription": ""
"schema": "EXAMPLE",
"features": {
          "accessControl": false,
         "activityReporting": false,
         "configurationOptions": false,
         "feedback": false,
"helpPages": false,
11
12
         "themeSelection": false
14
15
       "appearance": {
  "themeStyle": "Vita",
16
         "navigation": "SIDE"
         "icon": "app-icon-rocket",
"iconBackgroundClass": "app-color-3",
19
20
21
22
23
24
25
         "iconColorHEX": "#81BB5F"
       },
"settings": {
          "baseTablePrefix" ""
         "primaryLanguage": "en",
"authentication": "Application Express"
26
27
28
29
       "pages": [
         {
  "page": "1",
  "pageType": "blank",
  "anoName": "Home",
                                                                                                                            Ι
   Load a Previous Blueprint
                                                                                                                                            Apply Blueprint
```

- 5. To edit the document:
  - Update application definition.

The following buttons display at the top of the Script Editor:

- Undo Ctrl+Z Removes, or undoes, the most recent line edit made in the Script Editor.
- Redo Ctrl+Y Repeats the most recent line edit made in the Script Editor.
- Find Ctrl+F Find resembles a magnifying glass. Click Find to perform a basic search.
- Replace Ctrl+Shift+F Replace resembles a two-sided arrow. Click Replace to search and replace existing code.
- b. Click **Apply Blueprint** to change the current application definition.
- 6. To replace the blueprint with the definition from a previously generated application:
  - a. Click Load Previous Blueprint.
  - In Load Blueprint, locate the blueprint and click Select.
  - c. Click Apply Blueprint to change the current application details.

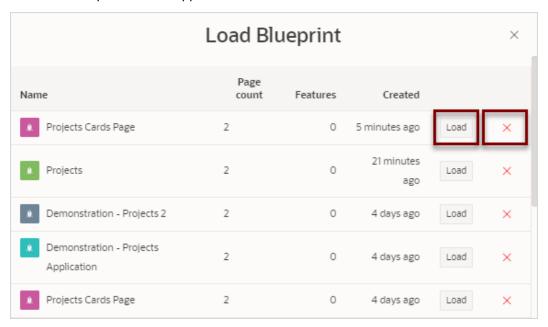
## 5.4.3 Loading an Application Blueprint

Load an application blueprint by running the Create Application Wizard and clicking the Load Blueprint link at the top of the Create Application Wizard.

To load an application blueprint:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. At the top of the page, click the **Load Blueprint** link.

The Load Blueprint window appears.



- 5. On Load Blueprint, you can:
  - Load a new blueprint. Locate the blueprint to load and click Select.
  - Delete a blueprint. Click the Delete Blue icon.



## 5.5 Copying an Application

Create a copy of an existing application.

Create a copy of an existing application by running the Create Application Wizard and selecting the **Copy Application** link, or by selecting the application and then **Copy this Application** from the Tasks list on the Application home page.

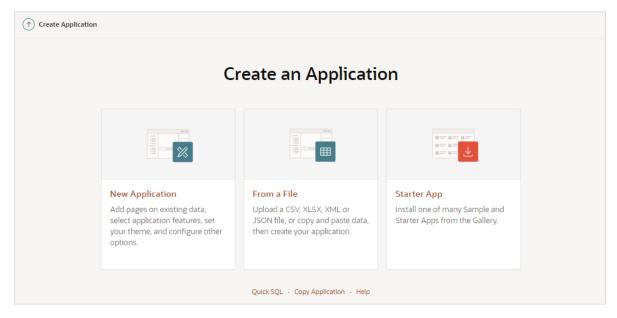
- Copying an Application by Running the Create Application Wizard
- Copying an Application from the Application Home Page

# 5.5.1 Copying an Application by Running the Create Application Wizard

To copy application by running the Create Application Wizard:

- On the Workspace home page, click the App Builder icon.
- 2. Click the Create button.

The Create Application Wizard appears.



- 3. Select the Copy Application link at the bottom of the window and click Next.
- 4. For Identify Copy Target:
  - a. Copy From Select the name of the application to copy.
  - **b.** Copy To Enter a short descriptive name for the application to distinguish the new application in select lists and reports.
  - c. New Application ID Specify an integer value that identifies the application. The application ID must be unique within your Oracle APEX instance. Application IDs in the range of 3000 to 9000 are reserved for internal use by APEX



- d. Copy Supporting Object Definitions You can copy supporting object definitions, configuration options, and scripts with your application. Select **On** to include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file. Select **Off** to not include supporting object definitions.
- 5. Confirm your selection and click **Create Application**.

## 5.5.2 Copying an Application from the Application Home Page

To copy an application from the Application home page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application to copy.

The Application home page appears.

- 3. From the Tasks list, click Copy this Application.
- 4. For Identify Copy Target:
  - a. New Application ID Enter a unique integer value to identify the application. Application IDs between 3000 to 9000 are reserved for internal use.
  - **b.** New Application Name Enter a short descriptive name for the application to distinguish the new application in select lists and reports.
  - **c.** Copy Supporting Object Definitions Copy supporting object definitions, configuration options, and scripts with your application.. Options include:
    - On Include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file.
    - Off Do not include supporting object definitions.
  - d. Click Next.
- 5. Click Copy Application.

## 5.6 Creating Applications for Mobile Devices

Build applications for mobile devices with mobile-specific design patterns that can provide an optimal user experience for small screens.

- Advantages of the Universal Theme
   Universal Theme 42 (Universal Theme) features responsive design, a versatile user
   interface, and easy customization and enables developers to build modern web
   applications without requiring extensive knowledge of HTML, CSS, or JavaScript.
- Creating a Progressive Web App (PWA)
   Learn about Progressive Web App (PWA) features and requirements.
- Forms Optimized for Mobile Environments
   Learn about forms optimized for mobile environments.

## 5.6.1 Advantages of the Universal Theme

Universal Theme - 42 (Universal Theme) features responsive design, a versatile user interface, and easy customization and enables developers to build modern web applications without requiring extensive knowledge of HTML, CSS, or JavaScript.

Key advantages of the Universal Theme include:



- Responsive Design Designed to work just as well on small screen devices
  (such as smartphones and tablets) as it does on larger screen devices (including
  laptops and desktops) by responding automatically to the dimensions of the
  screen on which it is running. The UI components in Universal Theme work across
  varying screen resolutions while maintaining the same or similar functionality. In
  addition, Universal Theme takes full advantage of ultra high screen resolutions by
  utilizing vector graphics where possible, and relying upon CSS3 features for UI
  styling.
- Versatile User Interface Provides all the components and building blocks necessary to build practically any type of business application user interface. To browse all of the components provided with Universal Theme go to the *Universal Theme* application at <a href="https://apex.oracle.com/ut">https://apex.oracle.com/ut</a> and select Components.
- Easy Customization Effortlessly customize and fully control the look and feel of your applications without becoming an expert in UI design, HTML, CSS, or JavaScript. Using Theme Roller and Template Options, you can easily customize your application to fit your company's brand and customize the look and feel of various components using Template Options.

#### About Migrating Existing jQuery Mobile Apps to the Universal Theme

jQuery Mobile and the jQuery Mobile User Interface used in previous releases has been desupported. If you have an existing mobile application that uses the jQuery Mobile User Interface, you must migrate your existing application to the Universal Theme.



#### Tip:

To learn more about migrating existing applications to the Universal Theme, go to the *Universal Theme* application at https://apex.oracle.com/ut and select **Migration Guide**.

### See Also:

- About Switching the Active Theme
- Understanding Template Options
- Using Theme Styles

## 5.6.2 Creating a Progressive Web App (PWA)

Learn about Progressive Web App (PWA) features and requirements.

About Progressive Web App Support
 Progressive Web Apps (PWAs) leverage modern web APIs giving users an
 experience that looks and feels like a native app.



- Creating a Progressive Web App
   Create a Progressive Web App by running the Create Application Wizard and enabling
   the Install Progressive Web App feature.
- Configuring Progressive Web App Attributes
   Configure Progressive Web App attributes for both new and existing Progressive Web App applications.

### 5.6.2.1 About Progressive Web App Support

Progressive Web Apps (PWAs) leverage modern web APIs giving users an experience that looks and feels like a native app.

Developers can create a PWA when creating a new application with the Create Application Wizard, or by editing attributes of an existing application.

#### **Progressive Web App Requirements**

Requirements for using this feature include:

- The Oracle APEX application must be served over a secured HTTPS environment, or localhost. If using an unsecured environment, PWA features will not be rendered
- The application Definition, Properties, Friendly URLs attribute must be On. See Accessing the Application Definition Page.

#### **About Progressive Web Apps**

**Enabling PWA functionality:** 

- Adds the ability to install the app as a Progressive Web App (PWA).
- Adds a new navigation bar entry named Install App to your application.
- Optimizes page loading speed on the mobile device. Improves page load rendering time with a new browser cache architecture for static files (APEX core files and app files).
- Enables users to install the application on devices.
- Provides a customizable offline page when users are offline and cannot request the network. See Progressive Web App (PWA) Messages Requiring Translation.
- Supports hooks into the service worker code for a fully customizable PWA experience.

#### Creating a New PWA

For a new application, you can create a PWA by enabling the **Install Progressive Web App** feature in the Create Application Wizard and then configuring the Progressive Web App attributes.

#### Making an Existing App a PWA

To make an existing application a PWA, you must:

- Verify **Friendly URLs** attribute is **On** in the Application Definition, **Properties** section.
- Turn on the Enable Progressive Web App attribute and then configure the remaining Progressive Web App attributes.



- Accessing the Application Definition Page
- Configuring Progressive Web App Attributes

## 5.6.2.2 Creating a Progressive Web App

Create a Progressive Web App by running the Create Application Wizard and enabling the **Install Progressive Web App** feature.



#### Tip:

To include mobile friendly reports and forms, create your application and then add pages to it. See Mobile Friendly Forms.

To create a new application with Progressive Web App functionality enabled:

- On the Workspace home page, click the App Builder icon.
- Click the **Create** button.
- 3. Click New Application.

The Create an Application page appears.



To learn more about all the options available in the Create Application Wizard, see Running the Create Application Wizard.

- 4. For Name, enter the name used to identify the application to developers.
- To add a page, click **Add Page** and select the desired page type. The user interface changes based on the selected page type.



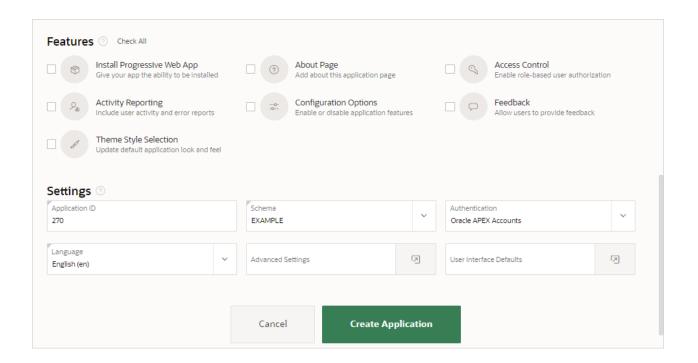
#### Tip:

The Create Page Wizard supports the creation of a number of mobile friendly reports and forms. See Mobile Friendly Forms.

Pages you create display under Pages.

6. For Features, select features to include with your application. Select Install **Progressive Web App.** 





Features provide application-level functionality and can only be added once per application. To learn more, see Help. To select all features, click **Check All**.

- 7. Click Create Application.
- 8. Configure Progressive Web App attributes. See Configuring Progressive Web App Attributes.

## 5.6.2.3 Configuring Progressive Web App Attributes

Configure Progressive Web App attributes for both new and existing Progressive Web App applications.

To configure Progressive Web App attributes:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. From the Application home page, you can access the Progressive Web App page in two ways:
  - Edit Application Definition button:
    - Click Edit Application Definition to the right of the application name.
    - Click the Progressive Web App tab.
  - From Shared Components:
    - a. Click Shared Components.
    - **b.** Under User Interface, click **Progressive Web App**.
- Under General, edit the following:
  - a. Enable Progressive Web App Confirm this option is enabled.
  - b. Installable Confirm this option is enabled.



#### 5. Under Appearance:

- **a.** Display Select the preferred display mode for the application. This option controls how much of the browser UI the user sees. Options include:
  - Fullscreen Opens the PWA without any browser UI. This option takes
    the entirety of the screen or window.
  - **Standalone** Opens the PWA to look like a standalone application. The app runs in a distinct window, separate from the browser. Standard browser UI components like the URL bar and buttons are not visible.
  - Minimal UI Similar to standalone, except with browser controlling navigation buttons like back and refresh.
  - Browser Opens the PWA is a regular browser UI.

**Note**: Some devices and browsers ignore this attribute. Oracle APEX is only relaying this information to the device which handles the Progressive Web App appropriately. For more information, see <a href="https://web.dev/add-manifest//">https://web.dev/add-manifest//</a>.

**b.** Screen Orientation - Select the preferred screen orientation when using this Progressive Web App. This option applies mostly for mobile devices.

**Note**: Some devices and browsers ignore this attribute. Oracle APEX is only relaying this information to the device which handles the Progressive Web App appropriately.

c. Theme Color - Defines the default theme color for the application.

This attribute affects how the operating system displays the application (for example, for an Android's task switcher, the theme color surrounds the application).

**Note**: Some devices and browsers ignore this attribute. Oracle APEX is only relaying this information to the device which handles the Progressive Web App appropriately.

d. Background Color - Select the background color.

The background color defines a placeholder background color for the application to display before its stylesheet is loaded. Therefore, the background color should match the theme body background color for a smooth transition between launching the web application and loading the application content.

**Note**: Some devices and browsers ignore this attribute. APEX is only relaying this information to the device which handles the Progressive Web App appropriately.

- e. iOS Status Bar Style Determines the style of the iOS status bar of your progressive web app. Apple offers three distinct choices:
  - Black Text and White Background
  - Black Text and Black Background This option makes it appear completely black
  - Translucent This option has white text takes the same background color as the body of your web app. The text color will remain white even if you use a light background color. If using translucent, the page content is displayed on the entire screen.



- f. App Description Explains what the application does. Use this attribute to provide more information to users when they are prompted to install the application.
- g. Custom Manifest Used to store additional JSON properties for the Web App Manifest file. The properties found here will be used to extend the declarative options above, by overriding existing properties or appending new properties.
  - For more information on building a Custom Manifest, you can read the Web App Manifest specifications: https://www.w3.org/TR/appmanifest/.
- h. Screenshots Include screenshots for promotional purposes when users are prompted to install the Progressive Web App.

#### To add a screenshot:

- Click Add Screenshot.
- Description Enter the PWA screenshot label which is used for accessibility purposes when installing the PWA.
- Sequence Identifies the display sequence used by this PWA screenshot.
- Upload a Screenshot:
  - Drag and Drop Drag and drop the file to the region.
  - Choose a File Click the Upload a Screenshot region and then navigate to and select the file.
- Build Option Identifies the build option that this PWA screenshot uses.
- Comments Add comments associated with this PWA screenshot.
- Click Create.
- i. Shortcuts Include shortcuts to enable users of installed PWAs to quickly access a specific page. For touch-enabled devices, shortcuts are accessible when doing a long-press on the application icon on the home screen. For other devices, shortcuts are accessible when doing a right click on the application icon on the task bar.

#### To add a shortcut:

- Click Add Shortcut.
- Name Enter the name of the PWA shortcut.
- Target URL Specify the page of the application for the current shortcut.
- Sequence Identifies the display sequence used by this PWA screenshot.
- Upload an icon:
  - Drag and Drop Drag and drop the file to the region.
  - Choose a File Click the **Upload an Icon** region and then navigate to and select the file.
- Description Enter a description for this PWA shortcut.
- Build Option Identifies the build option that this PWA shortcut uses.
- Comments Add comments associated with this PWA shortcut.
- Click Create.





#### Tip:

An APEX application can only use PWA Shortcuts if Rejoin Sessions is enabled. Before configuring shortcuts, click either **Enable for Public Sessions** or **Enable for All Sessions**. To learn more, see Session Management.

6. Under Service Worker Configuration, select a Service Worker.

Service workers are JavaScript files that can execute code even when the app is not in use. Service workers can listen to events like fetching resources or handling notifications. You can modify a service worker through hooks, or by replacing events completely. Service Worker options include:

- Default The APEX engine generates it with the following strategy:
  - Install and activate the service worker
  - Serve resources from cache if cache exists
  - Otherwise serve from network, then put resource in cache
  - Serve an offline page if network fails
- Configure Hooks Fill in the placeholders in the service worker code to add your own. Hooks locations are provided by Oracle APEX. When using this option, you can choose to "Download Configuration" and use it as a File URL.
- File URL Provide a URL reference to a file that contains the service worker hooks interface. This is useful for sharing service worker hooks across multiple applications. If using the file reference, make sure to follow the interface architecture appropriately or else the service worker will fail at runtime.

To view the interface structure, see field-level Help for this attribute.

7. Click Apply Changes.

## 5.6.3 Forms Optimized for Mobile Environments

Learn about forms optimized for mobile environments.

- Mobile Friendly Forms
  - Oracle APEX includes three mobile friendly reports and forms: List View, Column Toggle, and Reflow Report.
- Creating a Column Toggle Report
   Create a column toggle report in Page Designer.
- Creating a List View Report
   Create a list view report in Page Designer.
- Creating a Reflow Report
   Create a reflow report in Page Designer.

## 5.6.3.1 Mobile Friendly Forms

Oracle APEX includes three mobile friendly reports and forms: List View, Column Toggle, and Reflow Report.

Although the Universal Theme is optimized to work well on mobile devices, not all components are mobile friendly. For example, interactive reports and interactive grids do not work well in mobile environments.

The following mobile friendly reports are optimized for mobile environments:

- List View A List view report features a responsive design to display data and provide
  easy navigation on Smartphones. A list view report contains the formatted result of a SQL
  query based on the data source (local or external) you specify and the table or SQL
  query you provide. Developers edit the report Attributes to determine the database
  columns that display, including the column used for List view entry.
- Column Toggle Report A column toggle report contains the formatted result of a SQL query based on the data source (local or external) you specify and the table or SQL query you provide. A column toggle report includes a Columns button which enables end users to select which columns they want to view.
- Reflow Report A reflow report contains the formatted result of a SQL query based on the data source (local or external) you specify and the table or SQL query you provide.
   When there is not enough space available to display the report horizontally, the report responds by collapsing the table columns into a vertical value pairs layout where each column displays on a separate row.

## 5.6.3.2 Creating a Column Toggle Report

Create a column toggle report in Page Designer.

A **column toggle** report contains the formatted result of a SQL query based on the data source (local or external) you specify and the table or SQL query you provide. A column toggle report includes a Columns button which enables end users to select which columns they want to view.

By default, column toggle reports are created with all columns set to the same priority. However, the developer can edit the report column attributes and rank columns by importance. Columns with a lesser priority (larger number) are hidden at narrower screen widths. The report includes a Columns button which enables end users to select which columns they want to view.

To create a column toggle report.

- 1. Create a Blank page using the Create Page Wizard.
- 2. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 3. Click the **Layout** tab in the central pane.
- 4. In the Gallery, click the **Regions** tab. Right-click **Column Toggle** and select **Add To**, and select the appropriate location (for example, **Body**).





#### Tip:

You can also select the Column Toggle region in the Gallery and drag it to the appropriate location in the Layout tab.

- Page Designer indicates what to do next. If there are errors, the **Show Messages** icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- **b.** Select an error to highlight the associated attribute in the Property Editor.
- **6.** Select the **New** region (if not already selected).

Next, edit the **Region** attributes in the Property Editor (or right pane).

- 7. Identification, Title Enter a region title. The region title only displays when it is defined in the region template.
- 8. Source Configure the Data Source for the region:

What appears next depends upon the attributes you select. For this example, the report is built on a local database on EBA PROJECTS table.



#### Tip:

To learn more about an attribute and view examples, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- a. Location Select the location of the data. For example, select **Local** Database.
- **b.** Type Select how the data is queried. For example, select **Table/View**.
- c. Table Name Enter the case-sensitive table or view name. You can type in the name or pick from the list. For example, select **EBA\_PROJECTS**.
- 9. Edit any additional attributes as needed.
- 10. View the page, click Save and Run Page.

The toggle columns report appears.

End users can control what columns display by clicking the **Columns** button.

## 5.6.3.3 Creating a List View Report

Create a list view report in Page Designer.

List view reports feature a responsive design to display data and provide easy navigation on Smartphones. A list view report contains the formatted result of a SQL query based on the data source (local or external) you specify and the table or SQL query you provide. Developers edit the report Attributes to determine the database columns that display, including the column used for List view entry.

The example in this topic builds a report on the EBA PROJECTS table available in the sample dataset, Project Data.



To create a list view report.

- 1. If needed, create a Blank page using the Create Page Wizard.
- 2. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

3. In the Gallery, click the **Regions** tab. Right-click **List View** and select **Add To**, and select the appropriate location (for example, **Body**).



#### Tip:

You can also select the **List View** region in the Gallery and drag it to the appropriate location in the Layout tab.

- **4.** Page Designer indicates what to do next. If there are errors, the **Show Messages** icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- **b.** Select an error to highlight the associated attribute in the Property Editor.
- 5. Select the **New** region (if not already selected).

Next, edit the **Region** attributes in the Property Editor (or right pane).

- **6.** Identification, Title Enter a region title. The region title only displays when it is defined in the region template.
- 7. Source Configure the Data Source for the region:

What appears next depends upon the attributes you select. For this example, the report is built on a local database on EBA PROJECTS table.



#### Tip:

To learn more about an attribute and view examples, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- Location Select the location of the data. For example, select Local Database.
- **b.** Type Select how the data is queried. For example, select **Table/View**.
- c. Table Name Enter the case-sensitive table or view name. You can type in the name or pick from the list. For example, select **EBA\_PROJECTS**.
- **8.** Configure the report Attributes:
  - a. In the Property Editor, click the Attributes tab.
  - **b.** Settings Configure the attributes such as the following:
    - Features Select the features to include with list view report. Depending upon what you select additional attributes may appear. For example, select Enable Search.



- Text Column Select the database column that contains the main content for the list view entry. For example, select NAME (required).
- Supplemental Information Column -Select the database column that contains supplemental information for the list view entry. For example, select **DESCRIPTION**.
- Counter Column Select the database column that contains the value to display in the count bubble. For example, select BUDGET.
- 9. Edit any additional attributes as needed.
- 10. View the page, click Save and Run Page.

The list view report appears.

## 5.6.3.4 Creating a Reflow Report

Create a reflow report in Page Designer.

A **reflow report** contains the formatted result of a SQL query based on the data source (local or external) you specify and the table or SQL query you provide. When there is not enough space available to display the report horizontally, the report responds by collapsing the table columns into a vertical value pairs layout where each column displays on a separate row.

The example in this topic builds a report on the EBA\_PROJECTS table available in the sample dataset, Project Data.

To create a reflow report.

- 1. If needed, create a Blank page using the Create Page Wizard.
- 2. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

 In the Gallery, click the Regions tab. Right-click Reflow Report and select Add To, and select the appropriate location (for example, Body).



#### Tip:

You can also select the **Reflow Report** region in the Gallery and drag it to the appropriate location in the Layout tab.

- Page Designer indicates what to do next. If there are errors, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- **b.** Select an error to highlight the associated attribute in the Property Editor.
- 5. Select the **New** region (if not already selected).

Next, edit the **Region** attributes in the Property Editor (or right pane).



- **6.** Identification, Title Enter a region title. The region title only displays when it is defined in the region template.
- 7. Source Configure the Data Source for the region:

What appears next depends upon the attributes you select. For this example, the report is built on a local database on EBA PROJECTS table.



#### Tip:

To learn more about an attribute and view examples, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- a. Location Select the location of the data. For example, select Local Database.
- b. Type Select how the data is queried. For example, select **Table/View**.
- **c.** Table Name Enter the case-sensitive table or view name. You can type in the name or pick from the list. For example, select **EBA\_PROJECTS**.
- 8. Edit any additional attributes as needed.

For example, to facilitate a better display in a smaller window, you may want to edit the Column attributes, Heading, Alignment and Layout, Column Alignment attributes.

9. View the page, click Save and Run Page.

The reflow report appears.

When there is not enough space available to display the report horizontally, the report responds by collapsing the table columns into a vertical value pairs layout where each column displays on a separate row as shown in the following example.

## 5.7 Deleting an Application

You can delete an application from the Application home page, or while editing application attributes.

When you delete an application, you are prompted whether to remove the application definition and/or drop supporting objects.

- Deleting an Application from the Application Home Page
   Delete an application by select Delete this Application from the Tasks list on Application home page.
- Deleting an Application from the Edit Application Definition
   Delete an application by clicking Delete on Edit Application Definition page.



See Also:

**Deinstalling Supporting Objects** 



## 5.7.1 Deleting an Application from the Application Home Page

Delete an application by select Delete this Application from the Tasks list on Application home page.

To delete an application from the Application home page:

- On the Workspace home page, click the App Builder icon.
- Select an application.

The Application home page appears.

- On the Application home appears, verify the application ID and name at the top of the page.
- 4. From the Tasks list, click **Delete this Application**.
- 5. When prompted, click Permanently Delete Now.

## 5.7.2 Deleting an Application from the Edit Application Definition

Delete an application by clicking Delete on Edit Application Definition page.

To delete an application from the Edit Application Definition page:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- Click the Edit Application Definition button to the right of the application name.The Edit Application Definition page appears.
- 4. Verify the application ID and name.
- 5. Click **Delete** at the top of the page.
- 6. When prompted, click **Permanently Delete Now**.



**Editing the Application Definition** 

## 5.8 Managing Application Attributes

Application attributes control the behavior of an entire application and are divided into the categories: Definition, Security, Globalization, User Interface, and Progressive Web App.

Once you create an application, you can review and update all application attributes.





#### Tip:

How to Create a Custom Application for information on using the Supporting Objects utility to create a custom application.

#### Editing the Application Definition

Use the Application Definition page to change general application attributes such as the application name, application alias, version number and control various properties and behaviors such as friendly URLs, logging, debugging, feedback, compatibility mode, application availability, error handling, and substitution strings.

Configuring Security Attributes
 Use the Security page to set application-wide security settings.

#### Configuring Globalization Attributes

Edit attributes on the Globalization page to configure application globalization options. In App Builder you can develop applications that can run concurrently in different languages.

#### Editing User Interface Attributes

Use the User Interface page to control the default characteristics of the application and optimize the display.

Configuring Progressive Web App Attributes

Use the Progressive Web App page to configure attributes for both new and existing Progressive Web App applications.

## 5.8.1 Editing the Application Definition

Use the Application Definition page to change general application attributes such as the application name, application alias, version number and control various properties and behaviors such as friendly URLs, logging, debugging, feedback, compatibility mode, application availability, error handling, and substitution strings.

Accessing the Application Definition Page
 Access the Application Definition page from the Application home page.

#### Application Definition Page

The Application Definition page is divided into the following regions: Name, Properties, Availability, Error Handling, Gloal Notification, Substitutions, Build Options, and Copyright Banner.

## 5.8.1.1 Accessing the Application Definition Page

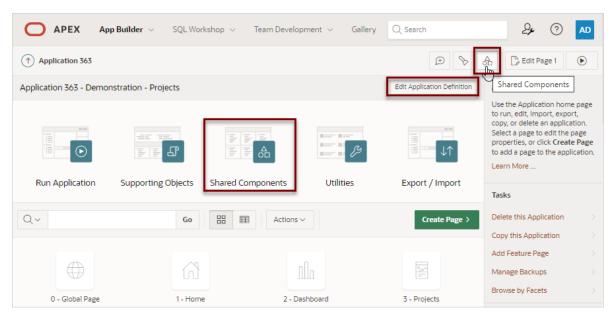
Access the Application Definition page from the Application home page.

To access the Application Definition page:

- On the Workspace home page, click the App Builder icon.
- Select an application.

The Application home page appears.





- 3. From Application home page, you can access the Application Definition page in two ways:
  - Click the Edit Application Definition button.
  - From Shared Components:
    - Click Shared Components.
    - Under Application Logic, click Application Definition.

The Edit Application Definition page appears.

- Edit the appropriate attributes.
- 5. Click Apply Changes to save your changes.

## 5.8.1.2 Application Definition Page

The Application Definition page is divided into the following regions: Name, Properties, Availability, Error Handling, Gloal Notification, Substitutions, Build Options, and Copyright Banner.



Required values are marked with a red asterisk (\*).

- Name
- Properties
- Availability
- Error Handling
- Global Notification
- Substitutions



- Build Options
- Report Printing
- Copyright Banner

#### 5.8.1.2.1 Name

Use **Name** attributes to define basic characteristics of your application, including the application name, an optional alphanumeric alias, and a version number.

Table 5-4 Application Definition, Name

Attribute	Description	To Learn More
Name	A short descriptive name for the application to distinguish it from other applications in your development environment.	n/a
Application Alias	Assigns an alternate alphanumeric application identifier. You can use this identifier for the application ID.	<ul><li>See:</li><li>Understanding Friendly URL Syntax</li><li>Customizing a Friendly URL</li></ul>
	When the <b>Friendly URLs</b> attribute is enabled, the <b>Application Alias</b> specified here displays in the URL when running the application. Applications created using Oracle APEX 20.1 or later default the <b>Application Alias</b> to the application <b>Name</b> .	
Version	Enter the application's version number. The value enter displays on the page. You can also automatically tie the version to the date of last modification using the following format masks:	n/a
	• YYYY.MM.DD	
	<ul><li>MM.DD.YYYY</li><li>DD.MM.YYYY</li></ul>	
	If your application version uses YYYY.MM.DD, then App Builder replaces this format mask with the date of last modification of any application attribute.	
Application Group	Displays the application group currently associated with this application. To select another application group, make a selection from the list. To remove an application from an existing group, select <b>Unassigned</b> .	See Managing Application Groups

## 5.8.1.2.2 Properties

Use Properties attributes to configure logging, debug behavior, feedback, compatibility, email from address, and the application proxy server.



Table 5-5 Application Definition, Properties

Attribute	Description	To Learn More
Friendly URLs	Determines whether URLs generated to navigate to other pages in the application should be easier to read. Options include:  On - If set to On, the application uses Friendly URLs Syntax in which the URL consists of a directory structure based on the Application Alias, Page Alias, and standard web parameter syntax If set to On, Progressive Web App attributes display on this page.  Off - If set to Off, the application uses f?p= Syntax.  Note: The friendly URL will include the workspace Path Prefix in the URL. To modify the Path Prefix, go to Workspace Administration, Manage Service, Set Workspace Preferences.	<ul> <li>See:         <ul> <li>Understanding Friendly URL Syntax</li> </ul> </li> <li>Customizing a Friendly URL</li> <li>Enabling RESTful Services and Defining a Path Prefix for a Workspace in Oracle APEX Administration Guide</li> </ul>
Allow Feedback	Enables support for end user feedback for this application. Select <b>Yes</b> or <b>No</b> .  If you select <b>Yes</b> , you must create a feedback feature page to use this attribute. If you enable this option, a Feedback icon displays. Uses can click the Feedback icon to leave feedback. Disabling this option hides the Feedback icon. This enables you to turn on feedback for testing and turn it off for production	See Managing Feedback
Logging	Determines whether user activity is recorded in the Oracle APEX activity log. Select <b>Yes</b> to log every page view and enable an administrator to monitor user activity for each application.  Disabling logging may be advisable for high volume applications.  This attribute can only be modified if the Application Activity Logging attribute in APEX Administration Services is set to <b>Use Application Setting</b> .	



Table 5-5 (Cont.) Application Definition, Properties

Attribute	Description	To Learn More
Debugging	<ul> <li>Controls debug mode for the current application. Available options include:</li> <li>Yes - Enables the application to run in a debug mode from a browser at runtime.</li> <li>No - Disables the application from enabling in debug from a browser.</li> <li>Running an application in debug mode is useful when an application is under development. For production applications, Oracle recommends disabling debugging and thus preventing users from viewing application logic.</li> <li>Debug can be enabled programmatically regardless of this debug setting. If the application is run from the APEX development environment, debugging can always be enabled.</li> </ul>	
Compatibility Mode	Controls the compatibility mode of the APEX runtime engine. Certain runtime behaviors change from release to release. To not break or change the behavior of existing applications, this attribute is automatically set during upgrade if necessary.  Use this attribute to obtain specific application behavior. To keep applications maintainable, set  Compatibility Mode to the latest release after reviewing the changed behavior in the Release Notes and making the necessary changes.  Note: In order to refresh any theme in release 22.2, you must set  Compatibility Mode to 21.2 / 22.1 / 22.2.	<ul> <li>For more information see     Changed Behavior,     Compatibility Mode in Oracle     APEX Release Notes.</li> <li>Updating App Compatibility Mode</li> </ul>



Table 5-5 (Cont.) Application Definition, Properties

Attribute	Description	To Learn More
Application Email from Address	Determines the email address to use as the from address in the application. Enter a valid email address to use as the from address when sending email from an email download or subscription. The value can be a literal string containing a valid email or a static substitution reference defined in the application using substitution syntax APP_EMAIL. Examples:  john.doe@abc.com  &MY_APP_EMAIL_FROM.	n/a
	Oracle does not recommend using an item substitution at the application or page-level since it only works in email download, but not for subscriptions.  Tip: You can also specify the Email from Address by editing interactive report attributes. See About Emailing from an Interactive Report.	
Proxy Server	Specify a proxy server.  For example, App Builder may require a proxy server when using a region source type of URL. The URL region source embeds the results of the URL (that is, the page returned by navigating to the URL) as the region source. If you use a firewall and the target of a URL is outside the firewall relative to App Builder, you may need to specify a proxy server.  You can reference values entered into this field from PL/SQL using the PL/SQL package variable  APEX_APPLICATION.G_PROXY_SERV ER.  For example:	n/a
	www-proxy.company.com	



Table 5-5 (Cont.) Application Definition, Properties

#### Attribute Description To Learn More **Oracle Text** The Oracle Text query syntax is very See Understanding Oracle Text **Function** complex and powerful and provides a Application Development in Oracle rich set of query operators to deal with Text Application Developer's Guide wildcards, stemming, fuzzy searches and so forth. For end users, this syntax is often hard to understand. Often users simply want to type text and have query features applied automatically. For that reason, you can specify the name of a PL/SQL function which converts end user input to an Oracle Text query. The function takes the end user input as VARCHAR2 and returns the Oracle Text query as a result This example uses Oracle Text Fuzzy Search for all queries. function convert\_end\_user\_search ( p search in varchar2 ) return varchar2 is begin return 'FUZZY({' || replace( p search, '}', '\}') || '}, 30, 2000)'; end; This example makes use of Query Relaxation. It executes the exact queries first and adds fuzzy or wildcard features later on when the exact query does not return enough rows. These change are all transparent to the end user. create or replace function convert end user search ( p search in varchar2 ) return varchar2 is c xml constant varchar2(32767) := '<query><textquery><progress ion>' || '<seq> #SEARCH# </seq>' ||



Table 5-5 (Cont.) Application Definition, Properties

Attribute	Description	To Learn More
	' <seq> ? #SEARCH# </seq> '	
	' <seq> #SEARCH#% </seq> '	
	' <seq> %#SEARCH#% </seq> '	
	<pre>'<!-- textquery-->';     l search</pre>	
	<pre>varchar2(32767) := p_search; begin     remove special</pre>	
	characters; irrelevant for full text search  l search :=	
	regexp_replace( l_search, '[<>{}/()*%&!\$?.:,;\+#]', '');	
	<pre>return replace( c_xml, '#SEARCH#', l_search ); end;</pre>	



Table 5-5 (Cont.) Application Definition, Properties

Attribute	Description	To Learn More
Tokenize Row Search	Specify how the search terms are applied when a row search is performed within a component.	n/a
	Selecting <b>On</b> treats each word of a search term separately and matches a record where the words are contained in any of the columns, together or independently. To search for an exact phrase, use a quotes (") around the search terms. For example, "ui developer". To escape a double quote in a search term, use a double quote ("").	
	Examples:	
	<ul> <li>Search for any record including the words "red" and "shoes"</li> </ul>	
	Search term: red shoes	
	<ul> <li>Search for any record including the word "developer" and the exact expression "ui designer"</li> </ul>	
	Search term: developer "ui designer"	
	<ul> <li>Search for any record including the word "author" and the exact expression "the sky is "blue" and nice"</li> </ul>	
	Search term: author "the sky is ""blue"" and nice"	
	Selecting <b>Off</b> treats the whole search term as an exact match.	

## 5.8.1.2.3 Availability

Use **Availability** attributes to manage your application by defining an application status and build status. For example, if you select the status **Restricted Access**, you can specify which users have access and can run the application.



Table 5-6 Application Definition, Availability

Attribute	Description	To Learn More
Status	Specifies whether the application is available or unavailable for use. Options include:  Available - Application is available with no restrictions.  Available with Developer Toolbar - Application is available for use. For developers, the Developer Toolbar displays on each page. Requires the developer to be logged in to App Builder in the same browser session.  Available to Developers Only - Application is available to users having developer privileges.  Restricted Access - Application is available to developers named in the Restrict to comma separated user list.  Unavailable - Application cannot be run or edited. The message in Message for unavailable application.  Unavailable (Status Shown with PL/SQL) - Application cannot be run or edited.  Unavailable (Redirect to URL) - Application cannot be run. The user is linked to the URL entered in Message for unavailable	
Build Status	<ul> <li>application.</li> <li>Identifies the build status of the current application. Options include:</li> <li>Run and Build Application -         Developers and users can both run and develop the application.</li> <li>Run Application Only - Users can only run the application. This option is intended for applications in a production instance.</li> </ul>	
Message for unavailable application	Use this attribute with Status. If you set Status to Unavailable, Unavailable (Status Shown with PL/SQL), or Unavailable (Redirect to URL), the text you enter in this attribute displays. If you set Status to Available, the text you enter in this attribute does not display.	n/a



Table 5-6 (Cont.) Application Definition, Availability

Attribute	Des	scription	To Learn More
Restrict to comma separated user list (status must equal Restricted Access)			n/a
	1.	From the Status list, select a restricted status.	
	2.	Enter a comma-delimited list of users who can run the application in the field provided.	
	3.	Click Apply Changes.	

## 5.8.1.2.4 Error Handling

Use the **Error Handling** attributes described to control or modify how an application logs errors.



#### Tip:

Error handling functions specified here are overridden by similar page-level attributes.

Table 5-7 Application Definition, Error Handling

Attribute	Description	To Learn More
Default Error Display Location	Identifies where the validation error messages display for basic validations performed by Oracle APEX or by plugins. Validation error messages can display in a notification area (defined as part of the page template), or within the field label. Options include:	n/a
	<ul> <li>Inline with Field and in Notification - Error messages display in a notification area defined as part of the page template.</li> <li>Inline with Field - Error messages display within the field label.</li> <li>Inline in Notification - Displays in the #NOTIFICATION_MESSAGE# template substitution string when an error occurs on the page.</li> </ul>	



Table 5-7 (Cont.) Application Definition, Error Handling

Attribute	Description	To Learn More
Attribute Error Handling Function	Enter the name of a PL/SQL error function to be called to modify the existing error message and display a more user-friendly message or log the error if one occurs. This function can reference a package function or standalone function in the database. For example:	See APEX_ERROR in <i>Oracle APEX API</i> Reference
	log_apex_error	
	When referencing a database PL/SQL package or standalone function, use the #OWNER# substitution string to reference the parsing schema of the current application. For example:	
	#OWNER#.log_apex_error	
	You must implement error handling functions using the syntax described in the apex_error package.	
	<pre>function <name function="" of=""> (     p_error in apex_error.t_error )     return apex error.t error result</name></pre>	
	apex_criot.t_error_resurt	
	<b>Note:</b> Error handling specified at the page-level overwrites any error handling function specified here.	

#### 5.8.1.2.5 Global Notification

Use the **Global Notification** attribute to communicate system status to application users. If the page templates used in your application contain the #GLOBAL\_NOTIFICATION# substitution string, the text entered here displays in that string's place. For example, you can use this attribute to notify users of scheduled downtime, or communicate other messages regarding application availability.

To create a global notification:

- 1. Include the #GLOBAL NOTIFICATION# substitution string in your page template.
- 2. Navigate to the Edit Application Definition page and enter a message in the Global Notification attribute.
- 3. Click Apply Changes.



#### See Also:

- Using Substitution Strings
- Page Templates

#### 5.8.1.2.6 Substitutions

Use **Substitutions** to define static substitution strings for your application. You can use static substitution string for phrases or labels that occur in many places within an application. To create a substitution string, enter the string name in the **Substitution String** column and the string value in the **Substitution Value** column.

Defining static substitution strings centrally enables you to change text strings in multiple places in your application by making a single change to the **Substitution Value** defined on this page.



**Using Substitution Strings** 

#### 5.8.1.2.7 Build Options

**Build Options** displays existing build options in the current application. Most applications have a build option attribute. Build Options have two possible values: INCLUDE and EXCLUDE. If you specify an attribute to be included, then the Oracle APEX engine includes and enables it at runtime. However, if you specify an attribute to be excluded, then the APEX engine disables it and excludes it at runtime.

Do not specify a build option unless you plan to exclude that object from specific installations.



Using Build Options to Control Configuration

## 5.8.1.2.8 Report Printing

**Report Printing** controls the print server of the application. These settings override the settings from Instance Administration. Available options include:

- Native Printing Use native printing. No external print server required.
- Remote Print Server Choose a remote server of the type Print Server that is configured in the Workspace Utilities.
- Use Instance Settings Use the Report Printing settings defined in Instance Administration.



Click the Add Remove Print Server button to open a wizard to create a Remote Print Server, including the credentials. To create a Remote Server, choose the Print Server Type, specify an Endpoint URL and click **Next**. If Authentication is required, specify the credentials. Click Apply Changes to add the Remote Print Server and Credentials to your workspace, and update the Report Printing attributes for the application. For detailed steps, see Configuring Report Printing at the Application-Level.

- **Printing Report Regions**
- Configuring Report Printing in Oracle APEX Administration Guide

### 5.8.1.2.9 Copyright Banner

Use Copyright Banner for copyright banner text. This text will be included in the application export file. You can use #APP NAME# substitution string to refer to current application name and #YEAR# to refer to the current year, for example:

Name: #APP NAME# Copyright (c) 1999, #YEAR#, Company Name.



See Also:

Exporting Workspaces, Applications, and App Components

## 5.8.2 Configuring Security Attributes

Use the Security page to set application-wide security settings.



#### Tip:

Edit application components directly to manage more granular settings. To learn more about security best practices, see Managing Application Security.

- Accessing the Security Page Access the Security page page from the Application home page.

The Security page is divided into the following sections: Authentication, Authorization, Session Management, Session State Protection, Browser Security, and Database Session.

### 5.8.2.1 Accessing the Security Page

Access the Security page page from the Application home page.



To access the Security page:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.

The Application home page appears.

- 3. From the Application home page, you can access the Security page in two ways:
  - Edit Application Definition button:
    - a. Click **Edit Application Definition** to the right of the application name.
    - **b.** Click the **Security** tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under Security, click Security Attributes.

The Edit Security Attributes page appears.

- 4. Edit the appropriate attributes.
- 5. Click **Apply Changes** to save your changes.

## 5.8.2.2 Security Page

The Security page is divided into the following sections: Authentication, Authorization, Session Management, Session State Protection, Browser Security, and Database Session.

Use the Security page to set application-wide security settings. Edit application components directly to manage more granular settings.



Required values are marked with a red asterisk (\*).

- Authentication
- Authorization
- Session Management
- Session State Protection
- Browser Security
- Database Session

#### 5.8.2.2.1 Authentication

**Authentication** is the process of establishing users' identities before they can access an application. Although you can define multiple authentication schemes for your application, only one scheme can be current at a time.



**Table 5-8 Authentication Attributes** 

Attribute	Descriptions	To Learn More
Public User	Identifies the Oracle schema (or user) used to connect to the database through the Database Access Descriptor (DAD). Once a user has been identified, the Oracle APEX engine keeps track of each user by setting the value of the built-in substitution string APP_USER.	See HOME_LINK and Understanding Conditional Rendering and Processing
	When APP_USER equals this value, the APEX engine considers the current session to be a "public user" session. The APEX engine supports the following built-in display conditions:	
	• USER_IS_PUBLIC_USER	
	If the current application user (APP_USER) equals the value of this attribute, then the user is logged on as a public user. Some applications have public (not logged in) and private (logged in) modes. By determining if the user is the public user, you can conditionally display or hide information.	
	For example, you can show a login button if the user is the public user and a logout link if the user is not a public user. Reference this value using  APEX_APPLICATION.G_PUBLIC_USE R.	
Authentication Scheme	Identifies the current authentication method used by this application. The purpose of authentication is to determine the application users identity. To create an authentication scheme, click <b>Define Authentication Schemes</b> .	See How Authentication Works and Creating an Authentication Scheme

### 5.8.2.2.2 Authorization

Application authorization schemes control access to all pages within an application. Unauthorized access to the application, regardless of which page is requested, causes an error page to display.

**Table 5-9 Authorization Attributes** 

Attribute	Descriptions
Define Authorization Schemes	Click the <b>Define Authorization Schemes</b> button to create an authorization scheme.



Table 5-9 (Cont.) Authorization Attributes

Attribute	Descriptions
Authorization Scheme	Specify an authorization scheme for your application. Application authorization schemes are defined for an application for the purpose of controlling access. Setting a required authorization scheme here at the application level will require all pages of the application to pass the defined authorization check.
Run on Public Pages	Controls whether the application-level authorization scheme is checked on public pages (that is, pages that do not require authorization). Options include:
	<ul> <li>On - If you select On and the page is public, the application authorization is checked.</li> </ul>
	<ul> <li>Off - If you select Off and the page is public, the application authorization is ignored.</li> </ul>
	Note: This attribute is ignored if you select <b>Must Not Be Public User</b> as Authorization Scheme.
Source for Role or Group Schemes	Define what APEX should use as the source for authorization schemes of type <i>Is In Role or Group</i> . The available values are:
	<ul> <li>Access Control User Role Assignments - Enable the user's assigned roles (under Shared Components / Application Access Control).</li> </ul>
	<ul> <li>Authentication Scheme - If the application's authentication scheme is APEX Accounts, enable the workspace user's assigned groups. If the application's authentication scheme is Database Accounts, database roles are checked when the authorization scheme is enabled. If the authentication scheme uses Real Application Security, enable RAS Dynamic Roles.</li> </ul>
	Custom Code - Call the procedure     apex_authentication.enable_dynamic_groups in a Post- Authentication process, to populate dynamic groups.



Attaching an Authorization Scheme to an Application

## 5.8.2.2.3 Session Management

Use Session Management attributes to reduce exposure at the application-level for abandoned computers with an open web browser.



**Table 5-10 Session Management** 

#### Attribute

#### **Descriptions**

Rejoin Sessions

Control at the application-level whether URLs in this application contain session IDs. When Rejoin Sessions is enabled, APEX attempts to use the session cookie to join an existing session, when a URL does not contain a session ID.

To use Rejoin Sessions at the application-level, administrators must enable **Rejoin Sessions** at the instance-level. A more restrictive instance-level setting overrides application and page settings.

Rejoin Sessions options include:

- Application Default The application-level setting applies.
- Disabled If the URL does not contain a session ID APEX creates a new session.
- Enabled for Public Sessions If the URL goes to a public page and does not contain a session ID, APEX attempts to utilize the existing session cookie established for that application. APEX only joins using the cookie when the session is not yet authenticated.
- Enabled for All Sessions If the URL does not contain a session ID, APEX attempts to utilize the existing session cookie established for that application, providing the following conditions are met:
  - Session State Protection is enabled for the application and the URL includes a valid checksum. For public bookmarks, the most restrictive item level protection must be either Unrestricted or Checksum Required -Application Level.
  - OR, the URL does not contain payload (a request parameter, clear cache or data value pairs).

This option requires you set Embed In Frames to **Allow from same origin** or **Deny**. This is not tied to a condition about the URL payload, but also applies to session state protected URLs.

**Warning**: Enabling rejoin sessions may expose your application to possible security breaches, as it can enable attackers to take over existing end user sessions. To learn more, see About Rejoin Sessions.

#### See Also:

- Session Management to configure Rejoin Sessions at the application-level.
- Configuring Rejoin Sessions for an Instance in Oracle APEX Administration Guide



Table 5-10 (Cont.) Session Management

#### Attribute **Descriptions** Deep Linking Enables or prevents deep linking to an application. Options **Enabled** - The URL to a specific page ultimately redirects there, possibly after the user has logged in. Disabled - If the URL does not contain a valid session ID, APEX starts a new session and redirects to the application's home page. For example, browsers often save the URLs of opened tabs and try to restore the sessions after a restart, causing a deep link. This behavior may be undesirable (for example if a URL points to a page in the middle of a multi-step wizard). Selecting **Disabled**, starts a new session and redirects to the application's home page. Maximum Session Length in Defines how long (in seconds) sessions can exist and be used Seconds by this application. Enter a positive integer to control how long a session can Enter 0 to have sessions exist indefinitely. Leave the value empty in order to use the session duration defined at the workspace-level or the instance level. Session Timeout URL Enter an optional URL to redirect to when the maximum session lifetime has been exceeded. The target page in this URL, if implemented in APEX, should be a public page. A common use for this page would be to inform the user of the session expiration and to present a login link or other options. If you do not enter a URL, users will see the message "Your session has timed out" and a link to the application home page. If you enter #LOGOUT URL#, APEX will execute a logout, just like when the user clicked on the application's logout link. Only three substitution items are supported: &APP SESSION. &SESSION. &APP ID. Because of the particular purpose of this URL. it is not necessary to include either &APP SESSION. or &SESSION. in the link. Maximum Session Idle Time The Session Idle Time is the time between the last page request in Seconds and the next page request. Options include: Enter a positive integer to control the idle time for sessions

used by this application.

Leave the value empty in order to use the idle time defined

at the workspace level or the instance level.



Table 5-10 (Cont.) Session Management

#### Attribute

#### **Descriptions**

#### Session Idle Timeout URL

Enter an optional URL to be redirected to when the maximum session idle time has been exceeded. The target page in this URL, if implemented in APEX, should be a public page. A common use for this page would be to inform the user of the session expiration and to present a login link or other options. If you do not enter a URL, users will see the message "Your session has timed out" and a link to the application home page. If you enter #LOGOUT\_URL#, APEX will execute a logout, just like when the user clicked on the application's logout link.

Only three substitution items are supported in this URL:

- &APP SESSION.
- &SESSION.
- &APP ID.

Because of the particular purpose of this URL, it is not necessary to include either  $\&APP\_SESSION$ . or &SESSION. in the link

## Session Timeout Warning in Seconds

The session timeout warning time defines (in seconds) how long before a session times out (either maximum session length, or maximum session idle time), to warn the user. For the maximum session idle time warning, the user will have the opportunity to extend the session. For maximum session length warning, the user will be prompted to save any work, to avoid loss of data when the session maximum time is reached.

- Enter a positive integer to control the session timeout warning time for sessions used by this application.
- Enter 0 to switch off session timeout warnings for sessions used by this application.
- Leave the value empty in order to use the warning time defined at the workspace-level or the instance-level.

#### See Also:

- About Utilizing Session Timeout
- Configuring Session Timeout for a Workspace and Configuring Session Timeout for an Instance in Oracle APEX Administration Guide

#### 5.8.2.2.4 Session State Protection

Enabling Session State Protection can prevent hackers from tampering with URLs within your application. URL tampering can adversely affect program logic, session state contents, and information privacy. This table describes the attributes available under Session State Protection.



**Table 5-11 Session State Protection** 

Attribute	Descriptions
Expire Bookmarks	Click <b>Expire Bookmarks</b> to reset this hidden application attribute (a checksum salt) salt attribute at any time. Clicking this button causes any bookmarked URLs that contain previously generated checksums to fail when they are subsequently used to access the application.
	<b>Tip</b> : You can also click <b>Expire Bookmarks</b> to change the Bookmark Hash Function to switch to a different algorithm for computing checksums.
Manage Session State Protection	Click <b>Manage Session State Protection</b> to configure Session State Protection.
Session State Protection	Make a selection from the Session State Protection list, to enable or disable Session State Protection for your application. Selecting <b>Enabled</b> turns on session state protection controls defined at the page and item-level. To learn more, see field-level Help.
Allows URLS Created After	Lists the date and time after which bookmarked links are usable to access pages in this application if the bookmarked link contains a checksum and Session State Protection is enabled for the application.
	Bookmarks created before this date and time are not usable to access this application if the bookmarked link contains a checksum and Session State Protection is enabled for the application. Bookmarks that do not contain checksums or bookmarks that contain checksums that are unnecessary are not affected by this attribute. Their usability is determined using other criteria. A hidden application attribute (a checksum salt) is used during the computation and later verification of checksums included in f?p= URLs generated during page rendering. Checksums are included when Session State Protection is enabled for the application. You can reset this checksum salt attribute at any time by clicking the <b>Expire Bookmarks</b> button.
Bookmark Hash Function	Used to create checksums for application-level and user-level checksums in bookmarkable URLs.



Preventing URL Tampering

# 5.8.2.2.5 Browser Security

This table describes the attributes available under Browser Security.



Table 5-12 Browser Security

### Attribute **Descriptions** Cache Use **Cache** to enable or disable browser caching of application page contents. If enabled, the browser saves the contents of pages for this application in its cache, both in memory and on disk. Typically when caching is enabled and the browser back button is clicked, the page is loaded from the cache instead of from the server. If disabled, the browser is instructed not to save application page contents and requests the latest page content from the server whenever the URL changes. To avoid the possibility of saving sensitive data, Oracle recommends that this attribute be disabled. Otherwise, it is possible to go back in the browser history after a logout and see cached content from a previous session. Disabling the browser cache also prevents issues with pages that use partial page refreshes, such as is the case with interactive reports. If this attribute is set to **Disabled**, APEX sends the HTTP header cache-control: no-store which instructs the browser to not cache the page contents on disk or in memory. Note that this feature requires modern browsers that support the HTTP header response variable cache-control. **Embed in Frames** Controls if a browser may display your application's pages within a frame. Available options include: Deny - The page cannot be displayed in a frame, regardless of the site attempting to do so. Allow from same origin - The page can only be displayed in a frame on the same origin as the page itself. **Allow** - The page can be displayed in any frame. Displaying pages within frames can be misused with "clickjacking" attacks. In a "clickjacking" attack, the attacker uses multiple layers to trick a user into clicking a button or link on another page when they were intending to click the top level page. Thus, the attacker is hijacking clicks (or keystrokes) meant for their page and routing them to another page. To learn more, see field-level Help. HTML Escaping Mode Defines how APEX escapes special characters. Options include: Basic: Escape &, ", < and > **Extended**: Escape &, ", <, >, ', / and non-ASCII characters if the database character set is not AL32UTF8 HTTP Response Headers Enter additional application specific HTTP headers that APEX should send on each response and that it does not support in another way (for example, X-Frame-Options using the Embed in Frames attribute). Example: X-XSS-Protection: 1; mode=block X-Content-Type-Options: nosniff





### Tip:

Both **Cache** and **Embed in Frames** require modern browsers that support the HTTP header response variable X-Frame-Options.

## 5.8.2.2.6 Database Session

This table describes the attributes available under Database Session.

**Table 5-13 Database Session** 

Attribute	Descriptions	
Parsing Schema	Specifies the schema that all SQL and PL/SQL in the application will be parsed as. You may use #OWNER# to reference this value in SQL queries and PL/SQL (for example, in a region or a process).	
Initialization PL/SQL Code	Use this attribute to enter a PL/SQL block that sets a context for the database session associated with the current "show page" or "accept page" request. The block you enter here is executed at a very early point during the page request, immediately after the APP_USER value is established. The value of APP_USER (using :APP_USER or v('APP_USER')) may be used within the block. Values of other items in session state may be referenced as well, but any such items must have been established in session state before the initiation of the current page request. To view examples, see field-level Help.	
Cleanup PL/SQL Code	Use this attribute to enter a PL/SQL block that runs at the end of page processing. It can be used to free or clean up resources that were used, like VPD contexts or database links. To view examples, see field-level Help.	
Runtime API Usage	<ul> <li>Control how this application can access APEX APIs that modify applications and workspace data while it is running. Options include:</li> <li>Modify This Application: The application can modify itself.</li> <li>Modify Other Applications: The application can change other applications in the workspace.</li> <li>Modify Workspace Repository: The application can change workspace users and groups.</li> </ul>	



### See Also:

Providing Security Through Authorization and Oracle Label Security Administrator's Guide

# 5.8.3 Configuring Globalization Attributes

Edit attributes on the Globalization page to configure application globalization options. In App Builder you can develop applications that can run concurrently in different languages.



A single application can be translated to support different languages. Use the attributes on the Edit Globalization Attributes page to specify globalization options such as the primary application language and defaults for date format, time format, timestamp format, time zone format, and CSV encoding.

- Accessing the Globalization Page
   Access the Globalization page page from the Application home page.
- Globalization Page
   The Globalization page has one section: Globalization.

See Also:

Managing Application Globalization

## 5.8.3.1 Accessing the Globalization Page

Access the Globalization page page from the Application home page.

To access the Globalization page:

- 1. On the Workspace home page, click the **App Builder** icon.
- Select an application.

The Application home page appears.

- 3. From Application home page, you can access the application Globalization page in two ways:
  - Edit Application Definition button:
    - a. Click **Edit Application Definition** to the right of the application name.
    - **b.** Click the **Globalization** tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under Globalization, click **Globalization Attributes**.

The Globalization page appears.

- 4. Edit the appropriate attributes.
- 5. Click **Apply Changes** to save your changes.

## 5.8.3.2 Globalization Page

The Globalization page has one section: Globalization.

- Application Primary Language
- Application Language Derived From
- Document Direction
- Application Date Format
- Application Date Time Format



- Application Timestamp Format
- Application Timestamp Time Zone Format
- Character Value Comparison
- Character Value Comparison Behavior
- Automatic Time Zone
- Automatic CSV Encoding



Specifying the Primary Language for an Application

## 5.8.3.2.1 Application Primary Language

Identifies the language in which an application is developed. This language is the base language from which all translations are made. For example, suppose application 100 was authored in English, translated into French, and published as application 101. English would be the Application Primary Language.

All modifications to the application should be made to the primary language specified here.

## 5.8.3.2.2 Application Language Derived From

Specifies how Oracle APEX derives the translated application language. The application primary language can be static, derived from the Web browser language, or determined from a user preference or item.

To learn more about the available options, see Field-level Help.

### 5.8.3.2.3 Document Direction

Sets the document direction. Options include:

- Left-To-Right
- Right-To-Left

## 5.8.3.2.4 Application Date Format

Determines the date format to be used in the application.

Use this date format to alter the <code>NLS\_DATE\_FORMAT</code> database session setting before showing or submitting any page in the application. This value can be a literal string containing a valid Oracle date format mask or an item reference using substitution syntax. If no value is specified, the default date format is derived from the database session at runtime. Consider the following examples:

- Month DD, YYYY
- &MY DATE FORMAT.



## 5.8.3.2.5 Application Date Time Format

Specify the date time format to be used in the application.

This date time format can be referenced in an application using the substitution reference &APP\_DATE\_TIME\_FORMAT., or in PL/SQL using the function  $v('APP_DATE_TIME_FORMAT')$ . This attribute does not alter any NLS settings. This value can be a literal string containing a valid Oracle date format mask or an item reference using substitution syntax. If this attribute value is not specified, then a reference to APP\_DATE\_TIME\_FORMAT returns the NLS database session date format and the NLS time format. Consider the following examples:

- Month DD, RRRR HH24:MI
- &MY DATE TIME FORMAT.

## 5.8.3.2.6 Application Timestamp Format

Determines the timestamp format to be used in the application. Select a timestamp format from the list of values.

Use this timestamp format to alter the NLS\_TIMESTAMP\_FORMAT database session setting before showing or submitting any page in the application. This value can be a literal string containing a valid Oracle timestamp format mask or an item reference using substitution syntax. If no value is specified, the default timestamp format is derived from the database session at runtime. Consider the following examples:

- DD-MON-RR HH.MI.SSXFF AM
- &MY TIMESTAMP FORMAT.

## 5.8.3.2.7 Application Timestamp Time Zone Format

Determines the timestamp with time zone format to be used in the application.

Use this date format to alter the <code>NLS\_TIMESTAMP\_TZ\_FORMAT</code> database session setting before showing or submitting any page in the application. This value can be a literal string containing a valid Oracle timestamp with time zone format mask or an item reference using substitution syntax. If no value is specified, the default timestamp with time zone format is derived from the database session at runtime. Consider the following examples:

- DD-MON-RR HH.MI.SSXFF AM TZR
- &MY TIMESTAMP TZ FORMAT.

## 5.8.3.2.8 Character Value Comparison

Determines the collating sequence for character value comparison in various SQL operations and clauses, for example, ORDER BY, LIKE, MIN/MAX.

Use this value to alter  $\[mathbb{NLS\_SORT}\]$  database session parameter for the execution of SQL queries in classic report and interactive report regions. If no value is specified, the default value is derived from the database session at runtime. Consider the following examples:



BINARY GERMAN CANADIAN M

## 5.8.3.2.9 Character Value Comparison Behavior

Determines the collation behavior of SQL operations, for example, LIKE, MIN/MAX.

This value is used to alter NLS\_COMP database session parameter for the execution of SQL queries in classic report, interactive report, and List view regions, as well as in plug-in API. Options include:

- Database session NLS setting (default) The NLS\_COMP value is derived from the database session at runtime.
- Binary Comparisons in WHERE clauses and other SQL operations are binary.
- **Linguistic** Comparisons in WHERE clauses and other SQL operations use the linguistic sort specified in the Character Value Comparison attribute (NLS SORT).

### 5.8.3.2.10 Automatic Time Zone

Controls the setting of the database session time zone. When set to **On**, the client time zone is derived from the client's web browser and set for the duration of the APEX session.

Subsequent page views have the database session time zone set properly per page view. Once set, this setting can be overridden using APEX\_UTIL.SET\_SESSION\_TIME\_ZONE, or reset using APEX\_UTIL.RESET\_SESSION\_TIME\_ZONE.



Oracle APEX API Reference

## 5.8.3.2.11 Automatic CSV Encoding

Automatic CSV Encoding controls the encoding of all comma-delimited (CSV) report output in an application. The default value for Automatic CSV Encoding is **On**. When Automatic CSV Encoding is set to **On**, CSV report output is converted to a character set compatible with localized desktop applications. The character set for the CSV encoding is determined by the Application Language Derived From setting.

The encoding of pages in App Builder is determined by the character set of the Database Access Descriptor (DAD) used to access Oracle APEX. For example, if the character set of the Database Access Descriptor is AL32UTF8, all pages in all applications in the APEX user interface are encoded in UTF-8.

By default, the CSV output from report regions is encoded in the same character set as the Database Access Descriptor. However, some desktop spreadsheet applications require that the data is encoded in the client desktop operating system character set. In the case of multibyte data, the CSV output from report regions often appears corrupted when opened by a desktop spreadsheet application. This is because the CSV output from report regions is encoded differently than what is required by the desktop application. Enabling Automatic CSV Encoding resolves this issue.



For example, if the user's language preference for an application is de, the CSV data is encoded in Western European Windows 1252, regardless of the Database Access Descriptor character set setting. If the user's language preference is zh-cn, the CSV data is encoded in Chinese GBK.

## 5.8.4 Editing User Interface Attributes

Use the User Interface page to control the default characteristics of the application and optimize the display.

- Accessing the User Interface Page
   Access the User Interface page from the Application home page.
- User Interface Page
   The User Interface page is divided into the following sections: Icon, Logo, Attributes, Navigation Menu, Navigation Bar, JavaScript, CSS, Concatenated Files, and Advanced.

## 5.8.4.1 Accessing the User Interface Page

Access the User Interface page from the Application home page.

To access the User Interface page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- From the Application home page, you can access the User Interface page in two ways:
  - Edit Application Definition button:
    - a. Click **Edit Application Definition** to the right of the application name.
    - b. Click the **User Interface** tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under User Interface, click User Interface Attributes.

The User Interfaces page appears.

- 4. Edit the appropriate attributes.
- 5. Click **Apply Changes** to save your changes.

## 5.8.4.2 User Interface Page

The User Interface page is divided into the following sections: Icon, Logo, Attributes, Navigation Menu, Navigation Bar, JavaScript, CSS, Concatenated Files, and Advanced.





Required values are marked with a red asterisk (\*).



### Tip:

To learn more about the attributes on this page, see field-level Help.

- Icon
- Logo
- Attributes
- Navigation Menu
- Navigation Bar
- JavaScript
- CSS
- Concatenated Files
- Advanced

### 5.8.4.2.1 Icon



## Tip:

If an application uses legacy icons, a note displays at top of the Icon region. Oracle recommends replacing legacy icons by clicking **Change Icon** button.

Use the Icon region to manage Favicon, the PWA icon, the Apple touch icon, and the App Builder icon. Any uploaded icons are automatically resized and propagated to the appropriate places at runtime.

Click **Edit** to view details or update an existing icon. In the Edit Application Icon dialog, you can either navigate to the file by clicking **Choose File**, or drag and drop a new file to the region provided.

To choose a new icon from library, click the **Change Icon** button. In the Choose Application Icon dialog you can:

- **Upload an icon**. Click the plus (+) sign and navigate to the icon, or drag and drop the icon to the **Upload your own icon** region.
- Select an icon from the library. Select the icon color and then the icon.



See Also:

**Managing Application Icons** 

## 5.8.4.2.2 Logo

Use Logo attributes to define an application logo that displays in the top navigation bar. An application logo can be an image, text, image and text, or based on custom markup.

Table 5-14 User Interface, Logo

Attribute	Description	
Logo	For Logo, select a logo type. Options include:	
	• None	
	Image	
	• Text	
	<ul> <li>Image and Text</li> </ul>	
	Custom	
	Additional atttibutes appear based depending upon your selention. To learn more about an attribute see item Help.	
	If you select <b>Image</b> , <b>Text</b> , <b>Image and Text</b> , or <b>Custom</b> , additional attributes display and your page template your page template must include the #LOGO# substitution string.	

See Also:

**Managing Application Logos** 

## 5.8.4.2.3 Attributes

Table 5-15 Attributes

Attribute	Description	To Learn More
Enable End Users to choose Theme Style	If set to <b>On</b> , end users can choose a Theme Style for their sessions within a customization dialog. Only Theme Styles marked as Public are eligible for selection.	See Enabling Users to Select a Theme Style
Add "Built with APEX" to Footer	If set to <b>On</b> , Oracle APEX adds the text "Built with ♥ using Oracle APEX" to the footer of every page.	n/a
Home URL	Specify the home page of the application.	n/a
Login URL	Specify the login page of the application.	n/a



Table 5-15 (Cont.) Attributes

Attribute	Description	To Learn More
Theme	Shows the theme currently associated with the user interface.	See Switching Themes
Theme Style	Select a theme style. This option only displays for newer themes that support theme styles.	See Using Theme Styles
Global Page	If defined, displays the global page for the application.	See Creating a Global Page to Display Components on Every Page

## 5.8.4.2.4 Navigation Menu

Applications using newer themes, such as *Universal Theme - 42*, provide navigation with navigation menus.

Table 5-16 Navigation Menu

Attribute	Description	
Display Navigation	Select <b>On</b> to include or <b>Off</b> to exclude a navigation men in your application.	
Navigation Menu List	Select the list utilized for the navigation menu for the application.	
Position	Select the position where you would like your navigation menu to be placed on this application.	
	<ul> <li>Side renders the navigation menu list template in the #SIDE_GLOBAL_NAVIGATION_LIST# position on your page template.</li> </ul>	
	<ul> <li>Top renders the navigation menu list template in the #TOP_GLOBAL_NAVIGATION_LIST# position on your page template.</li> </ul>	
	For example, if you choose <b>Side</b> , your navigation could be rendered as a tree on the left side of your pages; and choosing <b>Top</b> can render your navigation as a menu bar in the header of your pages.	
List Template	Select the List Template used to render the navigation menu for this application.	
Template Options	Set Template Options for the List Template used for the navigation menu list for the application.	



**Managing Navigation Menus** 

## 5.8.4.2.5 Navigation Bar

Applications using newer themes, such as *Universal Theme - 42*, include navigation bar lists. Navigation Bar settings enable you to select list and list templates. Selecting classic



implementation uses tabs instead of a list. Navigation Bar attributes only display with newer themes.

**Table 5-17 Navigation Bar** 

Attribute	Description	
Implementation	Select how to you wish to implement the navigation bar in this application.	
	<ul> <li>Classic renders the navigation bar as a classic navigation bar in the #NAVIGATION_BAR# position on your page template.</li> </ul>	
	<ul> <li>List renders the navigation bar as a list, using the selected list and list template in the #NAVIGATION_BAR# position on your page template.</li> </ul>	
Navigation Bar List	Select the list utilized for the navigation bar on this application.	
List Template	Select the List Template used to render the navigation menu for this application.	
Template Options	Set Template Options for the List Template used for the navigation menu list for the application.	



**Managing Navigation Bar Lists** 

## 5.8.4.2.6 JavaScript

Use these attributes to control or modify how an application handles JavaScript.



Table 5-18 JavaScript

#### Attribute

#### Description

File URLs

Enter JavaScript file URLs for code to be loaded on every page. Each URL has to be written into a new line. If you provide a minified version of your file, you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode.

JavaScript file URLs you enter here replaces the #APPLICATION\_JAVASCRIPT# substitution string in the page template.

**Note**: You do not need to include opening or closing script tags. Just write the URL.

#### Examples:

Standard file reference:

```
/myjs/main.js
```

• Standard file reference which loads the minified file main.min.js from /myjs/minified/ for regular page views and main.js from /myjs/ in debug mode:

```
/myjs/#MIN DIRECTORY#main#MIN#.js
```

Use this syntax if the library is also used from a RequireJS require call. The define name must match what is used in the requirejs.config paths and the value must be the global symbol exposed by the library. Only applies when using RequireJS. This avoids RequireJS loading that library a second time.

```
[define hammerjs=Hammer]/myjs/hammer.js
```

 Use this syntax if the file has a dependency on RequireJS. This will automatically load RequireJS before this file.

```
[require requirejs]/myjs/main.js
```

Use this syntax if the file has a dependency on Oracle JET. This
will automatically load RequireJS and the Oracle JET RequireJS
configuration before this file.

```
[require jet]/myjs/main.js
```

Include Deprecated or Desupported Javascript Functions Specifies if deprecated or desupported JavaScript functions are included on every page in the application. The functions deprecated or desupported are listed in the Release Notes for every release. If you are confident your application does not contain any references to deprecated or supported functions, do not make a selection and reduce the overall size of the JavaScript files loaded.



Table 5-18 (Cont.) JavaScript

Attribute	Description
Include j Query Migrate	Specifies if the jQuery Migrate plug-in should be included on every page in the application.
	The plug-in restores deprecated features and behaviors of jQuery so that old JavaScript code and jQuery plug-ins will still run properly with the j Query version loaded by APEX.
	If you are confident your application and any used jQuery plug-in does not contain any references to deprecated jQuery features, set this to <b>No</b> to reduce the overall size of the JavaScript files loaded.

## 5.8.4.2.7 CSS

In **File URLs**, enter CSS file URLs to be loaded on every page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.

File URLs you enter here will replace the #APPLICATION\_CSS# substitution string in the page template.

**Note**: You do not need to include opening or closing link tags. Just include the file URL.

#### Examples:

Standard file reference.

/mycss/main.css

Standard file reference which loads the minified file main.min.css from /mycss/minified/ for regular page views and main.css from /mycss/ in debug mode.

/mycss/#MIN DIRECTORY#main#MIN#.css

Conditional media query.

[media="only screen and (max-device-width: 480px)"]/mycss/smartphone.css

 File reference using a query string in the URL referencing the application version, such that when the application is upgraded (and the version is incremented), the browser is instructed to always load the new file and ignore any previously cached files.

/mycss/main.css?version=#APP\_VERSION#



### 5.8.4.2.8 Concatenated Files

Using a concatenated file can increase the performance of loading your page because instead of issuing multiple HTTP requests for each single file, the browser only loads one file. This approach gives you the option to use smaller, more modular files during development and to use a single concatenated file when running the application outside of the APEX development environment.

To create a concatenated file, click **Concatenated File** and follow the on-screen instructions. To learn more and view examples, see field-level Help.

### 5.8.4.2.9 Advanced

Use the attributes under Advanced to define the virtual path the Web server uses to point to the images directory distributed with Oracle APEX.

Table 5-19 User Interface, Advanced

Attribute	Description
#APP_FILES# Path	Determines the virtual path the Web server uses to point to the static files when using the #APP_FILES# substitution string.
	Do not specify anything to reference files which are stored with your application definition in the database.
	For performance reasons you can also store your application files on your Web Server. Use any valid URL to reference them.
	Examples:
	<ul><li>/myFiles/</li></ul>
	<ul> <li>http://contentDeliveryNetwork.com/myFiles/</li> </ul>
#APEX_FILES# Path	Determines the virtual path the web server uses to point to the images directory distributed with App Builder. During installation, the virtual path is configured as $/i/$ . If you are unsure, contact your administrator.
	When embedding an image in static text (for example, in page or region headers or footers), you can reference an image using the substitution string #APEX_FILES#. For example, to reference the image go.gif, you would use the following syntax:
	<pre><img src="#APEX_FILES#go.gif"/></pre>
	<b>Note:</b> If the entered image prefix is equal to the instance image prefix then the application-level attribute will always be null. This easily facilities the movement of an application across different instances that may have different image prefixes.
	See Also: APEX_FILES
Media Type	Enter the Internet media type. An Internet media type is two-part identifier for file formats on the internet. A Media Type is composed of at least two parts: a type, a subtype, and one or more optional parameters. This Media Type is used in the Content-Type HTTP header when rendering the page.
	The page-level Media Type overrides the application-level Media Type The default value for this attribute is NULL. If both the page-level and application-level values for Media Type are NULL, the Media Type text/html is used.



# 5.8.5 Configuring Progressive Web App Attributes

Use the Progressive Web App page to configure attributes for both new and existing Progressive Web App applications.



### Tip:

Progressive Web App attributes only display if the Application Definition, **Properties**, **Friendly URLs** attribute is **On**.

- Accessing the Progressive Web App Page
   Access the Progressive Web App page from the Application home page.
- Progressive Web App Page
   The Progressive Web App page is divided into the following sections: General, Appearance, and Service Worker Configuration.



### See Also:

Creating a Progressive Web App (PWA)

## 5.8.5.1 Accessing the Progressive Web App Page

Access the Progressive Web App page from the Application home page.

To access the Progressive Web App page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- 3. From the Application home page, you can access the User Interface page in two ways:
  - Edit Application Definition button:
    - a. Click **Edit Application Definition** to the right of the application name.
    - b. Click the Progressive Web App tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under User Interface, click Progressive Web App.

The Progressive Web App page appears.

- 4. Edit the appropriate attributes.
- 5. Click **Apply Changes** to save your changes.



# 5.8.5.2 Progressive Web App Page

The Progressive Web App page is divided into the following sections: General, Appearance, and Service Worker Configuration.



## Tip:

To learn more about the attributes on this page, see field-level Help.

- General
- Appearance
- Service Worker Configuration

### 5.8.5.2.1 General



### Tip:

Progressive Web App attributes only display if the Application Definition, **Properties**, **Friendly URLs** attribute is **On**. See **Properties**, Friendly URLs.

Use General attributes to enable and disable to configure Progressive Web App applications.

Table 5-20 Progressive Web App, General

Attribute	Description	To Learn More
General	Enable Progressive Web App functionality.	See Creating a Progressive Web App (PWA)
	Enabling this option:	
	<ul> <li>Serves static files more efficiently using advanced caching.</li> <li>Enables the display of declarative Progressive Web App settings.</li> </ul>	
Installable	Only displays if <b>Enable Progressive Web App</b> is <b>On</b> .	See Creating a Progressive Web App (PWA)
	A Progressive Web App can be installed on devices. Installing a Progressive Web App, adds an icon to the device home screen to feel like a native application. Enabling this option:	
	<ul> <li>Add a new navigation bar entry: Install App.</li> </ul>	
	<ul> <li>Enables users to install the APEX app on devices.</li> </ul>	



## 5.8.5.2.2 Appearance



## Tip:

Appearance attributes only display if the Progressive Web App, General attributes **Enable Progressive Web App** and **Installable** attribute are **On**.

Use Appearance attributes to configure Progressive Web App (PWA) attributes for display, screen orientation, theme color, background color, IOS status bar style, app description, and custom manifest as well as upload screenshots and shortcuts.

Table 5-21 Progressive Web App, Appearance

Attribute	Description	To Learn More
Display	Select the preferred display mode for the application. This option controls how much of the browser UI the user sees. Options include:	See Creating a Progressive Web App (PWA)
	<ul> <li>Fullscreen - Opens the PWA without any browser UI. This option takes the entirety of the screen or window.</li> </ul>	
	• Standalone- Opens the PWA to look like a standalone application. The app runs in a distinct window, separate from the browser. Standard browser UI components like the URL bar and buttons are not visible.	
	<ul> <li>Minimal UI - Similar to standalone, except with browser controlling navigation buttons like back and refresh.</li> </ul>	
	<ul> <li>Browser - Opens the PWA is a regular browser UI.</li> </ul>	
	Note: Some devices and browsers ignore this attribute. Oracle APEX is only relaying this information to the device which handles the Progressive Web App appropriately. For more information, see https://web.dev/addmanifest//	
Screen Orientation	Select the preferred screen orientation when using this Progressive Web App. This option applies mostly for mobile devices.	
	<b>Note</b> : Some devices and browsers ignore this attribute. APEX is only relaying this information to the device which handles the Progressive Web App appropriately.	



Table 5-21 (Cont.) Progressive Web App, Appearance

Attribute	Description	To Learn More
Theme Color	Defines the default theme color for the application.  This attribute affects how the operating system displays the application (for example, for an Android's task switcher, the theme color surrounds the application).	See Creating a Progressive Web App (PWA)
	<b>Note</b> : Some devices and browsers ignore this attribute. Oracle APEX is only relaying this information to the device which handles the Progressive Web App appropriately	
Background Color	Select the background color.  The background color defines a placeholder background color for the application to display before its stylesheet is loaded. Therefore, the background color should match the theme body background color for a smooth transition between launching the web application and loading the application content.	See Creating a Progressive Web App (PWA)
	This affects how the operating system displays the application (for example, for an Android's task switcher, the theme color surrounds the application).	
	<b>Note</b> : Some devices and browsers ignore this attribute. Oracle APEX is only relaying this information to the device which handles the Progressive Web App appropriately	
iOS Status Bar Style	Determines the style of the iOS status bar of your progressive web app. Apple offers three distinct choices:  Black Text and White Background  Black Text and Black Background - This option makes it appear completely black  Translucent - This option has white text takes the same background color as the body of your web app. The text color will remain white even if you use a light background color. If using translucent, the page content is displayed on the entire screen.	See Creating a Progressive Web App (PWA)
App Description	Explains what the application does. Use this attribute to provide more information to users when they are prompted to install the application.	See Creating a Progressive Web App (PWA)



Table 5-21 (Cont.) Progressive Web App, Appearance

Attribute	Description	To Learn More
Custom Manifest	Used to store additional JSON properties for the Web App Manifest file. The properties found here will be used to extend the declarative options above, by overriding existing properties or appending new properties.	See Creating a Progressive Web App (PWA)  For more information on building a Custom Manifest, you can read the Web App Manifest specifications: https://www.w3.org/TR/appmanifest/.
Screenshots	Include screenshots for promotional purposes when users are prompted to install the Progressive Web App. Click Add Screenshot to upload a promotional screenshot.  For best results, Oracle recommends all screenshots have the same aspect ratio.	See Creating a Progressive Web App (PWA)
Shortcuts	Note: An APEX application can only use PWA Shortcuts if Rejoin Sessions is enabled. Before configuring shortcuts, click either Enable for Public Sessions or Enable for All Sessions. To learn more, see Session Management.  Use shortcuts enable users of installed PWAs to quickly access a specific page. For touch-enabled devices, shortcuts are accessible when doing a long-press on the application icon on the home screen. For other devices, shortcuts are accessible when doing a right click on the application icon on the task bar.  Click Add Shortcut to provide users with a shortcut to quickly access a specific page.	See Creating a Progressive Web App (PWA)

## 5.8.5.2.3 Service Worker Configuration

Use the Service Workers Configuration attributes to configure service workers. Service workers are JavaScript files that can execute code even when the app is not in use.

Service Workers can listen to events such as fetching resources or handling notifications. You can modify a service worker through hooks, or by replacing events completely.

Service Worker options include:

- Default The APEX engine generates it with the following strategy:
  - Install and activate the service worker
  - Serve resources from cache if cache exists
  - Otherwise serve from network, then put resource in cache



- Serve an offline page if network fails
- **Configure Hooks** Fill in the placeholders in the service worker code to add your own. Hooks locations are provided by Oracle APEX. When using this option, you can choose to "Download Configuration" and use it as a File URL.
- File URL Provide a URL reference to a file that contains the service worker hooks interface. This is useful for sharing service worker hooks across multiple applications. If using the file reference, make sure to follow the interface architecture appropriately or else the service worker will fail at runtime.

To view the interface structure, see field-level Help for this attribute.

# 5.9 Managing Application Logos

Add and update an application logo in an Oracle APEX application.

An application logo displays in the top navigation bar of your application at runtime.



#### Tip:

To include a logo in your application, your page template must include the #LOGO# substitution string.

- Managing Logos in the User Interface Attributes Edit User Interface attributes to add or update an application logo.
- **Editing App Logos at Runtime** Use Edit Logo on the Runtime Developer toolbar to quickly change an app logo that displays at runtime.

## 5.9.1 Managing Logos in the User Interface Attributes

Edit User Interface attributes to add or update an application logo.

To manage an application logo by editing User Interface attributes:

- On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- From the Application home page, you can access the User Interface page in two ways:
  - **Edit Application Definition** button:
    - a. Click Edit Application Definition to the right of the application name.
    - **b.** Click the **User Interface** tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under User Interface, click User Interface Attributes.

The User Interfaces page appears.

4. Under **Logo**, select a logo type. Additional attributes appear depending upon your selection.



- None No logo is shown in the app.
- **Image-** Creates a logo based on a valid image file type.
  - Logo Select **Image**.
  - Image URL Enter the URL for the image to be used as the logo, including the filename extension. Note your page template must include the #LOGO# substitution string. For example:

```
#APP FILES#my-logo.png
```

- Text Defines a text only logo.
  - Logo Select Text.
  - Text Select **Text** Enter the text that should be display in the application logo.
- Image and Text Defines an image and text logo.
  - Logo Select Image and Text.
  - Image URL Enter the URL for the image to be used as the logo, including the filename extension. Note your page template must include the #LOGO# substitution string. For example:

```
#APP FILES#my-logo.png
```

Text - Select **Text** - Enter the text that should be display in the application logo.

#### Custom

- Logo Select Custom.
- Custom HTML Enter markup of your application's logo. The value in this field will be inserted into the #LOGO# substitution string of your page template.
- 5. Click Apply Changes.



### Tip:

You can also reference an image uploaded to the static file repository using a substitution string. See Referencing Static Application Files and About Referencing Static Workspace Files.

### See Also:

- Managing Static Application Files
- Managing Static Workspace Files
- **Creating Custom Themes**
- **Page Templates**



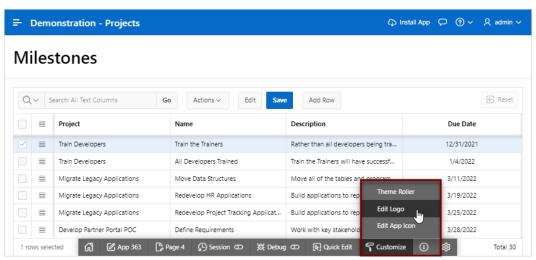
# 5.9.2 Editing App Logos at Runtime

Use Edit Logo on the Runtime Developer toolbar to quickly change an app logo that displays at runtime.

To add or update an application logo at runtime use Edit Logo:

Preview the page by running it.
 The Runtime Developer toolbar displays at the bottom of any editable running page.

2. On the Runtime Developer Toolbar. click Customize and then select Edit Logo.



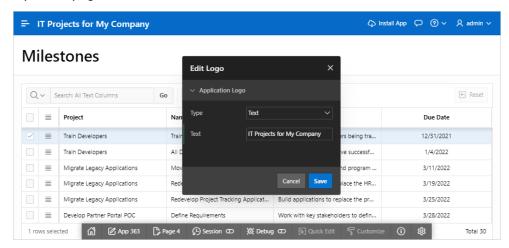
The Edit Logo dialog appears.

- Type Select the type of logo. Options include:
  - None No logo is shown in the app.
  - Text Defnes a text only logo.
    - Type Select **Text**.
    - Text Enter the text that should be display as the application logo.
  - Image Creates a logo based on a valid image file type and under 500 kb in size.
    - Type Select Image.
    - Specify the image Drag and drop the file, or click Choose File and navigate to the image.
  - Image and Text:
    - Type Select Image and Text.
    - Specify the image Drag and drop the file, or click Choose File and navigate to the image.
  - Custom define custom HTML to serve as the application's logo:

Due to security concerns, however, this cannot be configured using Edit Logo. When you select Custom, the **User Interface Attibutes** button appears. Click **User Interface Attibutes** and add the **Custom** logo on the User Interface Attributes page.



In following example, Type is set to **Text** and the Text reads IT Projects for My Company. Note that the revised logo, IT Projects for My Company, displays at the top of the page.



Click Save.

The confirmation message appears:

Logo saved successfully

5. Click Cancel to exit the dialog.

Note:

You can also edit an application logo by editing the application User Interface attributes. See Managing Logos in the User Interface Attributes.

# 5.10 Managing Application Icons

Add and update the icon that displays as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon in Oracle APEX applications.

- About Application Icons
   Learn about managing application icons in your APEX application.
- Managing Icons in User Interface Attributes
   Edit or upload application icons from the Icon region on the User Interface page.
- Using Edit App Icon on the Runtime Developer Toolbar
   Edit icons in runtime using the Use Edit App Icon option on on the Runtime
   Developer toolbar, Customize menu.

# 5.10.1 About Application Icons

Learn about managing application icons in your APEX application.

When you add an icon to an application it is propagated to the following places in your application:

Favicon (browser tab icon)

- PWA icon
- App Builder icon (that is the icon that displays on Application home page)
- Sign In page
- Home page breadcrumb region
- Apple touch icon (when adding a PWA app to iOS)

Application icons are stored in **Shared Components**, **Static Application Files** in three sizes, 32x32, 192x192 or 512x512.



### Tip:

When editing an individual icon, you take ownership of the icon. Be sure to upload an icon that matches the right size (that is 32x32, 192x192, or 512x512).

You can edit or upload app icons in the following ways:

- When Creating a New App When creating a new application, click Set Icon on the Create an Application page in the Create Application Wizard. See Running the Create Application Wizard.
- **By Editing User Interface Attributes** By editing the attributes under **Icon** on the User Interface page. See Managing Icons in User Interface Attributes.
- By Editing the Icon in Runtime In runtime, click Customize, Edit App Icon on the Runtime Developer Toolbar. See Using Edit App Icon on the Runtime Developer Toolbar
- By Uploading Icons to Static Application Files Application icons are stored in Shared Components, Static Application Files in three sizes, 32x32, 192x192 or 512x512.

To control the upload for all icon sizes, upload your icons to the Shared Components, Static Application Files and use the following file paths:

- #APP FILES#icons/app-icon-32.png
- #APP FILES#icons/app-icon-192.png
- #APP\_FILES#icons/app-icon-512.png



### See Also:

Managing Static Application Files

## 5.10.2 Managing Icons in User Interface Attributes

Edit or upload application icons from the Icon region on the User Interface page.



#### Tip:

If an application uses legacy icons, a note displays at top of the Icon region. Oracle recommends replacing legacy icons by clicking **Change Icon** button.



To manage application icons by editing User Interface attributes:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- 3. From the Application home page, you can access the User Interface page in two ways:
  - Edit Application Definition button:
    - a. Click **Edit Application Definition** to the right of the application name.
    - **b.** Click the **User Interface** tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under User Interface, click User Interface Attributes.

The User Interfaces page appears.

Find Icon.

Existing icons display in a table on the left side of the page.

- 5. To edit or update an icon, click Edit.
  - a. In the Edit Application Icon dialog you can either:
    - Click Choose Fileto navigate to the new icon.
    - Drag and drop a new file to the region provided.
  - b. Click Close.
- 6. To choose a new icon from the library, click **Change Icon**.
  - a. In the Edit Application Icon dialog, you can either:
    - **Upload an icon**. Click the plus (+) sign and navigate to the icon, or drag and drop the icon to the **Upload your own icon** region.
      - If you upload a custom icon, it is resized to a number of sizes and will be propagated to the appropriate places at runtime.
    - Select an icon from the library. Select the icon color and then the icon.
  - b. Click Close.
- 7. Click **Apply Changes** to save your changes.

## 5.10.3 Using Edit App Icon on the Runtime Developer Toolbar

Edit icons in runtime using the Use Edit App Icon option on on the Runtime Developer toolbar, Customize menu.

To use Edit App Icon:

- 1. Preview the page by running it.
  - The Runtime Developer toolbar displays at the bottom of any editable running page.
- On the Runtime Developer toolbar. click Customize and then select Edit App Icon.



The Edit Application Icon dialog appears.

- 3. In the Edit Application Icon dialog, you can either:
  - Drag and drop the file to the Upload a new icon region.
  - Click the Upload a new icon region and navigate to the file.
- **4.** When the new icon appears, use the Zoom slider to reposition it within the frame.

When focused on the icon cropper, the following keyboard shortcuts are also available:

- Left Arrow Move the image left
- Up Arrow Move the image up
- Right Arrow Move the image right
- Down Arrow Move the image down
- I Zoom in
- O Zoom out
- L Rotate left
- R Rotate right

Press Shift to move faster.

- 5. To save your changes, click Save.
- 6. To exit the dialog without saving, click Cancel

# 5.11 Adding Developer Comments

Add comments to an application, a page, or a group of pages using the Developer Comment, Bug, or To Do button. You can use developer comments to communicate application changes, report issues, or record developer suggestions.

- Locating Developer Comment Button Locate the Developer Comment button.
- Adding Developer Comments to an Application
   Add developer comments to an application, a page, or a group of pages.
- Viewing and Editing Developer Comments
   Click the Developer Comment button to view or edit existing comments.
- Deleting Developer Comments
   Delete specific developer comments or delete multiple comments at once.
- Accessing the Developer Comments from Shared Components
   Access the Developer Comments page from Shared Components.
- Viewing the Developer Comments Calendar
   View the Developer Comments Calendar page.



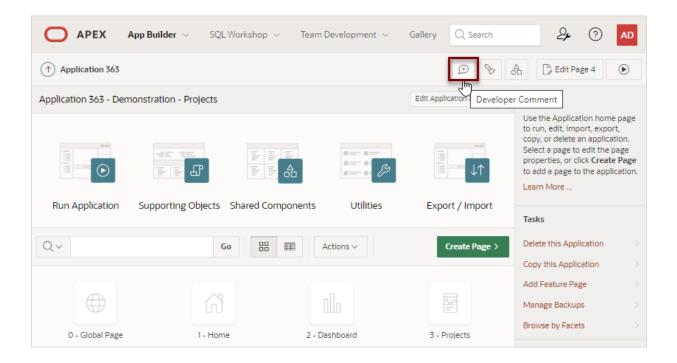
**Adding Application Comments** 



# 5.11.1 Locating Developer Comment Button

Locate the Developer Comment button.

The Developer Comment button resembles a small word balloon. This button displays on most pages in App Builder that relate to a specific application or application page.



# 5.11.2 Adding Developer Comments to an Application

Add developer comments to an application, a page, or a group of pages.

To add a developer comment:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. Click the **Developer Comment** button.
- 4. In Comment, enter up to 4000 characters of text.
- 5. Click Create.

# 5.11.3 Viewing and Editing Developer Comments

Click the Developer Comment button to view or edit existing comments.

To edit a developer comment:

- On the Workspace home page, click the App Builder icon.
- Select an application.



- 3. Click the **Developer Comment** button.
- 4. Click View Comments.

The Developer Comments page appears.

- 5. Locate the comment to be edited.
- 6. Click the Edit icon.

The Edit Comment page appears.

- 7. In Comment, enter up to 4000 characters of text.
- 8. Click Apply Changes.



### Tip:

You can also view and edit Developer Comments on the Shared Components page. Navigate to the Shared Components page and click **Developer Comments** in the Tasks region.

## 5.11.4 Deleting Developer Comments

Delete specific developer comments or delete multiple comments at once.

- Deleting a Specific Developer Comment Learn about deleting a developer comment.
- Deleting Multiple Developer Comments
  Learn about deleting multiple developer comments.

## 5.11.4.1 Deleting a Specific Developer Comment

Learn about deleting a developer comment.

To delete a developer comment:

- 1. On the Workspace home page, click the **App Builder** icon.
- Select an application.
- 3. Click the **Developer Comment** button.
- 4. Click View Comments.

The Developer Comments page appears.

- 5. Locate the comment to be deleted.
- 6. Click the Edit icon.

The Edit Comment page appears.

7. Click Delete.

## 5.11.4.2 Deleting Multiple Developer Comments

Learn about deleting multiple developer comments.

To delete multiple developer comments:



- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- Click the **Developer Comment** button.
- Click View Comments.
- Click Delete Comments.
- Select one of the following actions:
  - Delete all comments
  - Delete comments created by a developer
  - Delete comments by date
- 7. Follow the on-screen instructions.

# 5.11.5 Accessing the Developer Comments from Shared Components

Access the Developer Comments page from Shared Components.

To view and edit Developer Comments from Shared Components:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Shared Components.
- 4. Under Tasks, click **Developer Comments**.

The Developer Comments page appears.

- 5. Locate the comment to be edited.
- Click the Edit icon.

The Edit Comment page appears.

- 7. In Comment, enter up to 4000 characters of text.
- 8. Click Apply Changes.

# 5.11.6 Viewing the Developer Comments Calendar

View the Developer Comments Calendar page.

To view the Developer Comments in a calendar:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. Click Shared Components.
- Under Tasks, click Developer Comments.

The Developer Comments page appears.

5. Click Developer Comments Calendar.

The Developer Comments Calendar page appears.

6. Use the Previous, Today and Next buttons to navigate.



# 5.12 Using the Find Icon

Click the Find icon to search for items, pages, queries, tables, PL/SQL code, view debug reports, view session state, and view errors.

The Find icon resembles a flashlight and displays on many pages in App Builder including the Application home page, Shared Components, and the Edit Application Definition.

 Locating the Find Icon Learn about the Find Icon.

Searching for Items
 Search for items using the Item Finder.

Searching for Pages
 Search for pages using the Page Finder.

Searching for Queries
 Search for queries using the Query Finder.

Searching for Tables
 Search for tables using the Table Finder.

Using the PL/SQL Finder
 Locate and view details about stored procedures, functions, and packages using the Procedure Finder.

Viewing Application Errors
 View a report of application errors.

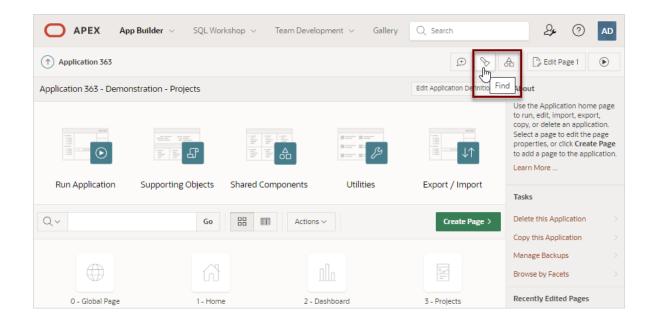
# 5.12.1 Locating the Find Icon

Learn about the Find Icon.

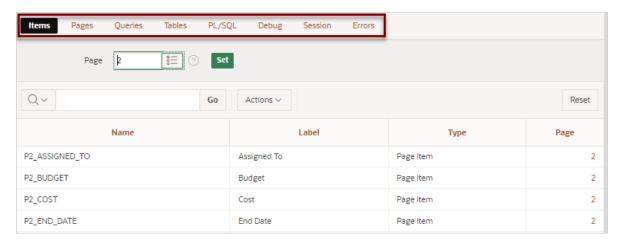
To use the Find icon:

1. Click the Find icon.





The Items Finder appears.



### 2. Click one of the following tabs:

- Items See Searching for Items.
- Pages See Searching for Pages.
- Queries See Searching for Queries.
- Tables See Searching for Tables.
- PL/SQL See Using the PL/SQL Finder.
- Debug See Viewing Debug Messages for an Application.
- Session See Viewing Session State
- Errors See Viewing Application Errors.



# 5.12.2 Searching for Items

Search for items using the Item Finder.

In App Builder, an item can be a text field, text area, password, select list, checkbox, and so on. You can use the Item Finder to search for items within the current application or within the schema associated with the workspace.

To search for items:

1. Click the Find icon.

The Items Finder appears.

A navigation bar displays in the center the page (see previous illustration) and contains the following controls:

- Select columns to search Resembles a magnifying glass. Click this icon to narrow your search to specific columns. To search all columns, select All Columns.
- **Text area** Enter case insensitive search criteria (wildcard characters are implied) and click **Go**.
- Go button Executes a search.
- Actions menu Clicking the icon displays the Actions menu. Use this menu to customize the display.
- 2. To edit a specific item, navigate to the appropriate item.



**Understanding Page Items** 

# 5.12.3 Searching for Pages

Search for pages using the Page Finder.

A page is the basic building block of an application. You can use the Pages Finder to search for pages within the current application or within the schema associated with the workspace.

To search for a page:

- 1. Click the Find icon.
- 2. Click the Pages tab.

The Pages Finder appears. A search bar displays at the top of the page.

3. To link to the Items page, click the page number.

# 5.12.4 Searching for Queries

Search for queries using the Query Finder.

You can use the Queries Finder to locate a query within your application or within the schema associated with the workspace.



To search for a query using the Queries Finder:

- 1. Click the Find icon.
- 2. Click the Queries tab.

The Queries Finder appears. A search bar displays at the top of the page.

3. To link to the Items page, click the page number.

## 5.12.5 Searching for Tables

Search for tables using the Table Finder.

You can use the Tables Finder to view tables within the schema associated with the workspace.

To view tables associated within the current schema:

- 1. Click the **Find** icon.
- 2. Click the **Tables** tab.

The Tables Finder appears. A search bar displays at the top of the page.

3. Select a table name.

A table definition appears.

This report displays the column names, data type, length, precision, and scale and the SQL necessary to re-create the table appears at the bottom of the page.



Managing Tables in Oracle APEX SQL Workshop Guide

# 5.12.6 Using the PL/SQL Finder

Locate and view details about stored procedures, functions, and packages using the Procedure Finder.

You can use the Procedure Finder to locate and view details about stored procedures, functions, and packages associated with each object within the schema associated with the workspace.

To search for PL/SQL code in the current schema:

- 1. Click the Find icon.
- 2. Click the PL/SQL tab.

The PL/SQL Finder appears. A search bar displays at the top of the page.

3. To view additional details, select the procedure, function, or package name.

The procedure, package, or function name appears and additional information including the owner, source name, source type, return type, argument names, data types, and IN/OUT parameters.



### See Also:

Managing Database Objects with Object Browser in *Oracle APEX SQL Workshop Guide* 

## 5.12.7 Viewing Application Errors

View a report of application errors.

To view a report of application errors:

- 1. Click the Find icon.
- 2. Click the Errors tab.

The Application Errors report appears.

# **5.13 Adding Application Comments**

Use Application Comments to describe an application or track developers involved in the application development.

To create an application comment:

- Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- Select an application.
- On the Application home page, click Shared Components.

The Shared Components page appears.

5. Under Tasks, click Edit Application Comment.

The Application Comments page appears.

6. Enter comments in the Comments field and click **Apply Changes**.

# 5.14 Managing Application Groups

Organize applications by assigning them to application groups. To use application groups, first create a group and then assign applications to it.

- About Using Application Groups
   Application groups are an ideal way to filter applications on the App Builder home page
- Viewing Application Groups
   View existing application groups on the Workspace Utilities, Application Groups page.
- Creating an Application Group
   Create application groups on the Workspace Utilities, Application Groups page.
- Assigning a Application to an Application Group
   Assign an application to application group on the Manage Application Group
   Assignments page.



- Removing an Application from an Application Group
   Remove an application from an application group on the Manage Application
   Group Assignments page.
- Deleting an Application Group
   Delete an application from an application group on the Manage Assignments page.

See Also:

Accessing Page Specific Utilities

# 5.14.1 About Using Application Groups

Application groups are an ideal way to filter applications on the App Builder home page

#### Adding the Group Column to the App Builder Home Page

Selecting **View Report** on the App Builder home page displays applications as an interactive report. By default, the Group column is hidden.

To add the Group column to the report:

- 1. Click View Report on the App Builder home page navigation bar.
- 2. Click the **Actions** menu and select **Columns**.
- 3. In the Select Columns dialog, move **Group** to **Display in Report** and click **Apply**.

#### **Creating a Group Filter**

Create filters on App Builder home page in either View Report or View Icon mode.

To create a filter that only displays the members of a particular application group:

- 1. Click the **Actions** menu and select **Filter**.
- In the Filter dialog:
  - **a.** From Column, select **Group**. Then use the Operator and Expression lists to create filter criteria and click **Apply**.

# 5.14.2 Viewing Application Groups

View existing application groups on the Workspace Utilities, Application Groups page.

To view application groups:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click Workspace Utilities.
- 3. Click Application Groups.

The Application Group page appears, displaying the Search bar.

Available controls include:



- Select columns to search Resembles a magnifying glass. Click this icon to narrow your search. To search all columns, select All Columns.
- **Text area** Enter case insensitive search criteria (wildcard characters are implied) to search for a group by name and click **Go**.
- Go button Executes a search or applies a filter.
- **View Icons** (the default) displays each group as a large icon. To edit a group, click the appropriate icon.
- View Report displays each group as a line in a report with the columns: Group Name, Description, Applications, Percent of Total, and Graph. To edit a group, click the name.
- 4. To edit a group or see the applications assigned to a group, click the group name.
  The applications assigned to the group display on the right side of the page.

## 5.14.3 Creating an Application Group

Create application groups on the Workspace Utilities, Application Groups page.

To create an application group:

- 1. On the Workspace home page, click the App Builder icon
- Click Workspace Utilities.
- Click Application Groups.
- 4. On the Application Group page, click Create.
- 5. Enter a name, a description (optional), and click Create.

### 5.14.4 Assigning a Application to an Application Group

Assign an application to application group on the Manage Application Group Assignments page.



#### Tip:

You can also assign an application to an application group by editing the application definition. Select the group from the Application Group list. See Editing the Application Definition.

To assign an application to a group:

- 1. On the Workspace home page, click the **App Builder** icon.
- Click Workspace Utilities.
- 3. Click Application Groups.
- On the Tasks list, click Manage Unassigned.
   The Manage Application Group Assignments page appears.
- 5. Filter the report:



- a. Application Enter a case insensitive query for the application name, alias, or ID and click Set.
- b. Group Select an application group and clicking and click Set.
- c. Show Filter the display and click Set. Available options include All, Assigned, and Unassigned.
- d. Show Select the number of applications to display and click **Set**.
- **6.** From the New Group list, select a group.
- 7. Select the applications to be assigned and click **Assigned Checked**.

### 5.14.5 Removing an Application from an Application Group

Remove an application from an application group on the Manage Application Group Assignments page.

To remove an application from an application group:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click Workspace Utilities.
- 3. Click Application Groups.
- 4. On the Tasks list, click Manage Assignments.

The Manage Application Group Assignments page appears.

- **5.** Filter the report:
  - Application Enter a case insensitive query for the application name, alias, or ID and click Set.
  - **b.** Group Select an application group and click **Set**.
  - c. Show Filter the display and click Set. Available options include All, Assigned, and Unassigned.
  - d. Show Select the number of applications to display and click **Set**.
- 6. From the New Group list, select **Unassign**.
- 7. Select the pages to be unassigned and click **Assigned Checked**.



#### Tip:

You can also remove an application from an application group by editing the application definition. Select **Unassigned** from the Application Group list. See Editing the Application Definition.

## 5.14.6 Deleting an Application Group

Delete an application from an application group on the Manage Assignments page.

To delete an application group:

- 1. On the Workspace home page, click the **App Builder** icon.
- Click Workspace Utilities.



- 3. Click Application Groups.
- 4. Assign all applications in the group to Unassign:
  - a. On the Tasks list, click **Manage Assignments**.
  - b. From the New Group list, select **Unassign**.
  - c. Select the pages to be unassigned and click **Assigned Checked**.
- 5. Return to the Application Groups page.
- **6.** Select the application group to be deleted.
- 7. On the Application Group page, click **Delete**.

A confirmation page appears.

8. Confirm your request.

## 5.15 Using Application Utilities

Access the Utilities page to view useful application summaries and reports.

#### Accessing Application Utilities

Access the Application Utilities page by selecting the application and then clicking the **Utilities** icon.

#### Application Utilities Page

Use the Application Utilities page to access the Application Dashboard, Advisor, Upgrade Application, Recently Updated Pages, Attribute Dictionary, Change History, Debug Messages, Oracle APEX Views, Export Repository, Manage Backups, and the Embedded Code Utility.

#### Viewing the Application Dashboard

View a report that summarizes application components and attributes.

#### Viewing the Recently Updated Pages Report

Displays a report of pages recently updated by the current user.

#### Viewing the Change History Report

The Change History report displays a summary report of edits to the current applications by developer, component type, and page number

#### Accessing APEX Views

Query various views against APEX metadata.

#### Managing Application Backups

Review backup history, perform manual backups, or restore an application from a backup.

#### Using the Embedded Code Utility

Review all embedded code used in an APEX application on one page. Embedded code is defined as code (such as SQL, PL/SQL and JavaScript) entered in the App Builder but does not include code such as PL/SQL packages or JavaScript libraries that code may reference.

#### Viewing Page and Application Checksums

View page and application checksums to compare to compare different application deployments and determine if the application or pages are different.

#### Accessing Font APEX

View the Font APEX page to search for Font APEX icons and view HTML markup.



Accessing Page Specific Utilities

Use the links in the Page Specific Utilities region to access Cross Page Utilities and Page Groups as well as access handy utilities for regions, buttons, items, computations, validations, process, dynamic actions, and branches.

- Accessing Cross Page Utilities
   Use Cross Page Utilities to perform edits across pages in the application.
- Using Interactive Report Utilities
   View and delete saved interactive reports and interactive report subscriptions.



Creating Custom Activity Reports Using APEX\_ACTIVITY\_LOG

## 5.15.1 Accessing Application Utilities

Access the Application Utilities page by selecting the application and then clicking the **Utilities** icon.

To access Application Utilities page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click the Utilities icon.

The application Utilities page appears.



To learn more about this page, see Application Utilities Page.

### See Also:

- Accessing Cross Page Utilities
- Accessing Page Specific Utilities

## 5.15.2 Application Utilities Page

Use the Application Utilities page to access the Application Dashboard, Advisor, Upgrade Application, Recently Updated Pages, Attribute Dictionary, Change History, Debug Messages, Oracle APEX Views, Export Repository, Manage Backups, and the Embedded Code Utility.

The following table describes the links on the Application Utilities page.

Link	Description	To Learn More
Application Dashboard	View a summary of application components and attributes	See: Viewing the Application Dashboard
Advisor	Performs various checks on your application, including checks for programming errors, security issues, quality assurance, and other best practice	See: Running Advisor to Check Application Integrity
Upgrade Application	Upgrade the current application to a new release. Review components eligible for upgrading to include the latest features.	See: Upgrading Oracle APEX Applications
Recently Updated Pages	View a history of page updates made to this application.	See Viewing the Recently Updated Pages Report
Attribute Dictionary	Manage item and column user interface defaults for a selected page.	See: Using the Attribute Dictionary
Change History	View a report of component updates made in this application.	See: Viewing the Change History Report
Debug Messages	Review debug messages generated by this application.	See: Debugging an Application
Oracle APEX Views	Query various views against APEX metadata.	See: Accessing APEX Views
Export Repository	Manage Export Files in the Export Repository.	See: Installing Export Files
Manage Backups	View and manage application backups in the current workspace. Backups provide a simple way to recover applications that may have been unexpectedly modified or deleted.	See: Managing Application Backups
Embedded Code	View all embedded code (such as SQL, PL/SQL and JavaScript) from all pages in an APEX application presented in easy-to-use faceted search page.	See: Using the Embedded Code Utility
Page Specific Utilities	Page Specific Utilities display in a region on the right-side of the Utilities page.  Use the links in the Page Specific Utilities region to access Cross Page Utilities and Page Groups as well as access handy utilities for managing regions, buttons, items, computations, validations, process, dynamic actions, and branches.	See:     Accessing Page Specific Utilities     Accessing Cross Page Utilities
Interactive Report Utilities	Interactive Report Utilities display in a region on the lower right-side of the Utilities page  Click Saved Reports to delete saved interactive reports in the current application. Click Subscriptions to manage interactive report subscriptions.	See: Using Interactive Report Utilities
Application Checksum	View the application checksum to determine if the same application is deployed in different workspaces.	See Viewing the Application Checksum



Link	Description	To Learn More
Font APEX Icons	Search Font APEX icons and HTML markup.	See Accessing Font APEX
Page Checksum	View the page checksum to compare two application deployments and determine which pages are the same and which are different.	See Viewing the Page Checksum

## 5.15.3 Viewing the Application Dashboard

View a report that summarizes application components and attributes.

To view the Application Dashboard:

- Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

- Click Utilities.
- Click Application Dashboard.

The Application Dashboard appears and contains the following sections:

- Application Overview lists detailed information and statistics about the current application, including the ID, name, alias, parsing schema, associated group, number of pages, and associated theme.
- Security lists the current authentication scheme, number of public and non public pages, and the number of authorization schemes used within the current application.
- Templates contains links to reports of templates used within the current application.
- Pages by Type lists counts of components, including types of reports and forms and dynamic HTML.
- Application Components contains links to reports of application-level controls and logic, including lists, shortcuts, lists of value, tabs, application computations, application items, plug-ins, and application processes.
- Page Components contains links to reports of page-level controls and logic, including regions, items, branches, computations, validations, dynamic actions, classic report columns, interactive report columns, and button.
- Native Region Component Utilization charts the total number of all types of region components used in the app. This is a visualization of the information provided in the Pages by Type section, the Page Components, and others.
- Plugin Region Utilization charts the total number of plug-ins used in the app.
- To view a specific report, click the number link to the right of the component type or template.



See Also:

Identifying At Risk Password Items

## 5.15.4 Viewing the Recently Updated Pages Report

Displays a report of pages recently updated by the current user.

To view the Recently Updated Pages report:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

- 4. Click Utilities.
- Click Recently Updated Pages.

The Recently Updated Pages report appears.

## 5.15.5 Viewing the Change History Report

The Change History report displays a summary report of edits to the current applications by developer, component type, and page number

To view the Change History report:

- Navigate to the Workspace home page.
- Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

- Click Utilities.
- 5. Click Change History.

The Change History report appears. Use the Since list to control the amount of time to include in your report.

From Since at the top of the page, select the amount of time to include in your report and click Set.

## 5.15.6 Accessing APEX Views

Query various views against APEX metadata.

**APEX Views** are data dictionary views that expose the metadata for applications. In APEX Views, you cannot only see the view, but you can also see the data they contain.

To access the APEX Views page:

- Navigate to the Workspace home page.
- 2. Click the App Builder icon.



3. Select an application.

The Application home page appears.

- Click Utilities.
- 5. Click Oracle APEX Views.

The APEX Views report appears. Use the Search bar at the top of the page to customize the display.



#### Tip:

Click **Tree View** to switch to a relational view of this information with expandable parent and children entries.

- 6. Select a view.
- 7. On Selected Columns, configure the columns.
  - a. From Select Columns use the controls to add and remove columns or change the column order.
  - b. Click the Results button.

The Results report appears.

8. To view the executed query, expand the **Query** region.

You can also copy this query for reuse with SQL Commands or SQL Developer.

9. To download the Results, click the **Download** link.

### 5.15.7 Managing Application Backups

Review backup history, perform manual backups, or restore an application from a backup.

About Application Backups

Backups provide a simple way for developers to automatically recover applications that may have been unexpectedly modified or deleted.

Viewing All Application Backups

View a summary of all application backups on the Manage Backups page.

Managing Backups for a Specific Application
 Manage Backups for all application on the Manage Backup page.

### 5.15.7.1 About Application Backups

Backups provide a simple way for developers to automatically recover applications that may have been unexpectedly modified or deleted.

Oracle APEX backs up modified applications as a part of daily maintenance. Backups are automatic and do not require an administrator or developer involvement. However, applications are not backed up if they meet the following criteria:

- If no changes have been made to the application since the last backup, then the application is not backed up again.
- Run-time only applications are not be backed up.



Applications that are installed into runtime-only instances are not backed up.

#### **About Configuring the Number of Backups**

By default, APEX only retains the 25 most recent backups. Older backups are deleted to make room for new ones.

Instance administrators can configure the number of backups per application, or disable automatic backups all together. To configure the number of backups for each application, sign in to the Administration Services application and navigate to **Manage Instance**, **Feature Configuration**, **Application Development**, and update the **Number of backups per application** attribute. Valid values are between 0 and 30. A value of zero (0) disables the backup feature.



Configuring the Number of Application Backups in *Oracle APEX Administration Guide* 

#### Viewing the Backup Log

Instance administrators monitor the performance of the backup job in the Backup Log. To view the Backup Log, sign in to the Administration Services application and navigate to **Monitor Activity**, **Backup Log**. The Backup Log reports when a backup job ran, the number of applications backed up by the job, and the elapsed time required to backup the applications.



Viewing the Backup Log in Oracle APEX Administration Guide

#### **Managing Backups**

Developers can view all backups in App Builder in **Workspace Utilities**, **Manage Backups**. To view backups for a specific application, click the application name.

### 5.15.7.2 Viewing All Application Backups

View a summary of all application backups on the Manage Backups page.

App Builder automatically backs up modified applications on a daily basis.

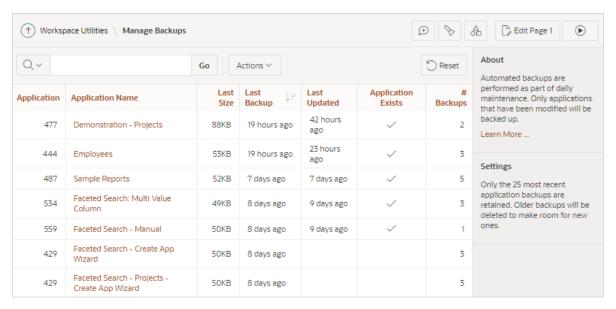
To view the Manage Backups page:

- 1. Navigate to the Workspace Utilities page:
  - a. Sign in to Oracle APEX.
  - b. On the Workspace home page, click the **App Builder** icon.
  - c. Click the Workspace Utilities icon.
- 2. Click Manage Backups.

The Manage Backups page appears displaying the following columns:



- Application Displays the Application ID
- Application Name Displays the application name when the backup occurred.
   If the name has changed, both names display in the report.
- Last Size
- · Last Updated
- Application Exists
- # Backup Displays the number of backups.



To view backup details for a specific application, click the Application Name.The Manage Backups page for the application appears.



#### Tip:

You can also access the Manage Backups page from the App Builder home page. Select **Manage Backups** from the Tasks region.

### 5.15.7.3 Managing Backups for a Specific Application

Manage Backups for all application on the Manage Backup page.

To manage backups for a specific application:

- 1. Navigate to the Manage Backups page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Click the Workspace Utilities icon.
  - c. Click Manage Backups.

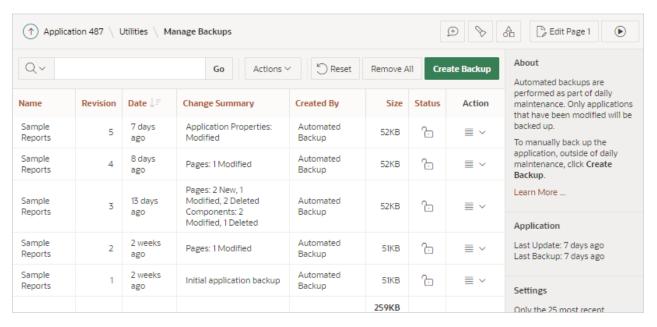
The Manage Backups page appears.

2. To view backups for a specific application, click the Application Name.

The application, Manage Backups page appears displaying the following columns:



- Name Application name at the time of backup.
- Revision Revision number.
- Date Backup date.
- Change Summary Indicates the number of new, modified, or deleted pages and components since the last backup.
- Created By Indicates whether the back up was automated or manual. If manual, the user who created the backup displays.
- Size Backup size.
- Status Generally displays a Lock or Unlock status icon. Locking a backup prevents
  it from being removed if the backup limit is reached. If a developer restores an
  application, then a Restore icon appears.
- Action Menu options include: Restore, Download, View Details, Manage Lock, or Delete. These options are discussed in detail in the steps that follow.



- 3. To restore a backup:
  - a. Locate the application and click the **Actions** menu.
  - **b.** From the Actions menu, select **Restore**.
  - c. In the Restore Application dialog:
    - Install As Application Select one of the following:
      - **Restore Application ID** The existing application ID will be used. This option overwrites the existing application without changing the ID.
      - Auto Assign New Application ID A new application ID will be created for you.
      - Change Application ID You specify a new application ID.
    - ii. Click Restore Application.
- **4.** To download a backup:



- Locate the application and click the Actions menu.
- **b.** From the Actions menu, select **Download**.
- c. Import the Export Files.
- 5. To view backup details:
  - a. Locate the application and click the **Actions** menu.
  - b. From the Actions menu, select View Details.
- To manage backup locks:
  - a. Locate the application and click the **Actions** menu.
  - b. From the Actions menu, select Manage Lock.Locking a backup prevents it from being deleted during daily maintenance.
  - c. In the Manage Backup Lock dialog, select Unlock Backup or Lock Backup.
- 7. To delete a backup:
  - a. Locate the application and click the Actions menu.
  - **b.** From the Actions menu, select **Delete**.
  - c. In the Delete Backup dialog, select **Delete Backup**.
- 8. To backup an application manually:
  - a. Click Create Backup.
  - b. In the Create a Backup dialog, enter comments and click **Backup**.
- 9. To remove all backups for an application:
  - a. Click Remove All.
  - In the Remove All Backups dialog, confirm your selection by clicking Remove All Backups.



You can also access the backups for a specific application from the Application home page. Navigate to the application and select **Manage Backups** from the Tasks list.

#### See Also:

Importing an Application, Page or Component Export

## 5.15.8 Using the Embedded Code Utility

Review all embedded code used in an APEX application on one page. Embedded code is defined as code (such as SQL, PL/SQL and JavaScript) entered in the App

Builder but does not include code such as PL/SQL packages or JavaScript libraries that code may reference.

The Embedded Code Utility displays all embedded code from all pages in an application in an easy-to-use faceted search page. Using the Embedded Code Utility is ideal for tasks such as code reviews, security evaluations, and application turning where historically developers would need to click on every property in a page or Shared Component.

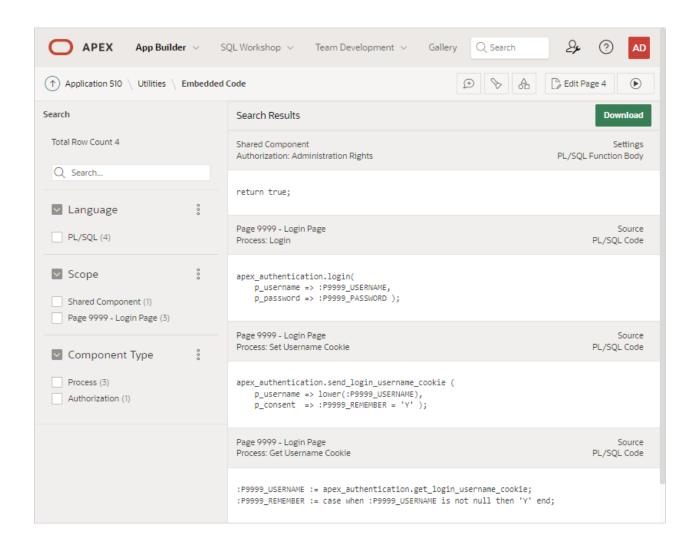
To access the Embedded Code Utility:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

- 4. Click Utilities.
- 5. Click Embedded Code.

The Embedded Code page appears. Note that large applications may take longer to display.



The left region contains facets that enable you to filter the Search Results report. The values of the facets depend upon the embedded code in the application. The left region contains the following facet filters:

Language - Identifies the programming language of the embedded code.
 Currently, SQL, PL/SQL and JavaScript are supported.

Only those languages that are included in the application appear. For example, if an application uses SQL and PL/SQL, but not JavaScript, then only the first two options will appear as filters. Selecting a filter refreshes the report and only displays the code that matches the languages selected.

• **Scope** - Identifies where in the application the embedded code is used.

**Shared Component** refers to any application component that is not part of a page such as application processes, authentication schemes, lists of values and so on. All other values refer to a specific page of an application. Selecting a page limits the results to only the embedded code for that page.

 Component Type - Identifies the type of component that contains the embedded code.

Only those component types that contain embedded code display in the filter. For example, a classic report that uses a SQL query results in a **Region** component type to be included. Similarly, if an application does not have any buttons, then a **Button** filter does not appear. Note that not all conditions require embedded code.

A Search Results report displays in the right region and includes identifying information about the component as well as where the embedded code is used by the component. For example, a page item may have a Source query used to populate the item's value, and it can also have a Server-side Condition to determine if the item should be included on the page.

Click **Download** to create a ZIP archive containing files for each of the components by language type.

The directory hierarchy of the files is similar to what is created when you split export files into separate scripts. The difference is that all files will be located below the <code>embedded code directory</code> as opposed to the <code>application directory</code>.

## 5.15.9 Viewing Page and Application Checksums

View page and application checksums to compare to compare different application deployments and determine if the application or pages are different.

- Viewing the Application Checksum
   View the application checksum to compare if the same application is deployed in different workspaces.
- Viewing the Page Checksum
   View the page checksum to compare two application deployments and determine which pages are the same and which are different.



### 5.15.9.1 Viewing the Application Checksum

View the application checksum to compare if the same application is deployed in different workspaces.

The application checksum is a unique identifier consisting of number and character strings. View the application checksum to verify if the same application is deployed across workspaces.

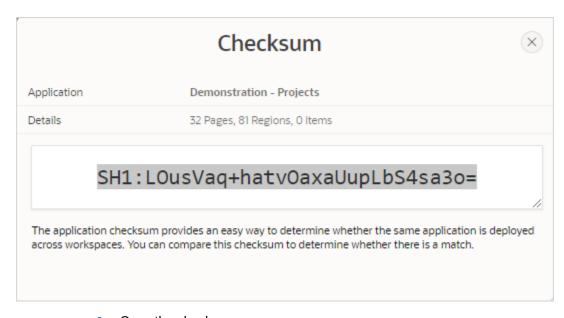
To view the application checksum:

- 1. Navigate to the Workspace home page.
- Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

- Click Utilities.
- Click Application Checksum.

The Checksum window appears displaying the application name and details such as the number of pages, regions, or items. The application checksum displays in the center of the window.



6. Copy the checksum.

### 5.15.9.2 Viewing the Page Checksum

View the page checksum to compare two application deployments and determine which pages are the same and which are different.

A page checksum is a unique identifier consisting of number and character strings. Use the page checksum to verify if the same page is deployed across workspaces.

To view the page checksum:



- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

- 4. Click Utilities.
- 5. Click Page Checksum.

The Page Checksum Report appears and includes the following columns: Name, Page (number), Alias, Checksum, Updated By, Group, and Updated.

- 6. To view the page checksum in Page Designer:
  - a. From the Page Checksum Report, click the page name.

Page Designer appears.

b. From the Page Designer toolbar, click the **Utilities** menu



) and select Checksum.

The Checksum window appears displaying the page name and details such as the number of regions, items, or buttons. The checksum displays in the center of the window.

c. Copy the checksum.

### 5.15.10 Accessing Font APEX

View the Font APEX page to search for Font APEX icons and view HTML markup.

- Font APEX Icons
   Font APEX is the icon library for Oracle APEX and the Universal Theme.
- Browsing Icons
   You can search and filter icons on the Font APEX page.

### 5.15.10.1 Font APEX Icons

Font APEX is the icon library for Oracle APEX and the Universal Theme.

Small icons are based on a 16x16 grid and are ideally suited for buttons and menus. Large icons are based on a 32x32 grid and are well suited for places where you need to provide a larger graphic, such as cards, media lists, or hero regions.

Many APEX components automatically use the large or small icons based on the context (such as Template Options). For example, when using Cards, the Block and Featured template option automatically shows the larger versions of the icons. In contrast, the Basic and Compact template options use icons from the smaller set. Font APEX contains over 1150 icons. You can choose from 25 modifiers that you can place on top of any existing icons so you can customize any icon to fit your needs.



## 5.15.10.2 Browsing Icons

You can search and filter icons on the Font APEX page.

Once you find the appropriate icon, you can customize the icon by configuring attributes. As you make selections, the icon image changes and HTML and Icon attributes are updated. You can then copy the updated HTML Markup and icon property for use in your applications.

#### To view Font APEX icons:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.

The Application home page appears.

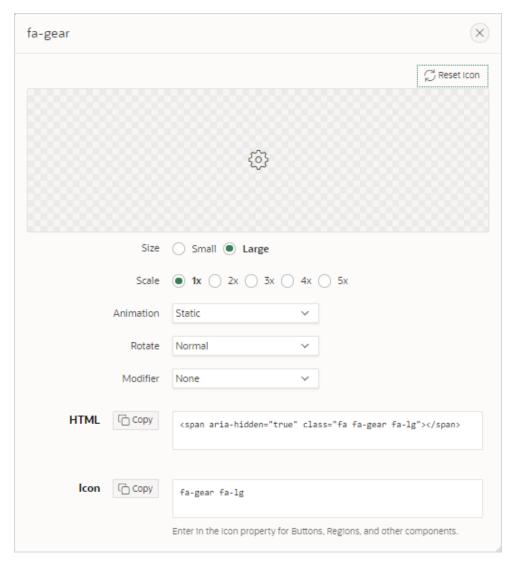
- 4. Click Utilities.
- 5. Click Font APEX Icons.

The Font APEX page appear.

- 6. Use the Search region on the right side of the page to narrow the display.
  - Choose Small or Large
  - In the Search field, enter keywords and click Go.
  - Select a Category.
- 7. Under Icons, select an icon.

The following example shows fa-gear.





- **8.** Configure the attributes:
  - Size
  - Scale
  - Animation
  - Rotate
  - Modifier

As you configure attributes, the icon image changes and the HTML and Icon attributes are updated to reflect your selections.

- 9. HTML Displays the HTML Markup. Click **Copy** to copy the HTML Markup.
- **10.** Icon Displays the icon property for buttons, regions, and other components. Click **Copy** to copy the icon..
- **11.** Click **Reset Icon** in the upper right corner to revert the attributes to the default settings.



## 5.15.11 Accessing Page Specific Utilities

Use the links in the Page Specific Utilities region to access Cross Page Utilities and Page Groups as well as access handy utilities for regions, buttons, items, computations, validations, process, dynamic actions, and branches.

To access Page Specific Utilities page:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.

The App Builder home page appears

3. Select an application.

The Application home page appears.

- 4. Click Utilities.
- 5. Under Page Specific Utilities, select one of the following:
  - Cross Page Utilities
  - Page Groups
  - · Region Utilities
  - Button Utilities
  - Item Utilities
  - Computations Utilities
  - Validation Utilities
  - Process Utilities
  - Dynamic Action Utilities
  - Branch Utilities



**Accessing Cross Page Utilities** 

## 5.15.12 Accessing Cross Page Utilities

Use Cross Page Utilities to perform edits across pages in the application.

To access the Cross Page Utilities page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Utilities.
- 4. From Page Specific Utilities, click Cross Page Utilities.

The Cross Page Utilities page provides access to the following tools and reports:



- Grid Edit of all Pages. Use this report to edit the page name, alias, title, page template, and security options. To link to a specific page, click the Edit icon adjacent to the page number. To save your changes, click **Apply Changes**.
- **Delete Multiple Pages**. Delete multiple pages at once.
- Page Attributes. View a report of details for all pages in the current application including the page name, page title, defined groups, type and number of components and controls, and application logic. To customize the report, use the search bar at the top of the page. To link to a specific page, click the page number.
- **Page Locks**. Use Page Locks to prevent conflicts during application development. By locking a page, you prevent other developers from editing it.

- Locking and Unlocking a PageDeleting Multiple Pages
- **Using Application Utilities**

## 5.15.13 Using Interactive Report Utilities

View and delete saved interactive reports and interactive report subscriptions.

- **Deleting Saved Interactive Reports** View and delete saved interactive reports in the current application.
- **Viewing Subscriptions** View and delete interactive report subscriptions.

### 5.15.13.1 Deleting Saved Interactive Reports

View and delete saved interactive reports in the current application.

To delete saved interactive reports:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- 3. Click Utilities.
- Under Interactive Report Utilities, select **Saved Reports**.
  - The report displays all of the saved report for the application which are not primary defaults. Each row includes the page number, region name, report type, report name, report alias, and owner.
- 5. To view private saved reports, deselect the checkbox for the **Primary Default** filter located below the search bar.
- 6. To delete a report, select the checkbox adjacent to the page number and click Delete Checked.
- 7. To view the page containing the report, click the page number.



### See Also:

- · Linking to Shared Interactive Reports
- Saving Interactive Reports
- Managing Saved Interactive Reports in Oracle APEX Administration Guide

### 5.15.13.2 Viewing Subscriptions

View and delete interactive report subscriptions.

End users can receive updated versions of a report by subscribing to it. Workspace administrators can view and manage these subscriptions on the Subscriptions page.

To manage interactive report subscriptions:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.

The Application home page appears.

- 3. Click Utilities.
- 4. Under Interactive Report Utilities, select Subscriptions.

The Subscriptions report appears.

To delete a subscriptions, select the checkbox adjacent to the page number and click Delete Checked.

## 5.16 Using Workspace Utilities

Use the Workspace Utilities page to acccess REST Enabled SQL Services, Remote Servers, Application Groups, Web Credentials, Workspace Themes, Export, Oracle APEX Views, Manage Backups, and REST Source Catalogs.

#### Accessing Workspace Utilities

Access Workspace Utilities by clicking the Workspace Utilities icon in the center of the {Conref}App Builder home page.

#### Workspace Utilities Page

The Workspace Utilities page contains links to common workspace utilities including REST Enabled SQL Services, Remote Servers, Application Groups, Web Credentials, Workspace Themes, Export, Oracle APEX Views, Manage Backups, and REST Source Catalogs.

#### Viewing Cross Application Reports

Use the links under Cross Application Reports page to view and edit information across multiple applications in the current workspace.

### 5.16.1 Accessing Workspace Utilities

Access Workspace Utilities by clicking the Workspace Utilities icon in the center of the {Conref}App Builder home page.



To access Workspace Utilities:

- 1. Sign in to Oracle APEX.
- 2. On the Workspace home page, click the **App Builder** icon.

The App Builder home page appears.

On the App Builder home pack, click the Workspace Utilities icon. The Workspace Utilities page appears.

## 5.16.2 Workspace Utilities Page

The Workspace Utilities page contains links to common workspace utilities including REST Enabled SQL Services, Remote Servers, Application Groups, Web Credentials, Workspace Themes, Export, Oracle APEX Views, Manage Backups, and REST Source Catalogs.

The following table describes the links on the Workspace Utilities page.

Link	Description	To Learn More
REST Enabled SQL Services	Manage references to external REST Enabled SQL services.	See: Managing REST Enabled SQL References
Remote Servers	Manage Remote Server objects used in REST Data Sources and Authentications.	See: Managing Remote Servers
Application Groups	Organize applications by assigning them to application groups. To use application groups, first create a group and then assign applications to it.	See: Managing Application Groups
Web Credentials	Manage secure credentials to connect to REST Enabled SQL or other REST services.	See: Managing Web Credentials
Workspace Themes	Manage workspace themes that can be utilized by any application within the workspace.	See: Managing Workspace Themes
Export	Export workspace components.	See: Exporting Workspaces, Applications, and App Components
Oracle APEX Views	Query the various views against APEX meta data.	See: Accessing APEX Views
Manage Backups	View and manage application backups in the current workspace. Backups provide a simple way to recover applications that may have been unexpectedly modified or deleted.	See: Managing Application Backups
REST Source Catalogs	Manage catalogs of REST Sources for integration into applications.	See: Managing REST Source Catalogs
Cross Application Reports	Cross Application Reports display on the right side of the Workspace Utilities page. Access these reports to view and edit information across multiple applications in the current workspace.	See: Viewing Cross Application Reports



## 5.16.3 Viewing Cross Application Reports

Use the links under Cross Application Reports page to view and edit information across multiple applications in the current workspace.

To access cross application reports:

1. Sign in to Oracle APEX.

The Workspace home page appears.

2. Click the App Builder icon.

The App Builder home page appears.

- 3. Click the Workspace Utilities icon.
- 4. Locate the Cross Application Reports region on the right side of the window. Available reports include:
  - All Reports
  - Application Attributes
  - Build Options
  - Developer Comments
  - Comments Calendar
  - Application Comparison
  - Component Comparison
  - Security Profiles
  - Authentication Schemes
  - Password Items
  - Theme Summary
- 5. To view all reports:
  - a. Click All Reports.
  - b. On the Cross Application Reports page, select a report to review.



6

# Managing Pages in an Application

A page is the basic building block of an application. Developers add pages to an application by running the Create Page Wizard.

- Adding a New Page to an Application
   Add a new page by running the Create Page Wizard from the Application home page.
- Understanding Page Types in the Create Page Wizard
   Run the Create Page Wizard to add a new page to existing application. How the wizard works depends upon the type of page you are creating.
- Managing Feature Pages
   Learn about adding and removing Feature pages.

one page template of template type Dialog Page.

- Creating Dialog Pages
   Oracle APEX includes support for modal and non-modal dialog pages. Modal and non-modal dialog pages are only supported if the current application theme contains at least
- About Copying Application Pages
   Copy a page from the current application or from another application.
- About Deleting Application Pages
   Deleting a page deletes the corresponding tabs, breadcrumbs, and list entries. You can only delete unlocked pages or pages that you have locked.
- Managing Page Groups
   Organize pages into page groups to make them to access easier. To use page groups, you create a group and then assign pages to the group.
- Locking and Unlocking a Page
   Prevent conflicts during application development by locking pages in your application. By locking a page, you prevent other developers from editing it.



Editing Pages in Page Designer and Using Application Utilities

## 6.1 Adding a New Page to an Application

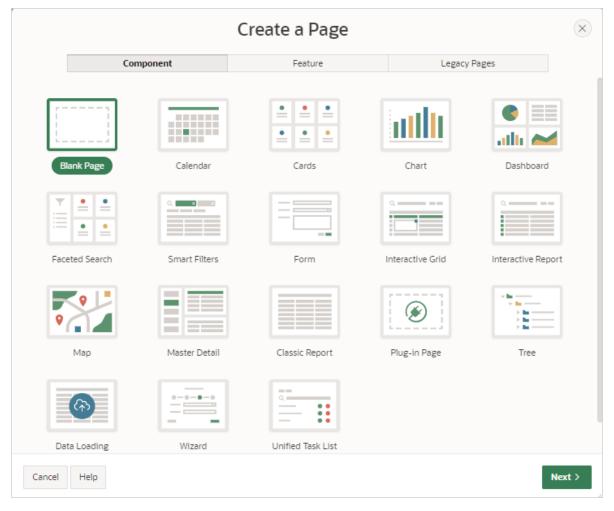
Add a new page by running the Create Page Wizard from the Application home page.

To create a new page:

- 1. On the Workspace home page, click App Builder.
- 2. Select an application.

The Application home page appears.

Click the Create Page button.



#### The Create Page Wizard appears.

#### **4.** Select a page type:

Component - Component pages provide page-level functionality. Examples
of Component pages include Blank Page, Calendar, Cards, Chart, Dashboard,
Faceted Search, Smart Filters, Form, Interactive Grid, Interactive Report, Map,
Search Page, Master Detail, Classic Report, Plug-In Page, Tree, Data
Loading, Wizard, and Unified Task List.Report, Form, Plug-in Page, Tree, Data
Loading, Wizard, and Unified Task List.

For more details about **Component** pages, see Component Page Types.

• Feature - Feature pages provide application-level functionality. Examples of Feature pages include About Page, Access Control, Activity Reporting, Configuration Options, Email Reporting, Feedback, Login Page, and Theme Style Selection.

For more details about Feature pages, see Feature Page Types.

 Legacy - Legacy pages are pages that Oracle still supports but does not recommend using.

For more details about Legacy pages, see Legacy Page Types and Managing Application Legacy Components.

What appears next depends upon the page type you select.

Click Next and follow the on-screen instructions. To learn more about an attribute, see field-level Help.



#### Tip:

To learn more, see the Create Page Wizard discussion for each component.

## 6.2 Understanding Page Types in the Create Page Wizard

Run the Create Page Wizard to add a new page to existing application. How the wizard works depends upon the type of page you are creating.



#### Tip:

Universal Theme - 42 is optimized to work equally well in either a mobile or desktop environment. In previous releases and in earlier themes, the Mobile user interface was based on jQuery Mobile. Because jQuery Mobile is desupported, you must migrate existing mobile applications to the Universal Theme.

Component Page Types
 Learn about available Component page types when running the Create Page Wizard and using the Universal Theme.

Feature Page Types
 Learn about available Feature page types when running the Create Page Wizard and

Legacy Page Types
 Learn about Legacy page types available when running the Create Page Wizard. Oracle still supports legacy pages, but does not recommend using them.

## 6.2.1 Component Page Types

Learn about available Component page types when running the Create Page Wizard and using the Universal Theme.

Table 6-1 Create Page Wizard Component Page Types

using the Universal Theme.

Page Type	Description	To Learn More
Blank Page	Creates a page with no built-in functionality. Once you create the application, you can create regions on the page in Page Designer.	See online Help when creating this page.
Calendar	Generates a calendar with monthly, weekly, and daily views.	See: Creating Calendars



Table 6-1 (Cont.) Create Page Wizard Component Page Types

Page Type	Description	To Learn More
Cards	A <b>cards</b> page features an orderly layout of information tiles. Developers choose between three layouts: Grid, Float, or Horizontal (Row).	See: Managing Cards
	Features:	
	<ul> <li>Customize every aspect of a cards region's UI (including layout, appearance, icon, badge, and media).</li> <li>Declaratively create links from a cards page by adding actions. Action types include Button, Full Card, Title, Subtitle, or Media.</li> <li>Supports advanced HTML expressions including template directives for client-side conditional formatting.</li> </ul>	
Chart	Creates a new page containing a chart. Supported chart types include area, bar, box plot, bubble, combination, status meter gauge, donut, funnel, gantt, line, line with area, pie, polar, pyramid, radar, scatter, and stock charts.	See: Creating Charts
Dashboard	Creates a dashboard page. Choose from four different chart layouts which you can easily customize in Page Designer. Available chart layouts include Primary and 2 secondary charts, Grid of 4 charts, Primary and 3 secondary charts, and Grid of 6 charts.	See: Creating a Dashboard Page Using the Create Application Wizard
Faceted Search	A <b>faceted search</b> page displays and filters data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region). Displays search results as cards or a classic report.	See: Managing Faceted Search
	Features:	
	<ul> <li>Select options from facets in the left Search region to narrow down search results.</li> <li>Set filters using facets that show possible values together with the occurrence count within the result set.</li> </ul>	
	<ul> <li>Built-in search capability.</li> </ul>	
	<ul> <li>Optionally include a chart for any facet.</li> <li>Toggle between a bar chart (which is the default) and pie chart type.</li> </ul>	
	<ul> <li>Create facet groups for data models having multiple flag columns.</li> </ul>	



Table 6-1 (Cont.) Create Page Wizard Component Page Types

Page Type	Description	To Learn More
Smart Filters	A <b>smart filters</b> page features single search field at the top of the page and a search results report (classic report, cards, map, or calendar). While a Smart Filter behaves similarly to faceted search, it features a more space efficient layout.  Features:	
	<ul> <li>Includes a search field at the top of the page with filters that display as suggestion chip.</li> <li>The Search Results can display as a classic report, cards, map, or calendar.</li> <li>Clicking a filter name displays a list of values.</li> <li>Clicking to right of a suggestion chip changes it to an applied filter chip and moves to the Applied Filters Area. Clicking the applied filter chip again displays a list.</li> <li>Built-in search capability.</li> </ul>	
Form	Forms enable users to update a single row or multiple rows in a table. When a local table which has foreign keys is	See: Creating a Form
	selected as the data source, then for those columns, the item type is set as <b>Select List</b> .	



Table 6-1 (Cont.) Create Page Wizard Component Page Types

Page Type	Description	To Learn More
Interactive Grid	An <b>interactive grid</b> presents data in a searchable, customizable report. Includes similar customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.  Features:  Extensive customization capabilities using	See: Managing Interactive Grids
	<ul><li>menus or inline editing.</li><li>Turn editing on or off using the region Attribute, Edit, Enabled.</li></ul>	
	<ul> <li>Built-in search capability.</li> <li>For both editable and non-editable reports, users can change the report layout and create private reports:         <ul> <li>Column Heading menu - Change the report layout with Control Break, Aggregations, Freeze, Hide, and Filter.</li> <li>Actions menu:</li></ul></li></ul>	
	show or hide.  * Filters - Create filters to alter the display.  * Data - Sort, Aggregate, Refresh, Flashback.  * Format - Control Break, Highlight, Stretch Column Widths.  * Selection - Cell Selection, Copy to Clipboard, Refresh Rows.	
	<ul> <li>* Chart - Create chart.</li> <li>* Report - Create, edit, and manage saved Private or Alternative reports.</li> <li>* Download - Download or email the report as a CSV, HTML, PDF, or Excel file</li> </ul>	
	<ul> <li>If editable, users can edit the data directly:         <ul> <li>Row Actions menu - Single Row View, Add Row, Duplicate Row, Delete Row, Refresh Row, Revert Changes.</li> <li>Add Rows - Add new rows by clicking the Add Row button.</li> <li>Edit Rows - Edit a row by selecting or</li> </ul> </li> </ul>	
	double-clicking a cell with the mouse, editing the content, and clicking the <b>Save</b> button.	



Table 6-1 (Cont.) Create Page Wizard Component Page Types

Page Type	Description	To Learn More
nteractive Report	An interactive report page features a searchable, easily customizable report.  Features:  Report can display as a standard application page or as a modal dialog.  Enable the Include Form option to create a report and update form combination.  Built-in search capability.  Change the report layout and create private reports using menus:  Column Heading menu: Change the report layout with Sort Ascending, Sort Descending, Hide Column, Control Break, and Filter.  Actions menu:  Columns - Configure the columns to show or hide.  Filters - Create filters to alter the display.  Data - Sort, Aggregate, Compute, Flashback.  Format - Control Break, Highlight, Rows Per Page.  Chart - Create a chart.  Group By - Group sets of results by one or more columns with Group By.  Pivot - Pivot reports transpose rows into columns to generate results in a cross tab format.  Report - Create, edit, and manage saved Named reports.  Download - Download or email the report as a CSV, HTML, Excel, or PDF.	See: Managing Interactive Reports
Мар	format.  The map component consists of a background map and spatial geometry objects (or layers) sourced from data in a local table. Supported spatial geometry objects (or layers) include: Points, Lines, Polygons, Heat Map, or Extruded Polygons. Spatial geometry objects can be either:  Geometry Column - Supported datatypes include SDO_GEOMETRY, VARCHAR2, or CLOB. VARCHAR2 and CLOB columns must contain geometry information in GeoJSON format.  Two Numeric Columns - These columns must contain longitude and latitude values. This option only applies to Point and Heat Map layers.	See: Creating Maps



Table 6-1 (Cont.) Create Page Wizard Component Page Types

Page Type	Description	To Learn More
Search Page	Create a decalarative search for an application by creating a search configuration that contain information about a searchable data source and then creating a search page that displays the results.	See Adding Search to an Application
Master Detail	A master detail reflects a one-to-many relationship between two tables in a database. Master detail forms enable users to insert, update, and delete values from two tables or views. Master Detail options include:  Stacked - Creates a single page master detail	See: Creating Master Detail Forms
	with editable interactive grids. Users select a row in the master grid to update the detail grids.  • Side by Side - Create a single page master detail utilizing side by side layout and report regions with modal edit windows. The left side contains a master list to navigate to the master record. The right side contains the selected master record and the associated detail report.  • Drill Down - Creates a two page (or Drill Down) master detail. The first page contains an interactive report for the master table. The second page features a standard form for the master and interactive grids for the detail.	
Classic Report	A <b>classic report</b> features a simple report page based on the formatted result of a SQL query.  Features:	See: Managing Classic Reports
	<ul> <li>Report can display as a standard application page or as a modal dialog.</li> <li>Enable the Include Form option to create a report and update form combination.</li> <li>Enable column sorting in Page Designer by selecting a column and configuring Column, Sorting attributes.</li> <li>The most versatile report as it is template-driven. Choose from the predefined report templates, including Media List, Comments, Timeline, Badge List, Value Attributes Pairs, and so on. Or, create your own template to customize and visualize data.</li> <li>Download the report as a CSV, HTML, Excel,</li> </ul>	
	<ul><li>or PDF.</li><li>Supports Report Layouts to format PDF exports.</li></ul>	
Plug-in Page	Creates a new page based on a region type plug-in. Plug-ins enable developers to declaratively extend, share, and reuse the built-in types available with Oracle APEX.	See: Importing a Plug-in from the Plug-in Page



Table 6-1 (Cont.) Create Page Wizard Component Page Types

Page Type	Description	To Learn More
Tree	Creates a tree to graphically communicate hierarchical or multiple level data and optionally navigating to a page or URL specific to each tree node.	See: Managing Trees
Data Loading	If a Data Load Definition exists, you can create a Data Loading page. The Create Page Wizard creates a single page with the Native Data Loading page process to provide the ability to upload data from a file or by copy and paste, and then upload the data. This Data Loading page enables end users to manage the loading of data.	See: Creating a Data Loading Page Using the Create Page Wizard
Wizard	Create a collection of pages to be used as a wizard. Generally wizards are used for entering data across multiple steps.	·
Unified Task List	Create a page that allows users to view, action, or edit their approval tasks.	See: Managing Unified Task Lists

## 6.2.2 Feature Page Types

Learn about available Feature page types when running the Create Page Wizard and using the Universal Theme.

Table 6-2 Create Page Wizard Feature Page Types

Page Type	Description	To Learn More
About Page	Include an <b>About this Application</b> page which features a description field that describes the application, includes the application version, and a count of the number of pages.	See online Help when creating feature.
Access Control	Creates pages to manage an access control list. Use the Application Access Control shared component to associate application roles with application users. This wizard also adds a reader, contributor and administrator role and corresponding authorization scheme to your application. Apply these authorization schemes to pages and page components to manage access by user and role.	See Controlling Access to Applications, Pages, and Page Components
Activity Reporting	Includes numerous reports on end user activity for your application. Determine the most active users, the most used pages, the performance of pages, and errors raised, to better understand how your application is being utilized and areas for improvement.	Not applicable.



Table 6-2 (Cont.) Create Page Wizard Feature Page Types

Page Type	Description	To Learn More
Configuration Options	Enables application administrators to enable or disable specific functionality within the application. This feature is useful if you select features that need additional development effort before they can be used by end users.	Not applicable.
	You can expand this feature to application-specific features. If developers define additional build options and associate them with specific functionality throughout the application, then they can be added to the configuration settings for administrators.	
Email Reporting	Include numerous reports on emails queued from this application, emails sent, and errors sending emails.	Not applicable.
Feedback	Provides a mechanism for end users to post general comments for application administrators and developers. The posts include useful session state information to help developers determine where the end user sent the feedback from.	See Managing Feedback.
	Creating Feedback:	
	<ul> <li>Creates Navigation bar icon which users can click to leave feedback.</li> </ul>	
	<ul> <li>Creates an report for viewing and updating feedback.</li> </ul>	
	<ul> <li>Captures the application and page ID, feedback comments, date and time, and user information.</li> </ul>	
Login Page	Creates a Login Page which enables the user to enter login credentials for accessing your application. Developers can select a template and labels for the Username and Password fields as well as determine if the Username value is stored a system-generated cookies.	Not applicable.
Theme Style Selection	Enables administrators to select a default color scheme (theme style) for the application.  Administrators can also choose to allow end users to choose their own theme style. End users can simply click on the Customize button at the bottom of the home page, and select from the available theme styles. For example, users with visual impairment may prefer to utilize the Vista theme style which has a much higher color contrast.	Not applicable.

See Also:

**Managing Feature Pages** 



### 6.2.3 Legacy Page Types

Learn about Legacy page types available when running the Create Page Wizard. Oracle still supports legacy pages, but does not recommend using them.

Legacy page available when running the Create Page Wizard include:

- Form on Local Procedure
- Summary Page
- Legacy Data Loading



Managing Application Legacy Components

## 6.3 Managing Feature Pages

Learn about adding and removing Feature pages.

About Feature Pages

Feature pages provide application-level functionality. Examples of Feature pages include About Page, Access Control, Activity Reporting, Configuration Options, Email Reporting, Feedback, Login Page, and Theme Style Selection.

- Adding Features to an Existing App
  - Add a Features page to an existing application by selecting **Add Feature Page** from the Tasks list on the Application home page.
- About Removing Features Created with the Create Page Wizard Remove features created with a wizard using build options.

### 6.3.1 About Feature Pages

Feature pages provide application-level functionality. Examples of Feature pages include About Page, Access Control, Activity Reporting, Configuration Options, Email Reporting, Feedback, Login Page, and Theme Style Selection.



Tip:

See Feature Page Types for details about available Feature pages.

Add Feature pages in the following ways:

- Create a new application. Run the Create Application Wizard and select options under Features. See Running the Create Application Wizard and Available Features in the Create Application Wizard.
- Create a new page. Run the Create Page Wizard. On the Features tab, select a feature.
   See Adding a New Page to an Application and Feature Page Types.



Add to an existing application. Add a Features page to an existing application.
 Navigate to the application. On the Application home page, select Add Feature

 Page from the Tasks list. On the Features tab, select a feature. See Feature Page Types.

## 6.3.2 Adding Features to an Existing App

Add a Features page to an existing application by selecting **Add Feature Page** from the Tasks list on the Application home page.

To add a Features page to an existing application:

- 1. On the Workspace home page, click **App Builder**.
- 2. Select an application.

The Application home page appears.

3. From the Tasks list, select Add Feature Page button.

The Create Page Wizard, Feature tab appears.

4. Select a feature.

For more details about Feature pages, see Feature Page Types.

What appears next depends upon the Feature type you select.

Click Next and follow the on-screen instructions. To learn more about an attribute, see field-level Help.

## 6.3.3 About Removing Features Created with the Create Page Wizard

Remove features created with a wizard using build options.

When you add a feature using a wizard, the wizard creates one or more pages and other components and processes to seamlessly integrate it into your application. Each feature is associated with a build option which contains one or more components. You can use the associated build option to enable, disable, or permanently remove features.

#### **Using Build Options to Include or Exclude Features**

Build options have two possible values: **Include** and **Exclude**. If you select the build option status of **Include**, then the Oracle APEX engine considers the associated components (in this case features) as part of the application definition at runtime. Conversely, if you specify the build options status as **Exclude**, then the APEX engine treats it and any associated components as if it did not exist.

#### **Removing Features Permanently**

You remove features created with a wizard by first removing the components associated with the build option and then deleting the build option.



### See Also:

- Including or Excluding Build Options
- Deleting Build Options and Associated Components

## 6.4 Creating Dialog Pages

Oracle APEX includes support for modal and non-modal dialog pages. Modal and non-modal dialog pages are only supported if the current application theme contains at least one page template of template type Dialog Page.

- About Supported Dialogs
  - When you create a new page, the wizard prompts you to select a Page Mode. The Page Mode determines if the page is a normal application page or a dialog page.
- Creating a Dialog Page Template
   Create a dialog template if your theme does not include one and how to edit dialog template attributes to change the display.
- Editing a Dialog Page in Page Designer
   Change how a dialog page displays by editing attributes in Page Designer.
- Generating a Cancel Dialog Dynamic Action on the Dialog Page
  For dialog pages that contain a Cancel button, create a dynamic action that controls what happens when the button is clicked.
- Generating a Close Dialog Page Process on the Dialog Page Close a dialog page by creating a Close Dialog page process.
- About Branching with Dialog Pages
   Open dialog pages using buttons or links.
- Handling Refresh Actions on Parent Page Learn about handling refresh actions on parent pages.

## 6.4.1 About Supported Dialogs

When you create a new page, the wizard prompts you to select a Page Mode. The Page Mode determines if the page is a normal application page or a dialog page.

Oracle APEX supports two types of dialog pages:

- Modal Dialog A modal dialog is an overlay window positioned within the same browser window. A modal dialog remains active and focused until the user has finished with it and closes it. While a modal dialog is active, the user is unable to interact with the rest of the page until the dialog is closed.
- Non-modal Dialog A non-modal dialog displays a separate popup browser window. A
  user can interact with a non-modal dialog and content on the page. Use a non-modal
  dialog when the requested information is not essential to continue. This type of window
  can be left open while work continues elsewhere.

Oracle APEX includes dialog page templates in the *Universal Theme - 42*. When you set the Page Mode to either **Modal** or **Non-Modal**, APEX automatically uses the default dialog page template.



You can further define the appearance and layout of a dialog by specifying the Dialog Template.

# 6.4.2 Creating a Dialog Page Template

Create a dialog template if your theme does not include one and how to edit dialog template attributes to change the display.

The dialog page template contains JavaScript function calls that handle the initialization, closure, and cancellation of a dialog page. When you create a dialog page template, you must define these and other Dialog Page Templates attributes.



Required Dialog Page Template Attributes

If you are using an existing application and the theme does not contain a dialog page template, then you must create one. While you can create one from scratch, the easiest option is to copy an existing dialog template.

To create a dialog page template:

- 1. Navigate to the Shared Components, Templates page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Templates**.
- 2. Click Create.
- 3. In the Create Template Wizard:.
  - a. Template Type Select Page and click Next.
  - b. Creation Method Select As a Copy of an Existing Template and click Next.
  - c. Copy From Select the application to copy from and click Next.
  - **d.** Identify Theme Select the theme you are copying from and the theme you are copying to and click **Next**.
  - e. New Templates Locate the Modal Dialog templates to copy (for example, **Drawer**, **Modal Dialog**, or **Wizard Modal Dialog**) and select **Yes**.
  - f. Select Copy Page Templates.
- 4. Verify the dialog page template is active in the current theme



Selecting a Default Page Template



# 6.4.3 Editing a Dialog Page in Page Designer

Change how a dialog page displays by editing attributes in Page Designer.

To edit a dialog page in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears. Attributes are organized in groups.

- 2. In Page Designer locate the **Appearance** group.
- 3. Appearance, Page Mode Select one of the following:
  - Modal Dialog The page is presented as a modal dialog. A modal dialog is an
    overlay window positioned within the viewport, which remains active and focused
    until the end user dismisses (or closes) it. The underlying page is grayed out and the
    end user is prevented from interacting with the rest of the page until the dialog is
    closed.
  - Non-Modal Dialog The page is presented as a non-modal dialog. A non-modal dialog is an overlay window positioned within the viewport, where the end user can interact with the dialog, and content on the page that launched the dialog. A non-modal dialog can be used when the requested information is not essential to continue; work can continue elsewhere while the window is still open.

Note that options Modal and Non-Modal Dialog will only be available for selection when the current application theme contains a default Dialog Page Template.

4. Appearance, Dialog Template - Select a dialog template to define the appearance and layout of this page. Making a selection here overrides the default dialog template.

Options include:

- Theme Default
- Drawer
- Modal Dialog
- Wizard Modal Dialog

Dialog templates are defined in the application theme. When a dialog page is created, the template is automatically set to **Theme Default** which renders the page using the default page template defined in the current theme.

Edit the remaining attributes in Appearance group as needed.

To learn more about an attribute, see field-level Help.

- 6. Under Dialog, edit the appropriate attributes:
  - a. Width Enter the width of the dialog, in pixels or a percentage.

The substitution string #DIALOG\_WIDTH# in the dialog initialization code of the page template is replaced with the value entered in this item. For a page using a Desktop user interface, the value is set in pixels, such as 500.

**b.** Height - Enter the height of the dialog, in pixels, for example, 500.



The substitution string #DIALOG\_HEIGHT# in the dialog initialization code of the page template is replaced with the value entered.

c. Maximum Width - Enter the maximum width of the dialog in pixels.

The substitution string #DIALOG\_MAX\_WIDTH# in the dialog initialization code of the page template is replaced with the value entered in this item.

d. Attributes - Dialog support varies depending on the user interface of the page. A subset of dialog attributes are declaratively supported: height, width, and maximum width.

To define any additional attributes for the dialog, enter the name/value pairings in a comma separated list. The substitution string <code>#DIALOG\_ATTRIBUTES#</code> in the dialog initialization code defined at page template level, is replaced by any value(s) entered in this item.

- e. CSS Classes Enter classes to add to this component. You may add multiple classes by separating them with spaces.
- **f.** Chained Select **On** if this dialog is opened by another dialog, and should reuse the same dialog window.

For example, if this dialog is part of a multiple page dialog wizard, and you wish to reuse the dialog window for each step of the wizard. Select **Off** if this dialog is opened by another dialog and should be opened in a new dialog window. For example, when this dialog is modal, and you wish to open it within a parent modal dialog window.

7. To save your changes, click Save.

## 6.4.4 Generating a Cancel Dialog Dynamic Action on the Dialog Page

For dialog pages that contain a Cancel button, create a dynamic action that controls what happens when the button is clicked.

The dynamic action must have True Action event which is set to **Cancel Dialog**. This dynamic action will use the cancellation JavaScript call contained in the page template (apex.navigation.dialog.cancel) to handle the canceling the dialog.



**Managing Dynamic Actions** 

## 6.4.5 Generating a Close Dialog Page Process on the Dialog Page

Close a dialog page by creating a Close Dialog page process.

In previous releases, this Close Dialog page processes were referred to as a <code>ClosePopup Window</code>. This dialog will use the closure JavaScript call contained in the page template (<code>apex.navigation.dialog.close</code>), to handle the closing of the dialog. The page process also supports the return of dialog page items, which you may wish to reference on the parent page.





### Tip:

You can also close a dialog page with the Close Dialog dynamic action. Both the dynamic action and the process support returning dialog page items. Use the page process when the page needs to be submitted and use the dynamic action when the page does not need to be submitted. Both end up calling the closure JavaScript call. Alternatively, you can create a page branch, which will close a dialog page and redirect to the page specified in the branch.

### See Also:

- **Understanding Page Processes**
- **Controlling Navigation Using Branches**

# 6.4.6 About Branching with Dialog Pages

Open dialog pages using buttons or links.

Dialog pages support the following branching options:

Dialog page to dialog page.

You can branch from one dialog page to another dialog page if:

- Both pages have the same Page Mode. For example, a Modal Dialog page and a page where the dialog Chained attribute is set to **On**. Setting the Chained attribute to On enables support for chained or nested dialogs such as the dialogs that appear in many internal APEX wizards. Chained or nested dialogs enable you to re-use a dialog window to display each page.
- Dialog page to Normal page.
  - When branching from a dialog page to a normal page, the dialog page is closed and the user navigates to a new page in the browser. The new page can be a parent (or launching) page or another Normal page in an application.

# 6.4.7 Handling Refresh Actions on Parent Page

Learn about handling refresh actions on parent pages.

If you have generated a Close Dialog page process on the dialog page, you must implement refresh actions on the parent page using the new Dialog Closed dynamic action event type. You can use the set type Dialog Return Item when creating a Set Value True Action, to set a single value, based on the return item of a dialog.





### Tip:

For a partial page refresh of a parent page, implement the close dialog with dynamic action (for example, for report and form pages where you want to edit data in a modal dialog form and only want the report refreshed on close). In contrast, branching is the best approach if you have a multi-step modal wizard or if you have several possible target pages when closing the dialog.



See Also:

Managing Dynamic Actions

# 6.5 About Copying Application Pages

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.

### **About Copying Pages Between User Interfaces in Older Themes**

The Copy Page Wizard enables you to copy a page to a different user interface. During the copying process, the user can select the user interface for the new page. If the application contains a Desktop and a Mobile theme, both user interface options display.



See Also:

Copying an Application Page

# 6.6 About Deleting Application Pages

Deleting a page deletes the corresponding tabs, breadcrumbs, and list entries. You can only delete unlocked pages or pages that you have locked.



See Also:

**Deleting Pages** 



# 6.7 Managing Page Groups

Organize pages into page groups to make them to access easier. To use page groups, you create a group and then assign pages to the group.



### Tip:

Page groups do not have any function other than to aid developers in organizing their application pages.

Viewing Page Groups

View page groups on by navigating to Utilities, Page Specific Utilities.

Creating a Page Group

Create a page group by navigating to Utilities, Page Specific Utilities.

Editing a Page Group Definition

Create a page group by defining a group name and description.

Assigning a Page to a Page Group

Assign a page to a page group in Page Designer.

 Viewing Pages by Page Group View pages by page group.

Deleting a Page Group

# 6.7.1 Viewing Page Groups

View page groups on by navigating to Utilities, Page Specific Utilities.

To view page groups:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click the Utilities icon.
- 4. From Page Specific Utilities, click Page Groups.

The Page Groups page appears.

A Search bar displays at the top of the page. Available controls include:

- Select columns to search Resembles a magnifying glass. Click this icon to narrow your search. To search all columns, select All Columns.
- **Text area** Enter case insensitive search criteria (wildcard characters are implied) to search for a page group by name and click **Go**.
- Go button Executes a search or applies a filter.
- View Icons Displays each group as a large icon. To edit a group, click the appropriate icon.
- View Report Displays each group as a line in a report. To edit a group, click the name.
- Actions menu Use the Actions menu to customize the report view.



5. To view the pages associated with a group, click Pages by Page Group.

## 6.7.2 Creating a Page Group

Create a page group by navigating to Utilities, Page Specific Utilities.

To create a page group:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application.
- 3. Click the Utilities icon.
- 4. From Page Specific Utilities, click Page Groups.
- 5. On the Page Groups page, click Create.
- 6. Enter a name, a description (optional), and click Create.

# 6.7.3 Editing a Page Group Definition

Create a page group by defining a group name and description.

To edit the Page Group definition:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application.
- 3. Click the Utilities icon.
- From Page Specific Utilities, click Page Groups.
- Select a page group.
- 6. On the Page Group page, edit the name or description and click Apply Changes.
- To move to the next Page Group definition, click the Previous (<) and Next (>) buttons and repeat the previous step.

# 6.7.4 Assigning a Page to a Page Group

Assign a page to a page group in Page Designer.

To assign pages to a page group:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application.
- Click the Utilities icon.
- 4. From Page Specific Utilities, click Page Groups.
- Click the Page Assignments tab.

The Page Assignments page appears.

6. Click the page number.

The page displays in Page Designer appears.

- 7. Identification, Name Select a page group.
- Click Apply Changes.



# 6.7.5 Viewing Pages by Page Group

View pages by page group.

To access the Pages by Page Group page:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application.
- 3. Click the Utilities icon.
- From Page Specific Utilities, click Page Groups.
- Click the Pages by Page Group tab.

The Pages by Page Group page appears. Click the Page Name to view the page.

- **6.** To remove a page from a group:
  - a. Click the page number.

The page displays in Page Designer appears.

- b. Identification, Name, Select Select -.
- c. Click Apply Changes.

# 6.7.6 Deleting a Page Group

To delete a page group:

- Remove all pages from the group to be deleted:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select the application.
  - c. From Page Specific Utilities, click Page Groups.
  - d. Click the Pages by Page Group tab.
  - e. Click the page number.

The Page Attributes page appears.

- f. Under Name, Group, select No Group Assigned -.
- g. Click Apply Changes.
- 2. When you have deleted all pages in the group, click the Page Groups tab.
- 3. Select the group to be deleted.
- Click Delete.

A confirmation page appears.

5. Confirm your request.

# 6.8 Locking and Unlocking a Page

Prevent conflicts during application development by locking pages in your application. By locking a page, you prevent other developers from editing it.



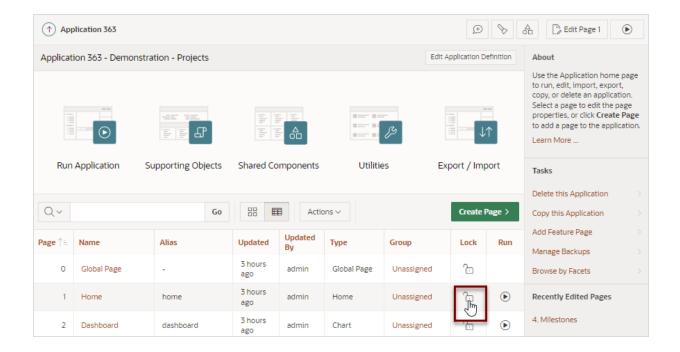
- Determining If a Page Is Locked Learn how to determine if a page is locked.
- Locking a Page Learn how to lock a page.
- Unlocking a Page Learn how to unlock a page.

## 6.8.1 Determining If a Page Is Locked

Learn how to determine if a page is locked.

A lock icon indicates whether a page is currently locked. If a page is unlocked, the icon appears as an open padlock. If the page is locked, the icon appears as a locked padlock. A lock icon appears on the Application home page and on the page.

To view the lock icon on the Application home page, click the **View Report** icon. A report appears. The lock icon appears on the right side of the page.



# 6.8.2 Locking a Page

Learn how to lock a page.

Developers can lock a page on the Application home page, Page Locks page, and in Page Designer.

- Locking a Page from the Application Home Page
- Locking a Page from the Page Locks Page
- Locking a Page in Page Designer



### 6.8.2.1 Locking a Page from the Application Home Page

To lock a page from the Application Home Page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the search bar, click the View Report or View Detail icon.
- 4. Click the Lock icon.
- 5. Enter a comment in the Comment field.
- 6. Click Lock Page(s).

### 6.8.2.2 Locking a Page from the Page Locks Page

To lock a page from the Page Locks Page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click the Utilities icon.
- 4. On the Page Specific Utilities list, click Cross Page Utilities.
- 5. Click Page Locks.
- 6. Select the appropriate pages and click **Lock Checked**.
- 7. Enter a comment in the Comment field.
- 8. Click Lock Page(s).

## 6.8.2.3 Locking a Page in Page Designer

The Page Lock button on the Page Designer toolbar indicates whether a page is locked. If the page is unlocked, the Page Lock button displays as an unlocked padlock.

To lock a page in Page Designer:

- Navigate to the appropriate page in Page Designer.
- 2. On the Page Designer toolbar, click the Page Unlocked button.
- 3. Enter a comment in the Comment field.
- 4. Click Lock.

When a page is locked, the Page Lock button displays as a locked padlock.



Viewing a Page in Page Designer



# 6.8.3 Unlocking a Page

Learn how to unlock a page.

Only the developer who locks a page can unlock it. However, a developer with administrative privileges can unlock pages locked by other developers.



### Tip:

To view information about an existing page lock, navigate to the Lock Details page and expand the Lock History region.

- Unlocking Pages from Utilities
- · Unlocking Pages from the Application Home Page
- Unlocking a Page in Page Designer
- Unlocking Pages As a Workspace Administrator

### 6.8.3.1 Unlocking Pages from Utilities

To unlock a page from the Page Locks page:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. Click the Utilities icon.
- 4. On the Page Specific Utilities list, click Cross Page Utilities.
- Click Page Locks.
- 6. Select the appropriate pages.
- Click Unlock Checked.

## 6.8.3.2 Unlocking Pages from the Application Home Page

To unlock a page from the Application Home Page:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. On the search bar, click the View Report icon.
- 4. Click the Lock icon.

The Lock Details page appears.

5. Click Unlock.

## 6.8.3.3 Unlocking a Page in Page Designer

The Page Lock button on the Page Designer toolbar indicates whether a page is locked. If the page is locked, the Page Lock button displays as a locked padlock.



Passing your cursor over a locked Page Lock button displays a tooltip that indicates who locked it.

To unlock a page in Page Designer:

- 1. Navigate to the appropriate page in Page Designer.
  - If a page is locked, the Page Lock button displays as a locked padlock.
- 2. On the Page Designer toolbar, click the Page locked by you button.
  - If the page has been locked by another user the Lock button appears in red. You cannot unlock a page locked by another user.
- 3. Click Unlock.

When a page is unlocked, the Page Lock button displays as an unlocked padlock.

Viewing a Page in Page Designer

### 6.8.3.4 Unlocking Pages As a Workspace Administrator

To unlock pages as a Workspace Administrator:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click the Utilities icon.
- 4. On the Page Specific Utilities list, click Cross Page Utilities.
- 5. Click Page Locks.
- 6. Click Lock Administration.
- 7. Select the appropriate pages.
- 8. Click Unlock Page(s).



7

# Editing Pages in Page Designer

Developers view and edit application pages in Page Designer. Page Designer is a full featured Integrated Development Environment (IDE) that includes a toolbar and multiple panes.

### About Page Designer

Use Page Designer to maintain and enhance pages within an Oracle APEX application. Page Designer is a full featured Integrated Development Environment (IDE) that includes a toolbar and multiple panes.

### Understanding Page Designer UI Elements

The Page Designer window features three panes: a left pane, a central pane, and a right pane. You select a component in the left or central pane and then edit the component's attributes in the Property Editor located in the right pane.

### Using Page Designer

Use Page Designer to view and edit application pages.

### Managing Page Attributes

Edit page attributes to control basic information and functionality for a given page, including the page name or title, header and footer text, navigation menus, inclusion of page-level JavaScript or CSS files, error handling, and the selected authorization scheme.

### Running a Page from Page Designer

The Oracle APEX 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 APEX engine.

#### Runtime Developer Toolbar

Use the Runtime Developer toolbar to quickly edit the current application or currently running page, or view session state.

### Copying an Application Page

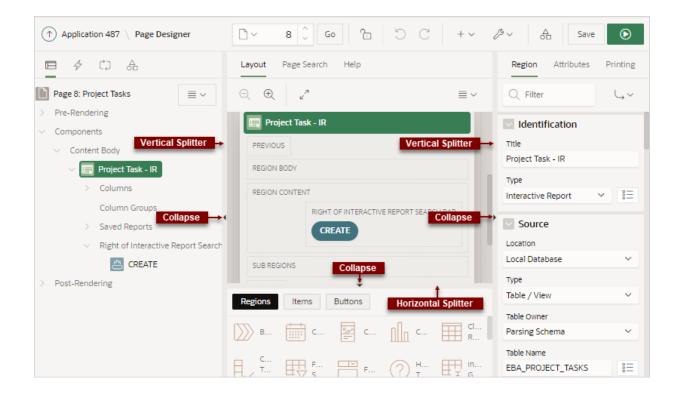
You can copy a page from the current application or from another application. During the copy process, you can also copy shared components or change mappings to shared components in the target application.

### Deleting Pages

Deleting a page deletes the corresponding tabs, breadcrumbs, and list entries.

# 7.1 About Page Designer

Use Page Designer to maintain and enhance pages within an Oracle APEX application. Page Designer is a full featured Integrated Development Environment (IDE) that includes a toolbar and multiple panes.



The Page Designer window is divided into three main panes:

- **Left Pane** Includes four tabs that display as a tree: Rendering, Dynamic Actions, Processing, and Shared Components.
- Central Pane Includes the following tabs: Layout, Component View, Page Search, and Help.
- Right Pane Displays the Property Editor. Use the Property Editor to update
  attributes for the selected component. When you select multiple components, the
  Property Editor only displays common attributes. Updating a common attribute
  updates that attribute for all of the selected components.

You can adjust the size of each pane by selecting and dragging the horizontal and vertical splitters. To expand or collapse each pane, click the small triangle labeled Collapse in the center of each splitter.



### Tip:

You can view an online summary that describes the Page Designer window. View a page in Page Designer, click the **Help** menu at the top of the page, and select **Getting Started with Page Designer**.

### See Also:

- Understanding Page Designer UI Elements
- · Viewing Help in Page Designer
- Editing Pages in Page Designer

# 7.2 Understanding Page Designer UI Elements

The Page Designer window features three panes: a left pane, a central pane, and a right pane. You select a component in the left or central pane and then edit the component's attributes in the Property Editor located in the right pane.

The **left** pane includes four tabs: Rendering, Dynamic Actions, Processing, and Page Shared Components. The **central** pane contains four tabs: Layout, Component View, Page Search, and Help and a Gallery pane at the bottom. The **right** pane contains the Property Editor.



### Tip:

You can view an online summary of this information. View a page in Page Designer, click the **Help** menu at the top of the page, and select **Getting Started with Page Designer**.

Page Designer Toolbar

The Page Designer toolbar displays at the top of the page and contains both buttons and menu options. Passing your cursor over an active button and menu displays a tooltip.

Left Pane of Page Designer

Use the left pane in Page Designer to select or add containers and components on a page.

Central Pane of Page Designer

The top of the central pane in Page Designer contains the **Layout**, **Page Search**, and **Help** tabs. The lower part of the central pane contains the **Gallery**.

- Right Pane of Page Designer (Property Editor)
   Learn about the Property Editor in the right pane of Page Designer.
- Code Editor
   Learn about using the Code Editor in Page Designer.



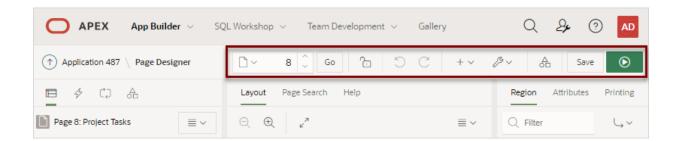
See Also:

Using Page Designer



# 7.2.1 Page Designer Toolbar

The Page Designer toolbar displays at the top of the page and contains both buttons and menu options. Passing your cursor over an active button and menu displays a tooltip.





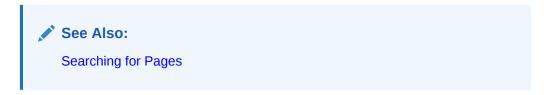
You can view an online summary of how to use Page Designer. To view a page in Page Designer, click the **Help** menu at the top of the page, and select **Getting Started with Page Designer**.

The Page Designer toolbar features the following buttons and menu options.

### **Page Selector**



The **Page Selector** displays the current page. Click the down arrow (labeled **Page Finder**) to search for pages. Alternatively, enter a page number in the field and click **Go**. To navigate to the previous or next page, click **Navigate to Next Page** (up arrow) and **Navigate to Previous Page** (down arrow).



### **Show Messages**



When you add a new component to a page, the **Show Messages** icon displays current errors and warnings. Clicking a message changes the focus within Property Editor to the corresponding attribute associated with the error or warning.

### Page Unlocked and Page Locked



Indicates the lock status of a page. **Page Unlocked** indicates the current page is unlocked and editable. **Page Locked** indicates the page is unavailable for editing. The appearance of the padlock icon changes depending upon the lock status:

- Clear unlocked padlock Indicates the page is unlocked.
- Red locked padlock Indicates the page is locked by you.
- Red locked padlock with person Indicates the page is locked by another user. To view
  the lock owner or update the lock comment, click the red padlock.



Locking and Unlocking a Page

### **Undo and Redo**





Applies to actions that result in a change to the page data. **Undo** reverts the previous update you made within Page Designer. **Redo** reapplies the last update that was undone using **Undo**.

#### Create



Features a graphical plus sign (+). Create menu options include:

- Page. Access to the Create Page Wizard. See Adding a New Page to an Application.
- Page as Copy. Access the Copy Page Wizard. See Copying an Application Page.
- **Breadcrumb Region**. Access to the Create Breadcrumb Wizard. See Creating Breadcrumbs and Adding a Breadcrumb Region with a Wizard.
- Shared Component. Access to the Create Application Component Wizard. Shared components are common elements that can display or be applied on any page within an application. See Managing Shared Components.
- Page Group. Links to the Page Group page. Use page groups to organize pages. See Managing Page Groups.
- Developer Comment. Access the Developer Comments dialog. Developers can add comments to an application, a page, or a group of pages. See Adding Developer Comments.
- Issue. Create a new issue in Team Development. See Creating an Issue.



### **Utilities**



Features a graphic of a wrench. Utilities menu options include:

- Delete Page. Delete the current page. See Deleting Pages.
- Advisor. Access Oracle APEX Advisor (Advisor). Use Advisor to check the
  integrity and quality of your APEX application. SeeRunning Advisor to Check
  Application Integrity.
- Caching. Links to the Caching page which displays a report of Cached Pages and Cached Regions. Enabling caching is an effective way to improve the performance. See Enabling Region Caching.
- **History**. Displays a report of changes to the current page.
- Checksum. View the page checksum. You can also access the page checksum from the Application Utilities page. See Viewing the Page Checksum and Using Application Utilities.
- **Export**. Export the current page. See Exporting Workspaces, Applications, and App Components.
- Show. Includes the following options:
  - Tooltips. Disable and enable tooltips within the UI.
  - Layout View. Disable or enable the Layout tab in the central pane of Page Designer. See Layout Tab.
- Layout. Controls the number of panes that display in Page Designer. See Switching Between Three Pane and Two Pane Mode.

### **Shared Components**



Links to the Shared Components page. Shared components can display or be applied on any page within an application. See Managing Shared Components.

### Save and Save and Run Page



Click **Save** to save the current page. Click **Save and Run Page** to save and then run the current page. See Running a Page from Page Designer.

## 7.2.2 Left Pane of Page Designer

Use the left pane in Page Designer to select or add containers and components on a page.

Once selected, edit the container or component attributes in the Property Editor located in the right pane.



About the Left Pane of Page Designer

The left pane in Page Designer includes four tabs: Rendering, Dynamic Actions, Processing, and Page Shared Components.

Rendering Tab

Learn about the Rendering tab in the left pane of Page Designer.

Dynamic Actions Tab

Learn about the Dynamic Actions tab in the left pane of Page Designer.

Processing Tab

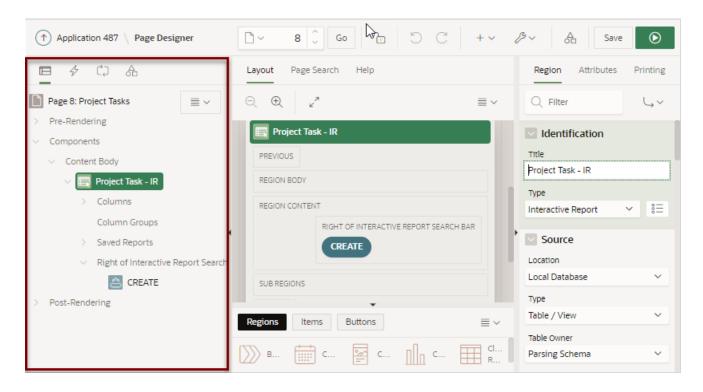
Learn about the Processing tab in the left pane of Page Designer.

Page Shared Components Tab
 Learn about the Page Shared Components tab in the left pane of Page Designer.

### 7.2.2.1 About the Left Pane of Page Designer

The left pane in Page Designer includes four tabs: Rendering, Dynamic Actions, Processing, and Page Shared Components.

Each tab displays a list of the corresponding component types and components created on the current page.



Key features of the Left pane include:

- **Context menus**. Right-click a component or control to display a context menu. You can also click the Rendering menu to select options for the selected component.
- 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. Drag components up and down within the tree to change the position or sequence of the selected component.

• **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.

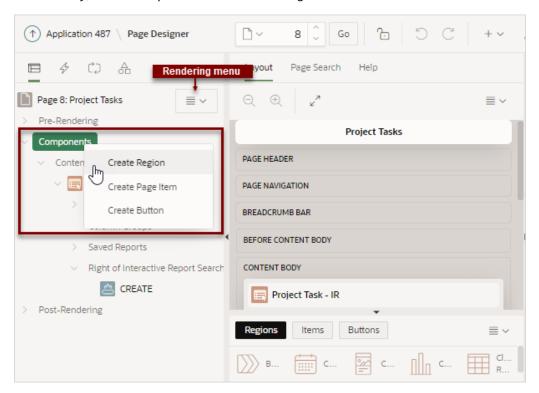
### 7.2.2.2 Rendering Tab

Learn about the Rendering tab in the left pane of Page Designer.

The Rendering tab displays containers and components that are rendered on a page. Components include regions, page items, and buttons. Application logic such as Dynamic Actions and Validations display inside of regions, page items, and buttons when applicable.

Components can placed at the page-level at a specific page position, or they can be nested inside regions at a specific region position. Additionally, the Rendering tab displays Pre-Rendering and Post-Rendering application logic such as Processes, Computations, and Branches. The Rendering tab groups and orders components based on how Oracle APEX processes them at runtime

To create a new component, right-click and select an option from the context menu. Alternatively, select an option from the Rendering menu.

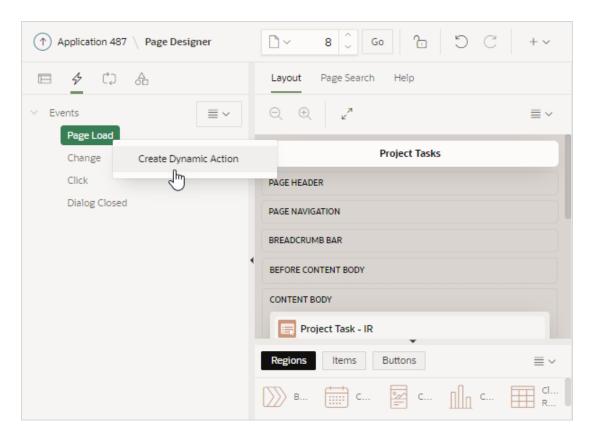


## 7.2.2.3 Dynamic Actions Tab

Learn about the Dynamic Actions tab in the left pane of Page Designer.

The Dynamic Actions tab displays dynamic actions defined on the current page. By creating a dynamic action, you can define complex client-side behavior declaratively without the need for JavaScript. To create a new dynamic action, right-click and select an option from the context menu.



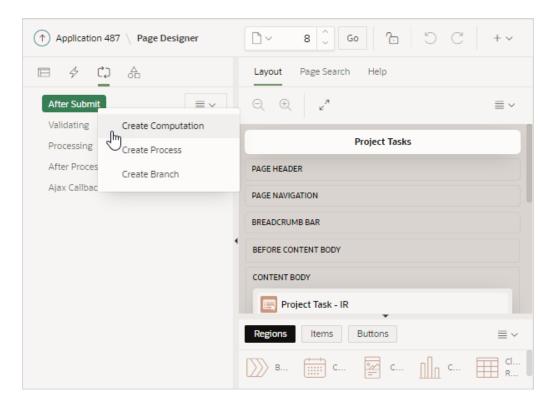




# 7.2.2.4 Processing Tab

Learn about the Processing tab in the left pane of Page Designer.

The Processing tab displays application logic defined on the page and groups and orders components based on how APEX processes them. To create a new process, right-click and select an option from the context menu.



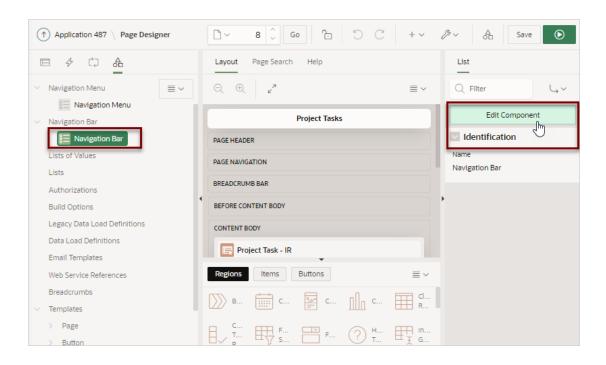


## 7.2.2.5 Page Shared Components Tab

Learn about the Page Shared Components tab in the left pane of Page Designer.

The Page Shared Components tab displays shared components associated with the current page. To edit a Shared Component, select it in the Page Shared Components tab and then click **Edit Component** in right pane.

In the following example, **Navigation Bar** is selected in the left pane and the cursor is positioned on **Edit Component** button in the right pane.



See Also:

**Managing Shared Components** 

# 7.2.3 Central Pane of Page Designer

The top of the central pane in Page Designer contains the **Layout**, **Page Search**, and **Help** tabs. The lower part of the central pane contains the **Gallery**.

- Layout Tab
   Learn about the Layout tab in the central pane of Page Designer.
- Page Search Tab
   Learn about the Page Search tab in the central pane of Page Designer.
- Help Tab
   Learn about the Help tab in the central pane of Page Designer.
- Gallery
   Learn about the Gallery in the central pane of Page Designer.

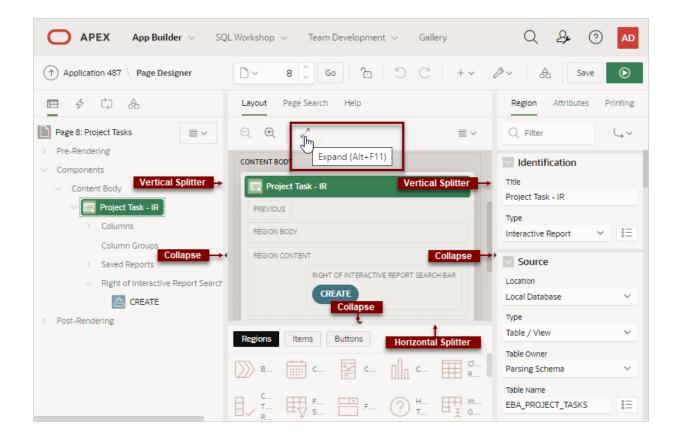
## 7.2.3.1 Layout Tab

Learn about the Layout tab in the central pane of Page Designer.

The Layout tab is a visual representation of how the components are positioned on the page. The Layout tab features context menus. By selecting a component and right-clicking, you can delete, move, or copy the component to other regions, or new regions on the page. You can also move existing regions, items, and buttons relative to other components by simply clicking on the component and dragging it to the new location. For example, you can place items next to one another by dragging the second item to the end of the first item and dropping it in the dark yellow box that appears when you hover in the desired location. You

can quickly add new components to an existing page by dragging the component from the Gallery up to the desired position within the Layout tab.

You can adjust the size of each pane by selecting and dragging the horizontal and vertical splitters. To expand or collapse each pane, click the small triangle labeled **Collapse** in the center of each splitter. Alternatively, you can click the **Expand** button to make the Layout tab larger and then **Restore** to return it to the previous size.



Tip:

Hidden items do not display in the Layout tab, but do display in the Rendering tree.

Key features of the Layout tab 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 . Move, copy, and reorder regions, items, and buttons by dragging and dropping. You can also add new regions, items, and button by dragging them from the Gallery and dropping them to the desired position on the page.
- **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.

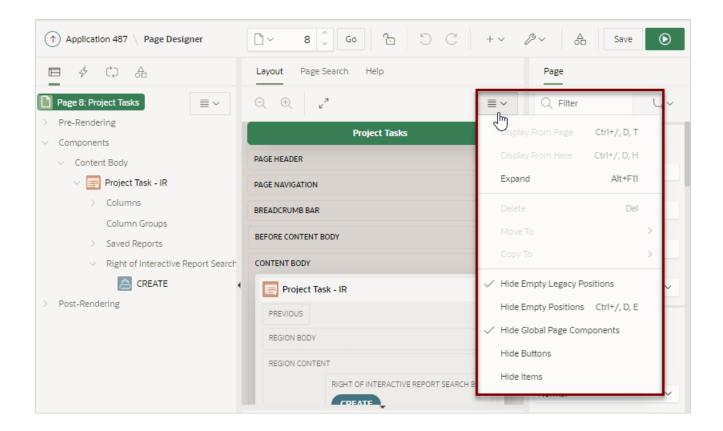


### Tip:

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 displays. See Adding a Region, Item, or Button by Dragging and Dropping.

### **Layout Menu**

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





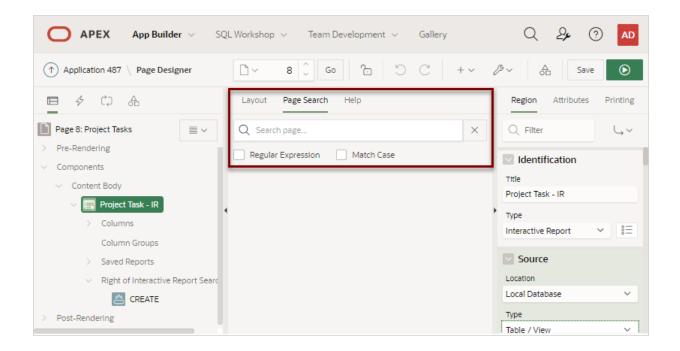
Adding a Region, Item, or Button by Dragging and Dropping



### 7.2.3.2 Page Search Tab

Learn about the Page Search tab in the central pane of Page Designer.

The Page Search tab displays to the right of Layout 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**.

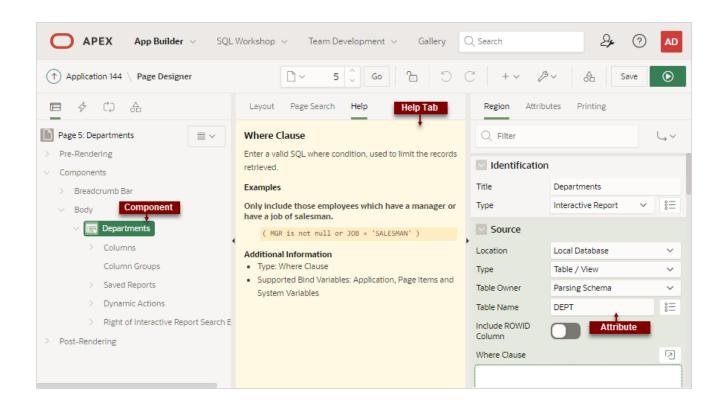


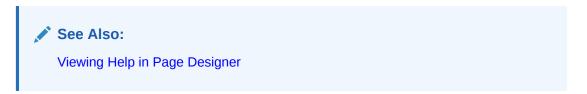
## 7.2.3.3 Help Tab

Learn about the Help tab in the central pane of Page Designer.

Page Designer includes Help for every Property Editor attribute. To view Help, select the attribute and click the **Help** tab. Once you activate the Help pane, the content that displays changes every time you select another attribute. In this example, the **Source**, **Type** attribute is selected and the Help tab describes what the attribute is for and the available options.



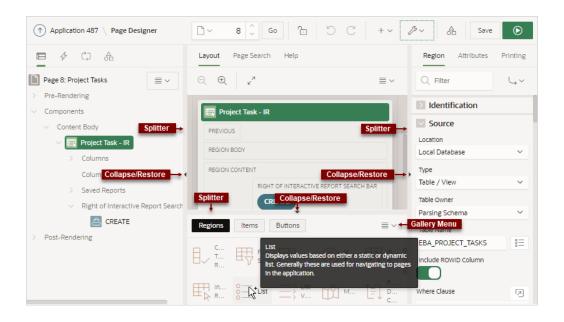




## 7.2.3.4 Gallery

Learn about the Gallery in the central pane of Page Designer.

The Gallery displays beneath the Layout tab in the central pane of Page Designer. The Gallery contains three tabs: Regions, Items, and Buttons. When you pass the cursor over a control or component, a tooltip displays that describes it. You can adjust the size of the pane by dragging the horizontal and vertical splitters. To collapse or restore the Gallery pane, click the small triangle in the center of each splitter.



You can add new controls and components to a page by selecting the control or component from the Gallery and dragging and dropping them into the Layout tab. Alternatively, you can select a control or component in the Gallery and right-click to view a context menu.

### **Gallery Menu**

The Gallery menu displays on the right side of the Gallery pane. By default, the Gallery only displays supported controls and components.

- Adding a Region, Item, or Button by Dragging and Dropping
- About Adding Components Using Gallery Context Menus
- Managing Application Legacy Components

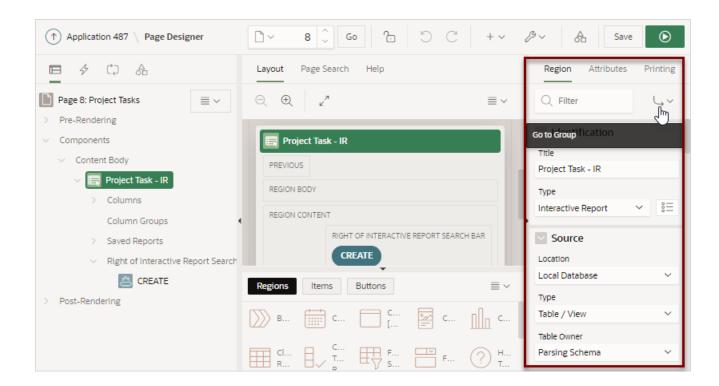
# 7.2.4 Right Pane of Page Designer (Property Editor)

Learn about the Property Editor in the right pane of Page Designer.

### **Property Editor**

Use the Property Editor to edit the attributes of the currently selected component. Property Editor displays all attributes for the currently selected component. When you select multiple components, the Property Editor only displays common attributes. Updating a common attribute updates that attribute for all of the selected components.





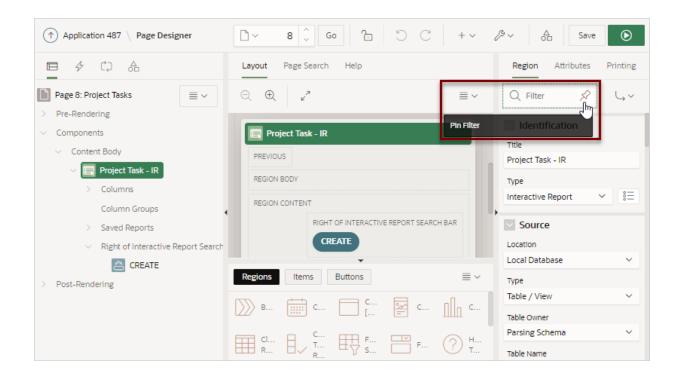
Property Editor organizes attributes into functional groups. To quickly access a group, click **Go to Group** and select the group. To return the default display, click **Go to Group** again and select **Expand All**.

### **Searching for Attributes**

To search for a group or an attribute, enter a keyword in the Filter Properties field. The groups and attributes containing the keyword appear. To return to the default display, delete the keyword in the Filter Properties field.

Click the **Pin Filter** button on the right side of the search field to search across different items, regions, and processes. You can "pin" keywords to have them persist as you click around Page Designer. To "unpin" the search, click the **Pin Filter** button again.





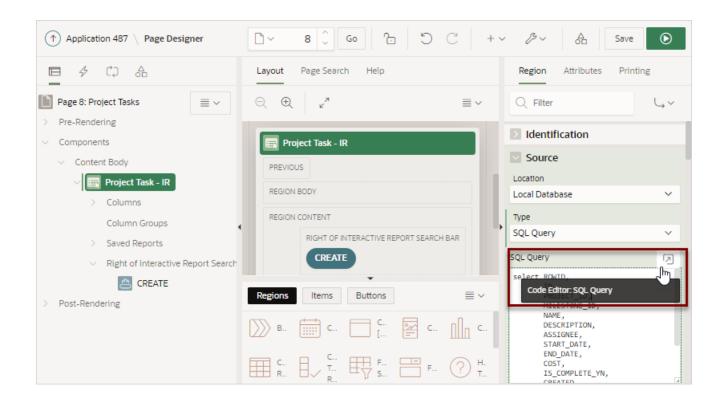


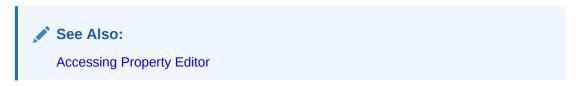
- Using Page Designer
- Managing Page Attributes

# 7.2.5 Code Editor

Learn about using the Code Editor in Page Designer.

For attributes requiring large amounts of code (for example, a region Source), you can enter text directly into the field or access a full-featured Code Editor.

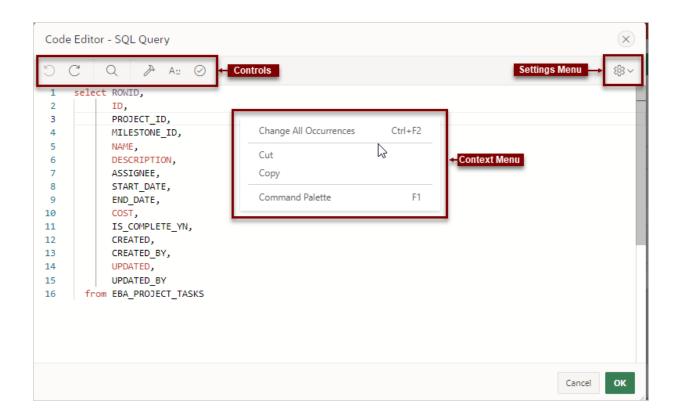




You access Code Editor by clicking the **Code Editor** button, which resembles an arrow within a square.

### **Code Editor Key Features**

The Code Editor displays as a modal dialog and 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.



### Code Editor controls include:



Undo - Ctrl+Z



Redo - Ctrl+Shift+Z



Find - Ctrl+F



Query Builder



Auto Complete - Ctrl+Space



Validate - Ctrl+Alt+V

Context Menu - Right-click and select one of the following:

- Change All Occurrences (Ctrl+F2) Right click and select Change All Occurrences from the context menu.
- Cut
- Copy
- Command Palette (F1) Displays the Command Palette.

#### **Command Palette**

Right click to display a context menu and select **Command Palette**. The Command Palette includes over 80 commands including:

- Replace (Ctrl+H)
- Replace with Next Value (Ctrl+Shift+.)
- Replace with Previous Value (Ctrl+Shift+,)

#### **Multi Cursor Selection**

- Add cursors at arbitrary positions Select a position with your mouse and press Shift+Alt+click (Shift+Option+click on macOS).
- Set cursors above the current position Select a position with your mouse and press Ctrl+Alt+Up (Option+Command+Up on macOS).
- Set cursors below the current position Select a position with your mouse and press Ctrl+Alt+Down (Option+Command+Down on macOS).

### **Settings Menu**

The **Settings** menu



displays on the right side and includes the following options:

- Indentation Options include: Tab Inserts Spaces, Tab Size, and Indent Size
- Themes Options include: Automatic, Light, Dark, and High Contrast Dark
- Show Ruler

# 7.3 Using Page Designer

Use Page Designer to view and edit application pages.



### Tip:

To view a list of keyboard shortcuts, press **Alt+Shift+F1**. Alternately, click the **Help** menu at the top of the page and select **Shortcuts**.

Viewing a Page in Page Designer

To view a page in Page Designer, select an application and then a page.



Searching for Pages

Use the Page Selector to search for pages within the current application.

Dragging and Dropping Tabs Between Panes
 Drag and drop tabs within a Page Designer pane.

Switching Between Three Pane and Two Pane Mode
 Use the Layout options on the Utilities menu on the Page Designer toolbar to switch between pane modes.

Accessing Property Editor

The Property Editor displays in the right pane of Page Designer and displays all attributes for currently selected components.

- Adding a Region, Item, or Button by Dragging and Dropping
   Add regions, page items and buttons by dragging and dropping from the Gallery.
- About Adding Components Using Gallery Context Menus
   Add a component to a page by right-clicking a component in the Gallery to view a context menu.
- Adding a Region, Item, or Button from the Rendering Tab
   Add a component or container from the Rendering tab by right-clicking an existing component or container to display a context menu.
- Copying a Region, Item, or Button
   Copy regions, items, and buttons by using context menus or pressing CTRL and dragging and dropping with the mouse.
- Creating Pre-Rendering Branches, Computations, and Processes
   Create branches, computations, and processes that execute before rendering the page:
- Creating Page Submission Branches, Validations, Computations, and Processes
  Create page submission branches, validations, computations, and processes in
  the Processing tab.

See Also:

- Understanding Page Designer UI Elements
- Viewing Help in Page Designer

# 7.3.1 Viewing a Page in Page Designer

To view a page in Page Designer, select an application and then a page.

To view a page in Page Designer:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.
- 4. Select a page.

The default view, Page Designer, appears.

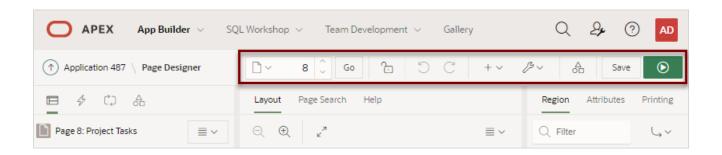


You preview a page by running it. Running an application page displays the rendered version as end users would see it.



# 7.3.2 Searching for Pages

Use the Page Selector to search for pages within the current application.



The Page Selector is the first control in the Page Designer toolbar and displays the current page number.

To search for pages within an application:

- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. On the Page Designer toolbar, click the Page Selector.

The Page Finder appears.

- 3. Click the tabs at the top of the window to change the view:
  - All Pages Displays all pages in the current application.
  - Recently Edited Displays recently edited pages.
- 4. Enter search terms in the Search field and press **Enter** or click **Go**.

Search for page numbers, page names, user interface, or group names. The search is not case sensitive and supports regular expressions.



### See Also:

- Running a Page from Page Designer
- Managing Page Groups

# 7.3.3 Dragging and Dropping Tabs Between Panes

Drag and drop tabs within a Page Designer pane.

By default, Page Designer displays three panes which contain one or more tabs. You can drag and drop tabs within a pane or between panes by selecting the pane heading (or icon) and then dragging and dropping it to a new location. To return to the default display, click **Utilities** on the Page Designer toolbar and select **Layout** and then **Reset Layout**.

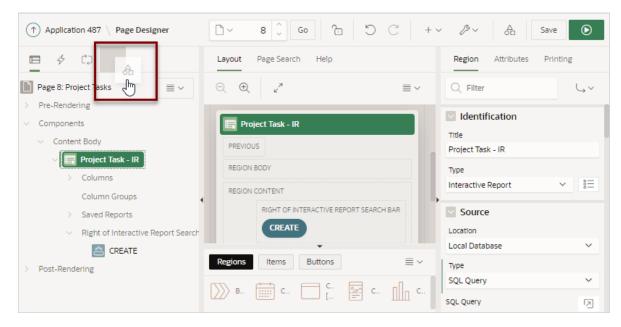
To drag and drop tabs in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Select a tab heading (or icon) and then drag and drop it to a new location.

In the following example, the **Page Shared Components** tab is selected and being moved within the left pane.



- 3. To return to the default display:
  - a. On the Page Designer toolbar, click Utilities.



b. Select Layout and then Reset Layout.

## 7.3.4 Switching Between Three Pane and Two Pane Mode

Use the Layout options on the Utilities menu on the Page Designer toolbar to switch between pane modes.

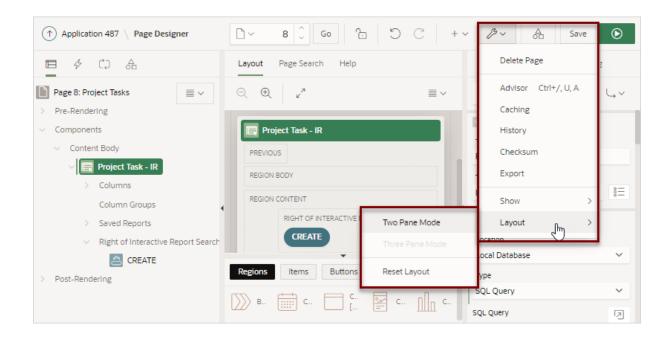
**Three Pane Mode** (the default) displays the left pane, central pane, and the right pane. **Two Pane Mode** displays just the central pane and the right pane. A typical use case for accessing Two Pane Mode, is when you want to view just the Rendering tree and the Property Editor. To return to the default display, click **Utilities** on the Page Designer toolbar and then select **Layout** and then **Reset Layout**.

To hide and show Page Designer panes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. To select a page mode:
  - a. On the Page Designer toolbar, click **Utilities** and then **Layout**.



The Layout menu has three options: **Two Pane Mode**, **Three Pane Mode**, and **Reset Layout**.

- **b.** From Layout, select one of the following:
  - **Two Pane Mode** Displays just the central pane and the right pane.
  - Three Pane Mode (the default) Displays the left pane, central pane, and the right pane.



- **3.** To return to the default display:
  - a. On the Page Designer toolbar, click **Utilities**.
  - b. Select Layout and then Reset Layout.

## 7.3.5 Accessing Property Editor

The Property Editor displays in the right pane of Page Designer and displays all attributes for currently selected components.

To access Property Editor:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the left pane or the Layout tab, select components or controls to edit.

Passing the cursor over a control or component, displays a tooltip that describes it.



### Tip:

Once you select a component, press ALT+6 to navigate directly to the Property Editor. To learn more, see *Oracle APEX Accessibility Guide* 

The Property Editor displays attributes for the selected component or control. As you select different components in either the left pane or the Layout tab, the Property Editor automatically updates to reflect the selected component. When you select multiple components, the Property Editor only displays common attributes. Updating a common attribute updates that attribute for all of the selected components.



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.



### See Also:

Right Pane of Page Designer (Property Editor)



## 7.3.6 Adding a Region, Item, or Button by Dragging and Dropping

Add regions, page items and buttons by dragging and dropping from the Gallery.

Each application page consists of regions, page items and buttons. Those components can be added to page positions or region positions, under the overarching container called Components.

To add a region, item, or button by dragging and dropping from the Gallery:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. If needed, select the Layout tab in the central pane.
- In the Gallery at the bottom of the central pane, locate the component or control you want to create.

The Gallery lists all controls or components you can add to a page. Passing the cursor over a control or component displays a tooltip that describes it.



### Tip:

In addition to dragging and dropping components from the Gallery, you can also right-click a component in the Gallery to view a context menu. Select Add To and then the location where you want to add the component.

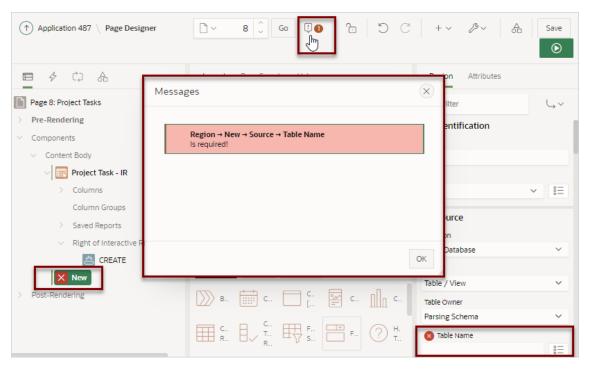
Click and hold the mouse on the component to be created and drag it the desired location in the Layout tab.

When the mouse is over the appropriate location, the Layout tab displays as a darkened yellow tile. Release the mouse to drop the component. You can only drop components into appropriate drop positions, as determined by the component type.

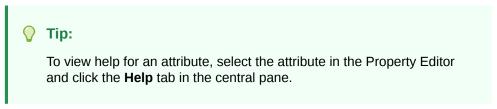
- 5. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.





- **b.** Select an error to highlight the associated attribute in the Property Editor.
- **6.** Edit the appropriate attributes in the Property Editor.



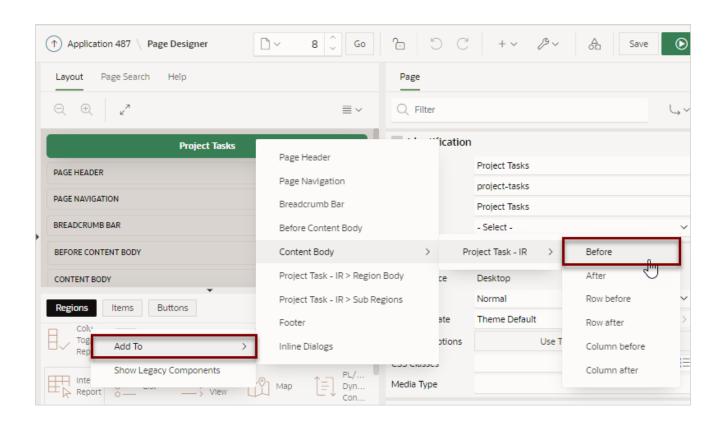
7. Click Save or Save and Run Page.

## 7.3.7 About Adding Components Using Gallery Context Menus

Add a component to a page by right-clicking a component in the Gallery to view a context menu.

In addition to dragging and dropping components from the Gallery, you can also rightclick a component in the Gallery to view a context menu. Each context menu features an Add To option which displays the actual locations where you can add the component. In this example, the developer is adding a new report to before the Content Body region.





See Also:

Adding a Region, Item, or Button by Dragging and Dropping

## 7.3.8 Adding a Region, Item, or Button from the Rendering Tab

Add a component or container from the Rendering tab by right-clicking an existing component or container to display a context menu.

To create new component or container in the Rendering tab:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.
- 2. In the left pane, select the **Rendering** tab.
- 3. Locate and select the appropriate region, item, or region button.
- **4.** Right-click an existing component or container to display the context menu for that component type.
- 5. Select a command (for example, Create Region, Create Sub Region, Create Page Item, Create Button and so on). The options available depend upon the node you select.



**6.** Edit the appropriate attributes in the Property Editor.

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.



### Tip:

To add a legacy component, from the Type attribute in the Property Editor, select **Show Legacy...** Legacy components are added to the list. Although Oracle still supports legacy application components, Oracle does not recommend using them.

7. Click Save or Save and Run Page.



- Right Pane of Page Designer (Property Editor)
- Managing Regions
- Viewing Page Items
- Creating a Button

## 7.3.9 Copying a Region, Item, or Button

Copy regions, items, and buttons by using context menus or pressing **CTRL** and dragging and dropping with the mouse.

Each application page consists of regions, page items and buttons. Those components can be added to page positions or region positions, under the overarching container called **Components**. Developers can copy regions, items, and buttons by using context menus or pressing **CTRL** and dragging and dropping with the mouse.

### Copying a Region, Item, or Button Using Context Menus

To copy a region, item, or button using context menus:

- 1. View the page in Page Designer.
- 2. In the central pane, select the **Layout** tab.
- 3. Locate and select the appropriate region, item, or region button.
- 4. Right-click to display the context menu.
- **5.** From the context menu, select **Copy To** and then select the location.
- 6. Edit the component attributes.

### Copying a Region, Item, or Button by Dragging and Dropping

To copy a region, item, or button by dragging and dropping:

- 1. View the page in Page Designer.
- 2. In the left pane, select the **Rendering** tab.



- 3. Locate and select the appropriate region, item, or region button.
- Press CTRL and then use the mouse to drag and drop the component to the new location.

A copy of the component appears in the new location.

**5.** Edit the component attributes.

### Copying a Region, Item, or Button to Another Page

To copy a region, item, or button to another page:

- 1. View the page in Page Designer.
- 2. In the left pane, select the **Rendering** tab.
- **3.** Locate and select the appropriate region, item, or region button.
- Right-click the component, and select Copy to other Page.
   The appropriate wizard appears.
- 5. Follow the on-screen instructions.

## 7.3.10 Creating Pre-Rendering Branches, Computations, and Processes

Create branches, computations, and processes that execute before rendering the page:

To create branches, computations, and processes that execute before rendering the page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the left pane, select the Rendering tab.
- **3.** Expand the Pre-Rending node at the top of the Rendering tab.
- Determine the processing point. Right-click Before Header, After Header, or Before Regions to display the context menu for that processing point.
- 5. Select the appropriate option: Create Branch, Create Computation, or Create Process.
- **6.** Edit the appropriate attributes in the Property Editor.



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

7. Click Save or Save and Run Page.





### Tip:

If you have changed the default display to group components by component type, then you must to navigate to the Processing tab to maintain prerendering components.



### See Also:

Managing Computations, Validations, and Processes

## 7.3.11 Creating Page Submission Branches, Validations, Computations, and Processes

Create page submission branches, validations, computations, and processes in the Processing tab.

To create branches, validations, computations, and processes that execute when the page is submitted:

- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - Select a page.

Page Designer appears.

- In the left pane, select the Processing tab.
- Navigate to After Submit, Validating, Processing, or After Processing as appropriate within the processing tree.
- Right-click the identifier or an existing component to display the context menu for that processing point.
- Select Create Branch, Create Validation, Create Computation, or Create Process.
- Edit the appropriate attributes in the Property Editor.



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

Click Save or Save and Run Page.



### Tip:

You can use context menus to duplicate, delete, and copy a component to other pages.



Managing Computations, Validations, and Processes

# 7.4 Managing Page Attributes

Edit page attributes to control basic information and functionality for a given page, including the page name or title, header and footer text, navigation menus, inclusion of page-level JavaScript or CSS files, error handling, and the selected authorization scheme.

- Editing Page Attributes
   Edit page attributes by viewing the page in Page Designer and selecting the page name.
- Incorporating JavaScript Using Page Designer
   Include JavaScript on a page by editing the page attributes in the JavaScript group.
- Configuring Rejoin Sessions for a Page
   Configure the Rejoin Sessions attribute to determine whether URLs to this application
   page contain session IDs.
- Configuring Dialog Attributes
   Configure Dialog attributes in Page Designer.
- Configuring Pages to Warn Users of Unsaved Changes
   Enable the Warn on Unsaved Changes page attribute to warn users if they navigate away from a page containing unsaved changes.



Right Pane of Page Designer (Property Editor)

## 7.4.1 Editing Page Attributes

Edit page attributes by viewing the page in Page Designer and selecting the page name.

To edit page attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.



Page Designer appears.

- 2. In either the Rendering tab or the Layout tab, select the page name.
- **3.** Edit the appropriate attributes in the Property Editor.



### Tip

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

4. To save your changes, click **Save** or **Save and Run Page**.



Right Pane of Page Designer (Property Editor) and Viewing Field-level and Page Designer Help

## 7.4.2 Incorporating JavaScript Using Page Designer

Include JavaScript on a page by editing the page attributes in the JavaScript group.

Including JavaScript on a page is a good approach for functions that are very specific to a page and a convenient way to test a function before you include it in a .js file.

To add JavaScript code to a page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the page name.

The Property Editor displays the Page attributes.

- 3. In the Property Editor, find the **JavaScript** group.
- **4.** Under JavaScript, edit following attributes:
  - a. File URLs Enter JavaScript file URLs for code to be loaded on this page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include dignified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.
  - b. Function and Global Variable Declaration Enter JavaScript code such as functions or global variable declarations referenced on this page. If the same JavaScript is required on multiple pages, consider putting the code into an



external JavaScript file to avoid duplication and to leverage browser caching of static files.

Code you enter here replaces the  $\#PAGE\_JAVASCRIPT\#$  substitution string in the page template.



### Tip:

Do not to include opening or closing script tags. Just include the JavaScript code.

To reference a shortcut, use:

"SHORTCUTNAME"

**c. Execute When Page Loads** - Enter JavaScript code to execute when the page loads. The code is executed after the JavaScript code generated by Oracle APEX.



### Tip:

To learn more about an attribute and view examples, select the attribute and click the **Help** tab in the central pane.

For example, adding the following to the Function and Global Variable Declaration attribute would create a function called test, which you could then use from anywhere on the current page.

```
function test() {
    alert('This is a test.');
}
```

5. Click Save.

## 7.4.3 Configuring Rejoin Sessions for a Page

Configure the Rejoin Sessions attribute to determine whether URLs to this application page contain session IDs.

The Rejoin Sessions attribute controls support for joining existing sessions (similar to deep linking).



### **`** Warning:

Enabling rejoin sessions may expose your application to possible security breaches, as it can enable attackers to take over existing end user sessions. To learn more, see About Rejoin Sessions.

To use Rejoin Sessions at the page level, administrators must enable **Rejoin Sessions** at the instance level. A more restrictive instance-level setting overrides application and page settings.

To configure Rejoin Sessions for a page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the page name.

The Property Editor displays the Page attributes.

- 3. In the Property Editor, find the **Security** group.
- 4. Under Security, Rejoin Sessions, select an option:
  - Application Default Inherits the setting defined at application-level.
  - Disabled If the URL does not contain a session ID Oracle APEX creates a new session.
  - Enabled for Public Sessions If the URL goes to a public page and does not contain a session ID, APEX attempts to utilize the existing session cookie established for that application. APEX only joins using the cookie when the session is not yet authenticated.

**Enabled for Public Sessions** requires that Embed In Frames be set to **Allow from same origin** or **Deny**. This is not tied to a condition about the URL payload, but also applies to session state protected URLs.

- Enabled for All Sessions If the URL does not contain a session ID, APEX attempts to utilize the existing session cookie established for that application, providing the following conditions are met:
  - Session State Protection is enabled for the application and the URL includes a valid checksum. For public bookmarks, the most restrictive item level protection must be either Unrestricted or Checksum Required Application Level.
  - The URL does not contain payload (a request parameter, clear cache or data value pairs).

This setting also requires that Embed In Frames is set to Allow from same origin or to **Deny** for the application.



### Tip:

The option **Application Default** inherits the setting defined at application-level. See Browser Security .

5. Click Save.

### See Also:

- **About Rejoin Sessions**
- Session Management to configure Rejoin Sessions at the application-level
- Configuring Rejoin Sessions for an Instance in Oracle APEX Administration Guide

## 7.4.4 Configuring Dialog Attributes

Configure Dialog attributes in Page Designer.



### Tip:

Creating a dialog page is a multiple step process. To learn more, see Creating Dialog Pages.

To configure Dialog attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the page name.

The Property Editor displays the Page attributes.

- 3. In the Property Editor, find Appearance and verify that the Page Mode is set to either Modal Dialog or Non-Modal Dialog.
- 4. Find **Dialog** and configure these attributes:
  - a. Width
  - b. Height
  - c. Maximum Width
  - d. Attributes
  - e. CSS Classes
  - f. Chained



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.



5. To save your changes, click **Save** or **Save and Run Page**.



Creating Dialog Pages and Right Pane of Page Designer (Property Editor)

## 7.4.5 Configuring Pages to Warn Users of Unsaved Changes

Enable the Warn on Unsaved Changes page attribute to warn users if they navigate away from a page containing unsaved changes.

To enable the Warn on Unsaved Changes page attribute:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the page name.

The Property Editor displays the Page attributes.

- 3. In the Property Editor, find the **Navigation** group.
- For Warn on Unsaved Changes, select On to warn users if they navigate away from a page that contains unsaved changes.
- 5. Click Save.



### Tip:

The Warn on Unsaved Changes attribute is implemented using the apex.page.warnOnUnsavedChanges API.

### See Also:

- Configuring Button Attributes to Warn Users of Unsaved Changes
- Configuring Item Attributes to Warn Users of Unsaved Changes
- warnOnUnsavedChanges in Oracle APEX JavaScript API Reference



# 7.5 Running a Page from Page Designer

The Oracle APEX 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 APEX engine.



### Tip:

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

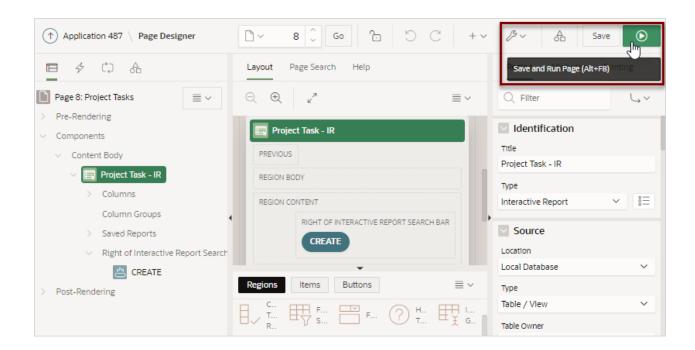
To run a page in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - Select an application.
  - c. Select a page.

Page Designer appears.

Page Designer appears. You preview a page by running it. Running an application page displays the rendered version as end users would see it.

Click the Save and Run Page button in the upper right corner. The Save and Run Page button resembles a green right-facing arrow.



A rendered version of the application page appears.





- Running an Application or Page
- Runtime Developer Toolbar

# 7.6 Runtime Developer Toolbar

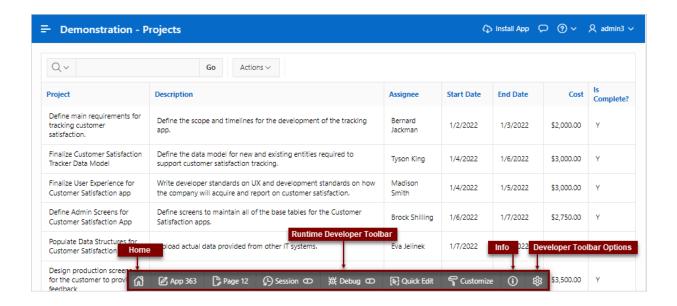
Use the Runtime Developer toolbar to quickly edit the current application or currently running page, or view session state.

When you run an application from App Builder and view a page, the Runtime Developer toolbar displays at the bottom of any editable page.



### Tip:

The Runtime Developer toolbar only displays if the Availability, Status attribute on the Application Definition page is set to **Available with Developer Toolbar**. See Editing the Application Definition.



The Runtime Developer toolbar contains of the following controls:

Oracle APEX Home



) - Links to the Workspace home page. See Understanding the Workspace Home Page.



- **App XX** (where *XX* is the app ID) Links to the Application home page. See Understanding the Application Home Page.
- **Page XX** (where *XX* is the page number) Displays the currently running page ID. Click the page ID to view the page in Page Designer and then edit the page.
- Session Displays two menus:
  - View Session State Displays session state information for the current page. See Viewing Session State.
  - Session Overrides Displays the Session Overrides dialog which lists session values that can be overidden in the current application. See Managing Session State Overrides.
- **Debug** Controls the display of debug information. Available options include:
  - Enable Debug Specifies the level of detail included when you click View Debug .
    - \* No Debug Enables and disables Debug mode
    - \* Info (default) The debug log contains the default or normal amount of information. This corresponds with a log level of 4 and a Debug URL argument of YES.
    - \* **App Trace** The debug log contains messages up to level 6. This corresponds with a Debug URL argument of LEVEL6.
    - \* **Full Trace** The log will contain the maximum amount of information. This corresponds with a Debug URL argument of LEVEL9. **Full Trace** can slow request processing but provides the most amount of detail.

See Utilizing Debug Mode.

- View Debug Displays debug information for the current page.
- Quick Edit Enables developers to enter either Quick Edit mode or access Live Template Options.
  - Quick Edit Mode Click Quick Edit and then select the desired component to instantly access the component in Page Designer. Press ESCAPE or click outside a component to exit quick edit mode.
  - Edit Live Template Options Click Quick Edit and then move the mouse over the component for which you want to modify template options and click the Wrench icon in the upper right corner. See Using Quick Edit to Modify Live Template Options.
- Customize Customize menu options include:
  - Theme Roller Access a live CSS editor that enables you to quickly change the theme style, colors, rounded corners and other application attributes. This option only displays for themes supporting Theme Roller. See Using Theme Roller.
  - Edit Logo Change the logo users see at runtime. See Managing Application Logos.
  - Edit App Icon Update or upload a new application icon. See Managing Application Icons.



) displays two menus:

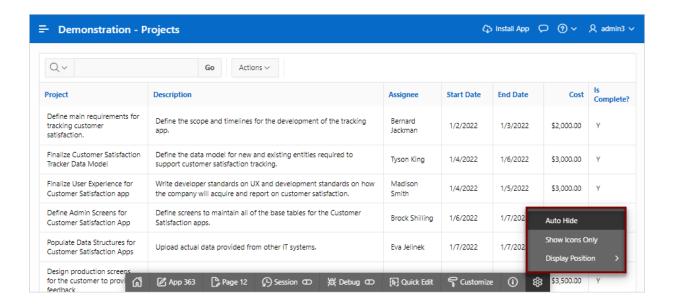


- Show Layout Columns Toggles between Show Layout Columns and Hide Layout Columns. This option only applies if a layout is used and that layout supports showing layout columns and the page has more than one column.
- Show Page Timing Displays the Page Performance Timing dialog. Click
   Copy to copy the data in table form and then paste it into another application.
   Click Clear to remove the current timing events.
- Show Landmarks Landmarks provide a powerful way to identify the structure of an APEX application and should be used to complement, but not replace Heading structure. See Landmarks in *Oracle APEX Accessibility Guide*.
- Show Headings View headings on the current page. See Headings in Oracle APEX Accessibility Guide.
- Developer Toolbar Options



) - Displays on the far right and resembles a mechanical gear. Click **Developer Toolbar Options** to control how the Runtime Developer Toolbar displays.

### **About Developer Toolbar Options**



Clicking **Developer Toolbar Options** ( ) displays a submenu containing the following controls:

- Auto Hide Hides the toolbar, making more of the page visible.
- Show Icons Only Removes the labels from the buttons to make the toolbar smaller.
- Display Position Controls the placement of the Developer toolbar. Options include: Top, Left, Bottom, or Right.



### **About Runtime Toolbar and the Environment Banner**

If a workspace or instance-level environment banner is enabled, the text and color will be applied to Runtime Developer toolbar.

An environment banner displays a colored banner with text at either the left or top of page. You can define an environment banner for a given workspace or an entire development instance. Workspace-level environment banners override those defined at the instance-level.



Configuring a Workspace Environment Banner and Configuring an Environment Banner in Administration Services in *Oracle APEX Administration Guide* 

### **About JavaScript Error Detection**

If a page has one or more JavaScript errors, a red error button displays on the left side of the Runtime Developer toolbar. If you have enabled **Auto Hide**, the Runtime Developer toolbar displays indicating the error.

Click the red error button to view an alert dialog which explains you should view the Browser console. The red error button persists until error has been resolved, the Browser console is cleared, and you refresh the page.

# 7.7 Copying an Application Page

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.

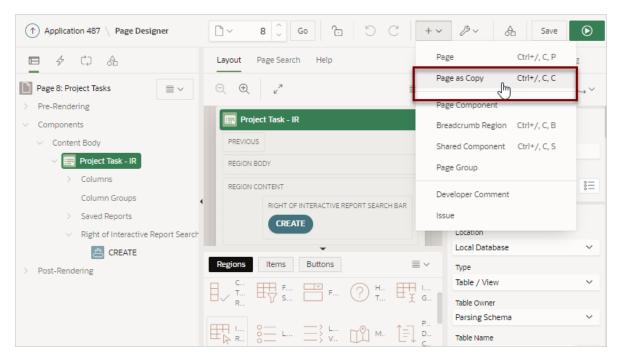
To copy a page:

- 1. View the page you want to copy in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

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 and click Next:
  - Page in this application
  - Page in another application
- 4. Follow the on-screen instructions.

# 7.8 Deleting Pages

Deleting a page deletes the corresponding tabs, breadcrumbs, and list entries.

- Deleting a Page
   Delete a page in Page Designer.
- Deleting Multiple Pages
  Delete multiple pages in Cross Page Utilities.
- Deleting a Range of Pages
   Delete a range of pages in Cross Page Utilities.



## 7.8.1 Deleting a Page

Delete a page in Page Designer.

To delete a page:

1. View the page in Page Designer:

- a. On the Workspace home page, click the **App Builder** icon.
- b. Select an application.
- c. Select a page.

Page Designer appears.

- 2. Verify the page number.
- 3. On the Page Designer toolbar, select the **Utilities** menu and click **Delete Page**.

The Confirm Page Delete page appears.

4. Click Permanently Delete Page.



Page Designer Toolbar

## 7.8.2 Deleting Multiple Pages

Delete multiple pages in Cross Page Utilities.

To delete multiple pages:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Utilities.
- 4. From Page Specific Utilities, click Cross Page Utilities.
- 5. Click Delete Multiple Pages.
- 6. Select the pages to be deleted and click **Delete Pages**.

## 7.8.3 Deleting a Range of Pages

Delete a range of pages in Cross Page Utilities.

To delete a range of pages:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- Click Utilities.
- 4. From Page Specific Utilities, click Cross Page Utilities.
- 5. Click Delete Multiple Pages.
- 6. Click the Delete Pages by Range tab.
- 7. Enter the pages to be deleted and click **Delete Pages**.



# **Developing Reports**

In Oracle APEX, a report is the formatted result of a SQL query. You can generate the SQL query by selecting a table or view in a wizard or by defining the SQL query manually.



### Tip:

To view examples, install the sample app, *Sample Reporting*. To learn more, see Sample Apps.

### Understanding Report Page Types

Learn about the available report page types when running the Create Application Wizard and Create Page Wizard.

### Creating a Report Using the Create Application Wizard

Run the Create Application Wizard to create a new application containing one or more pages. Supported report pages include cards, faceted search, interactive grid, interactive report, and classic report.

### Creating a Report Using the Create Page Wizard

Run the Create Page Wizard from an existing application to create a variety of different reports.

Creating a Report by Dragging and Dropping from the Gallery

Create a report by dragging and dropping a report type from the Gallery.

### Managing Cards

A cards page features an orderly layout of information tiles. Developers choose between three layouts: Grid, Float, or Horizontal (Row).

### Managing Smart Filters

A smart filters page features a single search field at the top of the page and a search results report (classic report, cards, map, or calendar). While a smart filter behaves similarly to faceted search, it features a more space efficient layout.

### Managing Faceted Search

A faceted search page displays and filters data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region). Displays search results as cards or a classic report.

### Managing Interactive Grids

An interactive grid presents data in a searchable, customizable report. Includes similar customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.

### Managing Interactive Reports

An interactive report page features a searchable, easily customizable report.

### Managing Classic Reports

A classic report features a simple report page based on the formatted result of a SQL query.

- Managing Sorting with Order By Item
   Create an inline static LOV by configuring region-level Order By Item attributes.
- Printing Report Regions
   Configure a report region to print by exporting it to several different formats.
- Understanding BLOB Support in Forms and Reports
   Oracle APEX includes declarative BLOB support to enable developers to declaratively upload files in forms, and download or display files in reports.



**Developing Forms and Managing Application Components** 

## 8.1 Understanding Report Page Types

Learn about the available report page types when running the Create Application Wizard and Create Page Wizard.

The Create Application Wizard and Create Page Wizard include a number of pages for displaying data. Some of these page types, such as classic reports, interactive reports, and interactive grids, are straightforward reports. However, others include a report region and an associated search region. For example, a faceted search page contains a search region and a report region which can display as either a cards region or a classic report. Similarly, a smart filters page includes a search region and a search results report which can be a classic report, cards, map, or calendar.



To learn more about reports and forms optimized for mobile devices, see Creating Applications for Mobile Devices and Forms Optimized for Mobile Environments.

- Report Page Type Use Cases
   Review common use cases for available report page types.
- Comparison of Report Page Types
   Compare report pages types available when running the Create Application
   Wizard and Create Page Wizard.

## 8.1.1 Report Page Type Use Cases

Review common use cases for available report page types.

The following table describes the report page types available in the Create Page Wizard and Create Application Wizard and the use cases in which each is most appropriate.



### Note:

For a more detailed comparison of report page types, see Comparison of Report Page Types.

Report Page Type	Use Case	Learn More
Cards	<ul> <li>Display data at a glance using information tiles that can easily include an image.</li> <li>Choose between three cards page layouts: Grid, Float, or Horizontal (Row).</li> <li>Provides summary information from a modern layout with one-click access to more details on another report or form page.</li> </ul>	<ul> <li>See:</li> <li>Managing Cards</li> <li>Example Cards Page</li> <li>Install the Sample Cards sample app. See Installing Apps from the Gallery.</li> </ul>
Classic Report	<ul> <li>Display data in a simple report region.</li> <li>Update data by including a report and update form combination during creation.</li> <li>Column sorting configurable.</li> </ul>	See:  Managing Classic Reports  Example Classic Report  Install the Sample Reporting sample app. See Installing Apps from the Gallery.
Faceted Search	<ul> <li>Display and filter data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region).</li> <li>Show search results as cards or a classic report.</li> <li>Includes built-in search capability.</li> <li>Users select facets in the Search region to narrow down the search results.</li> </ul>	See:  Managing Faceted Search  Example Faceted Search  Install the Sample Reporting sample app. See Installing Apps from the Gallery.



Report Page Type	Use Case	Learn More
Interactive Grid	<ul> <li>Display data in a searchable, customizable report that supports inline editing at runtime using the mouse or keyboard.</li> <li>Enable end users to create highly customized reports. Users can alter the report layout by using either the Column Heading menu or Actions menu.</li> <li>Move columns by using the Actions menu, Column dialog, or by dragging and dropping with the mouse.</li> <li>Save customizations and report layout by saving a private or alternative report just for yourself, a public report, or as a primary report that can be viewed by others.</li> <li>Save a report layout by creating an Alternative or Private report.</li> <li>Download or email the report as a CSV, HTML, PDF, or Excel file.</li> <li>Enable and disable editing capability at by editing attributes in Page Designer.</li> <li>If editable:         <ul> <li>Select options from the Row Action menu.</li> <li>Add and remove rows or edit data by directly editing a cell.</li> </ul> </li> </ul>	<ul> <li>Understanding Report Page Types</li> <li>Install the Sample Reporting sample app. See Installing Apps from the Gallery.</li> </ul>
Interactive Report	<ul> <li>Display data in a searchable, customizable report.</li> <li>Enable end users to create highly customized reports. Users can alter the report layout by using either the Column Heading menu or Actions menu.</li> <li>Update data by including an update form during creation.</li> <li>Save customizations and report layout by saving a private report just for yourself, a public report, or as a default report that can be viewed by others.</li> <li>Download, email, or subscribe to report update subscriptions in CSV, HTML, Excel, or PDF format.</li> </ul>	sample app. See Installing Apps from the Gallery.



Report Page Type	Use Case	Learn More
Smart Filters	<ul> <li>Display data using a single search field region at the top of the page and results report.</li> <li>Offers a more compact UI wher compared to faceted search.</li> <li>Search results report can display as a classic report, cards, map, or calendar.</li> <li>End users select filters that display as suggestion chips.</li> <li>Includes built-in search capability.</li> <li>Configurable search suggestion</li> </ul>	<ul> <li>Example Smart Filters</li> <li>Install the Sample Reporting sample app. See Installing Apps from the Gallery.</li> </ul>

# 8.1.2 Comparison of Report Page Types

Compare report pages types available when running the Create Application Wizard and Create Page Wizard.

The following table describes the commonly used report page types available in the Create Page Wizard and Create Application Wizard.

Report Page Type	Description	Learn More
Cards	A cards page features an orderly layout of information tiles. Developers choose between three layouts: Grid, Float, or Horizontal (Row).  Features:  Customize every aspect of a cards region's UI (including layout, appearance, icon, badge, and media).  Declaratively create links from a cards page by adding actions. Action types include Button, Full Card, Title, Subtitle, or Media.  Supports advanced HTML expressions including template directives for client-side conditional formatting.	See:  Managing Cards  Example Cards Page  Install the Sample Cards sample app. See Installing Apps from the Gallery.



Report Page Type	Description	Learn More
Classic Report	A classic report features a simple report page based on the formatted result of a SQL query.  Features:  Report can display as a standard application page or as a modal dialog.  Enable the Include Form option to create a report and update form combination.  Enable column sorting in Page Designer by selecting a column and configuring Column, Sorting attributes.  The most versatile report as it is template-driven. Choose from the predefined report templates, including Media List, Comments Timeline, Badge List, Value Attributes Pairs, and so on. Or, create your own template to customize and visualize data.  Download the report as a CSV, HTML, Excel, or PDF.  Supports Report Layouts to format PDF exports.  Limitations compared to other report types:  Using templates requires changing the SQL query column names to match the chosen template (for row templates)  No support for scroll pagination or virtual scrolling. Other pagination options available.  No column header groups, frozen columns, and template directives.	



Report Page Type	Description	Learn More
Faceted Search	A faceted search page displays and filters data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region). Displays search results as cards or a classic report.  Features:  Select options from facets in the left Search region to narrow down search results.  Set filters using facets that show possible values together with the occurrence count within the result set.  Built-in search capability.  Optionally include a chart for any facet.  Toggle between a bar chart (which is the default) and pie chart type.  Create facet groups for data models having multiple flag columns.	See:  Managing Faceted Search Example Faceted Search Install the Sample Reporting sample app. See Installing Apps from the Gallery.



Report Page Type	Description	Learn More
Interactive Grid	An interactive grid presents data in a searchable, customizable report. Includes similar customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.  Features:  Extensive customization capabilities using menus or inline editing.  Turn editing on or off using the region Attribute, Edit, Enabled.  Built-in search capability.  For both editable and noneditable reports, users can change the report layout and create private reports:  Column Heading menu - Change the report layout with Control Break, Aggregations, Freeze, Hide, and Filter.  Actions menu:  Columns - Configure the columns to show or hide.  Filters - Create filters to alter the display.  Data - Sort, Aggregate, Refresh, Flashback.  Format - Control Break, Highlight, Stretch Column Widths.  Selection - Cell Selection, Copy to Clipboard, Refresh Rows.  Chart - Create chart.  Report - Create, edit, and manage saved Private or Alternative reports.  Download - Download or email the report as a CSV, HTML, PDF, or Excel file  If editable, users can edit the data directly:  Row Actions menu - Single Row View, Add Row, Duplicate Row, Delete Row, Refresh Row, Revert Changes.	See:  Understanding Report Page Types  Understanding Report Page Types  Install the Sample Reporting sample app. See Installing Apps from the Gallery.



Report Page Type	Description	Learn More
	<ul> <li>Add Rows - Add new rows by clicking the Add Row button.</li> <li>Edit Rows - Edit a row by selecting or double-clicking a cell with the mouse, editing the content, and clicking the Save button.</li> <li>Limitations compared to other reportage types:</li> </ul>	g
	<ul> <li>Rows are fixed height. No variable height option.</li> <li>Does not remember current page.</li> <li>Tabular form limitations: subm selected rows, always edit for small number of records</li> <li>Interactive report features not supported: Pivot view, Group I view, Computed columns, and complex filters.</li> </ul>	Зу



Report Page Type	Description Learn More
Interactive Report	An interactive report page features a searchable, easily customizable report.  Features:  Report can display as a standard application page or as a modal dialog. Enable the Include Form option to create a report and update form combination. Built-in search capability. Change the report layout and create private reports using menus: Column Heading menu: Change the report layout with Sort Ascending, Sort Descending, Hide Column, Control Break, and Filter. Actions menu: Columns - Configure the columns to show or hide. Filters - Create filters to after the display. Data - Sort, Aggregate, Compute, Flashback. Format - Control Break, Highlight, Rows Per Page. Chart - Create a chart. Group By - Group sets of results by one or more columns with Group By. Pivot - Pivot reports transpose rows into columns to generate results in a cross tab format. Report - Create, edit, and manage saved Named reports. Download - Download or email the report as a CSV, HTML, Excel, or PDF. Subscription - Subscript on. Subscription - Subscript con. Limitations compared to other report page types: No scroll pagination.
	<ul> <li>Freeze columns not supported.</li> </ul>



Report Page Type	Description	Learn More
	<ul> <li>Column groups not supported.</li> <li>Charts not as powerful as interactive grid.</li> </ul>	
Smart Filters	A smart filters page features a single search field at the top of the page and a search results report (classic report, cards, map, or calendar). While a smart filter behaves similarly to faceted search, it features a more space efficient layout.  Features:  Includes a search field at the top of the page with filters that display as suggestion chip.  The Search Results can display as a classic report, cards, map, or calendar.  Clicking a filter name displays a list of values.  Clicking to right of a suggestion chip changes it to an applied filter chip and moves to the Applied Filters Area. Clicking the applied filter chip again displays a list.  Built-in search capability.	<ul> <li>See:</li> <li>Managing Smart Filters</li> <li>Example Smart Filters</li> <li>Install the Sample Reporting sample app. See Installing Apps from the Gallery.</li> </ul>

# 8.2 Creating a Report Using the Create Application Wizard

Run the Create Application Wizard to create a new application containing one or more pages. Supported report pages include cards, faceted search, interactive grid, interactive report, and classic report.



### Tip:

To learn more, see the Create Application Wizard discussion for each component.

Report Options When Running the Create Application Wizard
 Learn about supported report options available when running the Create Application
 Wizard.

## 8.2.1 Report Options When Running the Create Application Wizard

Learn about supported report options available when running the Create Application Wizard.

### **Available Reports When Creating Applications**

The Create Application Wizard supports the following report types.



Table 8-1 Create Application Wizard - Available Reports

Report Type	Description
Cards	A cards page consists of individual boxes, which resemble index cards, laid out on a page. Each card displays three pieces of information: Card Title, Description Column, and Additional Text Column. First, you select a table or view on which to build the page. Second, you select the Card Title, Description Column, and Additional Text Column.
	See Also: Managing Cards
Faceted Search	Creates a faceted search region and report. First, you select a report type ( <b>Report</b> or <b>Cards</b> . Second, you select the Table or View on which to build the faceted search region and report.
	If you select a <b>Table</b> , facets are auto discovered using APEX Data Dictionary Cache. If you select a <b>View</b> , facets are not auto-discovered. Developers can create the faceted report page based on a View, but the only Search facets included are searchable VARCHAR2 columns.
	See Also: Managing Faceted Search
Smart Filters	A smart filters page features a single search field at the top of the page with filters and a report. Each filter displays as a suggestion chip with a single count of how often the specific suggestion value occurs. Users can search, or click a smart chip to quickly filter the report.
	While a smart filters page behaves similarly to faceted search, it features a more space efficient layout. Smart filter pages feature a single search field at the top of the page with filters which display as smart chips with counts that show how often a specific value occurs. Users can search, or click a smart chip to quickly filter the report.
	See Also: Managing Smart Filters
Interactive Grid	An interactive grid presents users a set of data in a searchable, customizable report. Functionally, an interactive grid includes most customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse.
	First, you select a page source (that is, <b>Table or View</b> or <b>SQL Query</b> ). Second, you determine if the interactive grid is editable by selecting <b>Allow Editing</b> or <b>Read Only</b> .
	If you select <b>Allow Editing</b> , users can add to, modify, and refresh the data set directly on the page. Functionally, an interactive grid includes most customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard. You choose a table on which to build the interactive grid.
	See Also: Managing Interactive Grids
Interactive Report	Creates a page that contains the formatted result of a SQL query. First, you select a page source (that is, <b>Table or View</b> or <b>SQL Query</b> ). Second, you select a report type, <b>Interactive Report</b> . To include a form page for creating or updating records, select <b>Include Form</b> .
	Select <b>Include Form</b> to include a form page for creating or updating records.
	If the report is based on table which has a foreign key constraints to another table, the developer can also define Lookup Columns. Use <b>Lookup Columns</b> to replace identifiers with a display column, such as showing the department name instead of the department number.
	See Also: Managing Interactive Reports



Table 8-1 (Cont.) Create Application Wizard - Available Reports

Report Type	Description
Additional Pages, Classic Report	Creates a page that contains the formatted result of a SQL query. First, you select a page source (that is, <b>Table or View</b> or <b>SQL Query</b> ). Second, you select the report type <b>Classic Report</b> ). To include a form page for creating or updating records, select <b>Include Form</b> .
	If the report is based on table which has a foreign key constraints to another table, the developer can also define Lookup Columns. Use <b>Lookup Columns</b> to replace identifiers with a display column, such as showing the department name instead of the department number.
	See Also: Managing Classic Reports
Additional Pages, Multiple Reports	Creates multiple report pages containing an interactive report with form. For each page, you choose a table on which to build the interactive report with form. Click <b>Edit</b> to change the default options (such as providing a custom <b>SQL Query</b> ), specifying another report type (such as, selecting <b>Classic Report</b> instead of <b>Interactive Report</b> ).
	Select <b>Include Form</b> to include a form page for creating or updating records.
	See Also: Managing Classic Reports



Creating an Interactive Report Using the Create Application Wizard and Available Page Types in the Create Application Wizard

# 8.3 Creating a Report Using the Create Page Wizard

Run the Create Page Wizard from an existing application to create a variety of different reports.

- Report Options When Running the Create Page Wizard
   Learn about available report options when running the Create Page Wizard and using the
   Universal Theme.
- Creating a Report on New Page
   Use the Create Page Wizard to create a wide variety of reports on a local database or on an external data source.



## 8.3.1 Report Options When Running the Create Page Wizard

Learn about available report options when running the Create Page Wizard and using the Universal Theme.



### Tip:

Universal Theme - 42 is optimized to work equally well in either a mobile or desktop environment. In previous releases and in earlier themes, the Mobile user interface is based on jQuery Mobile. Oracle recommends migrating existing mobile applications to the Universal Theme as soon as possible.

### **Available Reports in the Create Page Wizard**

The Create Page Wizard supports the following reports when running the Create Page Wizard with the Universal Theme.

Table 8-2 Create Page Wizard — Available Reports

Report Type	Description	To Learn More
Cards	A cards page consists of individual boxes, which resemble index cards, laid out on a page. Each card displays three pieces of information: Card Title, Description Column, and Additional Text Column. First, you select a table or view on which to build the page. Second, you select the Card Title, Description Column, and Additional Text Column.	See: Managing Cards
Faceted Search	Creates a faceted search page which contains a left Search region and a report.	See: Managing Faceted Search
	You select a table or view on which to build the page. The wizard shows facet selections with options, enabling you to select or deselect the facet columns. When a page is based on local table, then facet recommendations display based on the statistics of the data in the selected table. In all other cases (that is, when the page is not based on local table), only VARCHAR2 columns are displayed for facet selections. You choose if the report is a classic report or a cards report.	



Table 8-2 (Cont.) Create Page Wizard — Available Reports

A smart filters page features a single search field at the top of the page with filters that display suggestion chips. While a smart filters page behaves similarly to faceted search, a smart filters page features a more space efficient layout.	See: Managing Smart Filters
You select a table or view on which to build the page. When a page is based on local table, then filter recommendations are displayed based on the statistics of the data in the selected table. In all other cases (that is, when the page is not based on local table), only VARCHAR2 columns are displayed for filter selection.	
Each suggestion chip displays a single count for the specific suggestion values. The suggestion chip count only displays for filters that support counts, such as LOV-based filter types. Users can search or click a suggestion chip to quickly filter the report. You choose if the report is a classic report or a cards report.	
An interactive grid presents users a set of data in a searchable, customizable report. Functionally, an interactive grid includes most customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.	See: Managing Interactive Grids
Enabling <b>Include Form Page</b> includes a modal form page. Then, you select the Data Source and the Source Type (that is, <b>Table</b> or <b>SQL Query</b> ).	
If the Data Source contains BLOB columns, then those columns are automatically excluded from the region source since interactive grid regions do not support BLOB columns. If the Data Source is a local table which has foreign keys selected, then for those columns, the column type is set as <b>Select List</b> . If a if matching LOV already exists, a Shared LOV is automatically created or re-used. You determine if the interactive grid is editable by enabling or disabling <b>Editing Enabled</b> . When this option is enabled, then the grid is rendered read-	
	the top of the page with filters that display suggestion chips. While a smart filters page behaves similarly to faceted search, a smart filters page features a more space efficient layout.  You select a table or view on which to build the page. When a page is based on local table, then filter recommendations are displayed based on the statistics of the data in the selected table. In all other cases (that is, when the page is not based on local table), only VARCHAR2 columns are displayed for filter selection.  Each suggestion chip displays a single count for the specific suggestion values. The suggestion chip count only displays for filters that support counts, such as LOV-based filter types. Users can search or click a suggestion chip to quickly filter the report. You choose if the report is a classic report or a cards report.  An interactive grid presents users a set of data in a searchable, customizable report. Functionally, an interactive grid includes most customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.  Enabling Include Form Page includes a modal form page. Then, you select the Data Source and the Source Type (that is, Table or SQL Query). If the Data Source contains BLOB columns, then those columns are automatically excluded from the region source since interactive grid regions do not support BLOB columns. If the Data Source is a local table which has foreign keys selected, then for those columns, the column type is set as Select List. If a if matching LOV already exists, a Shared LOV is automatically created or re-used. You determine if the interactive grid is editable by enabling or disabling Editing Enabled. When this



Table 8-2 (Cont.) Create Page Wizard — Available Reports

Report Type	Description	To Learn More
Interactive Report	Creates a page that contains the formatted result of a SQL query. Enabling <b>Include Form Page</b> includes a modal form page. Then, you select the Data Source and the Source Type (that is, <b>Table</b> or <b>SQL Query</b> ).	See: Managing Interactive Reports
	If a Data Source contains BLOB columns and if a local table with primary key constraints is selected as the Data Source, then BLOB columns are set as <b>Download BLOB</b> type, with proper BLOB attributes. If the Data Source is a local table, which has foreign keys selected, then for those columns, the column type is set as <b>Plain Text (based on List of Values)</b> . If a if matching LOV already exists, a Shared LOV is automatically created or re-used.	
Classic Report	Creates a page that contains the formatted result of a SQL query. You choose a table on which to build a report or provide a custom SQL SELECT statement or a PL/SQL function returning a SQL SELECT statement.	
	When a Data Source contains BLOB columns and if a local table with primary key constraints is selected as the Data Source, then BLOB columns are set as <b>Download BLOB</b> type, with proper BLOB attributes. When a local table, which has foreign keys is selected as the Data Source, then for those columns, column type is set as <b>Plain Text (based on List of Values)</b> . If a if matching LOV already exists, a Shared LOV is automatically created or reused.	
	Enable <b>Include Form Page</b> to include a form page for creating or updating records.	
	With the exception of sorting and simple filtering, end users cannot customize a classic report.	

### 8.3.2 Creating a Report on New Page

Use the Create Page Wizard to create a wide variety of reports on a local database or on an external data source.

The component(s) described in this topic include built-in support for REST Enabled SQL and REST Data Sources which enables read and write access to remote data sources. In order to build a component on a remote data source, you must first create the application and configure the external data source.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.

To add a report on a new page by running the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select a report type. Options include:
  - **Cards**
  - **Faceted Search**
  - **Smart Filter**
  - **Interactive Grid**
  - **Interactive Report**
  - **Classic Report**



#### Tip:

To learn more about each report type, see Report Options When Running the Create Page Wizard.

5. What displays next changes based on your selection. Follow the on-screen instruction. To learn more about an attribute, see field-level Help.



#### Tip:

When prompted to select a Data Source, select Local Database, REST **Enabled SQL** or **REST Data Source**.

6. To view the report, click Save and Run Page.

The rendered page appears.



#### Tip:

You can also run the Create Page Wizard in Page Designer by clicking the Create menu and selecting Page.



# 8.4 Creating a Report by Dragging and Dropping from the Gallery

Create a report by dragging and dropping a report type from the Gallery.



#### Tip:

When you drag and drop a report region from the Gallery, you must provide the underlying SQL query.

To add a report by dragging and dropping from the Gallery:

- View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

In the Gallery at the bottom of the central pane, locate the report type you want to create.

The Gallery lists all controls or components you can add to a page. Passing the cursor over a control or component displays a tooltip that describes it.



#### Tip:

In addition to dragging and dropping components from the Gallery, you can also right-click a component in the Gallery to view a context menu. Select **Add To** and then the location where you want to add the component.

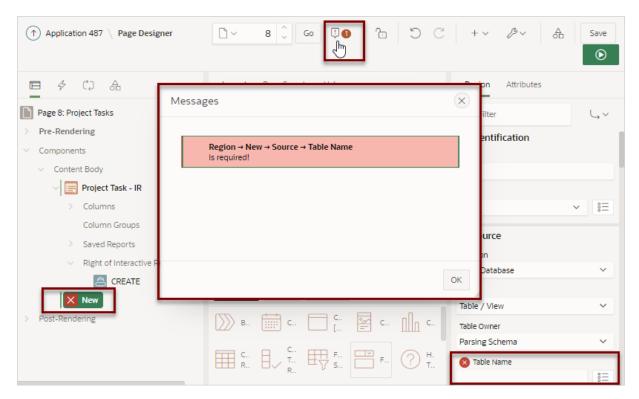
Click and hold the mouse on the component to be created and drag it the desired location in the Layout tab.

When the mouse is over the appropriate location, the Layout tab displays as a darkened yellow tile. Release the mouse to drop the component. You can only drop components into appropriate drop positions, as determined by the component type.

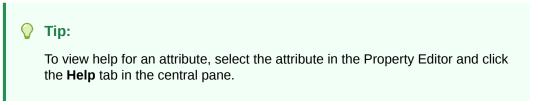
- **4.** Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.





- b. Select an error to highlight the associated attribute in the Property Editor.
- 5. Edit the appropriate attributes in the Property Editor.



**6.** To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.5 Managing Cards

A cards page features an orderly layout of information tiles. Developers choose between three layouts: Grid, Float, or Horizontal (Row).

A cards report region declaratively supports customizations of layout and appearance and the inclusion of icons, badges, media, and actions. Use cards to embed and share media sourced from a BLOB column, URL or video in iFrame.

- Example Cards Page
   View an example cards page.
- Creating a Cards Page Using the Create Application Wizard
  Run the Create Application Wizard to create a new application that contains a cards
  page.
- Creating a Cards Page Using the Create Page Wizard
   Run the Create Page Wizard to add a new cards page to an existing application.



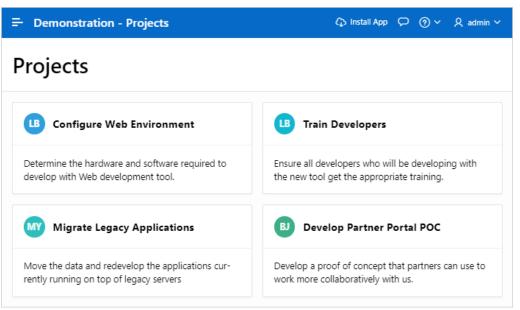
- Editing Cards Region Attributes
   Edit region attributes to alter the SQL source, change the region layout and appearance, or create region conditions.
- Editing Card Attributes
   Edit card specific attributes by clicking the Attributes tab in the Property Editor.
- Using Actions to Link from a Cards Page Create actions to link from a cards page.

### 8.5.1 Example Cards Page

View an example cards page.

Both the Create Application Wizard and Create Page Wizard support the creation of cards pages. First, you select a table or view or provide a SQL query on which to build the page. Then, you specify the general page layout, for example, Grid, Float, or Horizontal (Row). Finally, you specify the Title Column, Body Column, and optionally Icon Initials Column.

The following is an example of a cards page built on the EBA PROJECTS table.



In this card example, each card displays the following attributes:

- Title Maps to the NAME column.
- Icon Maps to the PROJECT LEAD column.
- Body Maps to the DESCRIPTION column.

Key features of cards pages include:

- Customize every aspect of a cards region's UI (including layout, appearance, icon, badge, and media).
- Declaratively create links from a cards page by adding actions. Action types include Button, Full Card, Title, Subtitle, or Media.
- Supports advanced HTML expressions including template directives for client-side conditional formatting.



#### Tip:

To view an example, install the sample app, *Sample Cards*. To learn more, see Installing Apps from the Gallery.

### 8.5.2 Creating a Cards Page Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains a cards page.

A cards page consists of individual boxes, which resemble index cards, laid out on a page. Each card displays three pieces of information.

To create an application that contains a cards page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- **5.** Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click **Set Appearance** to change it.
- 7. Click Add Page and select Cards.
- On Add Cards Page:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - c. Table or View Select a table or view on which to build the page.
  - d. Select a layout. Options include: Grid, Float, or Horizontal (Row)
  - e. Select the information to display on each card. Options include:
    - Title Column
    - Body Column
    - Icon Initials Column
    - Badge Column

The Title Column and Body Column are pre-selected from the Data Dictionary Cache. Developers can change these defaults.

- f. Advanced Expand Advanced to configure these options:
  - Set as Home Page Enable this to make this page the home page for the application.
  - Set as Administration Page Enable this to have this page display under Administration.
  - Page Help Enter text to be displayed when the user selects Page Help.
- g. Click Add Page.



- Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.



Accessing the Data Dictionary Cache Report from Workspace Administration or Accessing the Data Dictionary Cache Report from Administration Services in *Oracle APEX Administration Guide* 

### 8.5.3 Creating a Cards Page Using the Create Page Wizard

Run the Create Page Wizard to add a new cards page to an existing application.

To create a cards page by running the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Cards.
- 5. Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page.



### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 6. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.



The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is Local Database.

- 7. Source Type Specify the source of the new page. Options include:
  - Table:
    - Table /View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the **SQL Query Example** region.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - b. Use Navigation Enable to create a navigation menu entry for this page. By default, the page name is used as navigation menu name.
- 9. Click Next.
- 10. Cards Layout Select a layout. Options include: Grid, Float, or Horizontal (Row)
- 11. Card Attributes Select the information to display on each card. Options include:
  - a. Title Column
  - b. Body Column
  - c. Icon Initials Column
  - d. Badge Column
- 12. Click Create Page.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.

#### See Also:

- Accessing the Data Dictionary Cache Report from Workspace Administration
- Accessing the Data Dictionary Cache Report from Administration Services in Oracle APEX Administration Guide
- Understanding Page Types in the Create Page Wizard



### 8.5.4 Editing Cards Region Attributes

Edit region attributes to alter the SQL source, change the region layout and appearance, or create region conditions.

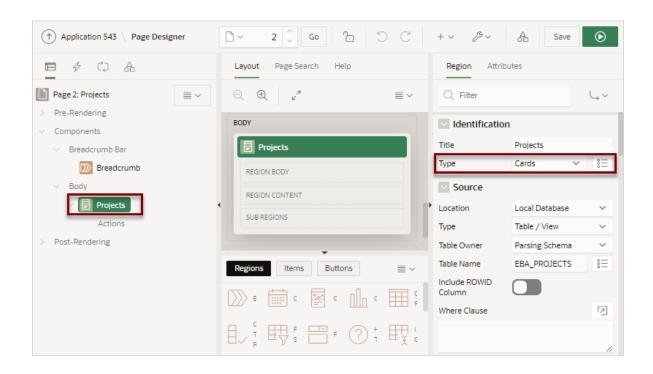
To edit a region attributes:

- 1. View the cards page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab under Content Body, locate and select the cards region (for example, **Projects**).

In the Property Editor, the **Region** tab displays the attributes. Attributes are organized in groups.



In the previous example, note that the **Type** attribute indicates that **Projects** is a **Cards** region.

3. Edit the appropriate attributes.



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.



- **4.** To find a group or attribute:
  - Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
  - Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 5. Click Save or Save and Run Page.

### 8.5.5 Editing Card Attributes

Edit card specific attributes by clicking the Attributes tab in the Property Editor.

Customize a cards page by editing the following attribute groups: **Appearance**, **Title**, **Subtitle**, **Body**, **Secondary Body**, **Icon and Badage**, or **Media**.

To edit a cards Attributes:

- 1. View the cards page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

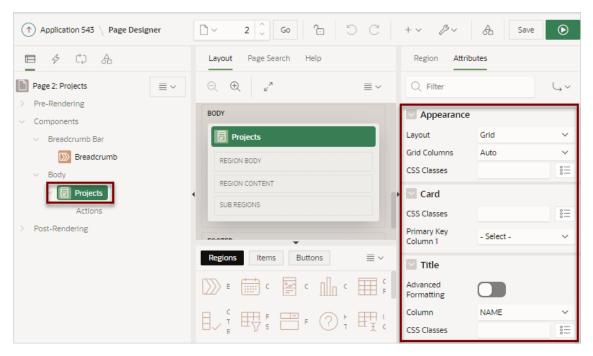
- 2. In the Rendering tab, select the Cards region.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

- 4. Select the cards region:
  - a. In the Rendering tab under Content Body, locate and select the cards region (for example, **Projects**).
  - b. In the Property Editor, select the **Attributes** tab.

In the Property Editor, the **Atributes** tab displays the card page attributes. Attributes are organized in groups.





5. Edit the appropriate attributes.

Title, Subtitle, Body, Secondary Body, and Media include an Advanced Formatting option which enables support for HTML expressions and supported substitution strings. All free form text attributes, such as CSS Classes, Icon or Image Description, or Badge Label, support column substitutions through standard substitution string syntax (for example, &ENAME. or &DNAME..



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- **6.** To find a group or attribute:
  - Search for the group or attribute Enter keywords in the Filter Properties
    field. The Property Editor displays the group or attributes. To return to the
    default display, delete the keywords.
  - Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 7. Click Save or Save and Run Page.



**Using Substitution Strings** 



### 8.5.6 Using Actions to Link from a Cards Page

Create actions to link from a cards page.

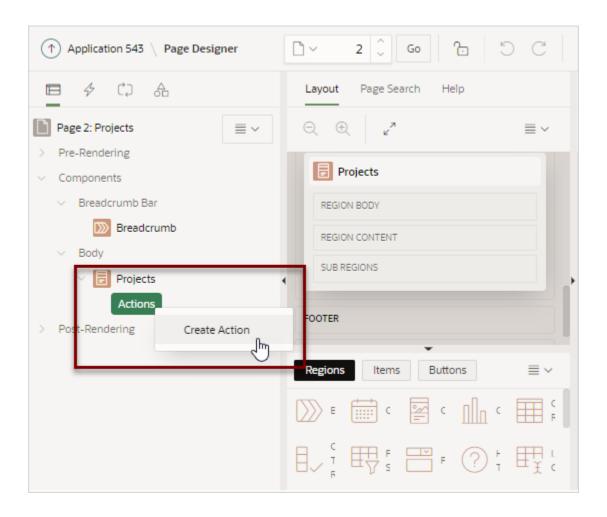
A cards page functions as a colorful way to display a subset of information and then enable the user to link to more detail. To create a link from a cards page, you create an action and then select an action type. You can create an action to link from a full card, a title, a subtitle, media, or a button.

#### To create an action:

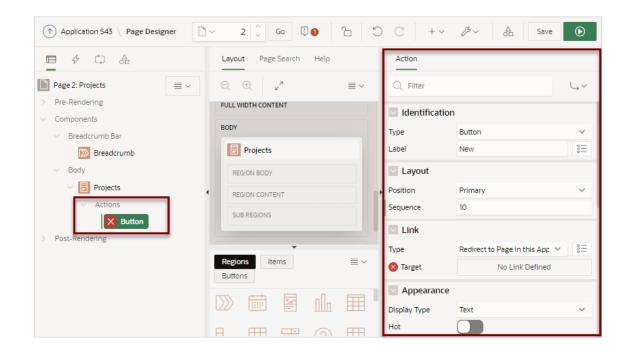
- 1. View the Cards page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select the Cards page.

Page Designer appears.

- 2. Add an action:
  - a. In the Rendering tab under Content Body, locate the cards region.
  - b. Under the cards region, right-click **Actions** and select **Create Action**.







A new Action appears and the **Action** tab displays in Property Editor.

Edit the action in the Property Editor (right pane).

- 3. Identification, Type Select the type of action to add to the card:
  - Button Adds button to the card.
  - Full Card Adds link to the full card.
  - Title Adds link to the card title.
  - Subtitle Adds link to the card subtitle.
  - Media Adds link to the card media.

You can define multiple actions of the same type. However, only button actions are rendered multiple times. For all other action types, the first TRUE display condition gets rendered, and the rest are ignored. If defining multiple action, add a display condition based on the column value and set it to check for each row.

- 4. Identification, Label (Button only) Enter the text to display on the button. If button display type is icon, this text becomes the ALT text for the icon image.
- 5. Define the Link:
  - **a.** Link, Type Select the action to be performed when the specified action type is clicked. Options include:
    - Redirect to Page in this Application Redirect to a page in the current application, with optional additional attributes for resetting pagination, setting the request value, clearing cache and setting item values, on the target page.
    - Redirect to Page in a different Application Redirect to a page in a
      different application, with optional additional attributes for resetting
      pagination, setting the request value, clearing cache and setting item
      values, on the target page.





#### Tip:

Redirecting to a page in different application relies on deep linking being enabled in the target application. To enable deep linking, go to the application's Security attributes and enable **Deep Linking**. See Configuring Security Attributes.

- Redirect to URL Redirect to the target URL you specify.
- b. Link, Target Click No Link Defined.

The Link Builder Target dialog appears. The attributes that display differs depending upon the Link Type. When redirecting to a page, the following attributes appear:

- Target, Page Enter a page number or page alias, or select the page number from the select list.
- Set Items, Name Enter or select page items (for example, P3\_ID), application items (for example, LAST\_PAGE) or interactive report filters (for example, IR EMPNO) to be set into session state.
- Set Items, Value Enter or select a report column (for example, &ID.), enter an application or page item (for example, &P2\_EMPNO.), or enter a static value (for example, 2).
- Clears/Reset, Clear Cache Enter a comma-delimited list of page numbers (for example, 2,3), items (for example, P3\_EMPNO, LAST\_PAGE), and report settings to be cleared. To reset pagination for a report enter RP. To clear or reset interactive report settings enter CR or RR.
- Action Select None, Clear Regions, Reset Regions, or Reset Pagination.

**Reset Pagination** resets the pagination back to the first set of records, for reports on the target page. This has the same affect as passing **RP** in Clear Cache.

- Advanced: Request Enter the request to be used.
- Click OK to save your changes and exit the dialog.
- **6.** Server Side Condition, Type Select a condition type that must be met in order for this component to be rendered or processed.

If you refer to Columns in your condition, you must specify For Each Row in order for the condition to be evaluated for each card. Otherwise, set to Once to evaluate the validations one time for the region.

7. Click Save or Save and Run Page.

The Cards page loads.

8. Click a project to view the Maintain Project form.

## 8.6 Managing Smart Filters

A smart filters page features a single search field at the top of the page and a search results report (classic report, cards, map, or calendar). While a smart filter behaves similarly to faceted search, it features a more space efficient layout.



You can create a smart filters page with either the Create Application Wizard or Create Page Wizard, or add a smart filters region to an existing report in Page Designer.

Example Smart Filters
 View an example smart filters page.

About Creating Smart Filters Pages

Create a smart filters page by running either the Create Application Wizard or Create Page Wizard.

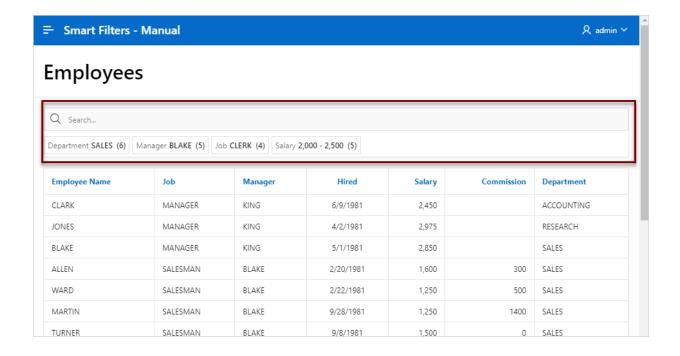
- Creating Smart Filters Using the Create Application Wizard
  Run the Create Application Wizard to create a new application that contains a
  smart filters page.
- Creating Smart Filters Using the Create Page Wizard
   Run the Create Page Wizard to add a new smart filters search page to an existing application.
- Creating a Smart Filters Page Manually
   Create a smart filters page by manually adding the page and smart filter components.
- Editing a Smart Filters Page
   Learn about how attributes can change the behavior of a smart filters page.

### 8.6.1 Example Smart Filters

View an example smart filters page.

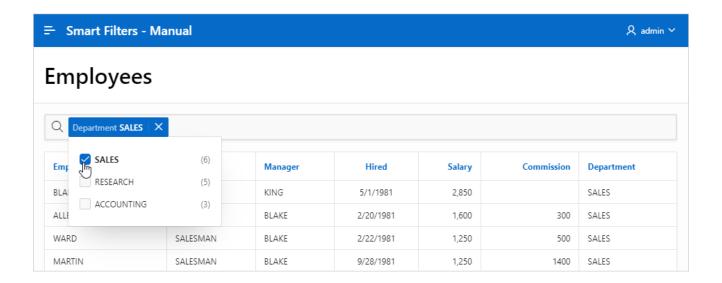
While a smart filters page behaves similarly to faceted search, it features a more space efficient layout. Smart filter pages include a single search field at the top of the page with filters that display as suggestion chips with counts that show how often a specific value occurs.

The following example shows a smart filters page built on the EMP table. Note the filter suggestion chips that display beneath the Search field.

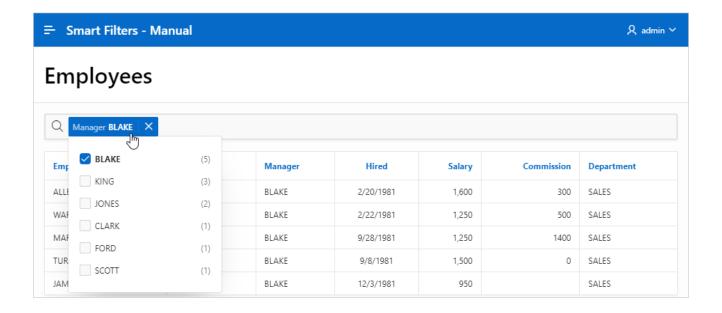




Clicking a the filter name displays a list of values. In this example the department, **Sales**, is selected and displays three values: SALES, RESEARCH, and ACCOUNTING.

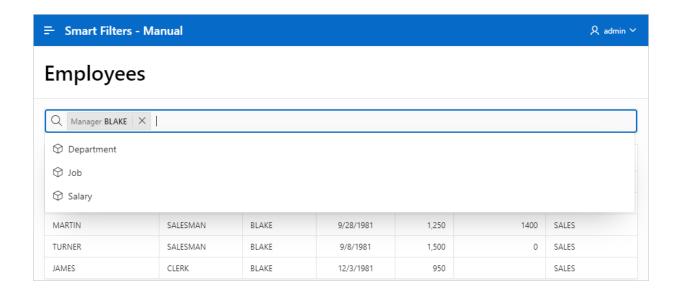


If you click any place to right of the name, the suggestion chip becomes an applied filter chip and moves to the Applied Filters Area. Clicking the applied filter chip again displays the list. In this example, the Manager applied filter chip displays six managers.



To see other filters, click the Search field again. The other filters display.





To remove a filter, the click the **X** after the filter name.



#### Tip:

To view an example, install the sample app, *Sample Reporting*. To learn more, see Installing Apps from the Gallery.

### 8.6.2 About Creating Smart Filters Pages

Create a smart filters page by running either the Create Application Wizard or Create Page Wizard.

Both the Create Application Wizard and Create Page Wizard support the creation of a smart filters page which contains a single search field at the top of the page with filters that display suggestion chips. Alternatively, you can add a smart filters region to an existing report in Page Designer. Each suggestion chip displays a single count for the specific suggestion values. The suggestion chip count only displays for filters that support counts, such as LOV-based filter types. Users can search, or click a suggestion chip to quickly filter the report. You choose if the report is a classic report or a cards report. If you create a smart filters page using the Create Application Wizard, you can also choose to include an update form.

#### Smart Filters, Breadcrumbs, and the Create Page Wizard

When adding a new smart filters page using the Create Page Wizard, breadcrumbs function a little differently. If breadcrumbs are disabled, the Smart Filters region is added to the Body container. However, if breadcrumbs are enabled, the Smart Filters region is added to the Breadcrumb container and a Breadcrumb displays at the top the page.

#### **About Auto-Discovered Filters**

When you build a smart filters page with either wizard, you can select a table or view on which to build the page. If you create the page based on a table, the filters are auto

discovered using the Data Dictionary Cache. In contrast, if you build the page on a view or a SQL query, the facets (filters) are not auto-discovered. Instead, the wizard creates a filter region which only searches VARCHAR2 columns.

#### **About the Data Dictionary Cache**

The Data Dictionary Cache report displays statistics and a data analysis of schema tables and caches in a workspace. Both the Create Application Wizard and Create Page Wizard use the Data Dictionary Cache when creating new applications and pages. You can preview how the wizards will render facets (filters) on the Data Dictionary Cache page by viewing the Table Column Cache report. The wizard uses the first top five facet (filter) search score columns with score greater than or equal to 20.

If a table changes due to DDL or DML modifications, the Oracle APEX nightly job ORACLE\_APEX\_DICTIONARY\_CACHE refreshes the Data Dictionary Cache. However, you can refresh the cache manually by navigating to the Data Dictionary Cache and clicking either **Gather Statistics and Refresh Cache** or **Refresh Cache Only** at the workspace or table-level.



Accessing the Data Dictionary Cache Report from Workspace Administration or Accessing the Data Dictionary Cache Report from Administration Services in *Oracle APEX Administration Guide* 

### 8.6.3 Creating Smart Filters Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains a smart filters page.

A smart filters page can include a classic report or a cards report. If you select classic report, you can also choose to include an update form.



#### Tip:

If you are creating a smart filters page that displays as a report, clicking **Include Form** automatically creates a form page for creating or updating records. This option is not available in the Create Page Wizard.

To create an application that includes a smart filters search page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- **5.** Name Enter the name used to identify the application to developers.



- Appearance Accept the default Theme Style and menu layout (Vita, Side Menu), or change it by clicking the **Set Appearance** icon adjacent to the Appearance field.
- Click Add Page and select Smart Filters.
- 8. In the Add Smart Filters Page dialog:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - c. Select a report type: Report or Cards.
  - d. Table Select a table.
  - e. What appears next depends upon whether you selected **Report** or **Cards**.
    - If Report Select Include Form to include a form page for creating or updating records.
    - If Cards Select the display: Grid, Float, and Horizontal (Row).
       Select the information to display on each card: Title Column, Body Column, Icon Initials Column, and Badge Column.
  - f. Advanced Expand Advanced to configure these options:
    - Set as Home Page Enable this to make this page the home page for the application.
    - Page Help Enter text to be displayed when the user selects Page Help.
  - g. Click Add Page.
- 9. Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to **Features**.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.

### 8.6.4 Creating Smart Filters Using the Create Page Wizard

Run the Create Page Wizard to add a new smart filters search page to an existing application.

If you are using the latest Universal Theme, breadcrumbs function a little differently when adding a new smart filters page using the Create Page Wizard. If breadcrumbs are disabled, the Smart Filters region is added to the Body container. However, if breadcrumbs are enabled, the Smart Filters region is added to the Breadcrumb container and a Breadcrumb displays at the top the page.



#### Tip:

To learn more about breadcrumbs, see Editing Breadcrumbs

To create a smart filters page by running the Create Page Wizard:

1. On the Workspace home page, click the **App Builder** icon.



- 2. Select the application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Smart Filters.
- 5. Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- 6. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the
    connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 7. Source Type Specify the source of the new page. Options include:
  - Table:
    - Table /View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 9. Click Next.
- Display As Select how you want to display the filtered region. Options include: Report or Cards.
- **11.** Select filters Select the filters include in this report.



Filter recommendations are based on statistics of data in your table. Click **Refresh** to refresh the column statistics to provide better recommendations.

#### 12. Click Create Page.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



#### See Also:

Understanding Page Types in the Create Page Wizard

### 8.6.5 Creating a Smart Filters Page Manually

Create a smart filters page by manually adding the page and smart filter components.

Using the Create Application Wizard or Create Page Wizard is the easiest way to create a smart filters page. However, you can create a smart filters page manually. At a minimum, creating a smart filters page manually involves the following steps:

 Create a report region that supports smart filters. Supported report regions include classic report, cards, map, or calendar.



#### Tip:

You must create maps and calendars manually since the Create Application and Create Page Wizards only support creating smart filter pages with a classic report and cards report.

- Add a smart filters region.
- Add individual filters to the smart filters region.

The following example creates a smart filters page which contains a classic report built on the EMP table. The EMP table is available in the sample dataset, EMP / DEPT.

To create a filtered search manually.

- 1. Run the Create Application Wizard:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Click the Create button.
  - c. Click New Application.

The Create Application Wizard appears.

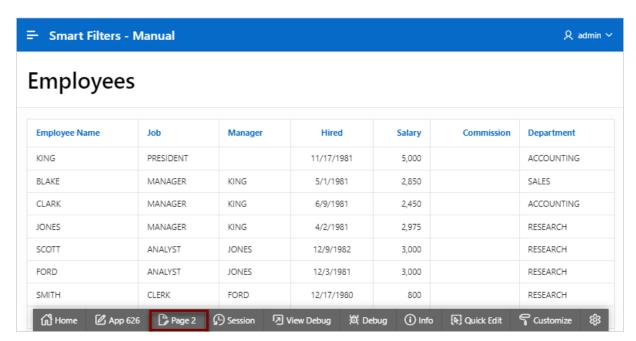
- 2. On Create a Page:
  - Name Enter a name to identify the application. For example, enter Smart Filters - Manual



- **b.** Appearance Accept the default Theme Style and menu layout (Vita, Side Menu). To change it, click the **Set Appearance** icon adjacent to the Appearance field.
- c. Under Pages, click Add Page. Expand Additional Pages at the bottom of the window and select Classic Report.
- d. On Add Report Page:
  - Page Name Enter a name for this page. For example, enter Employees
  - Set Icon Accept the default, or select an icon to display in the navigation menu for this page.
  - Table or View Select a table or view on which to build the page. Select EMP.
  - Click Add Page.
- e. Click Create Application.

The Application home page appears.

- **3.** View the new page.
  - a. On the Application home page, select the new page, 2 Employees.
     The page displays in Page Designer.
  - b. Click **Save and Run Page** on the right side of the Page Designer toolbar.
  - When prompted, enter your workspace username and password and click Sign In.
     A Employees report appears.



- **d.** Return to Page Designer. Click **Page X** on the Runtime Developer toolbar where *X* is the page number.
- 4. Add a search region:

When adding a search region, you can add it in the Body or Breadcrumb Bar. Adding it to the Breadcrumb Bar ensures it always displays at the top of the page. In this example, you add the search region to the Body.



- a. In the Rendering tab (or left pane), right-click **Body** and select **Create Region**.
- **b.** Select the new region. Edit the following Region attributes in the Property Editor (or right pane):
  - Identification, Title Enter Search
  - Identification, Type Select Smart Filters.
  - Source, Filtered Region Select Employees.
- c. Update the Template Options:
  - Appearance, Template Options Click Use Template Defaults, Scroll Default.

The Template Options dialog appears.

- Common, General Select Remove Body Padding.
- Common, Header Select Hidden but accessible.
- Click OK.
- 5. Update the Search region appearance:
  - a. Layout, Sequence Enter 5
  - b. Layout, Column Span Select 8.
  - c. Save your changes. Click Save.
- 6. Update the filter for searching multiple columns:
  - a. Select PX SEARCH where X represents the page number.
  - b. Source, Database Column(s) Enter ENAME, JOB, MGR, DEPTNO
  - c. Save your changes. Click Save.
- 7. Add a filter for the DEPTNO column:
  - a. In the Rendering tab, right-click the Filters and select Create Filter.
  - **b.** Select the new filter and edit the following attributes in the Property Editor:
    - Identification, Name Enter PX\_DEPTNO where X represents the page number.
    - Identification, Type Accept the default, Checkbox Group.
    - Source, Database Column Verify that the column is **DEPTNO**.
    - Label, Label Enter Department
    - List of Values, Type Select Shared Component.

The Create Application Wizard created a lookup list of values named DEPT. DNAME so that the DEPT column displays the department name instead of the department number.

- List of Values, List of Values Select DEPT. DNAME
- c. Save your changes. Click Save.
- 8. Add a filter for the MGR column:
  - a. In the Rendering tab, right-click the Filters and select Create Filter.
  - **b.** Select the new filter and edit the following attributes in the Property Editor:



- Identification, Name Enter PX MGR where X represents the page number.
- Identification, Type Accept the default, Checkbox Group.
- Source, Database Column Verify that the column is MGR.
- Label, Label Enter Manager
- List of Values, Type Select Shared Component.

The Create Application Wizard created a lookup list of values named EMP. ENAME so that the MGR column displays the manager name instead of the employee number.

- List of Values, List of Values Select EMP.ENAME.
- c. Save your changes. Click Save.
- 9. Add a filter for the JOB column:
  - a. In the Rendering tab, right-click **Filters** and select **Create Filter**.
  - **b.** Select the new filter and edit the following attributes in the Property Editor:
    - Identification, Name Enter PX JOB where X represents the page number.
    - Identification, Type Accept the default Checkbox Group.
    - Label, Label Verify the label is Job.
    - Source, Database Column Verify that the column is JOB.
    - List of Values, Type Select Distinct Values.
  - c. Save your changes. Click Save.
- 10. Add a filter for the SAL column:
  - a. In the Rendering tab, right-click **Filters** and select **Create Filter**.
  - **b.** Select the new filter and edit the following filter attributes in the Property Editor:
    - Identification, Name Enter PX SAL where X represents the page number.
    - Identification, Type Select Range.
    - Label, Label Enter Salary
    - Source, Database Column Verify that the column is SAL.
    - Source, Data Type Select NUMBER.
    - Settings, Select Multiple Enable Select Multiple.
  - c. Define the PX SAL filter as a static list of values:
    - List of Values, Type Select Static Values.
    - List of Values, Static Value Click Display1, Display2.

In the Static Values dialog, define the following:

- Row 1:

Display Value - Enter <900

Return Value - Enter | 900

Row 2:

Display Value - Enter 900 - 1#G#300



Return Value - Enter 900 | 1300

Row 3:

Display Value - Enter 1#G#300 - 2#G#000

Return Value - Enter 1300 | 2000

Row 4:

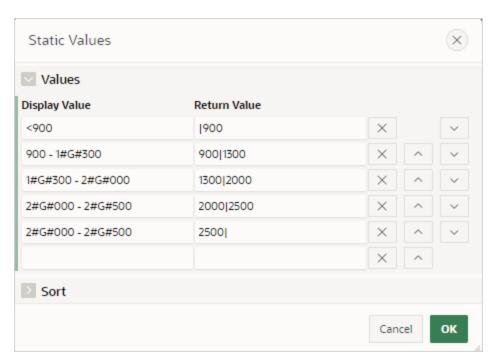
Display Value - Enter 2#G#000 - 2#G#500

Return Value - Enter 2000 | 2500

Row 5:

Display Value - Enter 2#G#000 - 2#G#500

Return Value - Enter 2500|

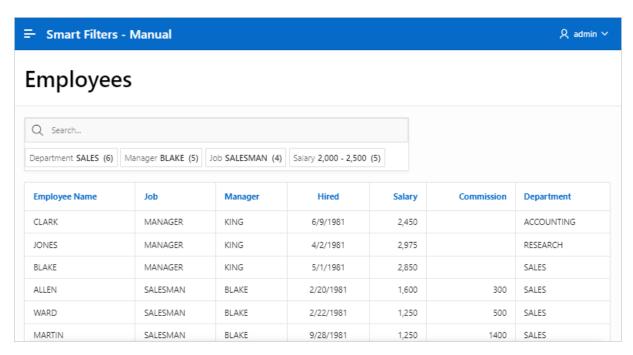


- Click **OK** to save your changes.
- d. Save your changes. Click Save.
- 11. View the page.

search field.

- a. Click Save and Run Page in the upper right corner.
- b. If prompted, enter your workspace username and password and click Sign In.
   The revised page appears. Notice four suggestion chips display under the





c. Test the page. Select filters. To remove a filter, click the **X** after the filter name.

### 8.6.6 Editing a Smart Filters Page

Learn about how attributes can change the behavior of a smart filters page.



#### Tip:

Many examples in this section are built on the EBA\_PROJECT\_TASKS table available in the sample dataset, Project Data, or the EMP table available in the sample dataset, EMP / DEPT. To install a sample dataset, see Using Sample Datasets in *Oracle APEX SQL Workshop Guide*.

- Reviewing Smart Filters Page Components
   Review the components that comprise a smart filters page by viewing attributes in Page Designer.
- Understanding a Smart Filters Page
   Learn about the regions that comprise a smart filters page.
- Adding a New Filter
   Add new filters in Page Designer by right-clicking filter and selecting Create Filter from the context menu.
- Editing Filter Attributes
   Edit attributes to change filter behavior.



### 8.6.6.1 Reviewing Smart Filters Page Components

Review the components that comprise a smart filters page by viewing attributes in Page Designer.

A smart filters page features a single search field at the top of the page with filters. Search Results can display as a classic report, cards, map, or calendar.



#### Tip:

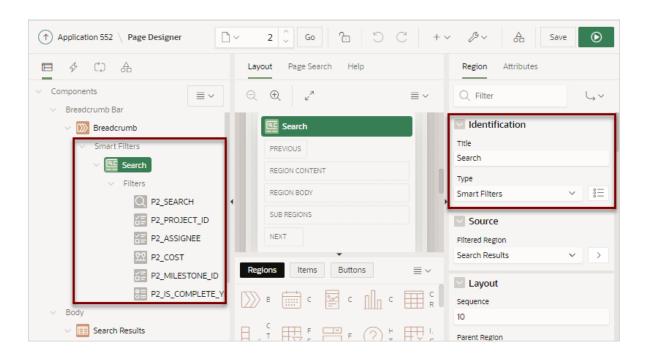
You must create maps and calendars manually since the Create Application and Create Page Wizards only support creating smart filter pages with a classic report and cards report.

To review the components of a smart filters page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

Review the Search region. In the Rendering tab, locate and select the Search region.

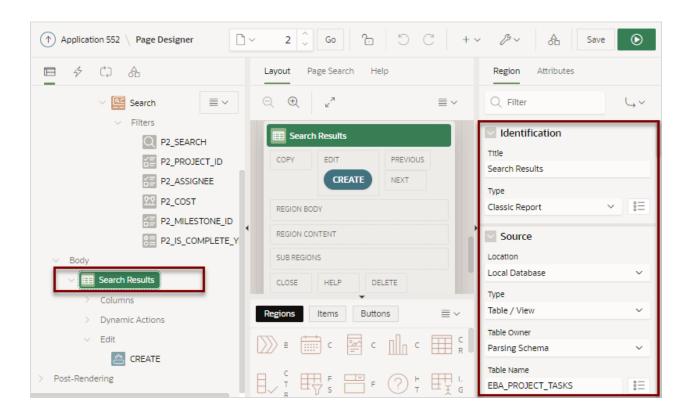


Note the Search region Type is **Smart Filter**. In this example, the Search region contains six filters. Filters display in runtime as suggestion chips with counts that show how often the specific value occurs. The value shown in the suggestion chip



is configured with the attributes in the Suggestions group. Filters are similar to items but feature the following unique characteristics:

- Naming Conventions Filters use the same naming convention as items. By default, wizards prefix filter names with P<page no>\_<item name> (for example, P2 SEARCH).
- Associated with a Column Filters are associated with a column from the Search Results (or report) region.
- Checkbox Group Filters The filters with the Type Checkbox Group create a UI for selecting or entering the filter values. They are not implemented the same as page items even if they have the same type name. For this reason, most dynamic actions do not apply to filters.
- Select a filter and explore the configurable options.To view Help, select the attribute and click the Help tab.
- 4. Review the report region. In the Rendering tab, locate and select the Search Results (or report).



In the previous example, note that the attributes indicate the report Type is a Classic Report built on the EBA PROJECT TASKS table in a local database:





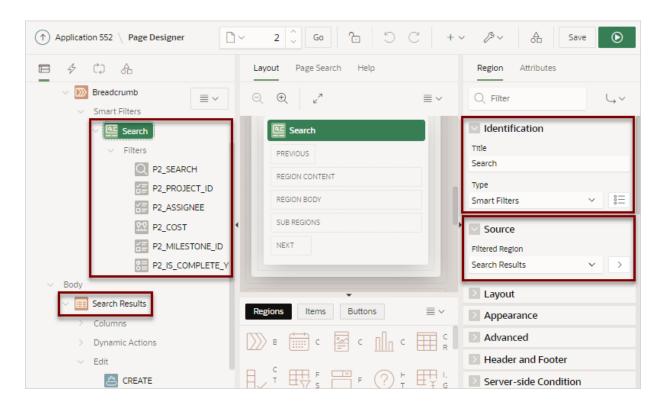
### 8.6.6.2 Understanding a Smart Filters Page

Learn about the regions that comprise a smart filters page.

#### **About the Search Region**

A smart filters page features a Search region which enables users to narrow down the search result and a report region such as classic report or cards report.

In Page Designer, the **Search** region displays in the left pane or Rendering tab. Selecting the Search region displays attributes in the Property Editor. In the following image, the Search region **Type** is defined as **Smart Filters**. The **Filtered Region** attribute identifies the Search Results region. In this example, **Filtered Region** is as a classic report named **Search Results**.



#### Tip:

Remember that each attribute in the Property Editor has associated Help. To view Help, select the attribute in the Property Editor and then click the **Help** tab in the central pane. Help describing the attribute appears in the central pane.

#### **About Filters**

Search filters display under **Filters** in the Rendering tab. When you select a filter, the associated attributes display in the Property Editor. Filters use the same naming convention as items. By default, wizards prefix filters names using the following



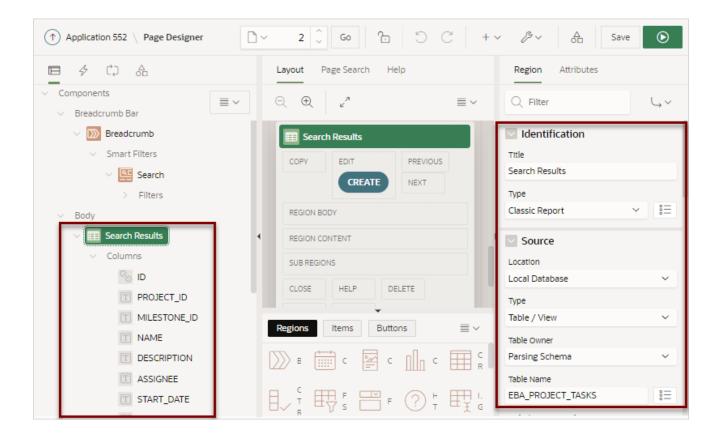
convention:  $P < page no > \_ < item name > .$  For example, in the previous example, the first filter is named P2 SEARCH).

Filters are similar to items but feature the following unique characteristics:

- Associated with a Column The filters are associated with a column from the report region.
- Checkbox Group Filters Filters with the Type Checkbox Group create a UI for selecting or entering the filter values. They are not implemented the same as page items even if they have the same type name. For this reason, most dynamic actions do not apply to filters.

#### **About the Search Results**

A smart filters page includes a Search Results region. If you create a smart filters page using either the Create Application Wizard or Create Page Wizard, the Search Results region is either a classic report or cards report. If you create a smart filters page manually, the Search Results region can also be a manually created map or calendar. In the following example, Search Results is a classic report built on the EBA PROJECT TASKS table.



#### **About Cards Page Search Results**

The Search Results on a smart filter search page can display as a cards report. A cards page functions as a colorful way to display a subset of information and then enable the user to link to more detail. You can create an action to link from a full card, a title, a subtitle, media, or a button. To see an example, see Using Actions to Link from a Cards Page.



#### See Also:

**About Item Naming Conventions** 

### 8.6.6.3 Adding a New Filter

Add new filters in Page Designer by right-clicking filter and selecting Create Filter from the context menu.

Filters map to specific database column. When creating a new filter, you can create the following types: Checkbox Group, Input Field, Radio Group, and Range.

You can control the filter order in the UI by reordering the filters in the Rendering tab. Note that there must always be one Search type filter.

The following example demonstrates how to create Range filter to filter employee salary. In this example, the filter maps to the SAL column in the EMP table available in the sample dataset, EMP / DEPT.

To create a Range filter:

- 1. View the smart filters page in Page Designer.
- 2. In the Rendering tab, right-click **Filters** and select **Create Filter**.
- Select the new filter and edit the following filter attributes in the Property Editor:
  - a. Identification, Name Enter PX SAL where X represents the page number.
  - b. Identification, Type Select Range.
  - c. Label, Label Enter Salary
  - d. Source, Database Column Verify that the column is SAL.
  - e. Source, Data Type Select NUMBER.
  - f. Settings, Select Multiple Enable Select Multiple.
- 4. Define the filter as a static list of values:
  - a. List of Values, Type Select Static Values.
  - b. List of Values, Static Value Click **Display1**, **Display2**.

In the Static Values dialog, define the following:

• Row 1:

Display Value - Enter <900

Return Value - Enter | 900

Row 2:

Display Value - Enter 900 - 1#G#300

Return Value - Enter 900 | 1300

• Row 3:

Display Value - Enter 1#G#300 - 2#G#000

Return Value - Enter 1300 | 2000



Row 4:

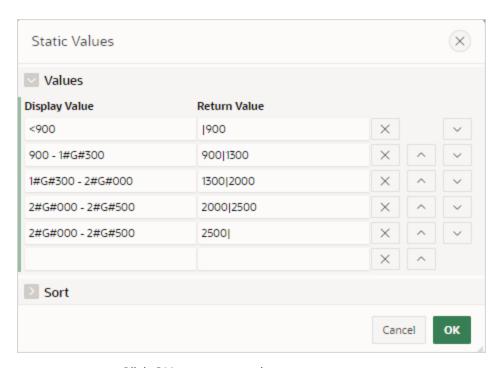
Display Value - Enter 2#G#000 - 2#G#500

Return Value - Enter 2000 | 2500

Row 4:

Display Value - Enter 2#G#000 - 2#G#500

Return Value - Enter 2500|



- Click **OK** to save your changes.
- 5. Configure the Suggestions attributes for the the PX SAL filter:
  - a. Select the the PX SAL filter (if not already selected).
  - b. Suggestions, Static Values Select how suggestions are determined for this filter. Options include:
    - Dynamic Picks the first visible entry from the List of Values.
    - Static Values Enter a comma delimited list of values.
    - SQL Query Values are returned from the SQL Query entered.

For this example, select Static Values.

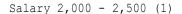
c. Suggestions, Static Values - Enter 2000 | 2500

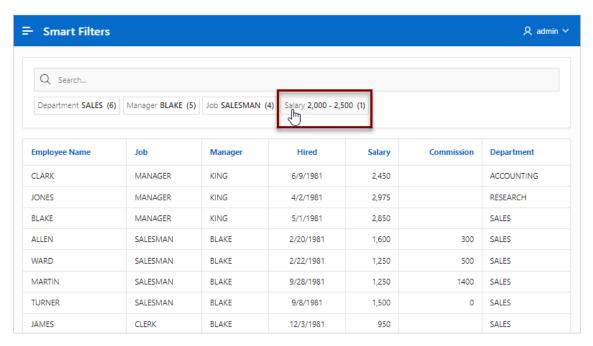
This will display **2,000 - 2,500** on the suggestion chip at runtime.

- d. Save your changes. Click Save.
- 6. View the page.
  - a. Click Save and Run Page in the upper right corner.
  - b. If prompted, enter your workspace username and password and click Sign In.

The revised page appears. Notice that a Salary suggestion chip appears that reads:







Select the Salary on the Salary suggestion chip.

The revised page appears. Notice that the Salary suggestion chip has become an applied filter chip and moved to the Applied Filters Area.

**d.** Test the new filter. To remove a filter, click the **X** after the filter name.

### 8.6.6.4 Editing Filter Attributes

Edit attributes to change filter behavior.

The following example demonstrates how to review and edit the Client-Side Filtering and Depending On attributes and change filter behavior. Enabling Client-Side Filtering adds a search field which enables users to filter the list. Depending On makes the display of one filter dependent upon another. The following example is also built on the EBA PROJECT TASKS table available in the sample dataset, Project Data.



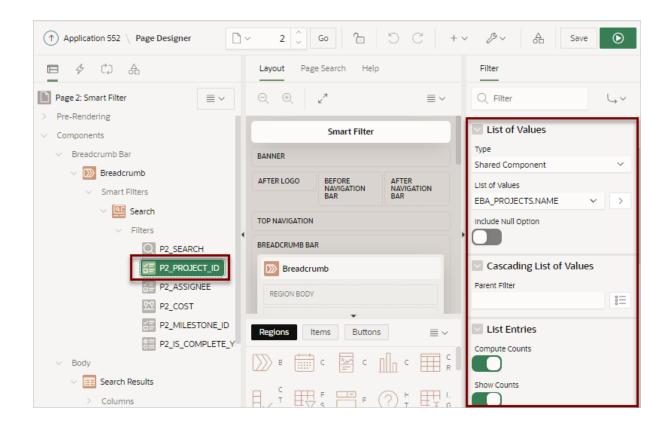
#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the Help tab in the central pane.

To view and edit filter attributes:

- 1. View the smart filters page in Page Designer.
- 2. View the filter attributes, P2\_PROJECT\_ID:
  - a. In the Rendering tab (or left pane) locate the Search region and select the filter, P2\_PROJECT\_ID.
  - **b.** In the Property Editor (or right pane) find the **List Entries** group.





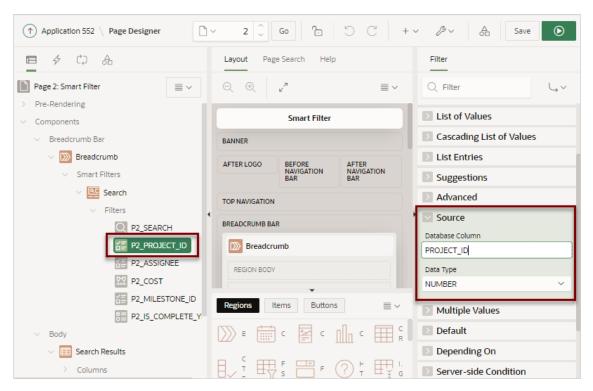
### Tip:

The maximum amount of items which can be returned by an LOV, or by Distinct Values, is 5,000. If an LOV returns more than 5,000 items, search cuts the LOV silently at 5,000 values. When logged in as a developer, APEX raises a runtime error once more than 2,000 LOV items are returned. These errors indicate that the LOV returns too many values for a useful search UI.

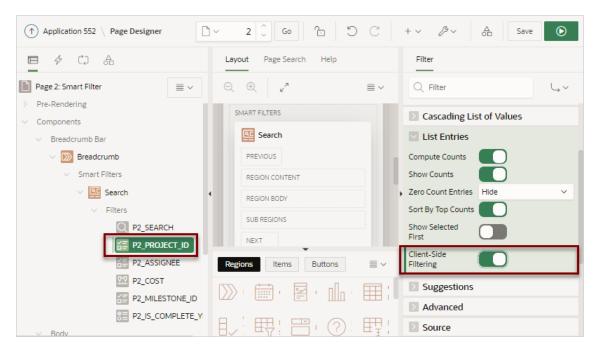
c. In the Property Editor, find the **Source** group.

The **Source** group indicates that the P2\_PROJECT\_ID filter is based on the  $PROJECT_ID$  column which has a data type of Number.



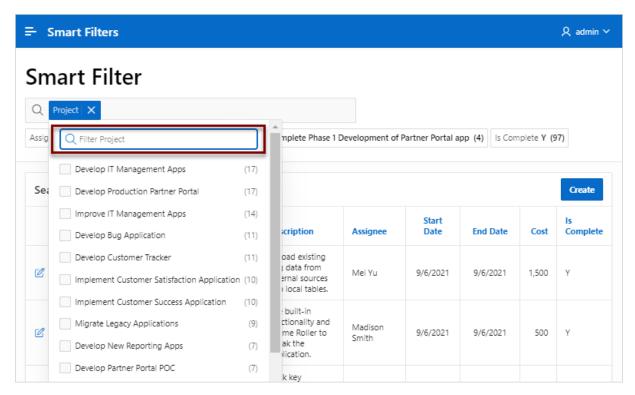


- 3. Update **P2\_PROJECT\_ID** and enable the Client-Side Filtering attribute:
  - In the Rendering tab, select the P2\_PROJECT\_ID filter (if not already selected).
  - b. In the Property Editor, find **List Entries** and enable **Client-Side Filtering**. Enabling this option renders a search field above the list entries.



c. Review your changes. Click Save and Run Page.

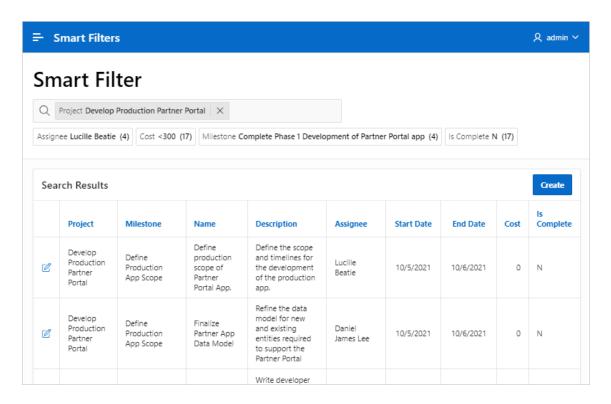
Click the name **Project** on the Project suggestion chip. Notice a **Filter Project** search field appears above the list.



- d. Test the new Filter Project field. For example, entering the keyword "develop" will update the Project list to only include filters containing that phrase.
- e. Click **Page XX** on the Runtime Developer Toolbar to return to Page Designer, where *XX* is the page number.
- 4. Only show Milestones for the selected Project by enabling the **Depending On** attribute.
  - a. In the Rendering tab locate the Search region and select the P2\_MILESTONE\_ID filter.
  - **b.** In the Property Editor, find **Depending On**, **Filter** and select **P2\_PROJECT\_ID**.
  - c. Review your changes. Click Save and Run Page.
    - The Smart Filters page appears. Note that the Milestone suggestion chip no longer displays.
  - d. Click Project on the Project suggestion chip and then select a project such as Develop Production Partner Portal

Note the Milestone suggestion chip displays again.





# 8.7 Managing Faceted Search

A faceted search page displays and filters data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region). Displays search results as cards or a classic report.

You can create a faceted search page with either the Create Application Wizard or Create Page Wizard.

- Example Faceted Search
  View an example faceted search page.
- About Creating Facet Search Pages
   Create a faceted search page by running either the Create Application Wizard or the Create Page Wizard.
- Creating Faceted Search Using the Create Application Wizard
  Run the Create Application Wizard to create a new application that contains a
  faceted search page.
- Creating Faceted Search Using the Create Page Wizard
   Run the Create Page Wizard to add a new faceted search page to an existing application.
- Creating a Faceted Search Manually
   Create a faceted search page by manually adding the page and facet components.
- Editing a Faceted Search Page
  Learn about how attributes can change faceted search page behavior.

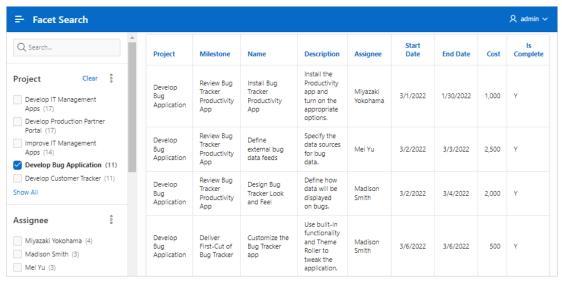


# 8.7.1 Example Faceted Search

View an example faceted search page.

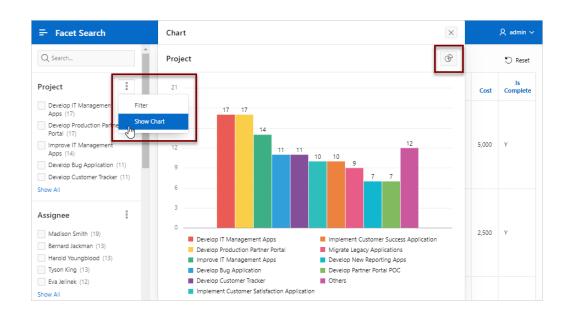
A faceted search page features a faceted Search region and report. The Search region displays on the left side of the page and enables users to narrow down the search result by selecting facet values. Narrowing the search result, makes it easier for users to find the data they want. The right side of the page features a Search Results region which can display as a classic report or cards report.

The following shows a faceted search page built on the EBA\_PROJECT\_TASKS table. In this example the Project, **Develop Bug Application**, is selected and the report displays 11 rows.



By default, when you create a facet that computes counts with a wizard, each facet that computes counts includes a chart based on the facet counts. Clicking the **three dots** context menu on the facet and then **Show Chart** displays a chart based on the facet counts in a popup dialog. You can toggle between a bar chart or a pie chart by clicking the chart icon in the upper right of the popup window.





#### Tip:

To view an example, install the sample app, *Sample Reporting*. To learn more, see Installing Apps from the Gallery.

# 8.7.2 About Creating Facet Search Pages

Create a faceted search page by running either the Create Application Wizard or the Create Page Wizard.

Both the Create Application Wizard and Create Page Wizard support the creation of a faceted search page which contains a left Search region and a report. You choose if the report is a classic report or a cards report.

#### **About Auto-Discovered Facets**

When you build a faceted seach page with either wizard, you can select a table or view on which to build the page. If you create the page based on a table, the facets are auto-discovered using the Data Dictionary Cache. In contrast, if you build the page on a view or a SQL query, the facets are not auto-discovered. Instead, the wizard creates a facet region which only searches VARCHAR2 columns.

#### **About the Data Dictionary Cache**

The Data Dictionary Cache report displays statistics and a data analysis of schema tables and caches in a workspace. Both the Create Application Wizard and Create Page Wizard use the Data Dictionary Cache when creating new applications and pages. You can preview how the wizards will render facets on the Data Dictionary Cache page by viewing the Table Column Cache report. The wizard uses the first top five facet search score columns with score greater than or equal to 20.

If a table changes due to DDL or DML modifications, the Oracle APEX nightly job ORACLE\_APEX\_DICTIONARY\_CACHE refreshes the Data Dictionary Cache. However, you can refresh the cache manually by navigating to the Data Dictionary Cache and

clicking either **Gather Statistics and Refresh Cache** or **Refresh Cache Only** at the workspace or table-level.



Accessing the Data Dictionary Cache Report from Workspace Administration or Accessing the Data Dictionary Cache Report from Administration Services in *Oracle APEX Administration Guide* 

# 8.7.3 Creating Faceted Search Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains a faceted search page.

A faceted search page can include a classic report or a cards report. If you select classic report, you can also choose to include an update form.



#### Tip:

If you are creating a faceted search page that displays as a report, clicking **Include Form** automatically creates a form page for creating or updating records. This option is not available in the Create Page Wizard.

To create an application that includes a faceted search page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- **6.** Appearance Accept the default or click **Set Appearance** to change it.
- 7. Click Add Page and select Faceted Search.
- 8. In the Add Faceted Search Page dialog:
  - a. Page Name Enter a name for this page.
  - **b.** Set Icon Select an icon to display in the navigation menu for this page.
  - c. Select a report type: **Report** or **Cards**.
  - d. Table Select a table.
  - e. What appears next depends upon whether you selected **Report** or **Card**.
    - If Report Select Include Form to include a form page for creating or updating records.
    - If Cards Select the display: Grid, Float, and Horizontal (Row).



Select the information to display on each card: **Title Column**, **Body Column**, **Icon Initials Column**, and **Badge Column**.

- f. Advanced Expand **Advanced** to configure these options:
  - Set as Home Page Enable this to make this page the home page for the application.
  - Page Help Enter text to be displayed when the user selects Page Help.
- g. Click Add Page.
- Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.

# 8.7.4 Creating Faceted Search Using the Create Page Wizard

Run the Create Page Wizard to add a new faceted search page to an existing application.

The Create Page Wizard offers a great deal of flexibilty. For all Data Sources (Local Database, REST Enabled SQL Service, or REST Data Source) and Source Types (Table/View or SQL Query), you can select the facet columns you want to include. If you choose a local table, the facets are auto-discovered and the wizard pre-selects facets columns based on Data Dictionary Cache.

To create a faceted search page using the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Faceted Search.
- 5. Under Page Definition:
  - **a.** Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- **6.** Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or

maintain REST Enabled SQL references, navigate to **Shared Components**, **REST Enabled SQL**.

 REST Data Source - Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- **7.** Source Type Specify the source of the new page. Options include:
  - Table:
    - Table /View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 9. Click Next.
- 10. Display As Select Report or Cards.
- **11.** Select the facets to include in the report.

Facet recommendations are based on statistics of data in your table. Click **Refresh** to refresh the column statistics to provide better recommendations.

12. Click Create Page.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



Understanding Page Types in the Create Page Wizard



## 8.7.5 Creating a Faceted Search Manually

Create a faceted search page by manually adding the page and facet components.

Using the Create Application Wizard or Create Page Wizard is the easiest way to create a faceted search page. However, you can create a faceted search page manually. At a minimun, creating a faceted search page manually involves the following steps:

- Create a classic report or cards region.
- Add a faceted search region.
- Add individual facets or facet groups to the search region.
- Add a reset button.

The following example creates a faceted search page which contains a classic report built on the EMP table. The EMP table is available in the sample dataset, EMP / DEPT.

To create a faceted search manually.

- 1. Run the Create Application Wizard:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Click the Create button.
  - c. Click New Application.

The Create Application Wizard appears.

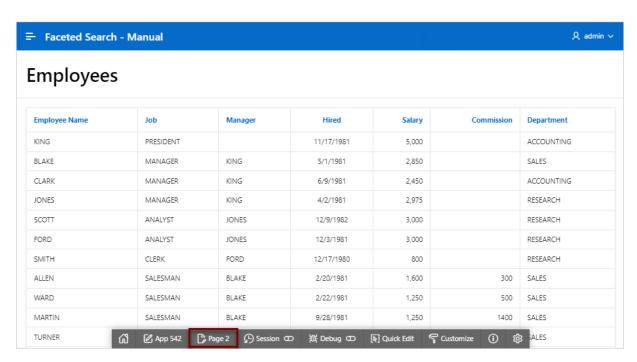
- 2. On Create an Application:
  - a. Set Icon Click Set Icon to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
  - Name Enter a name to identify the application. For example, enter Faceted Search - Manual
  - c. Appearance Accept the default Theme Style and menu layout (Vita, Side Menu). To change it, click the **Set Appearance** icon adjacent to the Appearance field.
  - d. Under Pages, click Add Page. Expand Additional Pages at the bottom of the window and select Classic Report.
  - e. On Add Report Page:
    - Page Name Enter a name for this page. For example, enter Employees
    - Set Icon Accept the default, or select an icon to display in the navigation menu for this page.
    - Table or View Select a table or view on which to build the page. Select EMP.
    - Click Add Page.
  - f. Click Create Application.

The Application home page appears.

3. View the new page.



- a. On the Application home page, select the new page, 2 Employees.
   The page displays in Page Designer.
- **b.** Click **Save and Run Page** on the right side of the Page Desiger toolbar.
- When prompted, enter your workspace username and password and click Sign In.
   A Employees report appears.



- **d.** Return to Page Designer. Click **Page X** on the Runtime Developer toolbar where *X* is the page number.
- 4. Add a search region:
  - In the Rendering tab (or left pane), right-click Components and select Create Region.
  - b. Select the new region. Edit the following Region attributes in the Property Editor (or right pane):
    - Identification, Title Enter Search
    - Identification, Type Select Faceted Search.
    - Source, Filtered Region Select Employees.
  - c. Update the region appearance:
    - Appearance, Template Options Click Use Template Defaults, Scroll Default.
       The Template Options dialog appears.
    - Common, General Select Remove Body Padding.
    - Common, Header Select Hidden but accessible.
    - Click OK.
- 5. Update the facet for searching multiple columns:
  - a. Select PX\_SEARCH where X represents the page number.



- b. Source, Database Column(s) Enter ENAME, JOB, MGR, DEPTNO
- c. Save your changes. Click **Save**.
- 6. Add a facet to filter the DEPTNO column:
  - a. In the Rendering tab, right-click **Facets** and select **Create Facet**.
  - **b.** Select the new facet and edit the following attributes in the Property Editor:
    - Identification, Name Enter PX\_DEPTNO where X represents the page number.
    - Identification, Type Accept the default, **Checkbox Group**.
    - Label, Label Enter Department
    - List of Values, Type Select SQL Query.
    - List of Values, SQL Query Enter SELECT dname, deptno FROM dept
  - c. Save your changes. Click **Save**.
- **7.** Add a facet to filter the MGR column:
  - a. In the Rendering tab, right-click **Facets** and select **Create Facet**.
  - **b.** Select the new facet and edit the following attributes in the Property Editor:
    - Identification, Name Enter PX MGR where X represents the page number.
    - Identification, Type Accept the default, Checkbox Group.
    - Source, Database Column Verify that the column is MGR.
    - Label, Label Enter Manager
    - List of Values, Type Select Shared Component.
      - The Create Application Wizard created a lookup list of values named  ${\tt EMP.ENAME}$  so that the  ${\tt MGR}$  column displays the manager name instead of the employee number.
    - List of Values, List of Values Select EMP.ENAME.
  - c. Save your changes. Click **Save**.
- 8. Add a facet to filter the JOB column:
  - a. In the Rendering tab, right-click **Facets** and select **Create Facet**.
  - **b.** Select the new facet and edit the following attributes in the Property Editor:
    - Identification, Name Enter PX JOB where X represents the page number.
    - Identification, Type Accept the default Checkbox Group.
    - Source, Database Column Verify that the column is **JOB**.
    - Label, Label Enter Job
    - List of Values, Type Select Distinct Values.
  - c. Save your changes. Click Save.
- **9.** Add a facet to filter the SAL column:
  - a. In the Rendering tab, right-click **Facets** and select **Create Facet**.
  - **b.** Select the new facet and edit the following attributes in the Property Editor:



- Identification, Name Enter PX SAL where X represents the page number.
- Identification, Type Select Range.
- Label, Label Enter Salary
- Source, Database Column Verify that the column is SAL.
- Source, Data Type Select NUMBER.
- Settings, Select Multiple Enble Select Multiple.
- c. Define the facet as a static list of values:
  - List of Values, Type Select Static Values.
  - List of Values, Static Value Click Display1, Display2.

In the Static Values dialog, define the following:

Row 1:

Display Value - Enter < 1000

Return Value - Enter | 1000

- Row 2:

Display Value - Enter 1000 to 3000

Return Value - Enter 1000 | 3000

Row 3:

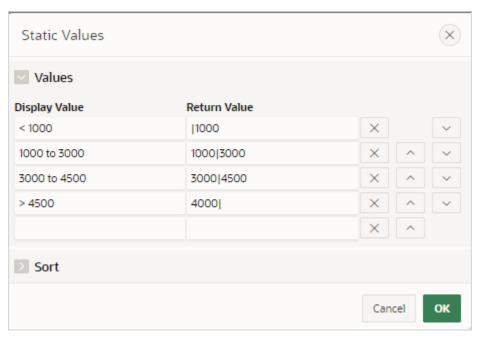
Display Value - Enter 3000 to 4500

Return Value - Enter 3000 | 4500

- Row 4:

Display Value - Enter > 4500

Return Value - Enter 4000|

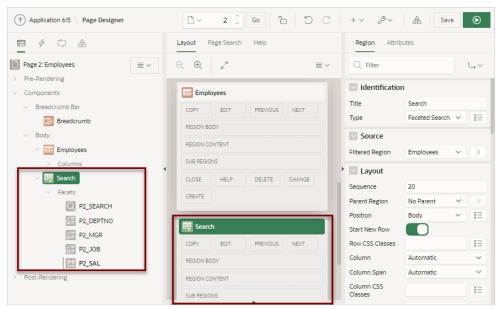


Click **OK** to save your changes.



d. Save your changes. Click Save.

Notice that the Search region displays below the Employees region.



Next, move the Employees report so it displays adjacent to the Search region.



#### Tip:

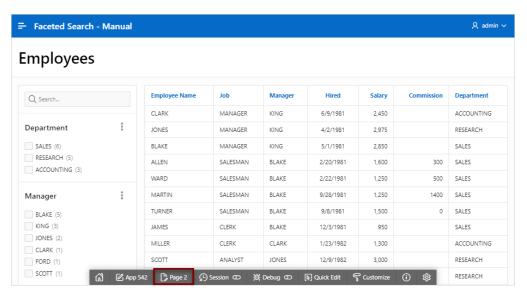
The procedure that follows explains how to reposition a region by editing Region attributes. You can also move components by selecting them in the Layout tab (central pane) and dragging and dropping them to a new position.

- 10. Select the **Employees** region and update the following Region attributes:
  - a. Layout, Sequence Enter 20
  - b. Start New Row Disable this option.

In the Layout tab, notice the Search and Employees regions now display adjacent to one another.

- 11. Make the Search region narrower and then update region appearance. Select the **Search** region and update the following Region attributes:
  - a. Layout, Column Enter 1
  - b. Layout, Column Span Select 3.
  - c. Save your changes. Click Save.
- 12. View the page.
  - a. Click **Save and Run Page** in the upper right corner.
  - b. If prompted, enter your workspace username and password and click **Sign In**.

The revised page appears. Notice that the Search region contains the following facets: Search, Department, Manager, and Salary.



c. Return to Page Designer. Click Page X on the Runtime Developer toolbar.

Next, add a button to refresh the page.

- **13.** Add a region to contain a reset button:
  - a. In the Rendering tab, right-click **Body** and select **Create Region**.
  - b. Select the new region. In the Property Editor under **Region**, edit the following attributes:
    - Identification, Title Enter Button Bar
    - Identification, Type Accept the default Static Content.
    - Layout, Sequence Enter 10
    - Appearance, Template Select Buttons Container.
  - c. Update the Appearance attributes:
    - Appearance, Template Options Click Use Template Defaults.
       The Template Options dialog appears.
    - Common, Body Padding Select No Padding.
    - Common, Style Select Remove UI Decoration.
    - Click OK.

#### **14.** Add a button:

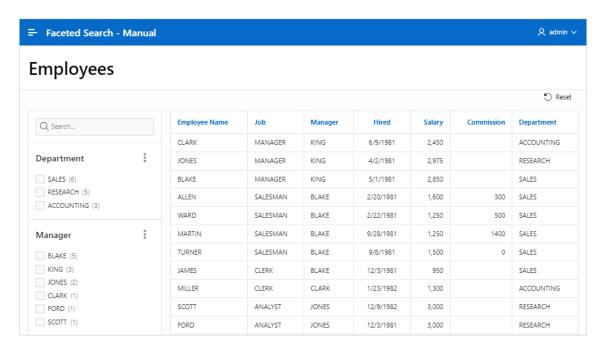
- a. In the Rendering tab, right-click the Button Bar region and select Create Button.
- b. Edit the button. Select the button and edit the following attributes in the Property Editor:
  - Identification, Button Name Enter RESET
  - Layout, Button Position Select Next.
- c. Update the Appearance attributes:
  - Appearance, Button Template Select Text with Icon.
  - Appearance, Template Options Click Use Template Defaults, Left.
     In the Template Options dialog:



- Common, Style Select Remove UI Decoration.
- Click OK.
- Appearance, Icon Click List of Values Icon and find and select faundo.
- d. Update the Behavior attributes:
  - Behavior, Action Select Redirect to Page in this Application.
  - Behavior, Target Click No Link Defined.

In the Link Builder - Target dialog:

- Target, Page Select the current page. For example, select 2.
- Clear/Reset, Clear Cache Select the current page. For example, select 2.
- Clear/Reset, Action Select Reset Regions.
- Click OK.
- e. Save your changes. Click Save.
- 15. View the revised page.
  - a. Click Save and Run Page.
  - b. If prompted, enter your workspace username and password and click Sign In. The faceted search page appears. Notice the new Reset button displays in the upper right above the report.



c. Test the page. Select facets and then click **Reset**.

# 8.7.6 Editing a Faceted Search Page

Learn about how attributes can change faceted search page behavior.





### Tip:

Many examples in this section are built on the EBA PROJECT TASKS table available in the sample dataset, Project Data, or the EMP table available in the sample dataset, EMP / DEPT. To install a sample dataset, see Using Sample Datasets in Oracle APEX SQL Workshop Guide.

Reviewing Faceted Search Page Components

Review the components that comprise a faceted search page by viewing attributes in Page Designer.

Understanding a Faceted Search Page

Learn about the regions that comprise a faceted search page.

**Editing Faceted Search Region Attributes** 

Edit region Attributes to change general search facet region behavior.

**Editing Facet Attributes** 

Edit facet attributes to change facet behavior.

Adding a New Facet

Add new facets in Page Designer by right-clicking Facet and selecting Create Facet from the context menu.

Adding a Facet on a Column Containing Multiple Values

Add a facet to filter a column storing multiple values.

**Creating Facet Groups** 

Create facet groups for data models having multiple flag columns.

**Configuring Single Facet Charts** 

Configure region and facet attributes to declaratively control how and if single facet charts display in the facet search region.

Editing the Static List of Values for a Range Facet Edit a range facet that displays as a static list of values.

### 8.7.6.1 Reviewing Faceted Search Page Components

Review the components that comprise a faceted search page by viewing attributes in Page Designer.

A faceted search page features a faceted region that enables users to narrow down the search results and displays the results in either a report or cards view.

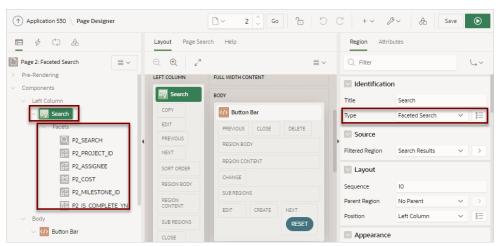
To review the components of a faceted search page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

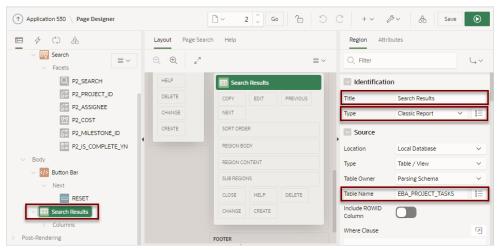
2. Review the Search region. In the Rendering tab under Left Column, locate and select the Search region.





Note the Search region Type is **Faceted Search**. The search fields display under **Facets**. Facets are similar to items but feature the following unique characteristics:

- Naming Conventions Facets use the same naming convention as items. By default, wizards prefix facet names with P<page no>\_<item name> (for example, P2 SEARCH).
- **Filtering on More Than One Column** Search facet type can filter based on more than one column and, when not external, is always at the top of the facets region.
- Associated with a Column Facets are associated with a column from the report region.
- Differences with Checkbox or Select List Facets The facet types such as Checkbox or Select List specify the UI for selecting or entering the facet values. They are not implemented the same as page items even if they have the same type name. For this reason, most dynamic actions do not apply to facets.
- Select a facet and explore the configurable options.To view Help, select the attribute and click the Help tab.
- Review the report region. In the Rendering tab, locate and select the report region (for example, Search Results).



In the previous example, note that the attributes indicate the report Type is a **Classic Report** built on the EBA\_PROJECT\_TASKS table in a local database.





**About Item Naming Conventions** 

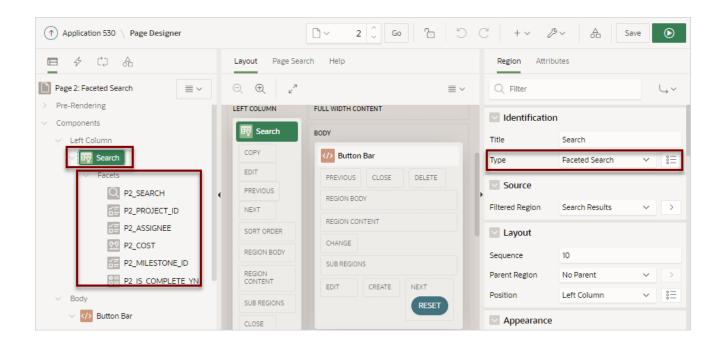
### 8.7.6.2 Understanding a Faceted Search Page

Learn about the regions that comprise a faceted search page.

### **About the Search Region**

A faceted search page features a Search region which enables users to narrow down the search result and a Search Results region which displays as either a classic report or cards report.

The **Search** region displays in the left pane or Rendering tab. Selecting the Search region displays attributes in the Property Editor. In the following image, the Search region **Type** is defined as **Faceted Search**. The **Filtered Region** attribute identifies the Search Results region. In this example, **Filtered Region** is as a classic report named **Search Results**.



#### Tip:

Remember that each attribute in the Property Editor has associated Help. To view Help, select the attribute in the Property Editor and then click the **Help** tab in the central pane. Help describing the attribute appears in the central pane.



#### **About Facets**

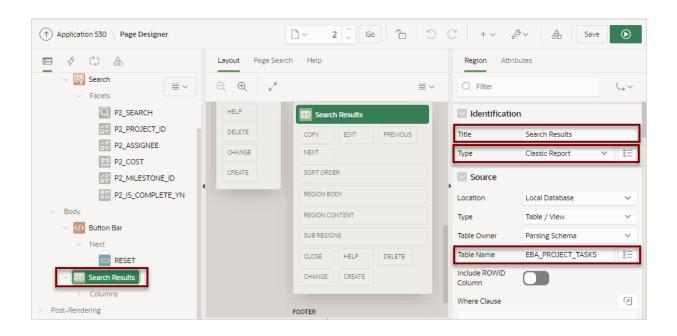
Search facets display under **Facets** in the Rendering tab. When you select a facet, the associated attributes display in the Property Editor. Facets use the same naming convention as items. By default, wizards prefix facet names using the following convention: P<page no>\_<item name>. For example, in the previous example, the first facet is named P2 SEARCH).

Facets are similar to items but feature the following unique characteristics:

- Filtering on More Than One Column The facet of type Search, generally called Search, can filter based on more than one column and, when not external always displays at the top of the facets region.
- Associated with a Column The facets are associated with a column from the report region.
- Differences with Checkbox or Select List Facets The facet types, such as Checkbox or Select List, indicate how UI enables the user to select or filter data.
   Facets are not implemented the same as page items even if they have a similar naming convention. For this reason, most dynamic actions do not apply to facets.

#### **About the Search Results**

A faceted search page includes a Search Results region which displays as either a classic report or cards report. In the following example, Search Results is a **Classic Report** built on the EBA PROJECT TASKS table.



#### **About Cards Page Search Results**

The Search Results in a faceted search page can display as a cards report. A cards page functions as a colorful way to display a subset of information and then enable the user to link to more detail. To create a link from a cards page, you create an action and then select an action type. You can create an action to link from a full card, a title, a



subtitle, media, or a button. To see an example, see Using Actions to Link from a Cards Page.



**About Item Naming Conventions** 

### 8.7.6.3 Editing Faceted Search Region Attributes

Edit region Attributes to change general search facet region behavior.

The following example demonstrates how to review and edit the region Attributes **Batch Facet Changes** and **Show Total Row Count**. **Batch Facet Changes** controls whether the report filtering executes as soon as a facet value changes, or individually by clicking an Apply button. **Show Total Row Count** determines if a row count value displays on the page. The following example built on the EBA\_PROJECT\_TASKS table available in the sample dataset, Project Data.

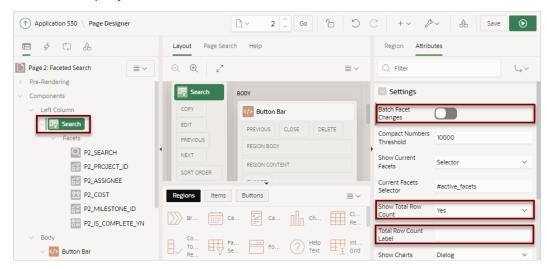


#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the Help tab in the central pane.

To edit Search facet region Attributes:

- 1. View the faceted search page in Page Designer.
- 2. View the Search region Attributes:
  - a. In the Rendering tab (or left pane), select the **Search** region.
  - b. In the Property Editor, select the Attributes tab.



#### 3. Enable Batch Facet Changes:

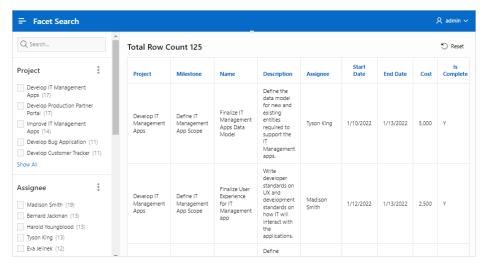
Batch Facet Changes controls how report filtering executes. When enabled and a user selects a facet, an Apply button appears under the facet. The user must click the Apply



button to apply the facet and filter the report. When disabled, the report filtering executes as soon as the facet value changes.

- a. In the Rendering tab (or left pane), select the **Search** region.
- b. In the Property Editor, select the **Attributes** tab.
- c. Under Settings, enable Batch Facet Changes.
- d. Click Save and Run Page.

A rendered version of the application appears.



e. In the Search region, select a project, such as **Develop Production Partner Portal**.

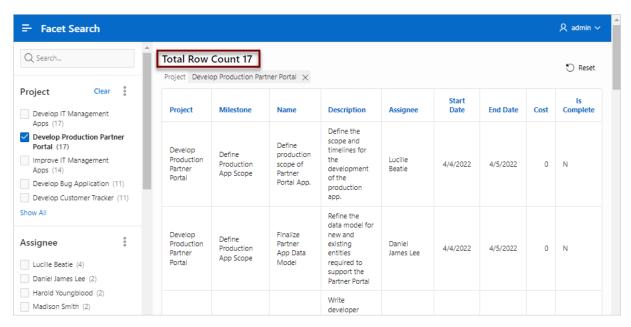
An Apply button appears.



Click Apply.

A revised report appears and a filter displays above report.





- g. Return to Page Designer by clicking Page XX on the Runtime Developer Toolbar.
- 4. Review the **Show Total Row Count** attribute.

When set to Yes, the total row count displays above the report. In the prevous illustration, this displays as Total Row Count 17.

- a. In the Rendering tab (or left pane), select the **Search** region.
- b. In the Property Editor, select the **Attributes** tab.
- c. Find Settings, Show Total Row Count. Options include:
  - No If No, the total row count does not display.
  - Yes If Yes, the total row count displays at the top of the current facets as shown in the previous illustration.

If Show Current Facets is a selector, the total row count displays whereever that selector is defined. The wizards by default create an element on the page called active\_facets and that is above the report. If Show Current Facets is **No** and Show Total Row Count is **Yes**, the total row count displays at the top of the facets region.

- Selector If Selector, the total row count displays wherever the selector is defined. This option enables you to place the total row count anywhere on the page.
- 5. Click Save or Save and Run Page.

### 8.7.6.4 Editing Facet Attributes

Edit facet attributes to change facet behavior.

The following example demonstrates how to review and edit the **Display Filter Initially** and **Depending On** attributes to change facet behavior. Enabling **Client-Side Filtering** adds a search field which enables users to filter the facet list. **Depending On** makes the display of one facet dependent upon another. The following example is also built on the EBA PROJECT TASKS table available in the sample dataset, Project Data.





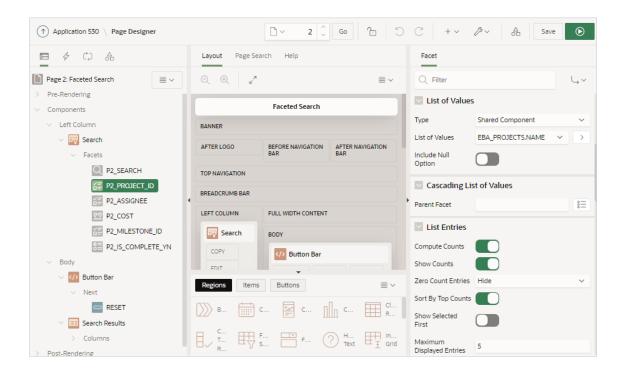
#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the Help tab in the central pane.

To view and edit facet attributes:

- 1. View the faceted search page in Page Designer.
- 2. View the facet attributes for the facet, **P2 PROJECT ID**:
  - a. In the Rendering tab (or left pane) locate the Search region and select the facet, P2\_PROJECT\_ID.
  - **b.** In the Property Editor (or right pane) find the **List of Values** group.

The **List of Values** group indicates that the P2\_PROJECT\_ID facet is a List of Values created as a Shared Component.





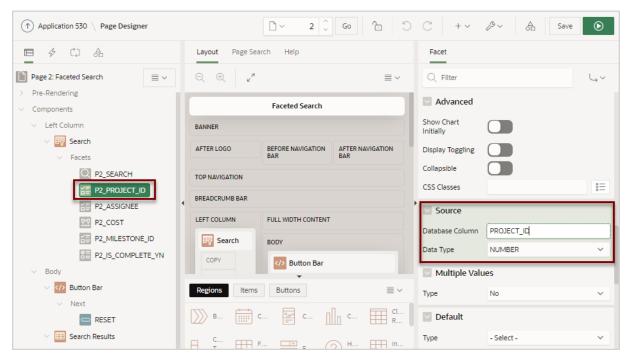
#### Tip:

The maximum amount of items which can be returned by an LOV, or by Distinct Values, is 5,000. If an LOV returns more than 5,000 items, faceted search cuts the LOV silently at 5,000 values. When logged in as a developer, Oracle APEX raises a runtime error once more than 2,000 LOV items are returned. These errors indicate that the LOV returns too many values for a useful faceted search UI.

c. In the Property Editor, find the **Source** group.

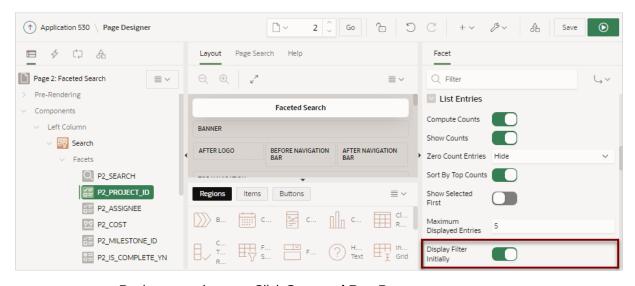


The **Source** group indicates that the P2\_PROJECT\_ID facet is based on the PROJECT ID column which has a data type of Number.



- 3. Update P2\_PROJECT\_ID and enable the Display Filter Initially attribute:
  - a. In the Rendering tab, select the P2\_PROJECT\_ID facet (if not already selected).
  - b. In the Property Editor, find **List Entries** and enable **Display Filter Initially**.

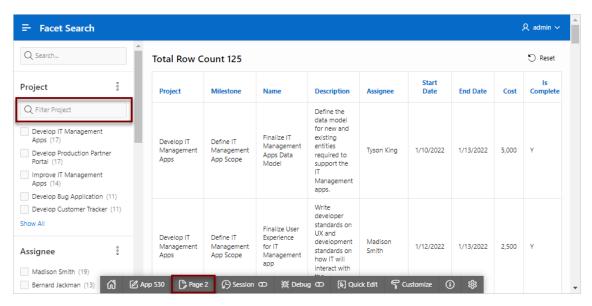
When **Display Filter Initially** is enabled, a filter field displays above the list entries. If the number of entries in the facet is less than the value on Maximum Displayed Entries, the filter field will not display.



c. Review your changes. Click Save and Run Page.

The faceted search page appears and a new Filter Project field appears.

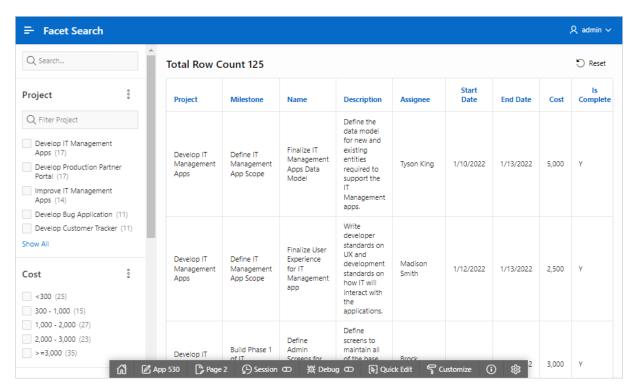




- **d.** Test the new Filter Project field. For example, entering the keyword "develop" will update the Project list to only include search facets containing that phrase.
- **e.** Click **Page XX** on the Runtime Developer Toolbar to return to Page Designer, where *XX* is the page number.
- **4.** Only show Assignees for the selected Project by enabling the **Depending On** attribute.
  - In the Rendering tab locate the Search region and select the P2\_ASSIGNEE facet.
  - b. In the Property Editor, find **Depending On**, **Facet** and select **P2\_PROJECT\_ID**.
  - c. Review your changes. Click Save and Run Page.

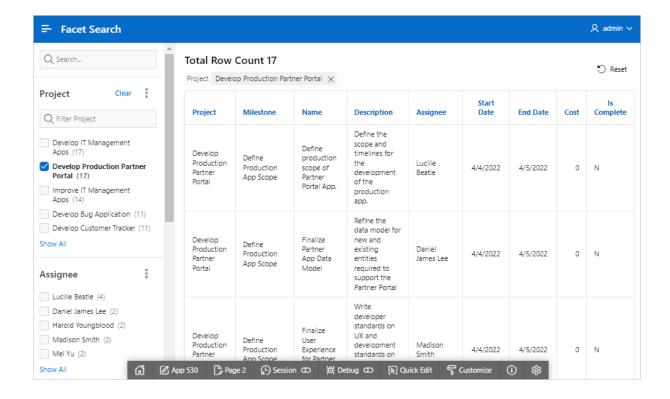
The faceted search page appears. Note that the Assingee list no longer displays.





d. Select a project such as **Develop Production Partner Portal**.

Note that the Assignee list now appears but only displays assignees associated with the **Develop Production Partner Portal** project.





### 8.7.6.5 Adding a New Facet

Add new facets in Page Designer by right-clicking Facet and selecting Create Facet from the context menu.

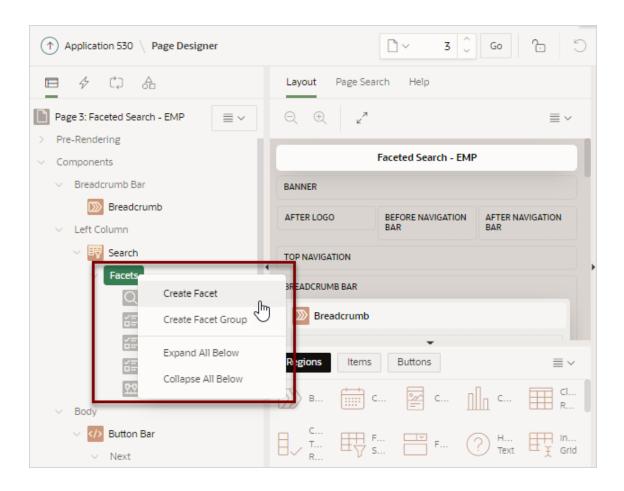
Facets map to specific database columns. When creating a new facet, you can create the following types: Checkbox Group, Input Field, Radio Group, Range, Search field, or Select List.

You can control the facet order in the UI by reordering the facets in the Rendering tab. Note there can be at most one Search type facet and if present it displays at the top of the faceted search region no matter where it resides in the Rendering tab.

The following example demonstrates how to create Input Field facet to filter employee salary that is less than or equal to the provided dollar amount. In this example, the Input Field facet maps to the SAL column in the EMP table available in the sample dataset, EMP / DEPT.

To create an Input Field facet:

- 1. View the faceted search page in Page Designer.
- 2. Create the new facet:
  - a. In the Rendering tab (or left pane), find the **Search** region.
  - b. Right-click Facets and select Create Facet from the context menu.





A new facet appears in the Rendering tab. In this example, the facet is named **P3 NEW**.

- 3. In the Rendering tab, select the new facet and then update the following attributes in the Property Editor (right pane):
  - a. Identification, Type Specify how this item is rendered. Select Input Field.
  - b. Label, Label Enter the label for the facet. The label displays on the page only if the facet displays. Enter:

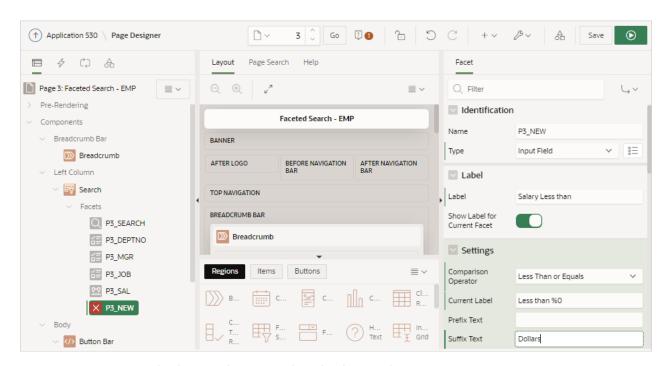
Salary Less than

- c. Settings, Comparison Operator Select a comparison operation. Select **Less Than** or **Equals**.
- d. Settings, Current Label Provide the text to be displayed for this facet in the current facets area. The current value must be referenced with the %0 placeholder. Enter:

Less than %0

e. Settings, Suffix Text - Provide text to be displayed after the input field. Enter:

Dollars



- Map the facet to the appropriate database column.
  - Source, Database Column Enter the case sensitive database column name used as the source for this facet. Since this facet maps to the SAL column, enter: SAL
  - Source, Data Type Select NUMBER.
- 5. Change the facet position so it displays after the **Search** facet.
  - Layout, Sequence Enter: 20



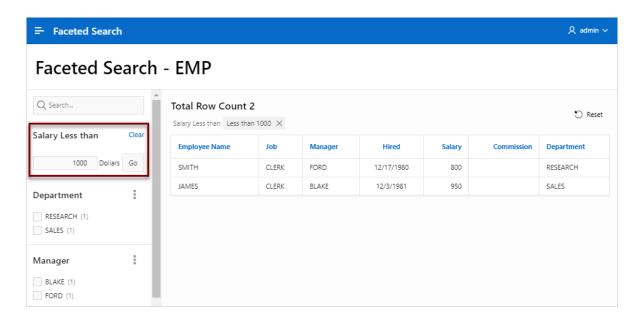


#### Tip:

You can also drag and drop the **P3\_NEW** facet in the Rendering tab to the appropriate location.

6. Review your changes. Click Save and Run Page.

The following example shows the new Input Facet in the Search region. In this example, the value 1000 is entered in the **Salary Less than** facet. The report in the Search Results region displays two employees that have a salary of less than \$1000.



### 8.7.6.6 Adding a Facet on a Column Containing Multiple Values

Add a facet to filter a column storing multiple values.



Creating a facet on a column containing multiple values requires Oracle Database release 12.2 or later. Using an earlier release raises an error.

Faceted Search supports the ability to filter columns storing multiple values as one string.

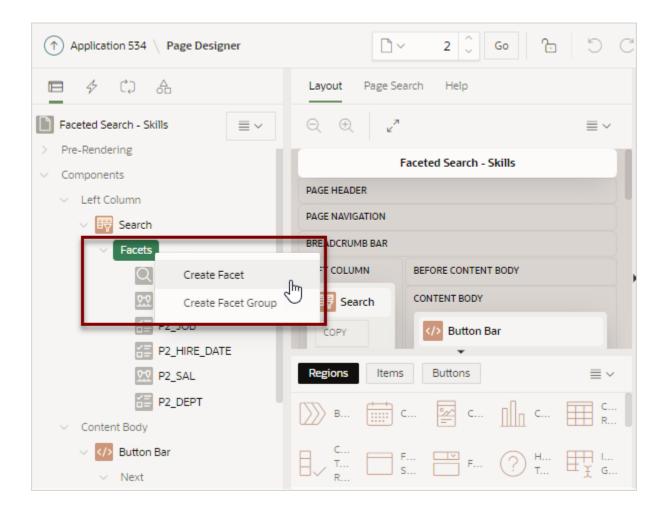
The following example demonstrates how to create a Checkbox Group facet which filters a column containing employee skills. The following example includes a Faceted Search page built on a table named EMP\_SKILLS. This example demonstrates how to create a Checkbox Group facet that maps to the SKILLS column which contains multiple values using a colon separator (for example, PLSQL:Spatial).

To add facet to filter a column storing multiple values:

1. View the faceted search page in Page Designer.



- 2. Create the new facet:
  - a. In the Rendering tab (or left pane), find the **Search** region.
  - b. Right-click Facets and select Create Facet from the context menu.



A new facet appears in the Rendering tab. In this example, the facet is named **P2 NEW**.

- 3. In the Rendering tab, select the new facet and then update the Identification and Label attributes in the Property Editor (right pane):
  - a. Identification, Name Enter the name of this item (for example, P2\_SKILLS).
    Item names must be valid Oracle identifiers. Oracle recommends that item names be no longer then 30 bytes so they can be used as bind variables in SQL Queries.
  - b. Identification, Type Specify how this item is rendered. Select **Checkbox Group**.
  - c. Label, Label Enter the label for the facet. The label displays on the page only if the facet displays. Enter:

Skills

- 4. Update List of Values attributes:
  - a. List of Values, Type Select Distinct Values.



- **Distinct Values** creates a list of values is based on an automatically generated query that selects the distinct column values.
- **b.** List of Values, Include Null Option Enable this option to include a NULL option at the top of the list.
- c. List of Values, Null Display Value Enter:

No Skills

- 5. Update the Multiple Values attributes:
  - Multiple Values, Type Determines whether the Source Column contains multiple values, and how these are encoded. For this example, select Delimited List.

Options include:

- No Column does not contain multiple values.
- **Delimited List** Column contains values as a delimited list. Example:

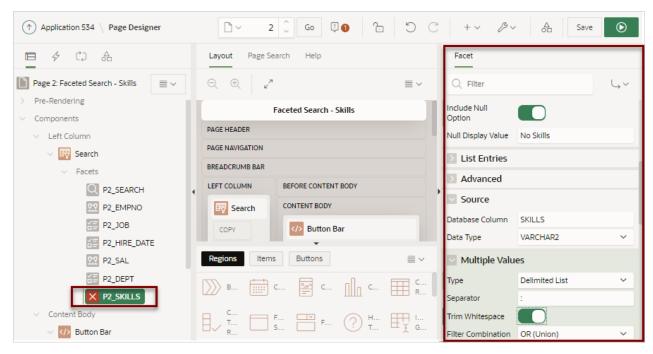
APEX, SQL, PL/SQL

 JSON Array - The Source column contains a JSON array of scalar values. APEX will raise error messages if the column contains invalid JSON syntax. Example:

APEX, SQL, PL/SQL

- **b.** Multiple Values, Separator Identifies the character which separates values from each other, such as a colon (:).
  - Double-quote (") and backslash ( $\setminus$ ) characters are not supported as a Value Separator.
- **c.** Multiple Values, Trim Whitespace Specify whether to trim leading and trailing whitespace from individual values after splitting.
  - Enabling **Trim Whitespace** increases the parsing effort and results in slower performance. Oracle recommends disabling this option. For larger data sets, consider data cleansing instead.
- **d.** Multiple Values, Filter Combination Specify how to combine individual values when filtering. For this example, select **OR** (**Union**).





6. Source, Database Column - Verify the case sensitive database column name used as the source for this facet. Since this facet maps to the SKILLS column, this attribute should display:

SKILLS

- 7. Change the facet position so it displays after the **P2\_SEARCH** facet.
  - Layout, Sequence Enter: 20

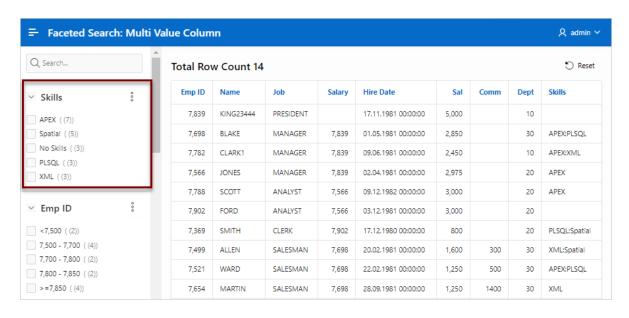


You can also drag and drop the **P2\_SKILLS** facet in the Rendering tab to the appropriate location.

8. Review your changes. Click Save and Run Page.

The following example shows a new facet labeled **Skills** which contains five checkboxes. Clicking a checkbox filters the report to only display only employees having the selected skill. In this example, no skills are selected.





# 8.7.6.7 Creating Facet Groups

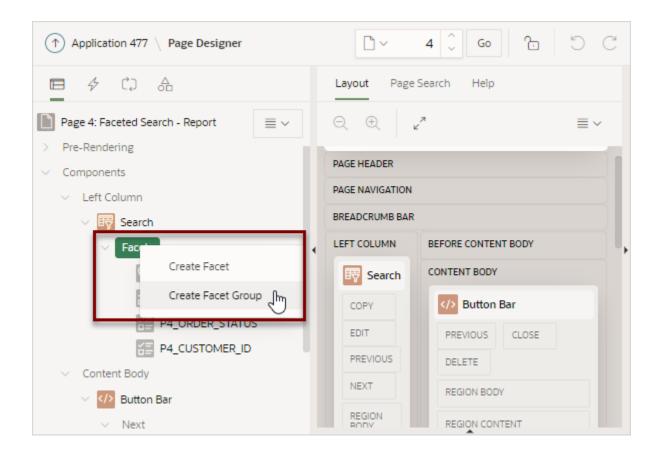
Create facet groups for data models having multiple flag columns.

Data models having multiple flag columns can result in a busy faceted search UI. Flag columns typically display two values such as Yes or No (for example, In Stock, Orderable, and so on). To streamline your faceted search UI, you can create a facet group which displays one facet that contains multiple checkboxes.

To create a facet group:

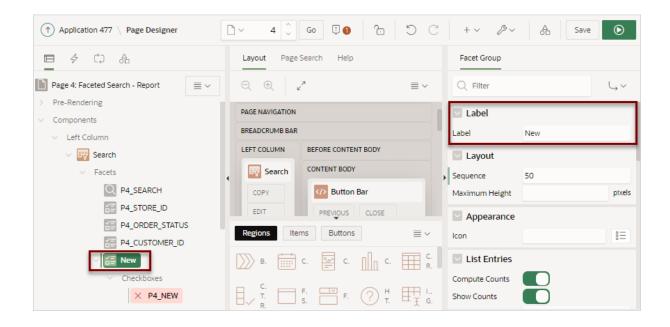
- 1. View the faceted search page in Page Designer.
- 2. In the Rendering tab (or left pane), find the **Search** region.
- 3. In the Rendering tab (or left pane), right-click **Facets** and select **Create Facet Group** from the context menu.





A Facet Group appears in the Rendering tab and a new checkbox named PX\_NEW.

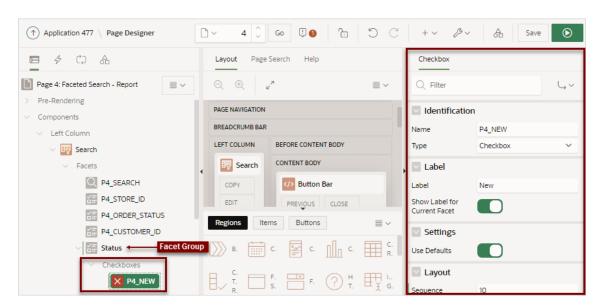
- 4. Update the label for the new facet group:
  - a. In the Rendering tab, select the new facet group, **New** (if not already selected).
  - **b.** In the Property Editor, edit the **Label** attribute.





#### 5. Edit the checkbox, PX\_NEW

a. In the Rendering tab, select the checkbox facet, PX NEW.



- **b.** In the Property Editor, edit the following Checkbox attributes:
  - · Identification, Name Update the name of this item.
  - Settings, Use Defaults Disable Use Defaults.

The Checked Value attribute appears.

- Settings, Checked Value Enter the value stored in the page item if the user checks the checkbox. The value can be up to 255 characters long.
- Source, Database Column Enter the case sensitive database column name used as the source for this facet.
- Source, Data Type Select the data type of the underlying database column.
- 6. Add more facet checkboxes:
  - a. In the Rendering tab (or left pane), right-click Checkboxes and select Create Checkbox.

A new checkbox named **PX\_NEW** appears.

- b. In the Property Editor (or right pane), edit the following Checkbox attributes:
  - Identification, Name Update the name of this item.
  - Settings, Settings Select Custom.
  - Settings, Checked Value Enter the value stored in the page item if the user checks the checkbox. The value can be up to 255 characters long.
  - Database Column Enter the case sensitive database column name used as the source for this facet.
  - Data Type Select the data type of the underlying database column.
- 7. Repeat the previous step until all facet checkboxes have been added.
- 8. Review your changes. Click Save and Run Page.



### 8.7.6.8 Configuring Single Facet Charts

Configure region and facet attributes to declaratively control how and if single facet charts display in the facet search region.

By default, when you create a facet that computes counts with a wizard, each facet that computes counts includes a chart based on the facet counts. When users click the three dots context menu on the facet and then **Show Chart**, a chart displays in a popup dialog. Users can toggle between a bar chart and pie chart by clicking the chart icon on the right side of the dialog. You can configure region and facet attributes to control if these charts appears.



To view an example of a single chart based on the facet counts, see Example Faceted Search.

To configure region and facet attributes to control facet charts:

- 1. Edit faceted search region attributes:
  - a. In the Rendering tab (or left pane), select the **Search** region.
  - b. In the Property Editor (right pane), select the Attributes tab.
  - c. Settings, Show Charts Specifies where facet value charts are shown. Options include:
    - Dialog Facet value charts are shown in a non-modal dialog. Adds the Show Chart action on the Facet Context Menu in the facet header. When the user clicks the Show Chart action, a popup dialog displays the chart.
    - No The Show Chart action is not displayed on Facet Context Menu in the facet header.

Also, when this attribute is set to **No**, the facet attributes **Chart** and **Show Chart Initially** are not applicable.

• **Selector** - Specify the selector for an element you place somewhere on the page. When the user clicks the **Show Chart** action, the chart is added to this element. This option enables you to place the charts in a dashboard like area just about anywhere on the page.

For example, suppose you added a static content region somewhere on the page and added a < div> with an id like this:

```
<div id='facetDashboardArea'></div>
```

Then in the Charts Selector attribute you would enter:

#facetDashboardArea

d. Settings, Display Chart for Top N Values - Use this attribute to control the maximum number of values to display in the chart for each facet. A value of 10 means that the facet charts will show at most the first 10 items. If the facet has the Sort By Top Counts attribute On then this will be the 10 largest count values.





#### Tip:

You may need to reset the region before changes to **Display Chart for Top N Values** appear because the current set of visible charts is stored in browser session storage.

- 2. Configure facet attributes.
  - a. In the Rendering tab locate the **Search** region and select a facet.
  - **b.** In the Property Editor, review the following facet attributes:
    - List Entries, Compute Counts Single facet charts are based on facet counts. Note that **Compute Counts** must be enabled for the **Show Chart** action to display on the facet context menu in the facet header.
    - List Entries, Show Chart Enable or disable this option to show or hide the Show Chart action in the facet context menu.
    - List Entries, Show Chart Initially Enable this option to have the chart display initially. Charts can only display initially if the Show Charts attribute is set to Selector.



#### Tip:

You may need to reset the region before changes to **Show Chart Initially** appear because the current set of visible charts is stored in browser session storage.

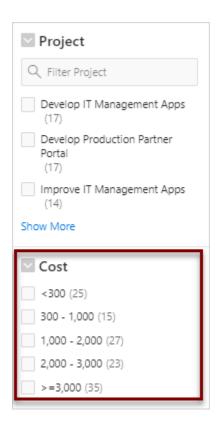
3. Click Save or Save and Run Page.

# 8.7.6.9 Editing the Static List of Values for a Range Facet

Edit a range facet that displays as a static list of values.

The following example demonstrates how to edit a facet that renders as a static list of values. The following example is built on the COST column of the EBA\_PROJECT\_TASKS table available in the sample dataset, Project Data. This example demonstrates how to update the Cost list shown in the following illustration so that the first two rows display in increments of 500 instead of 300.

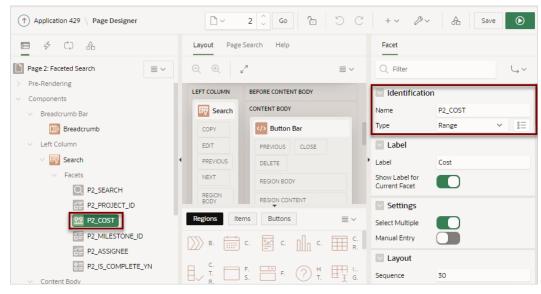




To edit a facet that displays as a static list of values:

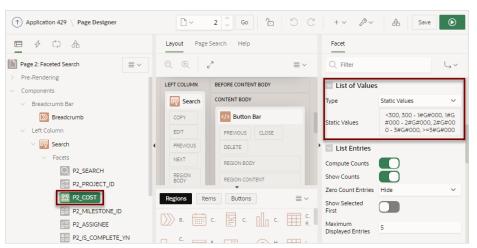
- 1. View the faceted search page in Page Designer.
- In the Rendering tab (or left pane) locate the Search region and select the facet, for example P2\_COST.

In the Property Editor (or right pane) note that the **Type** attribute indicates that P2\_COST is defined as a **Range**.

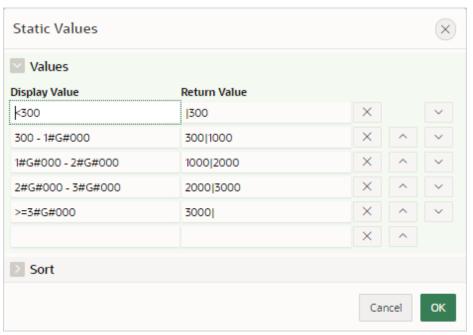


- 3. Edit the List of Values:
  - a. Find the List of Values group.
  - b. Click Static Values.





The Static Values dialog appear.



To avoid hard-coding a specific separator in the Display Value, the Static Values dialog uses substitution strings which are replaced with the appropriate NLS separator at runtime.

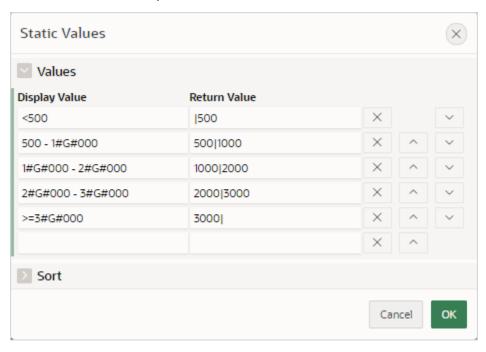
In this example, the substitution string #G# is replaced with the NLS Group Separator, comma (,). Other lists can include a #D# substitution string which is replaced at runtime with the NLS Decimal Separator.

Therefore, in this example 1#G#000 - 2#G#000 displays at runtime as 1,000 - 2,000.

- c. Update the Display Values and Return Values of the first two facets to use increments of 500:
  - Row 1:
    - Display Value Update <300 to <500</li>
    - Return Value Update | 300 to | 500
  - Row 2:



- Display Value Update 300 1#G#000 to 500 1#G#000
- Return Value: Update 300|1000 to 500|1000



- d. Click Ok to accept the changes.
- 4. Review your changes. Click Save and Run Page.

The revised facets search page displays. Note the first two facets in the Cost list display as <500 and 500 - 1,000.



# 8.8 Managing Interactive Grids

An interactive grid presents data in a searchable, customizable report. Includes similar customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.

- Example Interactive Grid
   View interactive grid examples.
- Creating an Interactive Grid Using the Create Application Wizard
  Run the Create Application Wizard to create a new application that contains one or
  multiple interactive grid report pages.



- Creating an Interactive Grid Using the Create Page Wizard
  Run the Create Page Wizard to add a new interactive grid page to an existing
  application.
- Creating Master Detail from an Existing Interactive Grid
   Create a single page master detail which includes two editable interactive grids based on two related tables or views.
- Managing Interactive Grid Region Attributes
   Edit region attributes to alter the SQL source, change the region layout and appearance, define a region displays selector, and create region conditions.
- Managing Interactive Grid Attributes
   Edit interactive grid Attributes to control how an interactive grid works.
- Managing Interactive Grid Column Attributes
   Edit column attributes to control the display, features, and behavior of interactive grid columns.
- About Customizing Interactive Grids in a Running Application
   When running an application, users can alter the report layout using Column
   menus and sort options, rearrange columns by dragging and dropping, and
   change how data displays using options on the Actions menu.
- Saving Interactive Grid Reports
   After users customize an interactive grid they can save it as either a Private or Public report.
- Linking to Interactive Grid Reports
   Developers can use the syntax in the Request value and ItemNames section of the URL to link to interactive grid report.

### See Also:

- Creating a Report Using the Create Page Wizard
- Using Interactive Grids in Oracle APEX End User's Guide
- Making an Existing Interactive Grid Editable

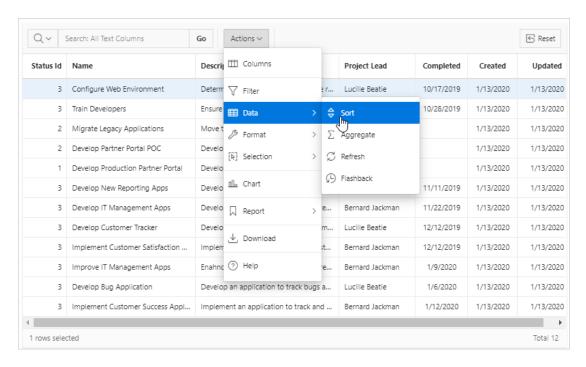
## 8.8.1 Example Interactive Grid

View interactive grid examples.

An interactive grid presents users with a set of data in a searchable, customizable report. Functionally, an interactive grid includes most customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse and keyboard. Users can lock, hide, filter, freeze, highlight, sort individual columns, and create control breaks on specific columns using the **Actions** and **Column Heading** menus. Advanced users can define breaks and aggregations against columns. Users can also directly customize the appearance of an interactive grid. Users can use the mouse and keyboard to resize the width of a column and drag and drop columns into different places in the grid. Once customized, the report can be saved as either a private or public report. Both the Create Application Wizard and Create Page Wizard support the creation of interactive grids.

The following is an example of an interactive grid.

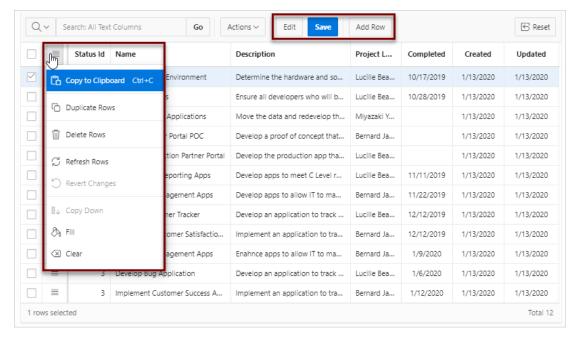




#### **Editable Interactive Grid**

Developers have the option of making an interactive grid editable. In an editable interactive grid, users can also add to, modify, and refresh the data set directly on the page. Editable interactive grids include additional controls. A Row Actions menu displays at the start of each row and enables users to add, edit, and refresh rows. Edit, Save, and Add Row buttons also display to the right of the Actions menu.

The following is an example of an editable interactive grid.







#### Tip:

To view an example, install the sample app, *Sample Interactive Grids*. To learn more, see Installing Apps from the Gallery.

### See Also:

- Using Interactive Grids in Oracle APEX End User's Guide
- Making an Existing Interactive Grid Editable

## 8.8.2 Creating an Interactive Grid Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains one or multiple interactive grid report pages.

To create an interactive grid using the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click Set Appearance to change it.
- 7. To add a report, click Add Page and select Interactive Grid.
- 8. On Add Interactive Grid Page:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - **c.** Page Source Select the source for the report:
    - Table or View
    - SQL Query

What you select determines what displays next. Follow the on-screen instructions. To learn more about an attribute, click the Help icon in the lower left corner.

- d. Determine if the report is editable. Select either:
  - Allow Editing
  - Read Only
- e. Advanced Expand Advanced to configure these options:
  - Set as Home Page Enable this to make this page the home page for the application.



- Set as Administration Page Enable this to have this page display under Administration.
- Page Help Enter text to be displayed when the user selects Page Help.
- f. Click Add Page.
- Features Select features to include with the application. Features provide applicationlevel functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.



Creating a Report Using the Create Page Wizard

## 8.8.3 Creating an Interactive Grid Using the Create Page Wizard

Run the Create Page Wizard to add a new interactive grid page to an existing application.

To create an interactive grid page by running the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Interactive Grid.
- 5. Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- **d.** Include Form Page Enable this flag to create a form page along with the report page.

Form pages are always created as Modal Dialog pages. Enabling this flag displays additional attributes. To learn more about an attribute, see field-level Help.

**6.** Data Source - Select a Data Source for the page:



- **Local Database** Data is sourced from the local database.
- REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to **Shared Components**, **REST Enabled SQL.**
- REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources. navigate to **Shared Components**, **REST Data Sources**.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is Local Database.

#### **7.** Source Type:

a. Specify the source of the new page. Options include:

#### Table:

- Table /View Owner Select the owner of the table on which you are building the page.
- Table/View Name Select the table or view on which the page will be based.

### SQL Query:

- Enter a SQL SELECT statement Enter the SQL guery. To see an example, expand the **SQL Query Example** region.
- **b.** Editing Enabled Select whether to enable editing for this interactive grid.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see fieldlevel Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - b. Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 9. Click Create Page.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



Understanding Page Types in the Create Page Wizard



## 8.8.4 Creating Master Detail from an Existing Interactive Grid

Create a single page master detail which includes two editable interactive grids based on two related tables or views.

You can define any number of master detail relationships on a single page by simply adding a related interactive grid to the page. If you have an existing interactive grid, you can add another related interactive grid by doing the following:

- Create the parent interactive grid.
- Define the primary key (if needed).
- Create the child interactive grid.
- For the child interactive grid, specify the Master Region and Master Column.

The following example demonstrates how to create an interactive grid on the departments table, <code>OEHR\_DEPARTMENTS</code> by running the Create Page Wizard. This wizard creates the parent interactive grid and enables you to define the primary key. Then, you create a child interactive grid on the employees table, <code>OEHR\_EMPLOYEES</code>. The <code>OEHR\_DEPARTMENTS</code> and <code>OEHR\_EMPLOYEES</code> tables are available in the sample data set, <code>HR</code> Data.

To add a related interactive grid below an existing grid:

- 1. Create an application.
- 2. Create the first interactive grid on the OEHR DEPARTMENTS table:
  - a. On the Application home page, click Create Page
  - b. Under Component, select Interactive Grid.
  - c. Name Specify a text name for this page (for example, Departments).



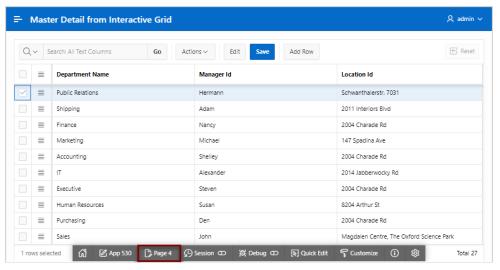
#### Tip:

This text is also used for report region Title. After page creation, you can modify the Title in Page Designer.

- d. Page Mode Select Normal.
- e. Include Form Page Disable this flag.
- f. Data Source Select Local Database.
- g. Source Type Select Table.
- h. Table /View Name Select OEHR\_DEPARTMENTS (table).
- i. Editing Enabled Enable this flag to make this interactive grid editable.
- j. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
- k. Click Next.
- 3. Primary Key Column 1 Accept the default.
- 4. Click Create Page.
- 5. Click Save and Run Page to view a rendered version of the parent interactive grid.

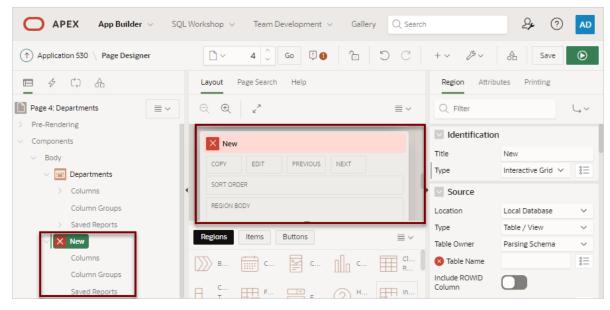


This following image shows an editable interactive grid created on the  ${\tt OEHR\_DEPARTMENTS}$  table.



- 6. Return to Page Designer. Click **Page X** on the Runtime Developer toolbar, where *X* is the page number.
- 7. Create the child interactive grid on the OEHR EMPLOYEES table:
  - a. In the Gallery, locate the Regions tab.
  - Under Regions, find and then right-click Interactive Grid.
  - c. Select Add To, Body, the region, Departments, and then After.

The Rendering tab and Layout tab both display the new region.



- 8. Edit the New child region:
  - a. In the Rendering tab, select the **New** region (if not already selected).
  - b. In the Property Editor, edit the region attributes:



### Note:

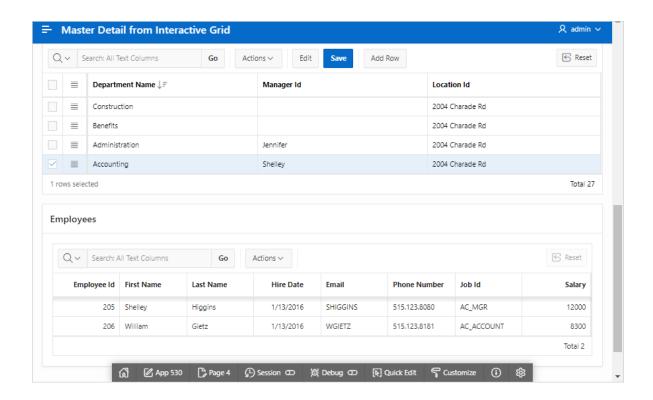
To find a group or attribute, enter keywords in the Filter field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.

- Identification, Title Enter Employees.
- Source, Type Select SQL Query.
- Source, SQL Query Enter the query:

```
select OEHR_EMPLOYEES.EMPLOYEE_ID as EMPLOYEE_ID,
OEHR_EMPLOYEES.FIRST_NAME as FIRST_NAME,
OEHR_EMPLOYEES.LAST_NAME as LAST_NAME,
OEHR_EMPLOYEES.HIRE_DATE as HIRE_DATE,
OEHR_EMPLOYEES.EMAIL as EMAIL,
OEHR_EMPLOYEES.PHONE_NUMBER as PHONE_NUMBER,
OEHR_EMPLOYEES.JOB_ID as JOB_ID,
OEHR_EMPLOYEES.SALARY as SALARY,
OEHR_EMPLOYEES.DEPARTMENT_ID as DEPARTMENT_ID
from OEHR_EMPLOYEES
```

- Layout, Start New Row Select On.
- Appearance, Template Select Standard
- Master Detail, Master Region Select the region, Departments.
- For the child interactive grid, Employees, define DEPARTMENTS as the Master Column:
  - In the Rendering tab, under the child interactive grid, Employees, expand the Columns node and select DEPARTMENT\_ID.
  - **b.** In Property Editor, edit the following:
    - Find Master Detail.
    - For Master Column, select **DEPARTMENT\_ID**.
- 10. Click Save. To run the page, click Save and Run Page.





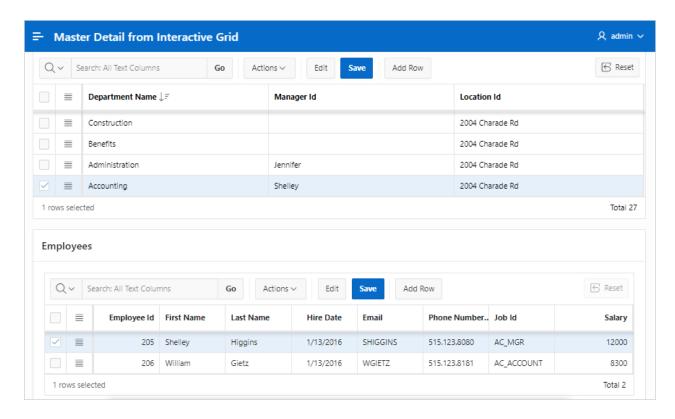
Note that parent the parent report, **Department**, filters the results in **Employees**, the child report.

Next, make the child report, Employees, editable.

- 11. Make Employees report editable:
  - **a.** Access Page Designer. Click **Page X** on the Runtime Developer toolbar, where *X* is the page number.
  - **b.** In the Rendering tab, select the **Employees** region.
  - c. In the Property Editor, click the Attributes tab.
  - d. In the Property Editor, edit the following:
    - Edit, Enabled Select On.
    - Allowed Operations Verify the following operations are enabled: Add Row, Update Row, and Delete Row.
- **12.** Define the EMPLOYEE ID column as the Primary Key Column:
  - In the Rendering tab, under Employees, expand Columns and select EMPLOYEE\_ID.
  - **b.** In the Property Editor, find **Source**, and turn **Primary Key** to **On**.
- 13. Click Save. To run the page, click Save and Run Page.

The child interactive grid, Employees, is now editable





## 8.8.5 Managing Interactive Grid Region Attributes

Edit region attributes to alter the SQL source, change the region layout and appearance, define a region displays selector, and create region conditions.

- Editing Interactive Grid Region Attributes
   Edit interactive grid region attributes in Page Designer.
- Displaying Interactive Grids Conditionally
   Dispay interactive grids conditionally by editing region attributes.

See Also:

Editing Pages in Page Designer

## 8.8.5.1 Editing Interactive Grid Region Attributes

Edit interactive grid region attributes in Page Designer.

To edit interactive grid region attributes:

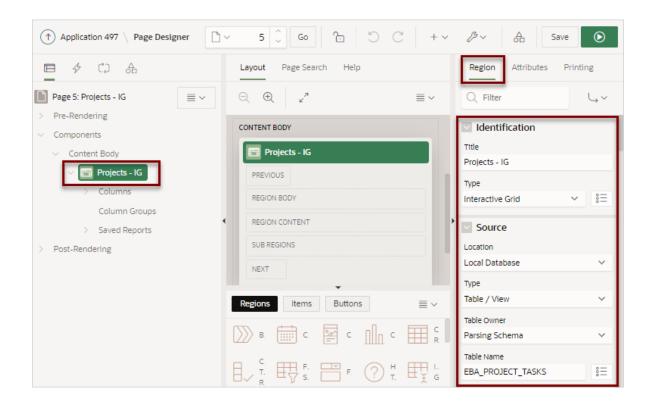
- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.



2. In the Rendering tab, select the region.

In the Property Editor, the **Region** tab displays the attributes. Attributes are organized in groups.



Use region attributes to alter the SQL source, change the region layout and appearance, create a master detail, define a region displays selector, or create conditions.

- **3.** To find a group or attribute:
  - Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
  - Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 4. Edit the appropriate attributes.



To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

To save your changes click Save. To save and run the page, click Save and Run Page. See Also:

Right Pane of Page Designer (Property Editor)

### 8.8.5.2 Displaying Interactive Grids Conditionally

Dispay interactive grids conditionally by editing region attributes.

To display an interactive grid conditionally:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the region.

The Property Editor displays the **Region** tab. Attributes are organized in groups.

- Edit Server-side Condition:
  - a. Find the Server-side Condition group.
  - b. Type Select a condition type and follow the on-screen instructions.

The UI changes based on the Type you select.



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

4. To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.6 Managing Interactive Grid Attributes

Edit interactive grid Attributes to control how an interactive grid works.

- Editing Interactive Grid Attributes
   Edit interactive grid Attributes in Page Designer.
- Making an Existing Interactive Grid Editable
   Make an existing interactive grid editable by configuring attributes in the Edit group.
- Controlling Interactive Grid Pagination
   Pagination provides the end user with information about the number of rows displayed
   and the current position within the result set.
- Customizing the Interactive Grid Toolbar
   Configure what controls display on the interactive grid toolbar.
- Enabling Users to Save Interactive Grid Public Reports
   Enable users to save an interactive grid as a Public report.



- Enabling Flashback and Charts
   Enable users to utilize flashback queries and define a chart in an interactive grid.
- Configuring Interactive Grid Download Formats
   Enable users to download an interactive grid to specified download formats.
- Enabling Icon View in an Interactive Grid
   Learn how to enable Icon View in an interactive grid.
- Enabling Detail View in an Interactive Grid
   Learn how to enable Detail View in an interactive grid.

### 8.8.6.1 Editing Interactive Grid Attributes

Edit interactive grid Attributes in Page Designer.

To edit interactive grid Attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, select the region containing the interactive grid.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups.



### Tip:

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

**4.** Edit the appropriate attributes.



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

To save your changes click Save. To save and run the page, click Save and Run Page.



#### See Also:

Right Pane of Page Designer (Property Editor)



### 8.8.6.2 Making an Existing Interactive Grid Editable

Make an existing interactive grid editable by configuring attributes in the Edit group.

End users can alter the report layout of an interactive grid using Column menus and sort options, rearrange columns by dragging and dropping, and change how data displays using options on the Actions menu. However, developers determine whether the underlying data is read-only or editable by users. When an interactive grid is editable, end users can edit the underlying data, add rows, delete rows, and refresh rows. By default, editable interactive grids include a Save button on the toolbar.

To make an interactive grid editable:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- 3. In the Property Editor, select the Attributes tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- 4. In the Property Editor Attributes tab, find the Edit group and update the following attributes:
  - a. Enabled Select On.
    - Selecting **On** automatically creates a process to process the records.
  - Allowed Operations Select supported data manipulation operations. Options include: Add Row, Update Row, Delete Row
  - c. Allowed Row Operations Column Select a column where the column value indicates if the row can be updated and/or deleted.
  - d. Lost Update Type Select how to protect data against lost updates.

Lost updates occur when two or more users try to update the same data, and the last update overwrites updates made by the previous user. To prevent this, updates can check the existing column value(s) in the database with the value(s) retrieved when the record was originally queried. For an example, see Page Designer Help.

Lost Update Type options include:

- Row Values A checksum value is calculated for each row, when initially querying the data. The checksum is calculated by concatenating all of the updateable columns into a string and then generating a unique value. When committing the updated record, this checksum is compared to the checksum value.
- Row Version Column If your database table includes a column which is
  incremented every time a record is updated, preferably by a database trigger,
  then this column can be used instead of calculating checksums. Oracle does not
  recommend this option if your interactive grid updates data in multiple tables.
- e. Add Row If Empty Specify whether to add a new row if the interactive grid currently has no records returned. When enabled, the No Data Found message never displays since there will always be at least one record. If no updates are made to the record that was added it will not be inserted when the region is saved.
- To save your changes click Save. To save and run the page, click Save and Run Page.



## 8.8.6.3 Controlling Interactive Grid Pagination

Pagination provides the end user with information about the number of rows displayed and the current position within the result set.

To change interactive grid pagination:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate the region containing the interactive grid.
- 3. Under the region, select the **Attributes** node.

The Property Editor displays the attributes. Attributes are organized in groups.

4. Find Pagination.

Pagination attributes provide the end user with information about the number of rows displayed and the current position within the result set.



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 5. Under Pagination, edit the following attributes:
  - a. Type Select an option:
    - Page Rows display based on what the end users select in the Actions menu, Format, Rows per Page option. If there are additional rows, controls are added to the report footer which enables users to navigate forwards and backwards between row sets.
    - **Scroll** Rows display to fill the height of the interactive grid. As the end user scrolls, additional rows display as needed.
  - **b.** Show Total Row Count Select **Yes** or **No**.

Selecting **Yes** displays the total row count in the report footer. Enabling this option requires an additional query which may hinder performance on very large data sets

To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.6.4 Customizing the Interactive Grid Toolbar

Configure what controls display on the interactive grid toolbar.

All interactive grids include a toolbar at the top of the page. Developers can customize what controls display on the toolbar or remove it.

Some of the options described in this procedure only apply if the interactive grid is editable. See Making an Existing Interactive Grid Editable.

To customize the interactive grid toolbar:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate the region containing the interactive grid.
- 3. Under the region, select the **Attributes** node.

The Property Editor displays the attributes. Attributes are organized in groups.



### Tip:

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, click **Go to Group** and select the group.

- In the Property Editor, find the **Toolbar** group and edit the following:
  - a. Show Select **Yes** or **No** to determine if a toolbar displays above the report.
  - **b.** Controls Configure the following:
    - Search Column Selection Displays a drop down list of displayed non-numeric columns. If a column is selected, then the search is only performed against the values in the selected column.
    - Search Field Displays a text field in the search bar used to enter search criteria.
    - Actions Menu Displays the Actions menu button, which generally includes a comprehensive set of options. These options enables the end user to customize the report based upon the functions you make available.
    - Reset Button Displays the Reset button. When clicked, any customizations, such as filters, column width, and ordering, are removed, and the report definition is reloaded from the server.
    - Save Button Saves changes made to the interactive grid, without needing to save the whole page. The **Save Button** only displays when an interactive grid is editable and the end user has authorization to add, update or delete.
  - c. Add Button Label Only displays when the interactive grid is editable. For Add Button Label, enter an alternative label for the Add button. The default label is Add Row.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



### 8.8.6.5 Enabling Users to Save Interactive Grid Public Reports

Enable users to save an interactive grid as a Public report.

Users can save an interactive grid as a Public report if the report developer enables that capability. Public reports display in a select list of available reports on the toolbar and are available to all users. However, only the user who creates a Public report can save, rename, or delete it. You can further restrict who can save Public reports by selecting an authorization scheme.



#### Tip:

The Save Public Report attribute is only available to authenticated users and can be further restricted by the defined Authorization scheme. See Establishing User Identity Through Authentication.

To enable end users to save Public reports:

- View the page in Page Designer: Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. In the Property Editor, find the **Enable Users To** group and edit the following:
  - a. Save Public Report Select **On**. Selecting **Off** enables users to save the current report as a Public report.
  - b. Save Public Report Authorization Only displays if Save Public Report is set to On. Select an authorization scheme to restrict who can save public report definitions. To enable an end user to save a public report, this authorization scheme must evaluate to TRUE for that user. If you do not select an authorization scheme, then any user may save public reports.
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.6.6 Enabling Flashback and Charts

Enable users to utilize flashback queries and define a chart in an interactive grid.

Developers can enable flashback queries and support for Chart view by editing the interactive grid Attributes, Flashback and Define Chart View

To enable Flashback or Define Chart View:

- View the page in Page Designer:
   Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- In the Property Editor, select the Attributes tab.
   The Property Editor displays the attributes. Attributes are organized in groups



- **4.** In the Property Editor, find the **Enable Users To** group and edit the following:
  - a. Flashback Specify whether end users can utilize flashback queries for this interactive grid.

Flashback queries utilize the Oracle Flashback Technology and Database Point-in-Time Recovery to view data as it existed at a previous point in time. Users can only query this data, but can not rewind any data changes. How far back in time they can successfully perform a flashback query is determined by when the redo log files were last switched within the Oracle database, as this technology utilizes the RMAN backup.

- **b.** Define Chart View Specify whether end users can define a chart for this interactive grid.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

### 8.8.6.7 Configuring Interactive Grid Download Formats

Enable users to download an interactive grid to specified download formats.

To configure interactive grid download formats:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. In the Property Editor Attributes tab, find **Enable User To** and edit the following:
  - Download Select On.



### Tip:

Setting **Download** to **Off** prevents the Download menu from displaying on the Actions menu. To fully prevent users from downloading data, deselect all Download Formats described in the next step.

- 5. Find **Download** and edit the following:
  - a. Authorization Select an authorization scheme to restrict who can download. To enable an end user to download, this authorization scheme must evaluate to TRUE for that user.
  - **b.** Formats Select download formats:
    - CSV
    - HTML
    - PDF
    - Excel
  - Send as Email Specify whether end users can send an email, with the report download included as a HTML attachment.



Email is only available to authenticated users, and requires the SMTP to be configured within APEX Administration Services application (Administration Services), by an Instance Administrator,

- d. CSV Separator (CSV only) Define the column separator. If no value is entered, a comma or semicolon is used depending on your current NLS settings.
- e. CSV Enclosed By (CSV only) Enter a delimiter character. This character delineates the starting and ending boundary of a data value. Default delimiter is double quotation marks (" ").
- Filename Enter a name for the downloaded document. Do not specify a file extension, the extension is added automatically. If you leave this blank, the region name is used as the file name.
- g. Supplemental Text Enter text that displays at the top of the download file. Use this attribute to for data classification, legal, or warning messages about the data in the file.



### WARNING:

Do not use the Supplemental Text attribute with CSV download. If you enable CSV download, the defined text will invalidate the CSV file format.

6. To save your changes click Save. To save and run the page, click Save and Run

## 8.8.6.8 Enabling Icon View in an Interactive Grid

Learn how to enable Icon View in an interactive grid.

Interactive grids support different views of data. By default, interactive grids display data in a Grid view. Developers can optionally display data as icons. Enabling Icon view adds an Icon button to the select view button group.

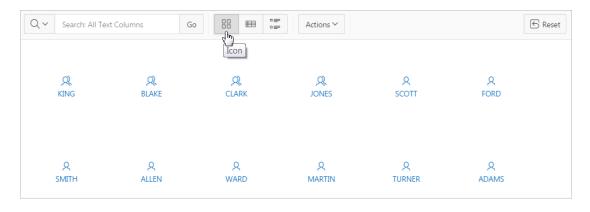
- About Icon View in an Interactive Grid Learn about interactive grid Icon View.
- Enabling Icon View in an Interactive Grid Learn how to enable Icon View in an interactive grid.
- Adding a Custom Icon View Link to an Interactive Grid Learn how to add custom Icon View link in an interactive grid.

### 8.8.6.8.1 About Icon View in an Interactive Grid

Learn about interactive grid Icon View.

Interactive grids support different views of data. Users can switch between these views by clicking the buttons in the select view button group. The following illustration shows an interactive grid with Icon view enabled and the Icon button selected. To enable Icon view, you must identify the columns used to identify the icon, the label, and the target (that is, the link).





### Viewing a Working Example of Icon View

To see a working example of this Icon view, install the sample application, *Sample Interactive Grids* and review **Reporting**, **Icon and Detail Views**.

### 8.8.6.8.2 Enabling Icon View in an Interactive Grid

Learn how to enable Icon View in an interactive grid.

An important requirement of icon view is that each item in the view must have the same width and height and the item content must not overflow. The width and height are set with CSS rules on elements with a class of a-IconList-item.

To add an Icon view to an interactive grid:

- View the page in Page Designer: Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- In the Property Editor, select the Attributes tab.
   The Property Editor displays the attributes. Attributes are organized in groups
- 4. In the Property Editor Attributes tab, find the **Icon View** group and edit the following:
  - a. Show Specify whether the Icon View is enabled. Select On.
  - **b.** Custom Select **On**. Selecting **On** provides full control over the icon view item markup but also requires a full understanding of HTML markup.
  - c. Icon Type Select the column type that holds the icon image source. Select Icon CSS Classes. You must also add a column to your SQL statement that has a value that is a CSS class for an icon (for example, a Font APEX icon class name). As an alternative, you can also select Image in URL and then specify the column that contains the URL and Icon Attributes.
  - d. Icon Select the interactive grid column that returns the CSS classes for the icon image source.
  - e. Link Target Click No Link Defined to display the Link Builder Link Target dialog. The link target defined is followed when the user activates the icon link with mouse or keyboard.
  - f. Link Attributes Enter HTML attributes that are associated with the display of each Link Target.
  - g. Label Column Select the report column that returns the image label.



5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

### 8.8.6.8.3 Adding a Custom Icon View Link to an Interactive Grid

Learn how to add custom Icon View link in an interactive grid.

A custom Icon View link provides greater flexibility in defining the content of the Icon View, including the ability to utilize more than one column.

To add custom Icon View link to an interactive grid:

- View the page in Page Designer: Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- In the Property Editor, select the Attributes tab.The Property Editor displays the attributes. Attributes are organized in groups
- 4. In the Property Editor Attributes tab, find the **Icon View** group and edit the
  - a. Show Select **On**.

following:

- **b.** Custom Select **Off**. Selecting **On** provides full control over the icon view item markup but also requires a full understanding of HTML markup..
- c. Icon Type Select the column type that holds the icon image source. Select Icon CSS Classes. You must also add a column to your SQL statement that has a value that is a CSS class for an icon (for example, a Font APEX icon class name). As an alternative, you can also select Image in URL and then specify the column that contains the URL and Icon Attributes.
- d. Icon Select the interactive grid column that returns the CSS classes for the icon image source.
- e. Link Target Click **No Link Defined** to display the Link Builder Link Target dialog. The link target defined is followed when the user activates the icon link with mouse or keyboard.
- f. Link Attributes Enter HTML attributes that are associated with the display of each Link Target.
- g. Label Column Select the report column that returns the image label.
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.6.9 Enabling Detail View in an Interactive Grid

Learn how to enable Detail View in an interactive grid.

Interactive grids support different views of data. By default, interactive grids display data in a Grid view. Developers can optionally display data as in a Detail view. Enabling Detail view adds an Detail button to the select view button group.

- About Detail View in an Interactive Grid Learn about interactive grid Detail View.
- Adding a Detail View to an Interactive Grid
  Learn how to enable Detail View in an interactive grid.



### 8.8.6.9.1 About Detail View in an Interactive Grid

Learn about interactive grid Detail View.

Interactive grids support different views of data. Users can switch between these views by clicking the buttons in the select view button group. The following illustration shows an interactive grid with Detail view enabled and the Detail button selected. Detail view displays column values using developer defined HTML markup as shown in the following illustration.



### 8.8.6.9.2 Adding a Detail View to an Interactive Grid

Learn how to enable Detail View in an interactive grid.

To add a Detail view to an interactive grid:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the interactive grid.
- 3. In the Property Editor, select the **Attributes** tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- 4. In the Property Editor Attributes tab, find the **Detail View** group and edit the following:
  - a. Show Select On.
  - Before Rows Enter the HTML to be displayed before report rows.
  - c. For Each Row Enter the HTML template to use for each report row in the Detail View. Use #COLUMN NAME# substitution strings for column names and column labels.

The following substitution strings are available:

- &COLUMN\_NAME. substitution strings for column labels and names.
- &APEX\$ROW ID. the record identifier for the row.
- &APEX\$ROW\_INDEX. the record display sequence number.



### Example:

```
&ENAME_LABEL.:&ENAME.&JOB LABEL.:&JOB.
```

- d. After Rows Enter the HTML to be displayed after report rows.
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.7 Managing Interactive Grid Column Attributes

Edit column attributes to control the display, features, and behavior of interactive grid columns.



Some settings are configured at runtime by the report developer and saved as part of the primary or alternate report (for example, column display order, the columns the report is sorted on, and column widths. To learn more about save options, see Saving Interactive Grid Reports.

- Editing Common Grid Column Attributes
  - Edit columns attributes to change the column heading, determine how a column renders, specify if users can edit a column value, and control how users can manipulate a column.
- Enabling Hide, Sort, Control Breaks, and Aggregates
   Configure the attributes in the Enable Users To group to control whether end users can hide, sort, or use a column in control breaks and aggregates.
- Defining a Column as a List of Values for Filtering
   Define an interactive grid column as a list of values to improve the speed of built-in filter tools.
- Creating a Column Link in an Interactive Grid
   Use Column Attributes to create a link from a report to another page in your application or to a URL.
- About Configuring Interactive Grids to Support Multi Select Learn about configuring interactive grids must to support multi select.



Editing Pages in Page Designer

## 8.8.7.1 Editing Common Grid Column Attributes

Edit columns attributes to change the column heading, determine how a column renders, specify if users can edit a column value, and control how users can manipulate a column.

To edit interactive grid Column attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

3. Select a column to edit.

The Property Editor displays the attributes.



To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 4. Edit the appropriate attributes.
- 5. To edit the column heading:
  - a. Find Heading.
  - **b.** Heading Enter the report column heading text.
  - **c.** Alignment Select the heading alignment. Note that your alignment selection must be supported by the selected report template..
  - d. Alternative Label Enter the alternative label to use in dialogs and in the Single Row View. Use an alternative label when the heading contains extra formatting, such as HTML tags, which do not display properly.
- To control how column values display and for editable grids how the column value is edited:
  - a. Find Identification.
  - **b.** Type Select how the column is rendered.

Different settings are available depending on the selected Type. For example, for an editable grid, select the Type **Display Only** to make a column uneditable. Choose the Type **Hidden** for primary key columns that should not be seen or other columns that are only used in templates such as icon or detail view, link targets, or columns of type HTML Expression.

- 7. To change how users interact with column widths:
  - a. Find Layout.
  - **b.** Stretch Select from the available options.

The default option is **Use Report Setting**, which uses the **Stretch Column Width** option to determine whether or not columns automatically stretch. You can also select **Never**, which does not stretch the column even if the report setting says to, or **Always**, which stretches the column even if the report says not to.

8. To control how users can manipulate a column:



- a. Find Enable Users To.
- **b.** Sort/Control Break/Aggregate Select whether end users can use this column in sorts, control breaks, and aggregates. Select **On** or **Off**.



### Tip:

Enabling these operations can cause performance issues, especially on large data sets or where appropriate column indexes are not available.

To save your changes click Save. To save and run the page, click Save and Run Page.

### 8.8.7.2 Enabling Hide, Sort, Control Breaks, and Aggregates

Configure the attributes in the Enable Users To group to control whether end users can hide, sort, or use a column in control breaks and aggregates.

To enable hide, sort, control breaks, and aggregates:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

3. Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. In the Property Editor, find **Enable Users To**. Configure the following:
  - a. Sort Select **On** to enable end users can use this column in sorts.
  - b. Control Break/Aggregate Select **On** to enable end users can use the column in control breaks and aggregates. This options only displays if **Sort** is enabled.
  - c. Hide Select **On** to enable end users yo hide this column.

Be aware that enabling **Sort** or **Control Break/Aggregate** operations can lead to performance issues, especially on large data sets or where appropriate column indexes are not available.

To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.7.3 Defining a Column as a List of Values for Filtering

Define an interactive grid column as a list of values to improve the speed of built-in filter tools.

To define a report column as a list of values:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

3. Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. In the Property Editor, find the **Column Filter** group. Specify the following:
  - a. Enabled Specify whether end users can filter this column. Select **On** or **Off**.
  - **b.** LOV Type Select how to derive the list of values for the filter when a user clicks on the column header or in filter dialogs. Options include:
    - None Disable any values being displayed in the filter. This option is appropriate
      on large columns, generally with most values being over 50 characters, or when
      a list would not be very usable for selecting a specific record. Instead the end
      user can just type in a partial value and then view the results.
    - Distinct Column Distinct column values are displayed for VARCHAR2 and NUMBER columns. DATE and TIMESTAMP columns utilize the built-in predefined date ranges.
    - SQL Query Values are derived from the SQL query definition.
    - Shared Component Values are derived from an existing list of values.
    - Static Values Values are derived from a static list of values.
    - PL/SQL Function Body returning SQL Query- Values are derived from the PL/SQL function body that returns a SQL Query.
    - Use List of Values Values are derived from list of values.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

### 8.8.7.4 Creating a Column Link in an Interactive Grid

Use Column Attributes to create a link from a report to another page in your application or to a URL.

To create a column link to another page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate the region and expand the Columns node.
- 3. Select the desired column.



The Column attributes appear in the Property Editor. Attributes are organized in groups.



### Tip:

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, click **Go to Group** and select the group.

- Find Identification. From Type, select Link.
- 5. Find Link and click No Link Defined.

The Link Builder - Target dialog appears. The Target Type you select determines the steps that follow.

- 6. To create a link to another page, in the Link Builder Target dialog:
  - a. Type Select Page in this application.
  - b. Page Specify the target page number.
  - c. Set Items Select a Name and Value to specify session state for an item.
  - d. Clear/Reset, Clear Cache Specify the page numbers on which to clear cache. To specify multiple pages, enter a comma-delimited list of page numbers.
  - e. Clear/Reset, Action Select one of the following:
    - None No clear or reset action when page loads.
    - Clear Regions Clears all region settings on the page.
    - Reset Regions Resets all regions on the page back to the default state, including sort orders, hidden columns and so on.
    - Reset Pagination This option enables backwards compatibility.
  - Advanced, Request Specify the request to be used.
  - g. Click OK.
- To create a link to another page in another application, in the Link Builder Target dialog:
  - a. Type Select Page in a different application.
  - **b.** Application Select the application.
  - c. Page Specify the target page number.
  - d. Set Items Select a Name and Value to specify session state for an item.
  - Clear/Reset, Clear Cache Specify the page numbers on which to clear cache. To specify multiple pages, enter a comma-delimited list of page numbers.
  - f. Clear/Reset, Action Select one of the following:
    - None No clear or reset action when page loads.
    - Clear Regions Clears all region settings on the page.
    - Reset Regions Resets all regions on the page, including sort orders, hidden columns and so on, back to default state.



- Reset Pagination This option is for backwards compatibility.
- g. Advanced, Request Specify the request to be used.
- h. Click OK.
- 8. To create a link to a URL, in the Link Builder Target dialog:
  - a. Type Select URL.
  - b. URL Enter the URL address.
  - c. Click OK.
- 9. To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.8.7.5 About Configuring Interactive Grids to Support Multi Select

Learn about configuring interactive grids must to support multi select.

Interactive grids must be configured to support multi select. When multi select is enabled, users can use arrow keys to move around an entire grid, use the Space key to select, or use Ctrl+Space to toggle selections.

To configure an interactive grid to support multi-select:

- Editable interactive grid Configure the APEX\$ROW\_SELECTOR column which is
  automatically created for you when you make an interactive grid editable. Under
  Settings, set the Enable Multi Select attribute to Yes (the default).
- Non-editable interactive grid Use an advanced JavaScript configuration. To see an
  example, install the Sample Interactive Grids sample application, and see the Multiple
  Selection example under Reporting.

### See Also:

- Making an Existing Interactive Grid Editable
- Installing Apps from the Gallery

## 8.8.8 About Customizing Interactive Grids in a Running Application

When running an application, users can alter the report layout using Column menus and sort options, rearrange columns by dragging and dropping, and change how data displays using options on the Actions menu.

When an interactive grid is editable, users can also edit the underlying data, add rows, delete rows, and refresh rows. After users customize an interactive grid they can save it. However, the available save capabilities differ depending upon the user type.



### See Also:

- Making an Existing Interactive Grid Editable
- Saving Interactive Grid Reports
- Oracle APEX End User's Guide

## 8.8.9 Saving Interactive Grid Reports

After users customize an interactive grid they can save it as either a Private or Public report.

Only the user who creates a **Private** report can view, save, rename, or delete it. Report developers have additional save capabilities in that they can save the **Primary** report (that is, the report that displays to all users), or create an **Alternative** report to test multiple report layouts.

- How the User Type Effects Available Save Options
   Learn how user type determines the save capabilities available in an interactive grid.
- About Configuration Dependencies When Saving Interactive Grid Reports
   Learn about configuration dependencies when saving interactive grid reports.
- Saving a Private Interactive Grid Report Save a private interactive grid report.
- Saving a Public Interactive Grid Report Save a public interactive grid report.
- Saving or Renaming a Primary Interactive Grid Report
  Developers can save or rename a primary interactive grid report.
- Saving an Alternative Interactive Grid Report
   Alternative reports enable a developers to optionally define multiple report layouts, which are available to all users (subject to any authorization scheme, if defined).
- Renaming a Saved Interactive Grid Report
   All users can rename the interactive grid reports they create.
- Deleting a Saved Interactive Grid Report
   All users can delete the interactive grid reports they create.
- Resetting a Saved Interactive Grid Report
   All users can reset an interactive grid report to the last saved version.

## 8.8.9.1 How the User Type Effects Available Save Options

Learn how user type determines the save capabilities available in an interactive grid.

After users customize an interactive grid they can save it. However, the available save capabilities differ depending upon the user type.

### **End Users**

End users can save an interactive grid as follows:



- Private report. Only the user who creates a Private report can view, save, rename, or delete it. All users (that is, end users and developers) can create interactive grid Private reports.
- Public report. All users can view a Public report. However, only the user who creates a
  Public report can save, rename, or delete it. All other users can view a Public report and
  save it under a new report name.



### Tip:

End users can only save Public reports if the report developer has enabled that capability. See Enabling Users to Save Interactive Grid Public Reports.

#### **Developers**

In addition to Private and Public reports, a developer can save two other report formats:

- **Primary** report. The Primary report displays to all users. Only a developer can save a new Primary report, rename it, or delete it.
- **Alternative** report. An Alternative report enables developers to create multiple report layouts. Only developers can save, rename, or delete an Alternative report.

## 8.8.9.2 About Configuration Dependencies When Saving Interactive Grid Reports

Learn about configuration dependencies when saving interactive grid reports.

To save a customized version of an interactive grid, users select the Actions menu and then click **Report** and then **Save** or **Save As**. End users can only access Save options if the application developer defines an authentication scheme at the application-level.

Other configuration issues that impact a user's ability to save an interactive grid include:

- Interactive Grid Toolbar Availability. Developers can edit the interactive grid Attribute, Toolbar to determine if an interactive grid includes a toolbar. If the toolbar is disabled, all the options on the Actions menu, including Save and Save As, are unavailable.
- Support for Saving Public Reports. By default, end users cannot save Public reports.
   To enable support for Public reports, developers edit the report Attribute, Enables Users
   To, Save Public Report.

When creating a public report, Oracle suggests you:

- Configure the Stretch settings for each column. See Editing Common Grid Column Attributes.
- 2. Run the page.
- 3. Adjust all columns to their smallest reasonable maximum width.
- 4. Save the report settings.



### See Also:

- Establishing User Identity Through Authentication
- Customizing the Interactive Grid Toolbar
- Enabling Users to Save Interactive Grid Public Reports

### 8.8.9.3 Saving a Private Interactive Grid Report

Save a private interactive grid report.

All users (that is, both end users and developers) can save a Private interactive grid. Only the user who creates a Private interactive grid can view, save, rename, or delete it.

To save a Private interactive grid:

- 1. Run the interactive grid.
- 2. Customize the report (for example, show, hide, or move columns, create filters, and so on).
- 3. Click the Actions menu.
- 4. Select **Report** and then **Save As**.
- 5. In the Report Save As dialog:
  - a. Type Select Private.
  - b. Name Enter a name for the report.
  - c. Click Save.

Private reports display on the Saved Reports list on the toolbar under the heading, Private.

## 8.8.9.4 Saving a Public Interactive Grid Report

Save a public interactive grid report.

All users (that is, both end users and developers) can save a Public interactive grid. Every user who has privileges to save public reports can modify any public report or make their own copy of it using the Save As option.



End users can only save Public interactive grids if the report developer has enabled that capability. See Enabling Users to Save Interactive Grid Public Reports.

To save a Public interactive grid:

Run the interactive grid.



- Customize the report (for example, show, hide, or move columns, create filters, and so on).
- 3. Click the Actions menu.
- 4. Select **Report** and then **Save As**.
- 5. In the Report Save As dialog:
  - a. Type Select Public.
  - b. Name Enter a name for the report.
  - c. Click Save.

Public reports display on the Saved Reports list on the toolbar under the heading, Public

### 8.8.9.5 Saving or Renaming a Primary Interactive Grid Report

Developers can save or rename a primary interactive grid report.

A Primary interactive grid displays to all users. Only developers can save or rename Primary reports. It is impossible to delete a primary report.

To save or rename a Primary interactive grid:

- 1. Run the interactive grid as a developer.
- 2. To customize and then save a primary interactive grid:
  - a. Customize the report (for example, show, hide, or move columns, create filters, and so on).
  - b. Click the **Actions** menu.
  - c. Select **Report** and then **Save**.
- 3. To rename a primary report:
  - a. Click the Actions menu.
  - b. Select **Report** and then **Edit**.

The Report - Edit dialog appears.

- c. In Name, enter a new name and click Save.
- 4. Select **Report** and then **Save**.

If multiple reports have been redefined, the Primary report displays on the Saved Reports list on the toolbar under the heading, Default.

### 8.8.9.6 Saving an Alternative Interactive Grid Report

Alternative reports enable a developers to optionally define multiple report layouts, which are available to all users (subject to any authorization scheme, if defined).

To save an Alternative interactive grid:

- 1. Run the interactive grid as a developer.
- Customize the report (for example, show, hide, or move columns, create filters, and so on).
- 3. Click the Actions menu.



- 4. Select Report and then Save As.
  - Type Select Alternative.
  - Name Enter a name for the report.
  - Authorization Select an alternative authorization scheme to restrict who can view this report.
  - Click Save.

An Alternative report displays on the Saved Reports list on the toolbar under the heading, Default.

## 8.8.9.7 Renaming a Saved Interactive Grid Report

All users can rename the interactive grid reports they create.

To rename an interactive grid report:

- 1. Run the interactive grid.
- 2. From the Saved Report list on the toolbar, select the report.
- 3. Click the **Actions** menu and then select **Report** and then **Edit**.
- 4. In the Report Edit dialog:
  - a. Type Select the type of report to be edited.
  - b. Name Enter a new name.
  - c. Click Save.

The new report name displays in the Saved Reports list on the toolbar.

## 8.8.9.8 Deleting a Saved Interactive Grid Report

All users can delete the interactive grid reports they create.

To delete an interactive grid report:

- 1. Run the interactive grid.
- 2. From the Saved Report list on the toolbar, select the report.
- 3. Click the **Actions** menu and then select **Report** and then **Delete**.

A confirmation dialog appears.

4. Confirm your request and click **OK**.

The report disappears from the Saved Reports list on the toolbar.

## 8.8.9.9 Resetting a Saved Interactive Grid Report

All users can reset an interactive grid report to the last saved version.

To reset an interactive grid report:

- 1. Run the interactive grid.
- 2. From the Saved Report list on the toolbar, select the report.
- 3. Customize the report (for example, show, hide, or move columns, create filters, and so on).



Reset the report to the last saved version. Click the Actions menu and then select Report and then Reset.



Alternatively, you can also click the **Reset** button on the toolbar.

The revised report appears.

## 8.8.10 Linking to Interactive Grid Reports

Developers can use the syntax in the Request value and ItemNames section of the URL to link to interactive grid report.

Data in an interactive grid is driven by declarative filters. Developer can set report parameters by modifying interactive grid report settings for an end user. However, these settings only affect the end user's working report and do not affect any saved report settings. Developers can use the syntax described in this section to link to interactive grid reports.



### Note:

When you add additional interactive grid report regions, be sure to change the old single interactive grid report link syntax. Otherwise, the link generates an error. A link to a page with more than one interactive grid report region, the request or name syntax needs to fully qualify with region static ID. To open a link to an interactive grid report from outside of an application (for example, from an email), you may need to enable the Session Management, Deep Linking attribute in your application. See Session Management.

- Interactive Grid Request Syntax Learn about interactive grid request syntax.
- Interactive Grid Name and Value Syntax Learn about interactive grid name and value syntax.
- Interactive Grid ClearCache Syntax Learn about interactive grid clearcache syntax.
- Restrictions When Linking to Interactive Grid Reports Learn about restrictions when linking to interactive grids.
- Valid Interactive Grid Linking Examples View valid linking examples.
- Invalid Interactive Grid Linking Examples View invalid linking examples.
- Linking to Shared Interactive Grid Reports learn about linking to shared interactive grid reports.



# 8.8.10.1 Interactive Grid Request Syntax

Learn about interactive grid request syntax.

To link to a specific saved interactive grid report, use the following Request syntax:

IG[region static ID]\_<report\_alias>

Consider the following example:

IG[EMP] dept20



The use of Request in the URL is optional. To link to multiple saved reports, separate each Request with comma.

# 8.8.10.2 Interactive Grid Name and Value Syntax

Learn about interactive grid name and value syntax.

To create a filter, use the following itemNames and itemValues syntax:

IG[region static ID]<operator>\_<target column alias>

Consider the following example:

IG[EMP]C\_ENAME:KING



If there is only one interactive grid report region on the page, the itemName does not need to be fully qualified with the region static ID. If an operator is not defined, a filter with equal operator is added.

To create a filter on an interactive grid report in a link, use the <code>itemNames</code> syntax described previously and add the filter value in the corresponding location in the item names section of the URL.

To create row text which contains a filter on an interactive grid, use ROWFILTER as the target column alias in the item name syntax and add a filter value in the item <code>itemValues</code> of the URL. The link will add a Row Text Contains filter which searches all columns displayed in the report with type <code>STRING</code> or <code>NUMBER</code>.



### Consider the following example:

IG[EMP] ROWFILTER:SALES

### Valid operators include:

- C = Contains
- EQ = Equals (this is the default)
- GTE = Greater than or equal to
- GT = Greater Than
- LT = Less than
- LTE = Less than or equal to
- N = Null
- NC = Not Contains
- NEQ = Not Equals
- NN = Not Null
- NIN = Not In (escape the comma separated values with a leading and trailing backslash,
   \()
- IN = In (escape the comma separated values with a leading and trailing backslash, \)
- ROWFILTER = Row Text Contains (this searches all columns displayed in the report with type STRING or NUMBER)

# 8.8.10.3 Interactive Grid ClearCache Syntax

Learn about interactive grid clearcache syntax.



### Tip:

Using ClearCache without specifying a saved report alias in the Request, clears the primary default report. To clear a specific interactive grid report region on a page with more than one interactive grid reports, specify the region static ID along with saved report alias in the Request.

Use the following syntax in the ClearCache section of the URL to reset or clear pagination in an interactive grid report:

- RR Resets an interactive grid report. This is equivalent to the end user choosing the Reset option from the interactive grid report Actions menu on the target page. The report is returned to the default report settings specified by the developer or saved by the user.
- CR Clears interactive grid report. This clears all of the report filters.



# 8.8.10.4 Restrictions When Linking to Interactive Grid Reports

Learn about restrictions when linking to interactive grids.

When linking to interactive grid reports, remember the following restrictions:

- 1. If a Request value is not defined in the URL, all of the primary default report settings will change.
- 2. If a Request value is not defined and itemNames section does not include a fully qualified filter column name with region static ID, an error occurs if there are more than one interactive grid report in the target page.
- 3. If a Request value is not defined and itemNames section do not include a fully qualified filter column name with region static ID, it will create a filter on the primary default report if there is only one interactive grid report region in the target page.

# 8.8.10.5 Valid Interactive Grid Linking Examples

View valid linking examples.

### Valid Linking Example 1

This example includes a link with no Request value, but includes a qualified filter column with region static ID in the itemNames section of the URL. This example creates a filter on the primary default report in the referenced region item name.

```
f?p=&APP_ID.:2:&SESSION.::::IG[EMP]_ENAME:KING
```

#### Valid Linking Example 2

In this example the link has no Request value. The clear cache section has RR or CR and will reset, or clear the primary default reports of all interactive grid report regions.

```
f?p=&APP ID.:1:&SESSION.:::RR:
```

# 8.8.10.6 Invalid Interactive Grid Linking Examples

View invalid linking examples.

### **Invalid Linking Example 1**

This link has no Request value and does not include a fully qualified filter column with region static ID in the item name section of the URL. This example generates an error if there is more than one interactive grid report region in the target page.

```
f?p=&APP ID.:2:&SESSION.::::ENAME:KING
```

### **Invalid Linking Example 2**

This example has a link with two request values separated by commas and does not contain a fully qualified filter column with region static ID in the item name section of



the URL. This example generates an error since it is not clear where the filter needs to be created.

f?p=&APP\_ID.:2:&SESSION.:IG[test]\_employee,IG[test2]\_dept10:::ENAME:KING

## 8.8.10.7 Linking to Shared Interactive Grid Reports

learn about linking to shared interactive grid reports.

You can link to saved primary default, alternative default, and public reports using IG[region static ID] <report alias> in the Request value of the URL.

- Editing the Interactive Grid Saved Report Alias
   Edit the Alias for a saved reports to create a more meaningful URL link to the saved report.
- Link Examples to a Primary Report
   View examples that demonstrate how to link to a primary report.
- Link Examples to Saved Reports
   View examples that demonstrate how to link to a saved report.

### See Also:

- About Using f?p Syntax to Link Pages
- Saving Interactive Grid Reports
- Deleting a Saved Interactive Grid Report

# 8.8.10.7.1 Editing the Interactive Grid Saved Report Alias

Edit the Alias for a saved reports to create a more meaningful URL link to the saved report.

To edit the Alias for saved reports:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, find the region containing the report.
- 3. Under the region, expand **Saved Reports** and select the saved report.

The Property Editor displays the attributes for the Saved Report.

- 4. Identification, Alias Enter a new alias for the report. Use this alias to define a more meaningful URL link to this saved report. This link can be used to link directly from elsewhere in the application.
- Link, Link Example View the URL link for this saved report. This attribute is view only and cannot be updated. Use this attribute to quickly copy the displayed URL. This URL



can be used to link directly to this particular saved report from anywhere else in the application.

To save your changes click Save. To save and run the page, click Save and Run Page.

### 8.8.10.7.2 Link Examples to a Primary Report

View examples that demonstrate how to link to a primary report.

The following examples demonstrate how to link to a primary report (report\_alias=PRIMARY):

This example links to a primary report:

```
f?p=100:1:&APP SESSION.:IG PRIMARY
```

This example links, resets, and clears primary report settings:

```
f?p=100:1:&APP SESSION.:IG PRIMARY::RR,CR:
```

This example links, resets, and clears primary report settings. It additionally creates a ENAME = 'KING' filter on the primary report:

```
f?p=100:1:&APP SESSION.:IG PRIMARY::RR,CR:IG ENAME:KING
```

### 8.8.10.7.3 Link Examples to Saved Reports

View examples that demonstrate how to link to a saved report.

The following examples demonstrate how to link to a saved report (report alias=12345):

This example links to a saved report:

```
f?p=100:1:&SESSION.:IG 12345
```

This example links, resets, and clears settings for saved report 12345:

```
f?p=100:1:&SESSION.:IG 12345::RR,CR:
```

This example links, resets, and clears saved report 12345 settings. It additionally creates a ENAME = 'KING' filter on saved report 12345.

```
f?p=100:1:&SESSION.:IG_12345::RR,CR:IG_ENAME:KING
```

# 8.9 Managing Interactive Reports

An interactive report page features a searchable, easily customizable report.

- Example Interactive Report
  - View an interactive report example.
- Creating an Interactive Report Using the Create Application Wizard
  Run the Create Application Wizard to create a new application that contains one or
  multiple interactive report pages.
- Creating an Interactive Report Using the Create Page Wizard
  Run the Create Page Wizard to add a new interactive report page to an existing
  application.



### Managing Interactive Report Region Attributes

Edit region attributes to alter the SQL source, change the region layout and appearance, define a region displays selector, and create region conditions.

### Managing Interactive Report Attributes

Edit report Attributes to control how an interactive report works.

### Managing Interactive Report Column Attributes

Edit column attributes to control the display, features, and behavior of interactive report columns.

#### Customizing Interactive Reports in a Running Application

When running an application, end users and developers can alter the layout of interactive reports data by choosing the columns they are interested in, applying filters, highlighting, and sorting. They can also define breaks, aggregations, charts, group bys, and add their own computations.

#### Linking to Interactive Reports

Link to interactive reports using the syntax in the Request value and ItemNames section of the URL.



Using Interactive Reports in Oracle APEX End User's Guide

# 8.9.1 Example Interactive Report

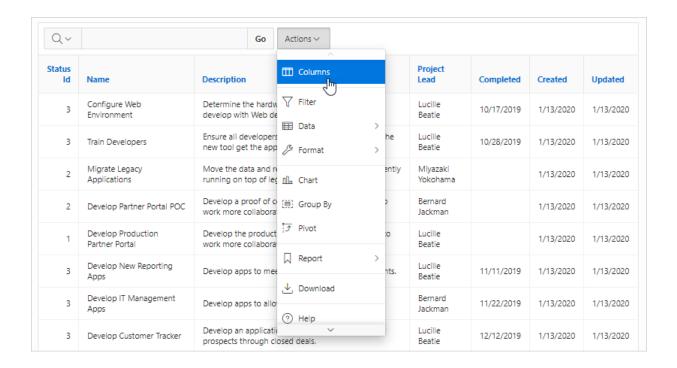
View an interactive report example.

An interactive report is a formatted result of a SQL query. End users can customize the both report layout and control how the data that displays. Both the Create Application Wizard and Create Page Wizard support the creation of interactive reports. You choose a table on which to build a report, or provide a custom SQL SELECT statement. Interactive reports are only supported for Desktop applications.

End users can customize the report layout and data displayed by selecting options on the Actions menu. For example, end users can alter the report layout by hiding or exposing specific columns and applying filters, highlighting, and sorting. Advanced end users can also define breaks, aggregations, charts, group data, and add computations. Once customized, the report can be saved as either a private or public report.

The following is an example of an interactive report.





Developers can include multiple interactive reports per page and can restrict the capabilities available to end users (such as disabling download or support for hiding column). When the end user views the report, report functionality is the same across all reports in the application.

When viewing an interactive report, end users can customize how and what data displays. By default, interactive reports include a search bar, an Actions menu, column heading menus, and Edit icons in the first column of each row. Using options on the Actions menu, users can alter the report layout by hiding or exposing specific columns and applying filters, highlighting, and sorting. They can also define breaks, aggregations, charts, group bys, and add their own computations. Once customized, the report can be saved as either a private or public report.



### Tip:

To view an example, install the sample app, *Sample Reporting*. To learn more, see Installing Apps from the Gallery.

### See Also:

Using Interactive Reports in Oracle APEX End User's Guide



# 8.9.2 Creating an Interactive Report Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains one or multiple interactive report pages.

To create an application that contains one or multiple interactive report pages:

- On the Workspace home page, click the App Builder icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click Set Icon to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click **Set Appearance** to change it.
- Click Add Page and select Interactive Report.
- 8. On Add Report Page:
  - a. Page Name Enter a name for this page.
  - **b.** Set Icon Select an icon to display in the navigation menu for this page.
  - c. Select the source for the report:
    - Table or View
    - SQL Query

What you select determines what displays next. Follow the on-screen instructions. To learn more about an attribute, click the Help icon in the lower left corner.

- d. Select the report type Interactive Report.
- Include Form Select Include Form to include a form page for creating or updating records.
- f. Lookup Columns Expand to see attributes for defining a lookup to another table. Use Lookup Columns to replace identifiers with a display column, such as showing the department name instead of the department number. Specify the following:
  - Lookup Key Select the column to change to output the display column.
  - Display Column Select the column (from the lookup table) to be displayed.



#### Tip:

**Lookup Columns** only appear if the current page is based on a table and has foreign key constraints to another table.

- g. Advanced Expand Advanced to configure these options:
  - Set as Home Page Enable this to make this page the home page for the application.
  - Set as Administration Page Enable this to have this page display under Administration.



- Page Help Enter text to be displayed when the user selects Page Help.
- h. Click Add Page.
- Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.



Creating a Report Using the Create Page Wizard

# 8.9.3 Creating an Interactive Report Using the Create Page Wizard

Run the Create Page Wizard to add a new interactive report page to an existing application.

To create an interactive report page by running the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Interactive Report.
- 5. Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page.



### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- **c.** Page Mode Identify the page mode. To learn more, see field-level Help.
- **d.** Include Form Page Enable this flag to create a form page along with the report page.

Form pages are always created as Modal Dialog pages. Enabling this flag displays additional attributes. To learn more about an attribute, see field-level Help.

- 6. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.



- REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
- **REST Data Source** Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is Local Database.

- 7. Source Type Specify the source of the new page. Options include:
  - Table:
    - Table /View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the **SQL Query Example** region.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - b. Use Navigation Enable to create a navigation menu entry for this page. By default, the page name is used as navigation menu name.
- 9. Click Create Page.



### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



Understanding Page Types in the Create Page Wizard

# 8.9.4 Managing Interactive Report Region Attributes

Edit region attributes to alter the SQL source, change the region layout and appearance, define a region displays selector, and create region conditions.

- **Editing Interactive Report Region Attributes** Edit interactive report region attributes in Page Designer.
- Displaying Interactive Reports Conditionally Display interactive reports conditionally by editing region attributes.



See Also:

Editing Pages in Page Designer

# 8.9.4.1 Editing Interactive Report Region Attributes

Edit interactive report region attributes in Page Designer.

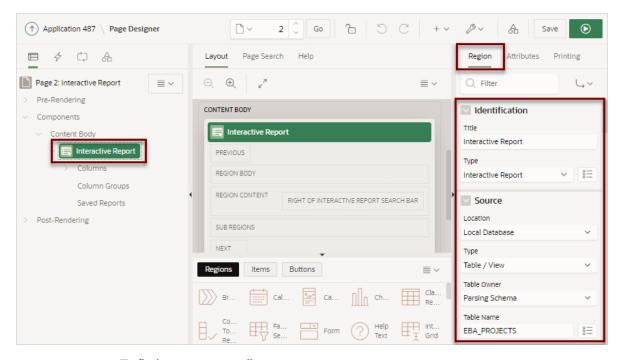
To edit interactive report region attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the region.

In the Property Editor, the **Region** tab displays the attributes which are organized into groups.



- To find a group or attribute:
  - Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
  - Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 4. Edit the appropriate attributes.





### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



### See Also:

Right Pane of Page Designer (Property Editor)

# 8.9.4.2 Displaying Interactive Reports Conditionally

Display interactive reports conditionally by editing region attributes.

To display an interactive report conditionally:

1. View the page in Page Designer:

Page Designer appears.

2. In the Rendering tab, select the region.

The Property Editor displays the **Region** tab. Attributes are organized in groups.

- Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- **b.** Select an error to highlight the associated attribute in the Property Editor.
- Configure **Server-side Condition**:
  - a. Find the **Server-side Condition** group.
  - **b. Type** Select a condition type and follow the on-screen instructions
- To save your changes click Save. To save and run the page, click Save and Run Page.



### Tip:

Asynchronous JavaScript and XML (Ajax) is used throughout interactive reports. Because Ajax is asynchronous, the value evaluated for conditional display must be in the session. To display an interactive report conditionally based on specified value, use a page item instead of using a : REQUEST value. Using : REQUEST in a conditional display causes the interactive report to function incorrectly.

# 8.9.5 Managing Interactive Report Attributes

Edit report Attributes to control how an interactive report works.



Editing Interactive Report Attributes
 Edit interactive report Attributes in Page Designer.

Managing Link Columns

A Link Column displays on the left side of an interactive report. Configure a Link Column to link to a single row view, a custom target, or be excluded from the report.

Customizing an Interactive Report Search Bar
 Customize or remove an interactive report search bar.

Customizing the Interactive Report Actions Menu
 Customize or disable an interactive report Actions menu.

Configuring Interactive Report Download Options
 Configure interactive report download options available on the Actions menu...

• Controlling Interactive Report Pagination Control interactive report pagination.

Enabling Icon View
 Learn about interactive report Icon View.

Enabling Detail View
 Add Details view to an interactive report.

Configuring Advanced Attributes for Interactive Reports
 Configure advanced interactive report attributes to define the region alias, specify
 an item whose value stores the saved report ID, and define a from address in an
 interactive report subscription or email download

See Also:

Editing Pages in Page Designer

# 8.9.5.1 Editing Interactive Report Attributes

Edit interactive report Attributes in Page Designer.

To edit interactive report Attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, select the region containing the interactive report.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

4. Edit the appropriate attributes.





### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



#### See Also:

Right Pane of Page Designer (Property Editor)

# 8.9.5.2 Managing Link Columns

A Link Column displays on the left side of an interactive report. Configure a Link Column to link to a single row view, a custom target, or be excluded from the report.



### Tip:

A Link Column cannot be sorted, hidden, or moved by an end user and does not interact with the standard column link defined on the Column Attributes page.

- Linking to a Single Row View
   Configure a link column to link to a single row view.
- Linking to a Specific Page
   Configure a link column to link to a specific page.
- Linking to a URL
   Configure a link column to link to a URL.
- Excluding a Link Column
   Exclude a Link Column from a report.

## 8.9.5.2.1 Linking to a Single Row View

Configure a link column to link to a single row view.

To link to a single row view in an interactive report:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- 4. Find the **Link** group and edit the following:
  - a. Link Column Select Link to Single Row View.



- b. Uniquely Identify Rows by Select ROWID or Unique Column.
   If you select, Unique Column, specify the column in the Unique Column field.
- c. Link Icon Accept the default or specify the path to another icon.
- d. Link Attributes Optionally specify additional column link attributes to be included in the <a href= > tag (for example, a link target, classes, or styles).
- e. **Authorization Scheme** Select an authorization scheme to associate with the Link Column. This authorization scheme must evaluate to TRUE in order for the Link Column to be rendered in the report.
- **f. Condition Type** Select a condition type from the list that must be met in order for this link to be rendered.
- 5. Find the **Single Row View** group and edit the following:
  - Exclude Null Values Specify whether null columns are hidden on the Single Record View
  - b. Only Displayed Columns Specify whether only those columns currently displayed are displayed in the Single Record View. If you select Off, then hidden report columns may also be shown on the Single Record View.
- To save your changes click Save. To save and run the page, click Save and Run Page.



### Tip:

If an interactive report links to single row view and the link icon is missing ALT text or has empty ALT text, the alt="Single Row View" gets included automatically to improve accessibility. This can be further improved by making the ALT text something specific to the row, for example alt="View Row:  $\#COLUMN_NAME\#$ " (where  $COLUMN_NAME$  should be a column that helps uniquely identify the current row).

### 8.9.5.2.2 Linking to a Specific Page

Configure a link column to link to a specific page.

To link to a specific page:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, locate the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- 4. Find the **Link** group and edit the following:
  - a. Link Column Select Link to Custom Target.
  - b. Target Click No Link Defined.

The Link Builder - Target dialog appears.

Target Type - Select Page in this Application.



- Page Select the target page number.
- Set Items Select a **Name** and **Value** to specify session state for an item.
- Clear/Reset, Clear Cache Specify the page numbers on which to clear cache. To specify multiple pages, enter a comma-delimited list of page numbers.
- Clear/Reset, Action Select one of the following:
  - None No clear or reset action when page loads.
  - Clear Regions Clears all region settings on the page.
  - Reset Regions Resets all regions on the page back to the default state, including sort orders, hidden columns and so on.
  - Reset Pagination This option enables backwards compatibility.
- Advanced, Request Specify the request to be used.
- Click OK.
- c. Link Icon Enter the HTML to be used for the link. Use an image tag to display images, or pick from the list of default images. If not defined, #APEX\_FILES#ws/small page.gif is used.
- d. Link Attributes (Optional) Enter additional column link attributes to be included in the <a href= > tag (for example, a link target, classes, or styles).

To view examples, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

### 8.9.5.2.3 Linking to a URL

Configure a link column to link to a URL.

To link to a URL:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. Find the **Link** group and edit the following:
  - a. Link Column Select Link to Custom Target.
  - b. Target Click the No Link Defined.

The Link Builder - Target dialog appears.

- Target Type Select URL.
- Click OK.
- c. Link Icon Enter the HTML to be used for the link. Use an image tag to display images, or pick from the list of default images. If not defined, #APEX\_FILES#ws/small\_page.gif is used.
- d. Link Attributes (Optional) Enter additional column link attributes to be included in the <a href= > tag (for example, a link target, classes, or styles).



To view examples, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 8.9.5.2.4 Excluding a Link Column

Exclude a Link Column from a report.

To exclude a column link:

1. View the page in Page Designer:

Page Designer appears.

- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. Configure Link attributes:
  - a. Find the Link group.
  - b. Link Column Select Exclude Link Column.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.9.5.3 Customizing an Interactive Report Search Bar

Customize or remove an interactive report search bar.

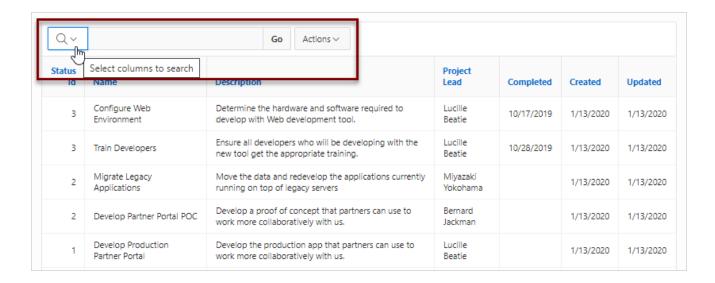
- Interactive Report Search Bar Learn about the interactive report search bar.
- Customizing the Search Bar Customize an interactive report search bar.
- Removing the Interactive Report Search Bar Disable an interactive report search bar.

## 8.9.5.3.1 Interactive Report Search Bar

Learn about the interactive report search bar.

All interactive reports include a search bar at the top of the page which includes the following controls: a Select columns to search button, Text area, Go button, and Actions menu.





If users have saved multiple reports, a saved report select list displays to the right of the **Go** button. Users can use this list to select a specific saved report. If multiple views are configured, a view selection button group also displays which enables the end user to switch views. You can remove or customize the search bar in Page Designer by configuring report attributes in the Property Editor.



Customizing the Search Bar and Removing the Interactive Report Search Bar

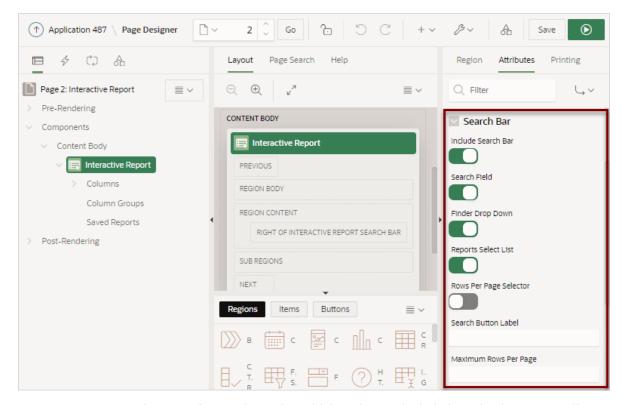
# 8.9.5.3.2 Customizing the Search Bar

Customize an interactive report search bar.

To customize the search bar:

- View the page in Page Designer: Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- In the Property Editor, select the Attributes tab.
   The Property Editor displays the attributes. Attributes are organized in groups
- 4. In the Property Editor, find the **Search Bar** group.





- . Under Search Bar, determine which options to include by selecting On or Off:
  - Include Search Bar Select On to include a search bar above the report. If you include the search bar, you can also fully customize which functions to display. Select Off to not include the Search bar.
  - Search Field Specify whether the search field is included within the search bar.
  - Finder Drop Down Specify whether the Finder drop down is included at the
    beginning of the Search field within the search bar. The Finder drop down is a
    list of columns that enables users to limit their search to a specific column. If a
    column is selected then the search is only performed against the values in the
    selected column. Within a running interactive report, this option is identified as
    Select columns to search.
  - Reports Select List Specify whether the Reports select list displays in the search bar. The Reports select list only displays if a report, other than the primary report, is accessible to the user.
  - Rows Per Page Selector Specify whether a separate drop down row selector is included within the search bar. Do not select both this attribute and Rows Per Page.
  - Search Button Label Enter the text for the search button label.
  - Maximum Rows Per Page Enter the maximum number to display in the Rows Per Page selector.
- To save your changes click Save. To save and run the page, click Save and Run Page.



See Also:

Saving Interactive Reports

### 8.9.5.3.3 Removing the Interactive Report Search Bar

Disable an interactive report search bar.

To remove the search bar from an interactive report:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- 4. Turn the Search Bar off:
  - a. In the Property Editor, find the **Search Bar** group.
  - b. Include Search Bar- Select Off.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.9.5.4 Customizing the Interactive Report Actions Menu

Customize or disable an interactive report Actions menu.

The Actions menu appears to the right of the Go button on the Search bar in an interactive report. Users use the Actions menu to customize how report information displays. Developers control what options display on the Actions menu in an interactive report.



### Tip:

The structure of the interactive report Actions menu changed in release 5.1 to be consistent with interactive grids. To alter an interactive report Actions menu to use the previous (or legacy) structure, go to Shared Components, Component Settings, and configure the Interactive Report component. See Configuring Interactive Report Action Menu Structure.

To customize the Actions menu:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- In the Property Editor, select the **Attributes** tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- In the Property Editor, find the **Actions Menu** group.
- Under Actions Menu, enable and disable options by selecting **On** or **Of**



- **Include Actions Menu** Specify whether the Actions menu is included within the Search Bar.
- Filter Specify whether end users can define filters on this report.
- **Select Columns** Specify whether end users can use Select Columns in the Actions menu to change the columns displayed in this report. User can select (or show), deselect (or hide) and reorder multiple columns using this option.
- Rows Per Page Specify whether end users can change the number of rows displayed for this report.
- Sort Specify whether end users can define sort columns for this report.
- Control Break Specify whether end users can define control breaks for this
  report.
- Highlight Specify whether end users can define highlights for this report.
- Compute Specify whether end users can define computational columns for this report.
- Aggregate Specify whether end users can define aggregates for this report.
- Chart Specify whether end users can define charts for this report.
- **Group By** Specify whether end users can define group by break-downs for this report.
- Pivot Specify whether end users can define pivot break-downs for this report.
- Flashback Specify whether end users can utilize flashback queries for this report.
- Save Report Specify whether end users can save their current report
  definition as a Private report. Private reports are displayed in a select list of
  available reports in the Search Bar, and are only displayed to the user who
  saved the report, providing they are authenticated. The option on the Actions
  menu is only available to authenticated users.
- Save Public Report Specify whether end users can save their current report
  definition as a Public report. Public reports are displayed in a select list of
  available reports in the Search Bar, and are displayed to everyone. The option
  on the Actions menu is only available to authenticated users and is further
  restricted if you also populate the Save Public Report Authorization.
- Save Public Report Authorization Select an authorization scheme to restrict who can save public report definitions. To enable an end user to save a public report, this authorization scheme must evaluate to TRUE. If no authorization scheme is provided then reports may be saved by any user.
- Reset Specify whether end users can reset their reports from the Actions menu. Resetting the report reverts all customizations made by the user, or specified by the calling URL, and displays the Primary Report.
- Help Specify whether end users can invoke the built-in help modal dialog for interactive reports. The help dialog only outlines those options available to the current user.
- **Subscription** Specify whether end users can define subscription settings for this report.
- **Download** Specify whether end users can download the report to one of the download formats specified.



To save your changes click Save. To save and run the page, click Save and Run Page.

# 8.9.5.5 Configuring Interactive Report Download Options

Configure interactive report download options available on the Actions menu...

The Download option on the Actions menu enables users to download an interactive report as a comma-delimited file (CSV) format, HTML, Microsoft Excel (XLSX) format, Adobe Portable Document Format (PDF), or as one of the formats attached to an email.



#### WARNING:

Downloads may also take considerable time to complete for large data sets.



The Pivot view does not support the PDF download format even if it is enabled and report server is configured.

- Configuring Interactive Report Download Formats Configure interactive report download options.
- **Enabling Interactive Report CSV Download** Enable the Enable CSV download in an interactive report.
- **Enabling Interactive Report Email Download** Enable interactive report email download.

### 8.9.5.5.1 Configuring Interactive Report Download Formats

Configure interactive report download options.



### Tip:

Email is only available to authenticated users, and requires the SMTP Server to be configured within Oracle APEX Administration Services application (Administration Services), by an Instance Administrator.

To configure download formats:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.
  - The Property Editor displays the attributes. Attributes are organized in groups
- 4. Search Bar, Include Search Bar Select On.
- 5. Actions Menu, Download Select On.





### Tip:

Setting **Download** to **Off** prevents the Download menu from displaying on the Actions menu. To fully prevent users from downloading data, deselect all Download Formats described in the next step.

#### 6. Under Download:

a. Download, Authorization - Select an authorization scheme to restrict who can download. To enable an end user to download, this authorization scheme must evaluate to TRUE for that user.

If no authorization scheme is provided then any user may download.

- **b. Download**, **Download Formats** Select the download formats users can utilize to download the currently displayed columns. Options include:
  - CSV
  - HTML
  - Excel
  - PDF



### Tip:

The Download attributes only appear on the Actions menu if you select a file format under **Download Formats**. If a report server has not been defined within Instance Administration then certain options do not display. To learn more, see Configuring Report Printing in a Full Development Environment in *Oracle APEX Administration Guide*.

c. Send as Email - Specify whether end users can send an email, with the report download included as an attachment.

Email is only available to authenticated users, and requires the SMTP to be configured within APEX Administration Services application by an Instance Administrator.

- d. CSV Separator Enter a column separator. If no value is entered, a comma or semicolon is used depending on your current NLS settings.
- e. **CSV Enclosed By** Enter a delimiter character to delineate the starting and ending boundary of a data value. The default delimiter is double quotation marks.
- f. Filename Enter the filename for the document when downloaded. Do not specify a file extension. The extension is added automatically. If you leave this attribute blank, the region name is used as the file name.
- g. Supplemental Text Enter text that appears at the top of the download files. You can enter data classification, legal or warning messages about the data in the file





#### **WARNING:**

Do not use the Supplemental Text attribute with CSV download. If you enable CSV download, the defined text will invalidate the CSV file format.

7. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



#### See Also:

About Printing Reports to PDF

### 8.9.5.5.2 Enabling Interactive Report CSV Download

Enable the Enable CSV download in an interactive report.

To enable support for CSV download, you must first enable Automatic CSV Encoding on the Edit Globalization Attributes page. See Accessing the Globalization Page and Automatic CSV Encoding.

To enable the Enable CSV download in an interactive report:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. Search Bar, Include Search Bar Select On.
- 5. Actions Menu, Download Select On.



### Tip:

Setting Download to Off prevents the Download menu from displaying on the Actions menu. To fully prevent users from downloading data, deselect all Download Formats described in the next step.

- 6. Under **Download**:
  - a. Download Formats Select CSV.



### Tip:

The Download option only appears on the Actions menu if a file format is selected.

b. CSV Separator - (CSV only) Define the column separator. If no value is entered, a comma or semicolon is used depending on your current NLS settings.

- c. CSV Enclosed By (CSV only) Enter a delimiter character. This character delineates the starting and ending boundary of a data value. Default delimiter is double guotation marks (" ").
- d. Filename Enter a name for the downloaded document. Do not specify a file extension, the extension is added automatically. If you leave this blank, the region name is used as the file name.



#### **WARNING:**

Do not use the Supplemental Text attribute with CSV download. If you enable **CSV** download, the defined text will invalidate the CSV file format.

To save your changes click Save. To save and run the page, click Save and Run Page.

### 8.9.5.5.3 Enabling Interactive Report Email Download

Enable interactive report email download.



#### Tip:

Email is only available to authenticated users, and requires the SMTP to be configured within APEX Administration Services application (Administration Services), by an Instance Administrator.

Interactive reports support email of all formats except Word (RTF). Note this only applies to Download dialog, not the Subscription dialog.



### Tip:

Email download is only supported on authenticated pages. If you enable Email download on a public page, the Email download option does not display in Download dialog.

To enable support for email download, an APEX administrator must configure email at the Instance level. See *Configuring Mail* in *Oracle APEX Administration Guide*.

To enable email download:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.
  - The Property Editor displays the attributes. Attributes are organized in groups.
- 4. Search Bar, Include Search Bar Select On.
- Actions Menu, Download Select On.





### Tip:

Setting Download to **Off** prevents the Download menu from displaying on the Actions menu. To fully prevent users from downloading data, deselect all Download Formats described in the next step.

#### 6. Under Download:

 Send as Email - Specifies whether end users can send an email, with the report download included as an attachment. Enable Send as Email.



### Tip:

The Download attributes only appear on the Actions menu if you select a file format under **Download Formats**.

- b. **Filename** Enter a name for the downloaded document. Do not specify a file extension, the extension is added automatically. If you leave this blank, the region name is used as the file name.
- **c. Supplemental Text** Enter text that displays at the top of the download files. You can enter data classification, legal, or warning messages about the data in the file.



### **WARNING:**

Do not use the Supplemental Text attribute with CSV download. If you enable **CSV** download, the defined text will invalidate the CSV file format.

7. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



### Note:

Email sent from an Email Download contains a system generated email signature identifying who sent the email. This signature cannot be removed.



### See Also:

About Emailing from an Interactive Report

# 8.9.5.6 Controlling Interactive Report Pagination

Control interactive report pagination.

Pagination provides the end user with information about the number of rows and the current position within the result set. You control how pagination displays by making selections from Pagination attributes on the Attributes page in the Property Editor.

To edit interactive report pagination:

1. View the page in Page Designer:

Page Designer appears.

- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

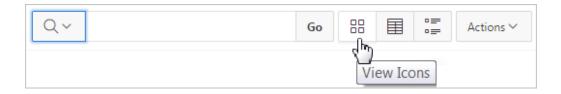
The Property Editor displays the attributes. Attributes are organized in groups

- 4. Configure Pagination attributes:
  - a. Find Pagination.
  - **b. Type** Select the pagination type for this report. Often only a certain number of rows of a report display on a page. In order to include additional rows, the application end user must to navigate to the next page of the report.
  - Display Position Select where the report pagination displays.
     Pagination can be shown above or below the report (or both) and can be positioned on the left or right.
- To save your changes click Save. To save and run the page, click Save and Run Page.

# 8.9.5.7 Enabling Icon View

Learn about interactive report Icon View.

By default, most interactive reports display as a report. You can optionally display columns as icons. When configured to display columns as icons, a View Icons icon displays on the Search bar.



To use Icon view, you must identify the columns used to identify the icon, the label, and the target (that is, the link). As a best practice, set these columns to display as hidden since they are typically not useful for end users.

- Adding a View Icon Button
   Add Icon view to an interactive report.
- Adding a Custom Icon View Link Add a custom Icon View link.

### 8.9.5.7.1 Adding a View Icon Button

Add Icon view to an interactive report.

To add Icon view to an interactive report:

 View the page in Page Designer: Page Designer appears.



- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. Find **Icon View**. Configure the following attributes:
  - a. Show Select On to add a View Icons icon to the Search bar.
  - b. **Custom** Specify whether you wish to define a custom link for the Icon View. This option provides greater flexibility in defining the content of the Icon View, including the ability to utilize more than one column. Select **On** or **Off**.
  - **c. Columns Per Row** Select the number of icons to display per row in Icon View. A value of 5 displays 5 icons per row of the report.
  - d. **Link Column** Select the column that returns the link target of the icon.
  - **e. Image Source Column** Identify the column that returns the image source.
  - f. Label Column Select the column that returns the image label.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



Adding a Custom Icon View Link

### 8.9.5.7.2 Adding a Custom Icon View Link

Add a custom Icon View link.

A custom Icon View link provides greater flexibility in defining the content of the Icon View, including the ability to utilize more than one column.

To add a custom Icon View link:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. Find **Icon View**. Configure the following attributes:
  - a. Show Select On.
  - b. Custom Select On.
  - c. Columns Per Page Select the number of icons to display per row in Icon View. A value of 5 displays 5 icons per row of the report.
  - **d. Custom Link** Enter the column link for the Icon view. Use substitution strings for column names, for example:

```
<a href="#EMP_LINK#"><img src="#EMP_IMG#" title="#ENAME#"
alt=""><br>br>#ENAME#</a>
```



To save your changes click Save. To save and run the page, click Save and Run Page.



# 8.9.5.8 Enabling Detail View

Add Details view to an interactive report.

Be default, most interactive reports display as a report. You can optionally display details about each column. When configured, a View Details icon displays on the Search bar.



To add Details view to an interactive report:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups

- 4. Find **Detail View**. Configure the following attributes:
  - a. Show Select On.
  - **b. Before Rows** Enter the HTML to be displayed before report rows. For example:

c. For Each Row - Enter the body for report rows in the Detail View. Use #COLUMN\_NAME# substitution strings for column names and column labels. For example:

```
#ENAME_LABEL#:#ENAME##JOB LABEL#:#JOB#
```

- d. After Rows Enter the HTML to be displayed after report rows. For example:
- To save your changes click Save. To save and run the page, click Save and Run Page.

# 8.9.5.9 Configuring Advanced Attributes for Interactive Reports

Configure advanced interactive report attributes to define the region alias, specify an item whose value stores the saved report ID, and define a from address in an interactive report subscription or email download

- About Emailing from an Interactive Report Learn about emailing from an interactive report.
- Configuring Advanced Attributes
   Configure Advanced interactive report Attributes.

### 8.9.5.9.1 About Emailing from an Interactive Report

Learn about emailing from an interactive report.

You can define the from address for emails sent from an interactive report in two ways:

- Application-level Edit the Application Email From Address attribute on the Edit Application Definition page.
- Report-level Access the report Attributes. Under Advanced, edit the Email from Address attribute.

In either case, the value can be a literal string containing a valid email or an application substitution defined at the application-level using substitution syntax or &APP\_EMAIL. substitution which returns the Application Email From Address defined at the application-level. Examples:

john.doe@abc.com
&MY\_APP\_EMAIL\_FROM.
&APP\_EMAIL.

### Note:

Oracle does not recommend using an item substitution at the application or pagelevel since it only works in email download, but not for subscriptions.

### See Also:

- Accessing the Application Definition Page
- Configuring Advanced Attributes for Interactive Reports
- Enabling Interactive Report Email Download

### 8.9.5.9.2 Configuring Advanced Attributes

Configure Advanced interactive report Attributes.

To configure Advanced Attributes:



1. View the page in Page Designer:

Page Designer appears.

- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups

- **4.** Find **Advanced** and configure the appropriate options.
  - a. Region Alias Enter an alphanumeric alias for this interactive report region.

The alias must be unique within the application. You can use an alias to reference an interactive report region in your custom API call. For example, you can write a function to return the INTERACTIVE\_REPORT\_ID by querying the ALIAS column in the APEX\_APPLICATION\_PAGE\_IR view. Since the INTERACTIVE\_REPORT\_ID value can change when you export or import the application to different instance, referencing interactive report regions using an alias may be preferable.

**b. Report ID Item** - Select a page or application item whose value stores the saved report ID.

Interactive report uses this item value to link to a saved report. For example, you can define list of saved reports with links with defined item name and saved report ID as its value to link to a saved default reports, public or private reports. The saved report IDs can be retrieved from the APPLICATION PAGE IR RPT view.

**c. Email From Address** - Enter a valid email address to use as the From address when sending email from this report.

Emails are sent from this report for Downloads of type Email and for Subscriptions. The value can be a literal string containing a valid email address or a static substitution reference defined in the application using substitution syntax.

Oracle does not recommend using an item substitution at the application or page-level since it only works in an email download, but not for subscriptions.

### Examples:

```
john.doe@abc.com
&MY_APP_EMAIL_FROM.
&APP_EMAIL.
```

 d. Oracle Text Index Column - Select a column where the column is indexed by an Oracle Text index.

Row Search returns results based on the Oracle Text operator entered, providing the corresponding Oracle Text index has been created for the column. This option should only be enabled if the necessary index exist, and the end users have been trained in how to utilize the Oracle Text search operators. To simplify Oracle Text syntax for end users, you can specify a function for the Oracle Text PL/SQL Function Name Component Setting of Interactive Grids in Shared Components.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.9.6 Managing Interactive Report Column Attributes

Edit column attributes to control the display, features, and behavior of interactive report columns.

- Editing Interactive Report Column Attributes
   Edit Column attributes to precisely control the report layout.
- Creating a Column Link in an Interactive Report
   Configure Column Attributes to create a link from a report to another page in your application or to a URL
- Defining a Column as a List of Values in an Interactive Report
   Add a list of values in an interactive report to improve the speed of built-in filter tools.
- Formatting Columns in an Interactive Report Customize column display with HTML expressions.
- About Filtering on Conditional Links in Interactive Report Columns
   Learn about about filtering on conditional links in interactive report columns.



Editing Pages in Page Designer

# 8.9.6.1 Editing Interactive Report Column Attributes

Edit Column attributes to precisely control the report layout.

For example, you can use these attributes to alter a column heading, change column positioning, hide a column, or control how users can manipulate a column.

To edit column attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select an application.
  - Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

4. Edit the appropriate attributes.





### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 5. To edit the column heading, find the **Heading** group:
  - a. Heading Enter the report column heading text.
  - **b.** Alignment Select the heading alignment. Note that your alignment selection must be supported by the selected report template.
- 6. To control how users can manipulate a column::
  - a. Find the Enable Users To group.
  - **b.** For Enable Users To For each attribute select **On** or **Off** to control how users can manipulate the report.
- To save your changes click Save. To save and run the page, click Save and Run Page.



#### See Also:

About Filtering on Conditional Links in Interactive Report Columns and Right Pane of Page Designer (Property Editor)

# 8.9.6.2 Creating a Column Link in an Interactive Report

Configure Column Attributes to create a link from a report to another page in your application or to a URL

To create a column link to another page:

- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

3. Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. Find Identification. From Type, select Link
- Find Link and click No Link Defined.

The Link Builder - Target dialog appears.

6. To create a link to another page, in the Link Builder - Target dialog:

- Type Select Page in this Application.
- b. Page Specify the target page number.
- c. Set Items Select a Name and Value to specify session state for an item.
- **d.** Clear/Reset, Clear Cache Specify the page numbers on which to clear cache. To specify multiple page, enter a comma-delimited list of page numbers.
- e. Clear/Reset, Action Select one of the following:
  - None No clear or reset action when page loads.
  - Clear Regions Clears all region settings on the page.
  - **Reset Regions** Resets all regions on the page back to the default state, including sort orders, hidden columns and so on.
  - Reset Pagination This option enables backwards compatibility.
- f. Advanced, Request Specify the request to be used.
- g. Click OK.
- 7. To create a link to a URL, in the Link Builder Target dialog:
  - a. Type Select URL.
  - b. URL Enter the URL address.
  - c. Click OK.
- 8. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.9.6.3 Defining a Column as a List of Values in an Interactive Report

Add a list of values in an interactive report to improve the speed of built-in filter tools.

To define a report column as a list of values:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate the region containing the report.
- 3. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

- 4. Select a column to edit.
- 5. Configure Column Filter:
  - a. Find Column Filter.
  - **b.** For Type, select how to derive the filters provided in the report column drop down list. Options include:
    - None No column filter is provided for this report.
    - Default Based on Column Type STRING and NUMBER columns derive the list of values from distinct column values. DATE columns derive the list of values from predefined date ranges.



- Use Defined List of Values to Filter Exact Match Derive the list of values from a defined list of values SQL query to create an equal filter.
- Use Defined List of Values to Filter Word Contains Derive the list of values from a defined list of values SQL query to create a contains filter.
- Use Named List of Values to Filter Exact Match Derive the list of values from the named list of values to create an equal filter.
- Use Named List of Values to Filter Word Contains Derive the list of values from the named list of values to create a contains filter.
- To save your changes click Save. To save and run the page, click Save and Run Page.

### 8.9.6.4 Formatting Columns in an Interactive Report

Customize column display with HTML expressions.

To define column formatting:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate the region and expand the Columns node.
  - The columns appear in the Rendering tab.
- 3. Select a column to edit.
- 4. Configure the column format:
  - a. Find Column Formatting.
  - b. In HTML Expression, enter HTML expressions to be shown in this column. Use #COLUMN# syntax to show column values in HTML.
    - Example 1: Change the background and text colors

```
<span style="background-color: yellow; color:
red;">#EMPLOYEE STATUS#</span>
```

Example 2: Use Heading 2

```
<h2>#EMPLOYEE NAME#</h2>
```

Example 3: Use a dynamic class from the SQL query

```
<span class="#COLUMN_CLASS#">#EMPLOYEE_STATUS#</span>
```

The #COLUMN\_CLASS# and #EMPLOYEE\_STATUS# substitutions in this example are columns selected in the report SQL query.



Example 4: Show an image, and a tooltip on hover

```
<img src="#IMAGE_NAME#" alt="#EMPLOYEE_NAME#"
title="#EMPLOYEE NAME#">
```

The next two examples demonstrate are examples that use template directives. To learn more, see Using Template Directives.

Example 5: Loop over a comma separated list of values

```
{loop "," TAGS/}&APEX$ITEM.{endloop/}
```

Example 6: Use an "if" directive for a column with a quoted identifier

```
{if Mixed Case Name/}<strong>#"Mixed Case Name"#</strong>{endif/}
```

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 8.9.6.5 About Filtering on Conditional Links in Interactive Report Columns

Learn about about filtering on conditional links in interactive report columns.

If an interactive report has a column value that is a link and the link markup is constructed in the report query, attempting to define a filter on this value from the column header menu fails. Oracle APEX is not be able to render the link correctly in the column header menu because the column values are themselves rendered as links, such that they can be selected to apply the filter. If the developer wanted to conditionally render the link based on query logic, the link may have been defined in the report query as opposed to using the declarative column link support.

For filtering to work on conditional links in columns, developers have two options:

- Option 1: Use an HTML Expression column:
  - 1. Add another column to your query that selects the equivalent of the link text from the link and define a column alias of my\_link\_display. This column alias will be the value used in the column header menu.
  - 2. Change the my link column to be of type Hidden Column.
  - 3. In the my\_link\_display column, set the column heading to be the same as the my\_link column and set HTML Expression to be #MY\_LINK#. Keep the default Escape Special Characters as Yes.
  - Run the page.

If needed, reorder the columns so that the new column in the same position as the old one. Select the **Actions** menu and then **Select Columns**.

Save a new default report. Select the Actions menu, Save Report, and then Save as Default Report Settings.

The link still renders fine in the report and the column header menu now renders just the my link display value which sets the filter correctly.

 Option 2: Use a custom Column Filter for the link column, where you could query for the link text.



See Also:

**Editing Interactive Report Column Attributes** 

# 8.9.7 Customizing Interactive Reports in a Running Application

When running an application, end users and developers can alter the layout of interactive reports data by choosing the columns they are interested in, applying filters, highlighting, and sorting. They can also define breaks, aggregations, charts, group bys, and add their own computations.

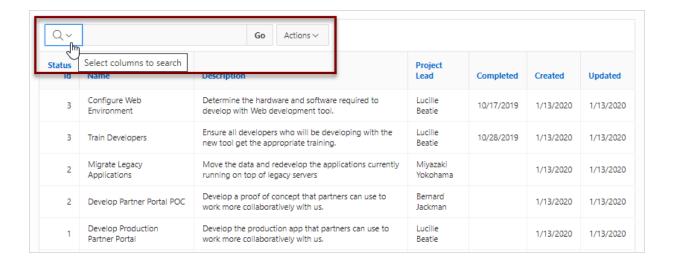
- About the Search Bar Learn about the interactive report search bar.
- About the Actions Menu
   Learn about the interactive report Actions menu.
- Using Interactive Report Filters
  Learn about using interactive report filters.
- Saving Interactive Reports
   Learn about saving private and public interactive reports.



Customizing an Interactive Report Using the Actions Menu in *Oracle APEX End User's Guide* 

# 8.9.7.1 About the Search Bar

Learn about the interactive report search bar.





A search bar displays at the top of every interactive report and may include the following features:

- **Select Columns to Search** This icon resembles a magnifying glass. Click this icon to narrow your search to specific columns. To search all columns, select **All Columns**.
- Text Area Enter case insensitive search criteria (wildcard characters are implied) and click Go.
- Go Button Executes a search.
- Reports Displays alternate default and saved private, or public reports. See Saving Interactive Reports.
- **View Icons** Switches between an View Icon, View Report and View Detail of the default report (if enabled). May also include Chart and Group By View (if defined).
- Actions menu Use the Actions menu to customize an interactive report. See About the Actions Menu.



Customizing an Interactive Report Search Bar

## 8.9.7.2 About the Actions Menu

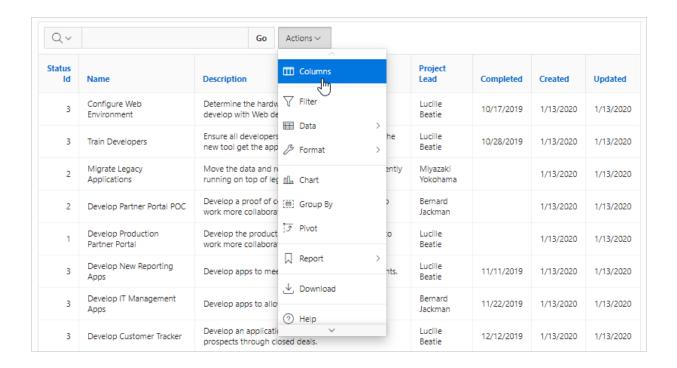
Learn about the interactive report Actions menu.



The structure of the interactive report Actions menu has changed to be consistent with interactive grids. To alter an interactive report Actions menu to use the previous (or legacy) structure, go to **Shared Components**, **Component Settings**, and configure the **Interactive Report** component. See Configuring Interactive Report Action Menu Structure.

The Actions menu appears to the right of the Go button on the Search bar. End users use the Actions menu to customize an interactive report.





## See Also:

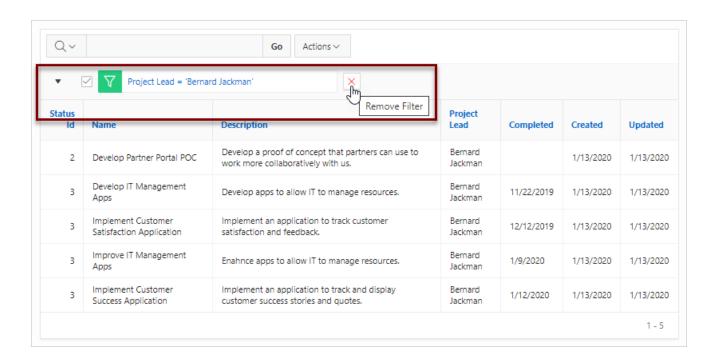
Customizing an Interactive Report Using the Actions Menu in *Oracle APEX End User's Guide* 

# 8.9.7.3 Using Interactive Report Filters

Learn about using interactive report filters.

When you customize an interactive report, a filter displays between the search bar and the report. The following illustration shows an interactive report with one filter, Project lead = 'Bernard Jackman'.



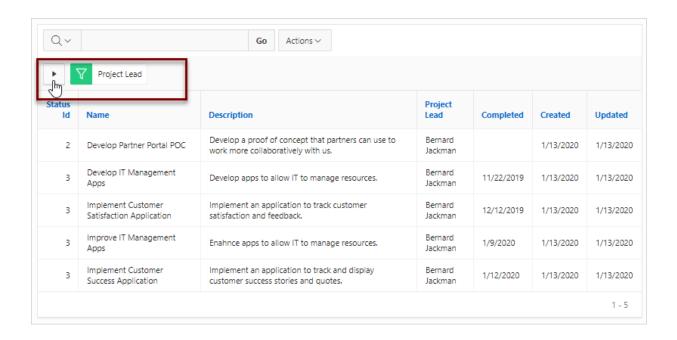


Other keys features of interactive report filters include:

- **Enable/Disable** To enable and disable a filter, select and deselect the checkbox to the left of the filter name.
- Filter Edit To edit a filter, click the filter name.
- **Remove Filter** To remove a filter, select the **Remove Filter** icon to the right of the filter name.

By default, multiple filters display horizontally stacked on top of one another. To minimize the amount of information that displays and hide filter details, click the arrow to the left of the filter name. The following illustration shows the same report with the filter details hidden.





# 8.9.7.4 Saving Interactive Reports

Learn about saving private and public interactive reports.

All users can save a private or public interactive report. However, only the user who creates a private report can view, save, rename, or delete it. Developers have additional save capabilities in that they can save the report that initially displays, called the Primary Default, or create an Alternative Default report.

- About the User Type and Available Save Options
   Learn how end users and developers can save interactive reports.
- About Configuration Dependencies When Saving Interactive Reports
   Developers control how users can save an interactive report by editing report
   Attributes.
- Saving a Public or Private Interactive Report
   End users can save public or private interactive reports.
- Saving a Default Interactive Report
   Developers can save primary and alternative interactive reports.
- Renaming a Public or Private Interactive Report Rename a public or private interactive report.
- Deleting a Public or Private Interactive Report Delete a public or private interactive report
- About Exporting Interactive Reports
   Learn about exporting interactive reports.



Managing Saved Interactive Reports in Oracle APEX Administration Guide



## 8.9.7.4.1 About the User Type and Available Save Options

Learn how end users and developers can save interactive reports.

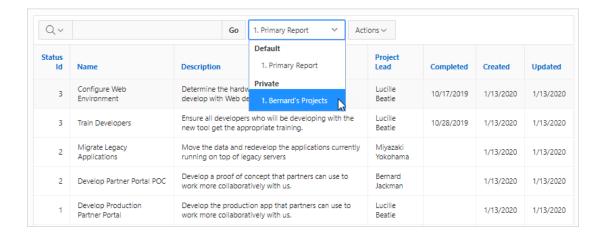
An end user can save an interactive report in two ways:

- Public Report (End user and developer). This report is viewable by all users. However, only the user who creates a public report can save, rename, or delete it. Although all users can view a public report, they can only save it under a new report name.
- **Private Report** (End user and developer). Only the user who creates the private report can view, save, rename, or delete it.

A developer can additionally save an interactive report in the following ways:

- **Primary Default** (Developer only). The Primary Default is the report that initially displays. Primary Default reports cannot be renamed or deleted.
- **Alternative Report** (Developer only). Enables developers to create multiple report layouts. Only developers can save, rename, or delete an Alternative Report.

The following illustration shows the Reports list on the Search bar of an interactive report.



This example shows two reports:

- Default Primary Report. This is the initial report created by the application developer.
   Default, Primary reports cannot be renamed or deleted.
- **Private 1. Bernard's Projects**. This is a Private report. Only the user who creates a private report can view, save, rename, or delete it.



## Tip:

You can view saved report activity from the Workspace Administration page. On the Workspace home page, click the **Administration** menu and then select **Administration**, **Monitor Activity**, and then under **Page Views** select **By Interactive Report**.



# 8.9.7.4.2 About Configuration Dependencies When Saving Interactive Reports

Developers control how users can save an interactive report by editing report Attributes.

To fully enable users to save private reports, a developer must:

- 1. Define an authentication scheme for the current application.
- **2.** Edit the following report Attributes:
  - **Search Bar**, **Reports Select List** Set this attribute to **On** to include a Reports select list in the Search bar.
  - Actions Menu, Save Report Set this attribute to On to enable end users to save their current report definition as a *Private* report.
  - Actions Menu, Save Public Report Set this attribute to On to enable end users to save their current report definition as a *Public* report.
  - Actions Menu, Save Public Report Authorization Select an authorization scheme to restrict who can save public report definitions. To enable an end user to save a public report, this authorization scheme must evaluate to TRUE. If no authorization scheme is provided then reports may be saved by any user.

## See Also:

- **Establishing User Identity Through Authentication**
- Customizing the Interactive Report Actions Menu
- Customizing an Interactive Report Search Bar

## 8.9.7.4.3 Saving a Public or Private Interactive Report

End users can save public or private interactive reports.

End users can save an interactive report and classify it as being either public or private. Public reports can be viewed by all users. Private reports can only be viewed by the user who saves the report.



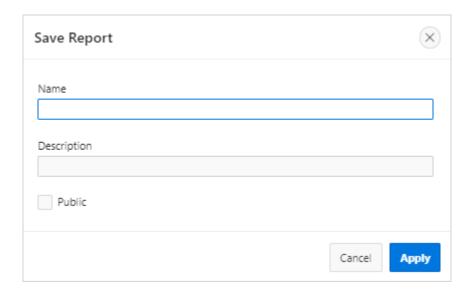
### Tip:

To save a public report, the developer must edit the report Attributes. In the Property Editor, locate **Actions Menu** and set **Save Public Report** to **On**. Developers can also apply an authorization scheme to enable or disable Save Public Report. See About Configuration Dependencies When Saving Interactive Reports.

To save a public or private interactive report:

1. Go to the page containing the interactive report you want to save.

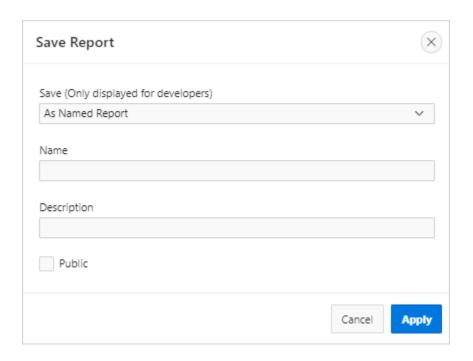
- 2. Customize the report (for example, hide columns, add filters, and so on).
- Click the Actions menu and select Report and then Save Report.The Save Report dialog appears.
- 4. For end users, the following Save Report dialog appears.



### In Save Report:

- a. Name Enter a name for the report.
- **b. Description** Enter an optional description.
- **c. Public** Select this option to make the report viewable to all users. Deselect this option to make the report private.
- d. Click Apply.
- 5. For developers, the following Save Report dialog appears.





## In Save Report:

- a. Save Select As Named Report.
- **b.** Name Enter a name for the report.
- c. **Description** Enter an optional description.
- **d. Public-** Select this option to make the report viewable to all users. Deselect this option to make the report private.



## Tip:

The Public checkbox only displays if you have enabled the **Save Public Report** report attribute.

e. Click Apply.

## 8.9.7.4.4 Saving a Default Interactive Report

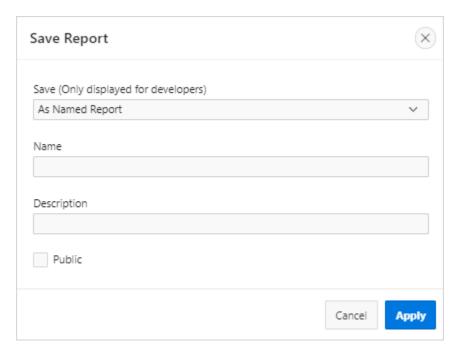
Developers can save primary and alternative interactive reports.

Developers can save two types of default interactive report: **primary** and **alternative**. Both reports display on the Report list on the search bar. However, primary default reports cannot be renamed or deleted.

To save a default interactive report:

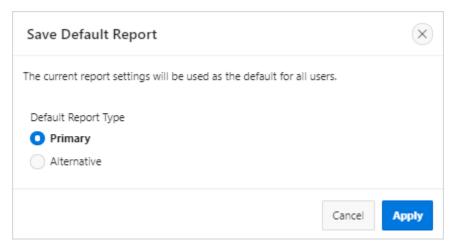
- Run the report as a developer.
- 2. Customize the report (for example, hide columns, add filters, and so on).
- Click the Actions menu and select Report and then Save Report.The Save Report dialog appears.





4. From Save, select As Default Report Settings.

The Save Default Report dialog appears.



- **5.** For Default Report Type, select either:
  - Primary This report displays as the primary report when the page runs.
  - **Alternative** This report displays as an alternative option on the Reports list on the Search bar. If you select **Alternative**, enter a name.
- 6. Click Apply.

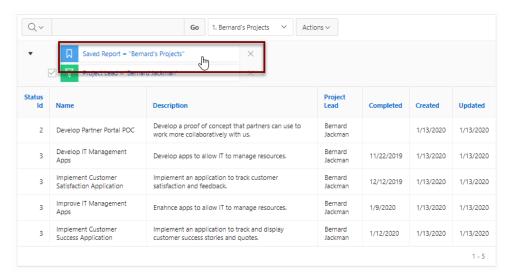
## 8.9.7.4.5 Renaming a Public or Private Interactive Report

Rename a public or private interactive report.

To rename a public or private interactive report:

1. Run the report as a developer.

- 2. Select the public or private interactive report to rename.
- 3. Click the saved report link.



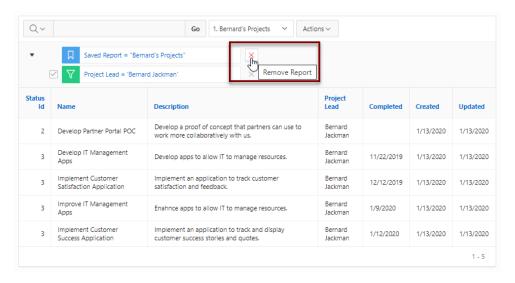
- 4. In the Rename Report dialog:
  - a. Edit the attributes. For example, enter a new name in Name.
  - b. Click **Apply** to save your changes.

## 8.9.7.4.6 Deleting a Public or Private Interactive Report

Delete a public or private interactive report

To delete a public or private interactive report:

- Run the report as a developer.
- 2. Click the **Remove Report** icon next to the report name link.



3. Click Apply.



## 8.9.7.4.7 About Exporting Interactive Reports

Learn about exporting interactive reports.

When you export an application, the Primary Default, Alternative Default, and public reports are included by default. Configure the **Export Public Reports** and **Export Private Reports** attributes to control the type of reports to include in your export.



**Exporting an Application** 

# 8.9.8 Linking to Interactive Reports

Link to interactive reports using the syntax in the Request value and ItemNames section of the URL.

Data in an interactive report is driven by declarative filters. Developer can set report parameters by modifying interactive report settings for an end user. However, these settings only affect the end user's working report and do not affect any saved report settings. Developers can use the syntax described in this topic to link to interactive reports.

## Note:

When you add additional interactive report regions, be sure to change the old single interactive report link syntax. Otherwise, the link generates an error. A link to a page with more than one interactive report regions, the request or name syntax needs to fully qualify with region static ID. To open a link to an interactive report from outside of an application (for example, from an email), you may need to enable the Session Management, Deep Linking attribute in your application. See Session Management.

- Interactive Report Request Syntax
   Link to a specific saved report using Request syntax.
- Interactive Report Name and Value Syntax
   Create a filter using itemNames and itemValues syntax.
- Interactive Report ClearCache Syntax
   Use the ClearCache section of the URL to reset, clear, or reset pagination the interactive report.
- Restrictions When Linking to Interactive Reports
   Learn about restrictions when linking to interactive reports.
- Valid Interactive Report Linking Examples
   View valid interactive report linking examples.
- Invalid Interactive Report Linking Examples
  View invalid interactive report linking examples.



Linking to Shared Interactive Reports
 Learn about linking to shared interactive reports.

## See Also:

- Understanding URL Syntax
- About Using f?p Syntax to Link Pages

# 8.9.8.1 Interactive Report Request Syntax

Link to a specific saved report using Request syntax.

To link to a specific saved report, use the following Request syntax:

IR[region static ID]\_<report\_alias>

Consider the following example:

IR[EMP] dept20



The use of Request in the URL is optional. To link to multiple saved reports, separate each Request with comma.

# 8.9.8.2 Interactive Report Name and Value Syntax

Create a filter using itemNames and itemValues syntax.

To create a filter, use the following itemNames and itemValues syntax:

IR[region static ID]<operator> <target column alias>

Consider the following example:

IR[EMP]C\_ENAME:KING



If there is only one interactive report region on the page, the itemName does not need to be fully qualified with the region static ID. If an operator is not defined, a filter with equal operator is added.

To create a filter on an interactive report in a link, use the itemNames syntax described previously and add the filter value in the corresponding location in the item names section of the URL.



To create row text which contains a filter on an interactive report, use ROWFILTER as the target column alias in the item name syntax and add a filter value in the item itemValues of the URL. The link will add a Row Text Contains filter which searches all columns displayed in the report with type STRING or NUMBER.

### Consider the following example:

IR[EMP]\_ROWFILTER:SALES

#### Valid operators include:

- C = Contains
- EQ = Equals (this is the default)
- GTE = Greater than or equal to
- GT = Greater Than
- LIKE = SQL Like operator
- LT = Less than
- LTE = Less than or equal to
- N = Null
- NC = Not Contains
- NEQ = Not Equals
- NLIKE = Not Like
- NN = Not Null
- NIN = Not In (escape the comma separated values with a leading and trailing backslash,
   )
- IN = In (escape the comma separated values with a leading and trailing backslash, \)
- ROWFILTER = Row Text Contains (this searches all columns displayed in the report with type STRING or NUMBER)

# 8.9.8.3 Interactive Report ClearCache Syntax

Use the ClearCache section of the URL to reset, clear, or reset pagination the interactive report.



## Tip:

Using ClearCache without specifying a saved report alias in the Request, clears the primary default report. To clear a specific interactive report region on a page with more than one interactive reports, specify the region static ID along with saved report alias in the Request.

Use the following syntax in the ClearCache section of the URL to reset, clear, or reset pagination the interactive report:

• RR - Resets an interactive report and pagination. This is equivalent to the end user choosing the Reset option from the interactive report Actions menu on the target page.



The report is returned to the default report settings specified by the developer or saved by the user.

- CR Clears interactive report and resets pagination. This clears all of the session report settings such as control break, aggregate, flashback, chart, number of rows to display, filter, highlight, computation, group by, and pivot.
- RP Resets interactive report pagination.

# 8.9.8.4 Restrictions When Linking to Interactive Reports

Learn about restrictions when linking to interactive reports.

When linking to interactive reports, remember the following restrictions:

- 1. If a Request value is not defined in the URL, all of the primary default report settings will change.
- 2. If a Request value is not defined and itemNames section does not include a fully qualified filter column name with region static ID, an error occurs if there are more than one interactive report region in the target page.
- 3. If a Request value is not defined and itemNames section do not include a fully qualified filter column name with region static ID, it will create a filter on the primary default report if there is only one interactive report region in the target page.

## 8.9.8.5 Valid Interactive Report Linking Examples

View valid interactive report linking examples.

#### Valid Linking Example 1

This example includes a link with no Request value, but includes a qualified filter column with region static ID in the itemNames section of the URL. This example creates a filter on the primary default report in the referenced region item name.

```
f?p=&APP ID.:2:&SESSION.::::IR[EMP] ENAME:KING
```

### Valid Linking Example 2

To support backwards compatibility with previous releases, this example uses older syntax and works on a page with one interactive report region.

```
?p=&APP_ID.:1:&SESSION.:IR_REPORT_12345::RIR,CIR::RIR,CIR:IR_ENAME:KING
```

#### Valid Linking Example 3

In this example the link has no REQUEST value. The clear cache section RR resets the report for all interactive report regions for page 1.

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



# 8.9.8.6 Invalid Interactive Report Linking Examples

View invalid interactive report linking examples.

## **Invalid Linking Example 1**

This link has no Request value and does not include a fully qualified filter column with region static ID in the item name section of the URL. This example generates an error if there is more than one interactive report region in the target page.

```
f?p=&APP ID.:2:&SESSION.::::ENAME:KING
```

### **Invalid Linking Example 2**

This example has a link with two request values separated by commas and does not contain a fully qualified filter column with region static ID in the item name section of the URL. This example generates an error since it is not clear where the filter needs to be created.

```
f?p=&APP ID.:2:&SESSION.:IR[test] employee, IR[test2] dept10:::ENAME:KING
```

### **Invalid Linking Example 3**

This example uses old request value syntax used on a page with multiple interactive report regions. This example will generate an error. The old syntax only works if there is one interactive report region.

```
f?p=&APP ID.:2:&SESSION.:IR REPORT myrpt:::ENAME:KING
```

# 8.9.8.7 Linking to Shared Interactive Reports

Learn about linking to shared interactive reports.

Link to saved primary default, alternative default, and public reports using  $IR[region static ID]\_\langle report\_alias \rangle$  in the Request value of the URL.

- Editing the Interactive Report Saved Report Alias
   Edit the Alias for a saved reports to create a more meaningful URL link to the saved report.
- Link Examples to a Primary Report
   View examples that demonstrate how to link to a primary report (report\_alias=PRIMARY).
- Link Examples to Saved Reports
   View examples that demonstrate how to link to a saved report (report\_alias=REPORT1).

### See Also:

- About Using f?p Syntax to Link Pages
- Saving a Default Interactive Report
- Deleting Saved Interactive Reports
- Managing Saved Interactive Reports in Oracle APEX Administration Guide



## 8.9.8.7.1 Editing the Interactive Report Saved Report Alias

Edit the Alias for a saved reports to create a more meaningful URL link to the saved report.

To edit the Alias for saved reports:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, find the region containing the report.
- 3. Under the region, expand Saved Reports and select the saved report.

The Property Editor displays the attributes for the Saved Report.

- 4. Identification, Alias Enter a new alias for the report. Use this alias to define a more meaningful URL link to this saved report. This link can be used to link directly from elsewhere in the application.
- 5. Link, Link Example View the URL link for this saved report. This attribute is view only and cannot be updated. Use this attribute to quickly copy the displayed URL. This URL can be used to link directly to this particular saved report from anywhere else in the application.
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.9.8.7.2 Link Examples to a Primary Report

View examples that demonstrate how to link to a primary report (report alias=PRIMARY).

This example links to a primary report:

```
f?p=100:1:&APP SESSION.:IR PRIMARY
```

This example links, resets, and clears primary report settings:

```
f?p=100:1:&APP SESSION.:IR PRIMARY::RR,CR:
```

This example links, resets, and clears primary report settings. It additionally creates a ENAME = 'KING' filter on the primary report:

```
f?p=100:1:&APP SESSION.:IR PRIMARY::RR,CR:IR ENAME:KING
```

## 8.9.8.7.3 Link Examples to Saved Reports

View examples that demonstrate how to link to a saved report (report alias=REPORT1).

This example links to a saved report:

```
f?p=100:1:&SESSION.:IR REPORT1
```

This example links, resets, and clears settings for saved report REPORT1:

```
f?p=100:1:&APP SESSION.:IR REPORT1::RR,CR:
```

This example links, resets, and clears saved report REPORT1 settings. It additionally creates a ENAME = 'KING' filter on saved report REPORT1.

f?p=100:1:&APP SESSION.:IR REPORT1::RR,CR:IR ENAME:KING

# 8.10 Managing Classic Reports

A classic report features a simple report page based on the formatted result of a SQL query.

Developers control how a classic report works by editing the following attributes in Page Designer: region attributes, report Attributes, and Column attributes.

- Example Classic Report
   View a classic report example.
- Creating a Classic Report Using the Create Application Wizard
   Run the Create Application Wizard to create a new application that contains one or
   multiple classic report pages.
- Creating a Classic Report Using the Create Page Wizard
   Run the Create Page Wizard to add a new classic report page to an existing application.
- Editing Classic Report Region Attributes
   Edit Region attributes to alter the SQL source, change the region layout and appearance, define a region displays selector, and create region conditions.
- Managing Classic Report Attributes
   Edit report Attributes control how a classic report works.
- Managing Classic Report Column Attributes
   Edit column attributes to control the display, features, and column behavior.

# 8.10.4 Editing Classic Report Region Attributes

Edit Region attributes to alter the SQL source, change the region layout and appearance, define a region displays selector, and create region conditions.

To edit classic report Region attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the region.

In the Property Editor, the **Region** tab displays the attributes. Attributes are organized in groups.





### Tip:

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click Go to Group and select the group.

3. Edit the appropriate attributes.



### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

To save your changes click **Save**. To save and run the page, click **Save and Run** Page.



### See Also:

Right Pane of Page Designer (Property Editor)

# 8.10.1 Example Classic Report

View a classic report example.

A classic report is a formatted result of a SQL query. You choose a table on which to build a report, or provide a custom SQL SELECT statement or a PL/SQL function returning a SQL SELECT statement. With the exception of sorting and simple filtering, end users cannot customize a classic report. Both the Create Application Wizard and Create Page Wizard support the creation of classic reports.

The following is an example of a classic report.

Status Id	Name	Description	Project Lead	Completed	Created	Updated
3	Configure Web Environment	Determine the hardware and software required to develop with Web development tool.	Lucille Beatie	10/17/2019	1/13/2020	1/13/2020
3	Train Developers	Ensure all developers who will be developing with the new tool get the appropriate training.	Lucille Beatie	10/28/2019	1/13/2020	1/13/2020
2	Migrate Legacy Applications	Move the data and redevelop the applications currently running on top of legacy servers	Miyazaki Yokohama		1/13/2020	1/13/202
2	Develop Partner Portal POC	Develop a proof of concept that partners can use to work more collaboratively with us.	Bernard Jackman		1/13/2020	1/13/2020
1	Develop Production Partner Portal	Develop the production app that partners can use to work more collaboratively with us,	Lucille Beatie		1/13/2020	1/13/2020
3	Develop New Reporting Apps	Develop apps to meet C Level reporting requirements.	Lucille Beatie	11/11/2019	1/13/2020	1/13/202

To create a classic report, developers either select a table or provide a SQL statement. Classic reports support general keyword search capability, the ability to specify the number of rows that display, and basic column sorting. You also have the option to include a form page for creating or updating records.



#### Tip:

To view an example, install the sample app, *Sample Reporting*. To learn more, see Installing Apps from the Gallery.



Developers can create highly customized reports using report template (in particular, named column templates). See Report Templates.

# 8.10.2 Creating a Classic Report Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains one or multiple classic report pages.

To create a classic report using the Create Application Wizard:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Click the Create button.
- Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- **6.** Appearance Accept the default or click **Set Appearance** to change it.
- 7. To add a classic report:
  - a. Click Add Page.
  - b. Expand Additional Pages and select Classic Report.
- 8. On Add Report Page:
  - a. Page Name Enter a name for this page.
  - **b.** Set Icon Select an icon to display in the navigation menu for this page.
  - c. Select the source for the report:
    - Table or View
    - SQL Query

What you select determines what displays next. Follow the on-screen instructions. To learn more about an attribute, click the Help icon in the lower left corner.

- **d.** Include Form Select **Include Form** to include a form page for creating or updating records.
- e. Lookup Columns Expand to see attributes for defining a lookup to another table. Use Lookup Columns to replace identifiers with a display column, such as showing the department name instead of the department number. Specify the following:
  - Lookup Key Select the column to change to output the display column.



 Display Column - Select the column (from the lookup table) to be displayed.



### Tip:

**Lookup Columns** only appear if the current page is based on a table and has foreign key constraints to another table.

- f. Advanced Expand Advanced to configure these options:
  - Set as Home Page Enable this to make this page the home page for the application.
  - Set as Administration Page Enable this to have this page display under Administration.
  - Page Help Enter text to be displayed when the user selects Page Help.
- g. Click Add Page.
- Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.



#### See Also:

Creating a Report Using the Create Page Wizard

# 8.10.3 Creating a Classic Report Using the Create Page Wizard

Run the Create Page Wizard to add a new classic report page to an existing application.

To create an classic report page by running the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Classic Report.
- Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page.





#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- **d.** Include Form Page Enable this flag to create a form page along with the report page.

Form pages are always created as Modal Dialog pages. Enabling this flag displays additional attributes. To learn more about an attribute, see field-level Help.

- 6. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the
    connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 7. Source Type Specify the source of the new page. Options include:
  - Table:
    - Table / View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- **8.** Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 9. Click Create Page.



## Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



See Also:

Understanding Page Types in the Create Page Wizard

# 8.10.5 Managing Classic Report Attributes

Edit report Attributes control how a classic report works.

- Editing Classic Report Attributes
   Customize a classic report by editing report Attributes.
- Editing Classic Report Pagination Edit classic report pagination.
- Adding Support for XML File or a CSV File Export
   Add support for exporting a report as an XML or CSV by selecting a report template.
- Enabling Classic Report CSV Output Option Enable classic report CSV output option.
- Controlling Classic Report Column Breaks Control classic report column breaks.

See Also:

Editing Pages in Page Designer

# 8.10.5.1 Editing Classic Report Attributes

Customize a classic report by editing report Attributes.

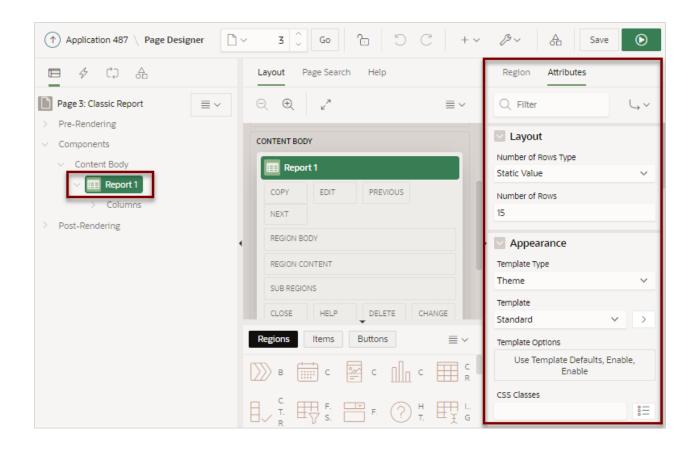
To edit report Attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.





The Property Editor displays the report Attributes. Attributes are organized in groups.

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

- 4. Edit the appropriate attributes.
- 5. To view Help, select the attribute and click the Help tab. Once you activate the Help pane, the content that displays changes every time you select another attribute.
- 6. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.10.5.2 Editing Classic Report Pagination

Edit classic report pagination.

To control classic report pagination:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups.

- Under Pagination, edit the following:
  - Type Select the pagination type for this report. Generally only a subset of the results are currently displayed in the report. Pagination provides the user with



information about the number of rows and the current position within the result set. Pagination also defines the style of links or buttons that are used to navigate to the next or previous page.

- **b. Display Position** Select where the report pagination displays.
- c. Partial Page Refresh Specify whether to use Partial Page Refresh (PPR) to update the report display.

If the end user performs an action, such as a pagination request or selection of a new sort column, the current report rows must be refreshed. Setting this attribute to  $\mathbf{On}$  refreshes just the report region. Setting this attribute to  $\mathbf{No}$  refreshes the entire page.

To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.10.5.3 Adding Support for XML File or a CSV File Export

Add support for exporting a report as an XML or CSV by selecting a report template.

To export a report as a file:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the Attributes tab.

The Property Editor displays the attributes. Attributes are organized in groups.

- 4. Under Appearance, edit the following:
  - a. Template Type Select Predefined.
  - b. Template Select XML or CSV.

Selecting **XML** prevents the APEX engine from rendering the page and dumps the content to an XML file.

To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.10.5.4 Enabling Classic Report CSV Output Option

Enable classic report CSV output option.

To use the enable the CSV output option:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups.

- 4. Under **Download**, edit the following:
  - a. **CSV Export Enabled** Specify whether end users can download the report contents to a CSV file. To enable CSV Downloads, you must use a report template with a #CSV LINK# substitution string and set this option to **On**.



- b. CSV Separator Enter a column separator. If no value is entered, a comma or semicolon is used depending on your current NLS settings.
- **c. CSV Enclosed By** Enter a delimiter character to delineate the starting and ending boundary of a data value. The default delimiter is double quotation marks.
- d. Link Text Specify the text for the link to invoke the CSV download.
- **e. Filename** Specify a name for the CSV download file. If no name is specified, the region name is used followed by the extension \*.csv.
- f. Supplemental Text Enter text that displays at the top of the download file. Use this attribute to for data classification, legal, or warning messages about the data in the file.

## **WARNING:**

Do not use the Supplemental Text attribute with CSV download. If you enable **CSV** download, the defined text will invalidate the CSV file format.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 8.10.5.5 Controlling Classic Report Column Breaks

Control classic report column breaks.

You can control if a specific column repeats and how column breaks appear when printed using **Break Formatting** attributes. For example, suppose your report displays employee information by department number. If multiple employees are members of the same department, you can increase the readability by specifying that the department number only appears once.

To control column breaks:

- 1. View the page in Page Designer:
  - Page Designer appears.
- 2. In the Rendering tab, select the region containing the report.
- 3. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups.

- 4. Under Break Formattingedit the following:
  - a. Report Sum Label Enter the text that displays adjacent to report sum values.
  - **b. Break Columns** Select how many report columns are incorporated into the break formatting. The columns must be consecutive columns, starting from the first column displayed in the report.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.10.6 Managing Classic Report Column Attributes

Edit column attributes to control the display, features, and column behavior.

Altering Classic Report Column Layout
 Edit Column attributes to precisely control the report layout.



- Enabling Column Sorting in a Classic Report Learn how to enable column sorting.
- Creating a Column Link in a Classic Report
   Use Column Link attributes to create a link from a report to another page in your
   application or to a URL.
- Defining an Updatable Column in a Classic Report Make a column updatable by editing column attributes.
- Defining a Column as a List of Values in a Classic Report Render a report column as a list of values.
- Controlling When Classic Report Columns Display
   Control when a column displays using an Authorization Scheme and Server-side
   Condition.
- Adding a Download Link to a Classic Report
   Create a link within a report to enable users to export the report as a commadelimited file (.csv) file.



Editing Pages in Page Designer

# 8.10.6.1 Altering Classic Report Column Layout

Edit Column attributes to precisely control the report layout.

For example, you can use these attributes to alter column heading text, change column positioning, hide a column, create a sum of a column, or select a sort sequence.

To edit the Column attributes:

- View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate the region and expand the Columns node.
  - The columns appear in the Rendering tab.
- 3. Select a column to edit.
- **4.** Edit the appropriate attributes in the Property Editor. Attributes are organized in groups.



### Tip:

To view Help, select the attribute and click the Help tab. Once you activate the Help pane, the content that displays changes every time you select another attribute.

The following table describes common ways to edit report columns.

Table 8-3 Common Report Column Edits for Classic Reports

Description	Developer Action		
Hide a column.	Find Identification. For Type, select Hidden Column.		
Edit the column heading text.	Find <b>Heading</b> . Edit the <b>Heading</b> and <b>Alignment</b> attributes.		
Change the column heading text alignment.	Find <b>Heading</b> . Under Heading, make a new selection from <b>Alignment</b> .		
Alter the column display sequence.	Find Layout. Edit the Sequence attribute.		
Enable a unique sort sequence.	Find <b>Sorting</b> . For <b>Sortable</b> , select <b>On</b> and select a <b>Default Sequence</b> .		
	Any number of columns can be sort enabled. However, at least one column must have a Sort Sequence defined.		
Enable the sum of a column.	Find Advanced. For Compute Sum, select On.		

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.10.6.2 Enabling Column Sorting in a Classic Report

Learn how to enable column sorting.

To enable column sorting:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

3. Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. Find Sorting.
- 5. Under Sorting, edit the following:
  - Default Sequence Select the sort sequence for this column. Each column should have a unique sequence to correctly order the report output.



- **b.** Sortable -To enable sorting, select **On**. Selecting **On** enables the end user to sort this column in the report.
- To save your changes click Save. To save and run the page, click Save and Run Page.



### Tip:

Column sorting must be enabled if you want columns with null values to display at the top or end of the report. To learn more about the Sort Nulls attribute, see Editing Classic Report Pagination.

# 8.10.6.3 Creating a Column Link in a Classic Report

Use Column Link attributes to create a link from a report to another page in your application or to a URL.

To create a column link to another page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

3. Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. Find Identification. From Type, select Link.
- 5. Find Link and click No Link Defined.

The Link Builder - Target dialog appears.

- 6. To create a link to another page, in the Link Builder Target dialog:
  - a. Type Select Page in this application.
  - b. Page Specify the target page number.
  - c. Set Items Select a Name and Value to specify session state for an item.
  - d. Clear/Reset, Clear Cache Specify the page numbers on which to clear cache. To specify multiple pages, enter a comma-delimited list of page numbers.
  - e. Clear/Reset, Action Select one of the following:
    - None No clear or reset action when page loads.
    - Clear Regions Clears all region settings on the page.
    - Reset Regions Resets all regions on the page back to the default state, including sort orders, hidden columns and so on.



- Reset Pagination This option enables backwards compatibility.
- f. Advanced, Request Specify the request to be used.
- g. Click OK.
- To create a link to a URL, in the Link Builder Target dialog:
  - a. Type Select URL.
  - b. URL Enter the URL address.
  - c. Click OK.
- 8. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 8.10.6.4 Defining an Updatable Column in a Classic Report

Make a column updatable by editing column attributes.

Note that the Oracle APEX engine can only perform updates if:

- A multirow update is defined.
- A PL/SQL process is implemented to process updated data.
- When using the built-in tabular form elements and display types, then the report has to be defined using the type SQL Query (updatable report).

To define updatable column attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. In the Property Editor, find **Identification** and edit the Type attribute.
- **5.** To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 8.10.6.5 Defining a Column as a List of Values in a Classic Report

Render a report column as a list of values.

A column can be rendered as Radio Group or a static, named, or query-based LOV. For example, a column can be rendered using a select list or a popup list of values. Or, a column can be rendered as read-only text based on a list of values.

This last approach is an effective strategy when creating display lookup values and is particularly useful in regular, nonupdatable reports. This approach enables you to display the value of a column without having to write a SQL JOIN statement.

To render a report column as a list of values:



- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate the region and expand the Columns node.

The columns appear in the Rendering tab.

Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- Find Identification. From Type, select Plain Text (based on List of Values).
- Find List of Values. Select a Type:
  - Shared Component Creates a list of values based on a predefined list of values defined in Shared Components.
  - SQL Query Creates a dynamic list of values based on the SQL Query you provide.
  - Static Values Creates a static list of values is based on the text value you provide.
  - PL/SQL Function Body returning SQL Query Creates a dynamic list of values is based on the SQL Query returned by the entered PL/SQL Function Body you provide.
- The UI changes based on the List of Values, Type you select. Fill in all required attributes (identified in red).
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 8.10.6.6 Controlling When Classic Report Columns Display

Control when a column displays using an Authorization Scheme and Server-side Condition.

Use Authorization Scheme to control access to resources (such as a report column) based on predefined user privileges. For example, you could create an authorization scheme in which only managers can view a specific report column. Before you can select an authorization scheme, you must first create it. Use Server-side Condition

A condition is a small unit of logic that enables you to control the display of a column based on a predefined condition type. The condition evaluates to true or false based on the values you enter in the Expressions fields.

To specify Authorization Scheme and Server-side Condition attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.



- 2. In the Rendering tab, locate the region and expand the Columns node.
- 3. Select a column to edit.

The Property Editor displays the attributes for that column. Attributes are organized in groups.

- 4. If controlling a column with an authorization scheme, select an authorization scheme:
  - a. Find Security.
  - **b.** Authorization Scheme Make a selection.
- 5. If controlling the column with a condition define a condition, define a condition:
  - a. Find Server-side Condition.
  - b. Type Make a selection.
  - c. Depending upon your selection, enter an expression or value in the fields provided.

If the authorization is successful and the condition type display evaluates to true, the column displays.

6. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## See Also:

- Providing Security Through Authorization
- Understanding Conditional Rendering and Processing
- Available Conditions

# 8.10.6.7 Adding a Download Link to a Classic Report

Create a link within a report to enable users to export the report as a comma-delimited file (.csv) file.

To add a CSV link to a report, you must enable **Automatic CSV Encoding**. When using Automatic CSV Encoding, the report template is not important. You can include a CSV link with any report template that has the CSV export substitution string defined.



Accessing the Globalization Page and Automatic CSV Encoding

# 8.11 Managing Sorting with Order By Item

Create an inline static LOV by configuring region-level Order By Item attributes.

Order By Item Sort Example
 View an Order By Item sort example.



Configuring Sorting with Order By Item
 Configure region Order By attributes to create an inline static LOV.

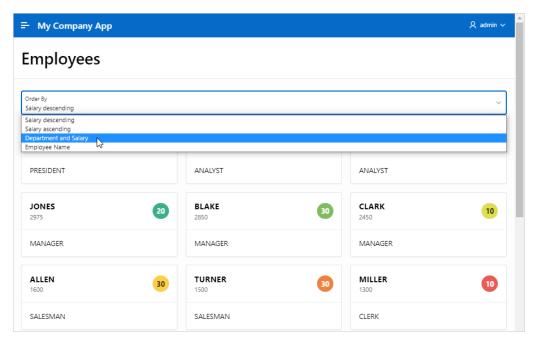
# 8.11.1 Order By Item Sort Example

View an Order By Item sort example.

Configuring an Order By Item enables end users to choose region ordering from a set of predefined options. Including an Order by Item is particularly useful for region types which do not support ordering on their own, such as a Cards region. Order By Item is supported by all region types except map regions, tree regions, interactive reports, and interactive grids.

An Order By Item configuration consists of predefined order by clauses which are maintained at the region level and a page item which is available to end users at runtime. While the default page item is a Select List, other item types, such as radio groups, plug-in based types or even hidden items, are also supported.

The following example shows a cards region. An **Order By** select list displays above the cards and contains the options: Salary descending, Salary ascending, Department and Salary, and Employee Name.



# 8.11.2 Configuring Sorting with Order By Item

Configure region Order By attributes to create an inline static LOV.

The following example configures an Order By Item for a Cards region built on the EMP table. The EMP table is available in the sample dataset, EMP / DEPT.



#### Tip:

In the following task, steps 1 to 5 creates a cards region. If you already have a cards region, skip to step 6.

To configure an order by item for a cards region:

Create a cards region:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Create a new cards region:
  - a. Click the **Layout** tab in the central pane.
  - b. In the Gallery, click the Regions tab. Right-click Cards and select Add To, and select the appropriate location.



### Tip:

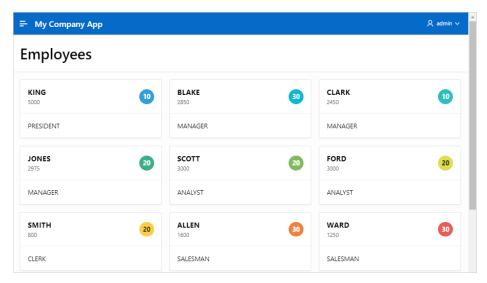
You can also select the Cards region in the Gallery and drag it to the appropriate location in the Layout tab.

- c. Page Designer indicates what to do next. If there are errors, the **Show Messages** icon displays in the Page Developer toolbar.
  - Click the Show Messages icon on the Page Designer toolbar.
    - The Messages dialog displays errors that must be addressed.
  - Select an error to highlight the associated attribute in the Property Editor.
- 3. Edit the **Region** attributes:
  - a. In the Property Editor, select the **Region** tab (if not already selected).
  - b. Identification, Title Enter a region title. For example, enter Employees.
  - c. Under Source:
    - Location Accept the default value, Local Database.
    - Type Accept the default value, Table/View.
    - Table Name Enter EMP. You can also type in the name or pick from the list.
  - d. Click Save.
- 4. Edit the cards region Attributes:
  - a. In the Property Editor, click the **Attributes** tab.
  - b. Edit the following cards region Attributes:
    - Title Select the column to be used as title. Select ENAME
    - Subtitle Select the column to be used as subtitle. Select SAL
    - Body Select the column to be used as body. Enter Select JOB
    - · Icon and Badge:
      - Icon Source Select Initials
      - Icon Column Select DEPTNO



- Icon Position Select End
- 5. Preview the page.
  - a. Click Save or Save and Run Page.

The cards page loads, displaying a cards for each employee. Each card includes the employee name, salary, job title, and an icon with the department number.



**b.** Return to Page Designer. Click Page *XX* on the Runtime Developer toolbar where *XX* is the page number.

Configure the Order By Item:

- 6. Enable Order By Items to create an inline static LOV:
  - a. In the Rendering tab, verify that cards region, **Employees**, is selected.
  - In the Property Editor, click the Region tab find Order By.
  - c. Order By, Type Select Item.
  - d. Order By, Iten Click the No Order By Item button.

The Order by Item dialog appears.

- 7. In the Order By Item dialog:
  - a. Order By Clauses Enter multiple Order By Clauses from which users can select at runtime. Each can contain one or more comma-separated column names, including directives, to define the order in which records are retrieved. See Page Designer Help for more details on directives and examples.

The following creates a LOV named Order By which contains the options: Salary descending, Salary ascending, Department and Salary, and Employee Name.

Row 1

Clause - Enter SAL DESC

Key - Enter SAL1

Display - Enter Salary descending

Row 2



Clause - Enter SAL ASC

Key - Enter SAL2

Display - Enter Salary ascending

Row 3

Clause - Enter DEPTNO ASC, SAL DESC

Key - Enter DEPT1

Display - Enter Department and Salary

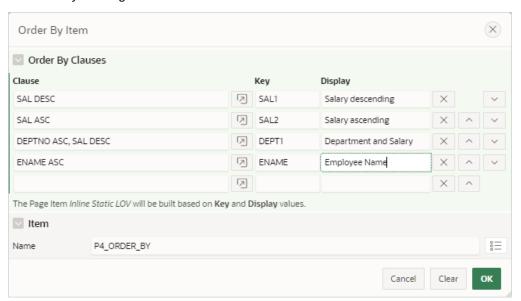
Row 4

Clause - Enter ENAME ASC

Key - Enter ENAME

Display - Enter Employee Name

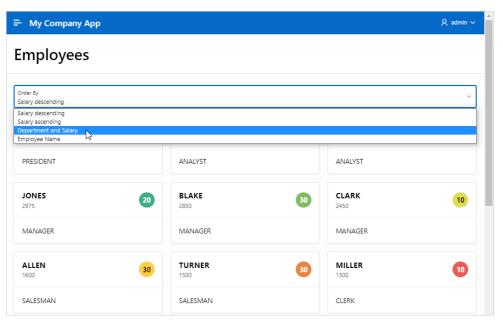
b. Item - Displays the page item to be built based on the Key and Display values defined under Order By Clauses. You can accept the Item Name or to make a new selection by clicking the **List of Values: Name** icon.



- c. Click OK.
- 8. Click Save or Save and Run Page.

The following example shows the revised cards region. An **Order By** select list now displays above the cards. Note, however, you can position the item anywhere on the page in Page Designer.





Select options from the **Order By** select list to alter the sort order.

# 8.12 Printing Report Regions

Configure a report region to print by exporting it to several different formats.



#### Tip:

You must enable network services to use report printing if you configured an external print server. See Enabling Network Services in Oracle Database.

- About Report Printing
   Learn about region report printing.
- About Printing Reports to PDF Learn about printing reports to PDF.
- Configuring Report Printing at the Application-Level Configuring report printing at the application-level.
- About Classic Report Printing Methods
   Learn about printing classic report regions.
- Configuring Classic Report Printing Attributes
   Learn about printing a report region by configuring Printing Attributes.
- About Report Queries
   Learn about report queries.
- About Report Layouts Learn about report layouts.



#### See Also:

- Configuring Interactive Report Download Options
- Configuring Interactive Grid Download Formats

# 8.12.1 About Report Printing

Learn about region report printing.

By taking advantage of region report printing, your application users can view and print reports that have a predefined orientation, page size, column headings, and page header and footer. Classic reports, interactive reports and interactive grids also have the ability to export to PDF, Microsoft Excel, HTML, and Comma Separated Values (CSV). Additional export formats require the use of an external print server.

Oracle APEX provides three report printing configuration options:

- None (Native) Select this option if you do not use an external print server. This option
  enables you to use the basic printing functionality, which includes CSV, HTML, PDF and
  XLSX.
- Oracle BI Publisher This option requires a valid license of Oracle BI Publisher (also known as Oracle XML Publisher). This option enables you to take report query results and convert them from XML to RTF format using Oracle BI Publisher. Select this option to upload your own customized RTF or XSL-FO templates for printing reports within APEX.
  - Oracle BI Publisher supports Adobe Portable Document Format (PDF), Microsoft Word Rich Text Format (RTF), or Microsoft Excel format (XLS), or Extensible Markup Language (XML). If you choose to use other third-party rendering engines, other output formats can also be configured.
- External (Apache FOP) Select this option if you are using Apache FOP on an external J2EE server. This option enables you to use the basic printing functionality, which includes creating report queries and printing report regions using the default templates provided in APEX and using your own customized XSL-FO templates.
- Oracle REST Data Services Select this option if you are using the Oracle REST Data Services (formerly called APEX Listener) release 2.0 or later. This option enables you to use the basic printing functionality, which includes creating report queries and printing report regions using the default templates provided in APEX and using your own customized XSL-FO templates.

#### Note:

The Oracle REST Data Services option does not require an external print server, instead the report data and style sheet are downloaded to the listener, rendered into PDF format by the listener and then sent to the client. The PDF documents in this setup are not returned back into the database, thus the print APIs are not supported when using the Oracle REST Data Services-based configuration.



#### Note:

The functionality to produce PDF Reports has been removed in Oracle REST Data Services (ORDS) release 19.4.

#### Note:

Your APEX instance administrator can change the report printing configuration for your instance. See Configuring Report Printing for an Instance in *Oracle APEX Administration Guide* 

# 8.12.2 About Printing Reports to PDF

Learn about printing reports to PDF.

APEX has native support to print basic reports to PDF. Use a report server if you want full control and advanced layouts for your reports.

# 8.12.3 Configuring Report Printing at the Application-Level

Configuring report printing at the application-level.

Configure the print server type for an application by editing the **Print Server Type** attribute on the Application Definition page. The application-level **Print Server Type** overrides similar settings in Instance Administration.

To configure report printing at the application-level:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.

The Application home page appears.

- 3. From Application home page, you can access the Definition page in two ways:
  - Click the Edit Application Definition button.
  - From Shared Components:
    - Click Shared Components.
    - Under Application Logic, click Application Definition.

The Definition page appears.

- 4. Report Printing:
  - a. Print Server Type Print Server Type controls the print server of the application. This setting overrides similar settings in Administration Services. Options include
    - Native Printing Use native printing. No external print server required.
    - Remote Print Server Choose a remote server of the type "Print Server" that is configured in the Workspace Utilities.



- Use Instance Settings Use the Report Printing settings defined at Instance Administration.
- b. Click Apply Changes.
- 5. To add a Remote Print Server:
  - a. Click the Add Remote Print Server button.

The Add Remote Print Server wizard appears.

- **b.** Print Server Type Select the Print Server type. Options include:
  - Oracle Analytics Publisher Select this option if you are using a licensed version of Oracle Analytics Publisher. This option enables you to take report query results and convert them from XML to RTF format using Oracle Analytics Publisher. Select this option if you want to upload your own customized RTF or XSL-FO templates for printing reports within APEX.
  - APEX Office Print Select this option if you are using APEX Office Print.

What appears next depends upon the Print Server Type you select.

- **6.** If the Print Server Type is **Oracle Analytics Publisher**, configure the following:
  - a. Add Remote Printer Server:
    - Print Server Type Select Oracle Analytics Publisher.
    - Name Enter a name for the remote server object here. Remote Server names must be unique within the workspace.
    - Static Identifier Use the Static ID to reference the Remote Server in API calls.
    - Endpoint URL Enter the Endpoint URL of the external print server.
    - Click Next.
  - b. Add Remote Print Server Credentials:
    - Authentication Required Determines whether to use authentication for the remote print server. See field-level help for more details.
    - Name Enter a descriptive name for the Web Credential. This name must be unique within the workspace.
    - Static Identifier Use the Static ID to reference the Web Credential in API calls.
    - Username Enter the Username for Basic Authentication. APEX does not store this information encrypted.
    - Password Enter the Password for Basic Authentication. APEX stores this information encrypted, so it cannot be retrieved back in clear text.
    - Click Apply Changes.
- 7. If the Print Server Type is **APEX Office Print**, configure the following:
  - a. Add Remote Print Server:
    - Print Server Type Select APEX Office Print.
    - Name Enter a name for the remote server object here. Remote Server names must be unique within the workspace.
    - Static Identifier Use the Static ID to reference the Remote Server in API calls.
    - Endpoint URL Enter the Endpoint URL of the external print server.



- HTTPS Host Name The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request. It can also be a domain name like \*.example.com. If NULL, the host name in the given URL will be used.
- Click Next.
- b. Add Remote Print Server Credentials:
  - Authentication Required Determines whether to use authentication for the remote print server. See field-level help for more details.
  - Name Enter a descriptive name for the Web Credential. This name must be unique within the workspace.
  - Static Identifier Use the Static ID to reference the Web Credential in API calls.
  - API Key Enter the API key for Authentication. APEX stores this information encrypted, so it cannot be retrieved back in clear text.
  - Click Apply Changes.



- Creating a Remote Server
- Configuring Report Printing in a Full Development Environment in Oracle APEX Administration Guide

### 8.12.4 About Classic Report Printing Methods

Learn about printing classic report regions.

There are two ways to print classic report regions:

- Configure Printing Attributes for a Report Region. You can print a report region by configuring the Printing Attributes for the region. See Configuring Classic Report Printing Attributes,
- Create a Report Query. You can print a report by defining a report query as a Shared Component. See Printing a Report Region by Defining a Report Query

Both report regions and report queries can be downloaded in the following formats:

- PDF Adobe Portable Document Format.
- RTF Microsoft Word Rich Text Format.
- Excel Microsoft Excel format. Note that when BI Publisher is configured as print server and a custom report layout is specified, the export is not a true .xls file because the content is HTML-based.
- HTML
- XML Extensible Markup Language.

To format either a report region or report query, you associate it with a report layout.





#### Tip:

You can also have the output format specified by an item that determines the output format at runtime. Select the item that holds the format value. Valid values are PDF, RTF (to open the document in Microsoft Word), XLS (to open the document in Microsoft Excel) and HTML (to download the document as an HTML file).



Formatting a Report Region or Report Query Using Report Layouts

# 8.12.5 Configuring Classic Report Printing Attributes

Learn about printing a report region by configurng Printing Attributes.

One approach to printing a report region is to configure Print Attributes. Once configured, these attributes apply only to the current region and cannot be used outside the context of the region.

To configure a classic report region for printing:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, select the region containing the report.
- 3. Enable the Attribute, **Printing**:
  - a. In the Property Editor, select the **Attributes** tab.
  - b. Under Printing, set Enabled to On.
- Configure **Printing** attributes:
  - a. In the Property Editor, select the **Printing** tab.
  - b. Edit the appropriate Printing attributes.



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



#### See Also:

- About Classic Report Printing Methods
- Configuring Report Printing for an Instance in Oracle APEX Administration Guide

## 8.12.6 About Report Queries

Learn about report queries.

You can print a report region by defining a report query as a Shared Component. A report query identifies the data to be extracted. Unlike SQL statements contained in regions, report queries contain SQL statements that are validated when you save the query. Note that report queries must be SQL statements, not functions returning SQL statements.



Printing a Report Region by Defining a Report Query

# 8.12.7 About Report Layouts

Learn about report layouts.

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



Formatting a Report Region or Report Query Using Report Layouts

# 8.13 Understanding BLOB Support in Forms and Reports

Oracle APEX includes declarative BLOB support to enable developers to declaratively upload files in forms, and download or display files in reports.

BLOB display and download can also be authored procedurally using PL/SQL. This section describes how to upload, download and display files, and how to manage additional file attributes such as MIME type and file name that are important for proper management of files stored in BLOB columns. Using this functionality, you can easily extend your APEX applications to manage files including images, documents, videos, and so on.



- About BLOB Support in Reports
  - Oracle APEX includes BLOB support for both classic and interactive reports.
- Including a Download Link
   Include a download link in a report by adding columns to your report query.
- Displaying a BLOB Image in a Report
  Display a BLOB image in a report by adding columns to your report query.
- About Working With BLOBs Procedurally
   As an alternative to using the built-in methods of providing a download link, use the
   APEX UTIL.GET BLOB FILE SRC function.

# 8.13.1 About BLOB Support in Reports

Oracle APEX includes BLOB support for both classic and interactive reports.

If you use a wizard to create a report and include a column of type BLOB, this column will not be included in the report definition. To include a BLOB download link, additional attributes have to be configured after generation to provide the download capability.

# 8.13.2 Including a Download Link

Include a download link in a report by adding columns to your report query.

By default, BLOB columns do not display in a report. Reports that include a BLOB column will display the text [unsupported data type] for the column. To include a download link in a report, you need to add a number column to your report query and select the display type **Download BLOB**.

To include a download link:

- 1. View the page containing the report in Page Designer.
- If your report's Source is based on a Table / View, change this attribute to SQL Query.
   The SQL Query attribute automatically generates the corresponding query.
- 3. Add a new numeric/integer column expression to your query, typically the size of the file referenced by the download link. If the length is 0, the BLOB is NULL, and no download link is displayed.

To calculate the file size use an expression such as:

```
col_n,
    sys.dbms_lob.getlength([blob_column]) as download
from ...
```

- 4. Find Identification of your download column. From Type, select Download BLOB.
- Find BLOB Attributes. Configure the following:
  - a. **Table Name** Enter the table name, which stores the BLOB content you want to display. You can type in the table name or pick from the list of available tables.
  - b. BLOB Column Select the BLOB column from the table, which stores the BLOB content you want to display.



- c. **Primary Key Column(s)** Select the primary key column(s) from the table, which stores the BLOB content you want to display. If the primary key of this table has more than two columns, you must select the ROWID column.
- **d. Mime Type Column** Optionally, select the mime type column from the table, which stores the BLOB content you want to display.
- e. Filename Column Optionally, select the filename column from the table, which stores the BLOB content you want to display.
- f. Last Updated Column Optionally, select the last updated column from the table, which stores the BLOB content you want to display. Ideally, this column represents the update of the file, not other column's values.
- g. Character Set Column Optionally, select the character set column from the table, which stores the BLOB content you want to display.

#### 6. Find Appearance:

- **a. Download Text** Enter the text to use for the download link on the page.
- b. Content Disposition Choose between Attachment and Inline.

**Attachment** forces a download of the file, while **Inline** will try to render the file in the browser, if possible. The inline behavior is depending on browser capabilities and configuration with respect to the file's mime type.

7. Click Save or Save and Run Page.

### 8.13.3 Displaying a BLOB Image in a Report

Display a BLOB image in a report by adding columns to your report query.

If the BLOB you are working with is an image, you can display it in a report using the display type **Display Image**.

To display a BLOB that is an image in a report:

- 1. View the page containing the report in Page Designer.
- If your report's Source is based on a Table / View, change this attribute to SQL Query.

The SQL Query attribute automatically generates the corresponding query.

3. Add a new numeric/integer column expression to your query, typically the size of the image file. If the length is 0, the **BLOB** is **NULL** and no image is displayed.

To calculate the file size use expression such as:

```
col_n,
   sys.dbms_lob.getlength([blob_column]) as image
from ...
```

- 4. Find Identification. From Type, select Display Image.
- 5. Find **BLOB Attributes**. Configure the following:
  - **a. Table Name** Enter the table name, which stores the BLOB content you want to display. You can type in the table name or pick from the list of available tables.



- b. BLOB Column Select the BLOB column from the table, which stores the BLOB content you want to display.
- c. **Primary Key Column(s)** Select the primary key column(s) from the table, which stores the BLOB content you want to display. If the primary key of this table has more than two columns, you must select the ROWID column.
- d. **Mime Type Column** Optionally, select the mime type column from the table, which stores the BLOB content you want to display.
- e. Filename Column Optionally, select the filename column from the table, which stores the BLOB content you want to display.
- f. Last Updated Column Optionally, select the last updated column from the table, which stores the BLOB content you want to display. Ideally, this column represents the update of the file, not other column's values.

If the BLOB column contains a file other than an image and depending on how the browser handles the file type, the content will not display.

The image will be rendered as-is, meaning the image displays with its original height and width in pixels.

- 6. To add some custom CSS to your page so that the images fits in your report:
  - a. Find Advanced. Add a Static ID to your report's image column (for example, my report image column).
  - **b.** Find **CSS**. Add CSS code to the **Inline Attribute**. For example, to display the image with a height of 25 pixels you would add:

```
td[headers="my_report_image_column"] img {
   height: 25px;
}
```

7. Click Save or Save and Run Page.

# 8.13.4 About Working With BLOBs Procedurally

As an alternative to using the built-in methods of providing a download link, use the APEX UTIL.GET BLOB FILE SRC function.

One advantage of using the APEX\_UTIL.GET\_BLOB\_FILE\_SRC function is the ability to more specifically format the display of the image (with height and width tags). Note that this approach is only valid if called from a valid Oracle APEX session. Also, this method requires that the parameters that describe the BLOB to be listed as the format of a valid item within the application. That item is then referenced by the function.



GET BLOB FILE SRC Function in Oracle APEX API Reference



9

# **Developing Forms**

Developers can create a variety of different application forms either manually or by using wizards. Some forms enable users to update a single row in a table, while other forms enable users to update multiple rows in a table.



#### Tip:

Run the **Upgrade Application** utility to automatically upgrade legacy forms to the new form region. See Running Application Upgrade.

#### Understanding Form Types

When creating an application, developers can create four basic form types: editable interactive grid, form, report with form, or master detail.

#### Creating a Form

Developers can create forms using the Create Application Wizard and Create Page Wizard.

#### Configuring Lost Update Detection

Prevent form users from overwriting one another by configuring the Lost Update Detection.

#### About Making an Interactive Grid Editable

Developers determine whether the underlying data is read-only or editable by users. An interactive grid presents users a set of data in a searchable, customizable report. In an editable interactive grid, users can also add to, modify, and refresh the data set directly on the page.

#### Creating Master Detail Forms

Developers can create a master detail form with either the Create Application Wizard or the Create Page Wizard.

#### Validating User Input in Forms

Developers can create validation and an associated error message to check the data a user enters before processing.

#### Understanding BLOB Support in Forms

Oracle APEX includes BLOB support to enable developers to declaratively upload and download files in forms.



- Managing Legacy Tabular Forms
- Developing Reports

# 9.1 Understanding Form Types

When creating an application, developers can create four basic form types: editable interactive grid, form, report with form, or master detail.

· Editable Interactive Grid

View an example of an editable interactive grid.

Form

View an example form.

Report with Form

View an example report with form.

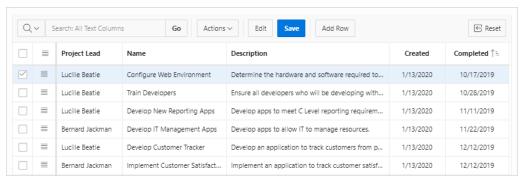
Master Detail Forms

View an example master detail form.

### 9.1.1 Editable Interactive Grid

View an example of an editable interactive grid.

An interactive grid presents users with a set of data in a searchable, customizable report. In an editable interactive grid, users can also add to, modify, and refresh the data set directly on the page. Functionally, an interactive grid includes most customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse. The following is an example of an editable interactive grid.



You can create an editable interactive grid with either the Create Application Wizard or Create Page Wizard by enabling the **Editing Enabled** flag when creating the report. In an existing interactive grid, you can make it editable by enabling the **Edit**, **Enabled** under Attributes in Page Designer.

#### See Also:

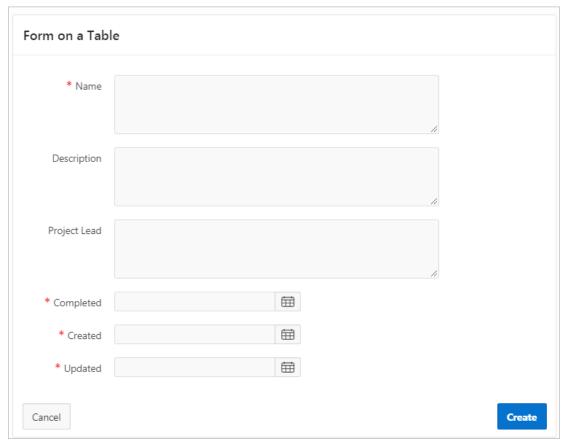
- Managing Interactive Grids
- Using an Editable Interactive Grid in Oracle APEX End User's Guide



### 9.1.2 Form

View an example form.

Form creates a form that enables users to update a single row in a database table. The following is an example of a form on table.



Both the Create Application Wizard and Create Page Wizard support the creation of a simple form. The main difference between these two wizards is that the Create Page Wizard offers more customization and data source options. Using the Create Page Wizard, the developer has the option to select a data source (that is, Local Database, REST Enabled SQL Service, or REST Data Source). Additionally, the developer can also specify whether to include and configure breadcrumbs or a navigation menu and select the columns and the order in which they display.





# 9.1.3 Report with Form

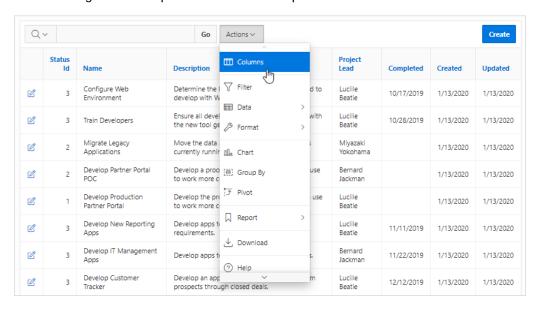
View an example report with form.

Both the Create Application Wizard and Create Page Wizard support the creation of a interactive report or classic report and form combination. In both wizards, you create the report and then enable a flag to add the form.

In the Create Application Wizard, you click **Add Page** and then select either **Interactive Report** or a **Classic Report** and then select the **Include Form** option.

In the Create Page Wizard, you select either Interactive Report or a Classic Report and then enable Include Form Page. The Create Page Wizard offers more customization and data source options. Using the Create Page Wizard, the developer select a data source (that is, Local Database, REST Enabled SQL Service, or REST Data Source) and also specify whether to include and configure breadcrumbs or a navigation menu.

The following is an example of an interactive report with form.





- Managing Interactive Reports
- Managing Classic Reports

### 9.1.4 Master Detail Forms

View an example master detail form.

A master detail form reflects a one-to-many relationship between two tables in a database. Master detail forms enable users to insert, update, and delete values from two tables or views. Typically, a master detail form displays a master row and multiple detail rows within a single HTML form. Developers can create a single page or two



page master detail. You choose the tables on which to build the master and detail regions. Master Detail form options include:

- Stacked Creates a single page master detail with editable interactive grids.
- Side by Side Creates a single page (or Side by Side) master detail with a master table
  and detail table. The left side contains a master list to navigate to the master record. The
  right side contains the selected master record and the associated detail report.
- Drill Down Creates a two page (or Drill Down) master detail. The first page contains an
  interactive report for the master table. The second page features a standard form for the
  master and interactive grid for the detail.

#### See Also:

- Creating Master Detail Forms
- About Master Detail Forms

# 9.2 Creating a Form

Developers can create forms using the Create Application Wizard and Create Page Wizard.



Both the Create Application Wizard and Create Page Wizard support the creation of a interactive report or classic report and form combination. In both wizards, you create the report and then enable a flag to add the form.

- Creating a Form Using the Create Application Wizard Use the Create Application Wizard to create a form.
- Creating a Form Using the Create Page Wizard
   Use the Create Page Wizard to add a form page to an existing application.

### See Also:

- Managing Interactive Reports
- Managing Classic Reports
- Managing Legacy Tabular Forms

# 9.2.1 Creating a Form Using the Create Application Wizard

Use the Create Application Wizard to create a form.

To create a form using the Create Application Wizard:



- 1. On the Workspace home page, click the **App Builder** icon.
- Click the Create button.
- Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click **Set Appearance** to change it.
- 7. Click Add Page and select Form.
- 8. On Create Form Page:
  - a. Page Name Enter a name for this page.
  - **b.** Set Icon Select an icon to display in the navigation menu for this page.
  - c. Table Select the table for the form.
  - **d.** Include Report Select **Include Report** to create a report and form. The first page is an interactive report. Each row provides a link to a form where users can update a record.
  - e. Advanced Expand Advanced:
    - Page Help Enter text to be displayed when the user selects Page Help.



#### Tip:

This setting requires you select the **About Page** feature. If you select the **About Page** feature, a help icon is generated in the navigation bar with an entry for page help.

- Click Add Page.
- 9. Under Features, select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to **Features**.



#### Tip:

Click the Check All button to select all features.

- **10.** Under Settings, specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.



#### See Also:

**Creating Applications** 



# 9.2.2 Creating a Form Using the Create Page Wizard

Use the Create Page Wizard to add a form page to an existing application.



Using the Create Page Wizard creates a complex form region which includes multiple form items and processes. Although you can create a region directly in the Rendering tree or drag a region from the Gallery, these approaches will not create these additional components.

To create a form using the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Form.
- 5. Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- **6.** Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the
    connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 7. Source Type Specify the source of the new page. Options include:
  - Table:



- Table/View Owner Select the owner of the table on which you are building the page.
- Table/View Name Select the table or view on which the page will be based.

#### SQL Query:

- Enter a SQL SELECT statement Enter the SQL query.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 9. Click Next.
- 10. Primary Key Column Select a primary key column, or accept the default.
- 11. Branch Pages:
  - Branch Here on Submit Select a page to branch to after the page processing is complete.
  - Cancel and Go To Page Select a page to which application shall redirect, when the Cancel button is clicked.

#### 12. Click Create Page.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



Understanding Page Types in the Create Page Wizard

# 9.3 Configuring Lost Update Detection

Prevent form users from overwriting one another by configuring the Lost Update Detection.

Lost updates occur when two or more users try to update the same data, and the last update overwrites updates made by the previous user. To prevent this, updates can check the existing column value(s) in the database with the value(s) retrieved when the record was originally queried.

Configuring Lost Update Detection, you configure the Form region Attribute, **Lost Update Type**, and enable the **Prevent Lost Updates** attribute for the corresponding Form - Automatic Row Processing (DML) process.

To enable Lost Update Detection:

- 1. Create a form region using the Create Page Wizard.
- 2. View the page containing the form region in Page Designer.
- 3. In the Rendering tab, select the form region.
- 4. In the Property Editor, select the **Attributes** tab.

The Property Editor displays the attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 5. In the Property Editor, find the **Edit** group and configure the **Lost Update Type** attribute. Options include:
  - Row Values A checksum value is calculated for each row, when initially querying
    the data. The checksum is calculated by concatenating all of the updateable columns
    into a string and then generating a unique value. When committing the updated
    record, this checksum is compared to the checksum value.
  - Row Version Column If your database table includes a column which is
    incremented every time a record is updated, preferably by a database trigger, then
    this column can be used instead of calculating checksums. Oracle does not
    recommend this option if your form updates data in multiple tables.

Next, update the corresponding Form - Automatic Row Processing (DML) process.

- 6. In the left pane, click the Processing tab.
- 7. Find and select the corresponding Form Automatic Row Processing (DML) process.
- 8. In the Property Editor, find the **Settings**.
- 9. For Prevent Lost Updates, select On.
- 10. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



See Also

Editing Pages in Page Designer

# 9.4 About Making an Interactive Grid Editable

Developers determine whether the underlying data is read-only or editable by users. An interactive grid presents users a set of data in a searchable, customizable report. In an editable interactive grid, users can also add to, modify, and refresh the data set directly on the page.

As described in Using Interactive Grids in *Oracle APEX End User's Guide*, users can lock, hide, filter, freeze, highlight, and sort individual columns. Advanced users can also define breaks, aggregations, and computations against columns. Users can also directly customize

the appearance of an interactive grid. Users can use the mouse to resize the width of a column and drag and drop columns into different places in the grid.

In an editable interactive grid, users can also add to, modify, and refresh the data set directly on the page. Editable interactive grids expand the functionality of regular interactive grids to enable users to more directly update a grid's structure and contents. Users can add and delete rows, edit cell contents, and refresh the grid with the latest updates.



Making an Existing Interactive Grid Editable and Managing Interactive Grids

# 9.5 Creating Master Detail Forms

Developers can create a master detail form with either the Create Application Wizard or the Create Page Wizard.

- About Master Detail Forms
  - A master detail form enables users to query, insert, update, and delete values from two related tables or views. You choose the tables on which to build the master and detail regions.
- Creating a Master Detail Form Using the Create Application Wizard
  Run the Create Application Wizard to create a new application that contains a
  Stacked or Side by Side master detail forms.
- Creating a Stacked Master Detail Using the Create Page Wizard
  Use the Create Page Wizard to add a stacked master detail to an existing
  application.
- Creating a Side by Side Master Detail Using the Create Page Wizard
   Run the Create Page Wizard to add a new page with a Side by Side master detail.
- Creating a Drill Down Master Detail Using Using the Create Page Wizard
   Run the Create Page Wizard to add a new page with a Drill Down master detail.



Creating Master Detail from an Existing Interactive Grid

# 9.5.1 About Master Detail Forms

A master detail form enables users to query, insert, update, and delete values from two related tables or views. You choose the tables on which to build the master and detail regions.

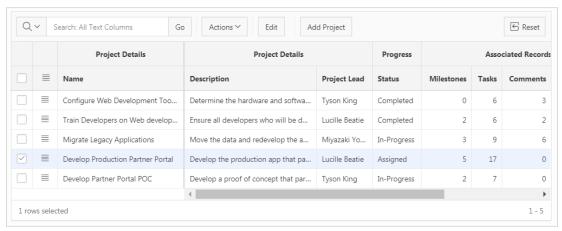
A master detail form reflects a one-to-many relationship between tables in a database. Typically, a master detail form displays a master row and multiple detail rows. When you create a master detail form using the Create Page or Create Application Wizards,

you choose the tables on which to build the master form and the detail form. **App Builder** supports three types of master detail form options: **Stacked**; **Drill Down**; and **Side by Side**. While the Create Page Wizard supports all master detail form options, the Create Application Wizard supports only Stacked and Side by Side.

#### **Stacked Master Detail**

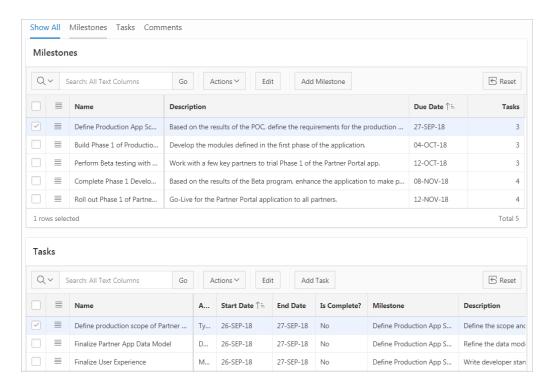
A **Stacked** master detail form contains a single page with editable interactive grids based on two related tables or views. Users select a row in the master grid to update the detail grids. Developers can create a stacked master detail with either the Create Application Wizard or the Create Page Wizard.

The following example displays master detail interactive grids on the same page. The user has option of interacting with either the master or the detail without leaving the page.



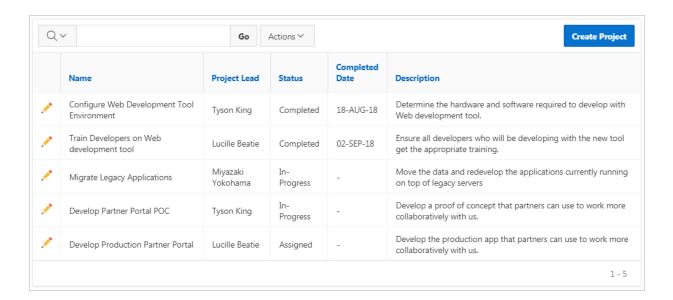
The previous example shows the master interactive grid with the project, *Develop Production Partner Portal* selected. The next example shows detail interactive grids for *Milestones* and *Tasks*.





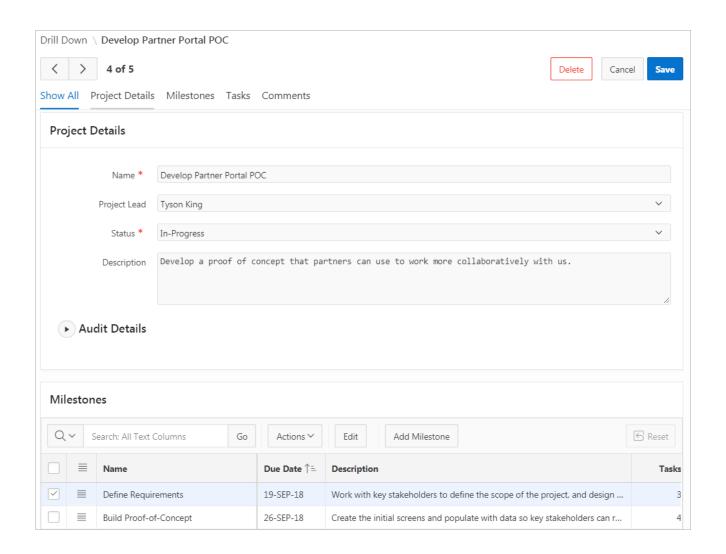
#### **Drill Down Master Detail**

A **Drill Down** master detail contains two pages based on two related tables or views. The first page contains an interactive report for the master table. The second page features a standard form for the master and interactive grids for the detail. Developers can create a Drill Down master detail with the Create Page Wizard.

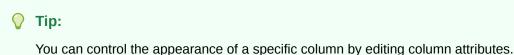


In this example, users click the Edit icon to view project details. The second page includes both a standard form (for the master) and editable interactive grids.





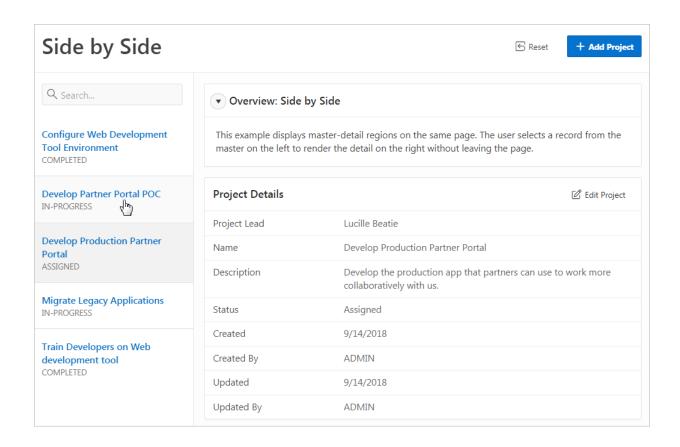
For numeric and date fields, you can also pre-define date and number format masks, or apply those format masks after generating the initial form. Wizard generated master detail forms also automatically create validations for some columns. Validations are created for columns that are set to <code>NOT NULL</code> in the underlying table and columns of type <code>NUMBER</code>, <code>DATE</code> or <code>TIMESTAMP</code>. Note that validations are not created for columns if the column is set to read-only, either based on the user's selection, or defined user interface defaults.



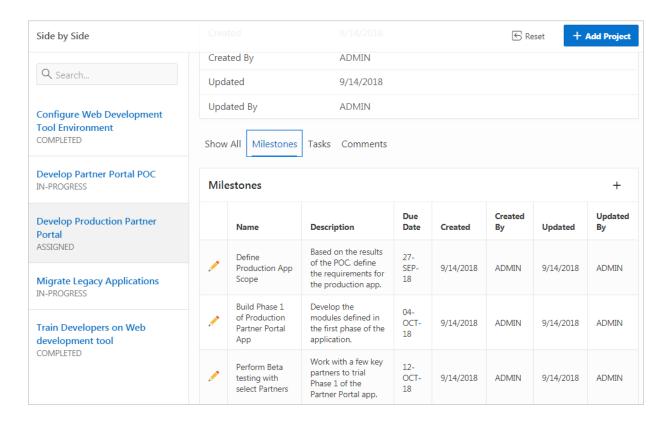
#### Side by Side Master Detail

A **Side by Side** master detail form contains a single page master detail utilizing a side by side layout and report regions with modal edit windows. The left side contains a master list to navigate to the master record. The right side contains the selected master record and the associated detail report(s). Developers can create Side by Side master detail with either Create Application Wizard or Create Page Wizard.





The example that follows shows the Milestones detail interactive report. Users can Milestones by clicking an Edit icon.





# 9.5.2 Creating a Master Detail Form Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains a Stacked or Side by Side master detail forms.



#### Tip:

The Create Application Wizard uses general best practices to generate the application and does not include several advanced options included in the Create Page Wizard.

To create a master detail form using the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click Set Icon to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- Appearance Accept the default or click Set Appearance to change it.
- Click Add Page and select Master Detail.
- 8. On Add Master Detail Page:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - c. Page Type Select one of the following:
    - Side by Side Creates a single page (or Side by Side) master detail with a master table and detail table. The left side contains a master list to navigate to the master record. The right side contains the selected master record and the associated detail report.
    - Stacked Creates single page master detail with editable interactive grids.

#### If Page Type is **Side by Side**:

- Table Select the master table for the page.
- Primary Display Column Select the column to display in the list of master records.
- Secondary Display Column Select the descriptive column to display in the list of master records, under the Primary Display Column.
- Detail Table Select the detail table.

#### If Page Type is Stacked:

- Table Select the master table for the editable interactive grid.
- Detail Table Select the detail table for the page.
- d. Advanced Expand Advanced:



Page Help - Enter text to be displayed when the user selects Page Help.



#### Tip:

This setting requires you select the **Help Pages** feature. If the **Help Pages** feature is not selected, the Help icon is not be generated and end users cannot access page help.

- e. Click Add Page.
- Under Features, select features to include with the application. Features provide application-level functionality and are typically added once per application. To learn more, click the Help icon adjacent to **Features**.



#### Tip:

Click the Check All button to select all features.

- 10. Under Settings, specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to Settings.
- 11. Click Create Application.



#### See Also:

**Creating Applications** 

### 9.5.3 Creating a Stacked Master Detail Using the Create Page Wizard

Use the Create Page Wizard to add a stacked master detail to an existing application.

A Stacked master detail form contains a single page with editable interactive grids based on two related tables or views. Users select a row in the master grid to update the detail grids.

To create a Stacked master detail on a new page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Master Detail.
- Master Detail Style Select Stacked and click Next.
- **6.** Page Definition:
  - Page Number The page number is an integer value that identifies a page within an application.



b. Name - Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

c. Page Mode - Identify the page mode. To learn more, see field-level Help.

#### 7. Master Data Source:

- Data Source Select a Data Source:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where
    the connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled
    SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.
- Table /View Owner Select the owner of the table on which you are building the page.
- Table/View Name Select the table or view on which the page will be based.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.

#### 9. Click Next.

- 10. Primary Key Column:
  - Primary Key Column 1 Select a primary key column.
  - Primary Key Column 2 Select a primary key column.

#### Click Next.

- 12. For Detail Data Source:
  - a. Detail Region Title Enter a region title for the detail region.
  - b. Data Source Select a Data Source for the page:
    - Local Database Data is sourced from the local database.
    - REST Enabled SQL Service Data is sourced from a remote database, where
      the connection is defined using REST Enabled SQL. To create or maintain REST
      Enabled SQL references, navigate to Shared Components, REST Enabled
      SQL.



 REST Data Source - Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- **c.** Show Only Related Tables Specify whether to restrict the list of detail tables to only those tables related to the master table.
- **d.** Table /View Owner Select the owner of the table on which you are building the page.
- e. Table/View Name Select the table or view on which the page will be based.
- f. Click Next.
- 13. Detail Primary Key:
  - Primary Key Column 1 Select primary key column.
  - Primary Key Column 2 Select primary key column.
- Master Detail Foreign Key Select the foreign key that relates between the master and detail tables.
- 15. Click Create Page.
- **16.** To view the new master detail, click **Save and Run Page**.

The rendered page appears.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



Understanding Page Types in the Create Page Wizard

# 9.5.4 Creating a Side by Side Master Detail Using the Create Page Wizard

Run the Create Page Wizard to add a new page with a Side by Side master detail.

A **Side by Side** master detail form contains a single page master detail utilizing a side by side layout and report regions with modal edit windows. The left side contains a master list to navigate to the master record. The right side contains the selected master record and the associated detail report(s).

To create a Side by Side master detail on a new page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.



Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Master Detail.
- 5. Master Detail Style Select Side by Side.
- 6. Page Definition:
  - a. Starting Page Number Enter an unused starting page number. The wizard will create multiple pages starting with the number specified. The default is the first available page number within this application.
  - b. Master Detail Page Name Enter the name of the master detail page which contains side by side master detail regions. The left side contains master list to navigate to different master record. The right side contains selected master record and associated detail report.
- 7. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- Click Next.
- Define the Master and Details tables:
  - a. Table /View Owner Select the owner of the table on which you are building the page.
  - **b.** Master Table Select the master table or view. When entering manually, note that the table name is case sensitive.
  - **c.** Primary Display Column Select the column to display as primary column in the report to navigate to a different master record.
  - **d.** Secondary Display Column Select the column to display as secondary column in the report to navigate to a different master record (optional).
  - e. Detail Table Select the detail table or view.

Add additional detail tables as needed.

f. Detail Table - Select the detail table or view.



#### Tip:

The previous steps assume the Data Source for this master detail is a Local Database. To create a master detail on an external database, such a REST Enabled SQL Service or REST Data Source, click Advanced and select the appropriate Data Source type.

- 10. Click Create Page.
- 11. To view the new master detail, click Save and Run Page.

The rendered page appears.





#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



#### See Also:

Understanding Page Types in the Create Page Wizard

# 9.5.5 Creating a Drill Down Master Detail Using Using the Create Page Wizard

Run the Create Page Wizard to add a new page with a Drill Down master detail.

A **Drill Down** master detail contains two pages based on two related tables or views. The first page contains an interactive report for the master table. The second page features a standard form for the master and interactive grids for the detail.

To create a two page Drill Down master detail on a new page:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select **Drill Down**.
- Master Page Definition:
  - a. Page Number Enter an unused starting page number. The wizard will create multiple pages starting with the number specified. The default is the first available page number within this application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- 6. Master Data Source:
  - Data Source Select a Data Source for the page:
    - Local Database Data is sourced from the local database.
    - REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to Shared Components, REST Enabled SQL.



- REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.
- Table /View Owner Select the owner of the table on which you are building the page.
- Table/View Name Select the table or view on which the page will be based.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 7. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 8. Click Next.
- 9. Primary Key:
  - Primary Key Column 1 Select a primary key column.
  - Primary Key Column 2 Select primary key column (optional).
  - Form Navigation Order Select the navigation order column used by the previous and next buttons on the Detail Page, which navigates to a different master record.

#### 10. Click Next.

- 11. Detail Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

#### 12. Detail Data Source:

- Data Source Select a Data Source:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where
    the connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled
    SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.
- Show Only Related Tables Specify whether to restrict the list of detail tables to only those tables related to the master table.



- Table /View Owner Select the owner of the table on which you are building the page.
- Table/View Name Select the table or view on which the page will be based.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 13. Click Next.
- 14. Detail Primary Key:
  - Primary Key Column 1 Select a primary key column.
  - Primary Key Column 2 Select a primary key column (optional).
- **15.** Master Detail Foreign Key Select the foreign key that relates between the master and detail tables.
- 16. Click Create Page.
- 17. To view the new master detail, click Save and Run Page.

The rendered page appears.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.



Understanding Page Types in the Create Page Wizard

# 9.6 Validating User Input in Forms

Developers can create validation and an associated error message to check the data a user enters before processing.

- About Creating Validations and Error Messages
   Learn about creating validations and error messages.
- Associating a Validation with a Specific Item
   Associate an item with a validation and specify error message text.
- About the Error Message Display Location Learn about error message display location.

### 9.6.1 About Creating Validations and Error Messages

Learn about creating validations and error messages.

You can use validations to check data a user enters before processing. Once you create a validation and the associated error message, you can associate it with a specific item. You can choose to have validation error messages display inline (that is, on the page where the validation is performed) or on a separate error page.



Creating an inline error message involves these steps:

- Step 1 Create a validation and specify error message text. To learn more, see Understanding Validations.
- Step 2 Associate the validation with a specific item.

# 9.6.2 Associating a Validation with a Specific Item

Associate an item with a validation and specify error message text.

To associate an item with a validation and specify error message text:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In Page Designer, select the Processing tab in the left pane.
- 3. Under Validating, select the validation you want to associate.

The Property Editor displays Validation attributes.

- 4. Under Validation, edit the following attributes:
  - Error, Error Message Enter the text to be displayed in the event that the validation does not pass.
  - Error, Display Location Select where the error message displays for this validation. Validation error messages display on a separate error page, or inline with the existing page. Inline error messages display underneath the associated item label or in a notification area defined as part of the page template.
  - Error, Associated Item Select the item where this validation error message displays.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. Click Save.

### 9.6.3 About the Error Message Display Location

Learn about error message display location.

The error message display location identifies where a validation error message displays. Validation error messages can display on an error page or inline within the existing page. Inline error messages can display in a notification area (defined as part of the page template) or within the field label.

To create a hard error that stops processes, including any remaining validations, you must display the error on an error page.



# 9.7 Understanding BLOB Support in Forms

Oracle APEX includes BLOB support to enable developers to declaratively upload and download files in forms.

- About BLOB Support in Forms Learn about BLOB support in forms.
- About Uploading and Downloading Files into a BLOB Learn about uploading and downloading files into a BLOB.
- About Displaying the BLOB Learn about displaying the BLOB.
- About Removing the Image Reference Learn about removing the image reference.

### 9.7.1 About BLOB Support in Forms

Learn about BLOB support in forms.

If you create a form using the Create Application Wizard, create a page of type of **Form** or **Report and Form**, create a region of type **Form**, or add an item to an existing form, any item whose source is a database column of type <code>BLOB</code> results in an item of type <code>File Browse</code>. When the form is called for <code>INSERT</code>, the file selected by the user is loaded into the <code>BLOB</code> column. When the form is called for update, a download link is displayed to the right of the Browse button. Users can use this link to download the file.

# 9.7.2 About Uploading and Downloading Files into a BLOB

Learn about uploading and downloading files into a BLOB.

The defaulted BLOB support does not give you all the information a typical application needs to effectively manage a BLOB. In addition to knowing that the column is a BLOB, more information about the file provides a better experience for the end-user. The File Browse page item has additional settings to facilitate managing this additional information completely declaratively.



#### Tip:

For more information on File Browse settings, see **File Browse** in About Item Types.

There are two different types of storage types available within the File Browse item type:

- BLOB column specific in Item Source Attribute Completely declarative approach
  that supports configuration of the additional settings discussed here. This
  references a BLOB in your own database table.
- Table wwv\_Flow\_Files Available for backwards compatibility. Oracle does not recommend using this in new applications.



• Table APEX\_APPLICATION\_TEMP\_FILES - Store the uploaded file in a temporary location that you can access with the view APEX\_APPLICATION\_TEMP\_FILES. Oracle APEX automatically deletes the file at the end of the session or at the end of the upload request, depending on what you choose for Purge File At.

To provide this additional information, it is recommended that you add additional columns to your base table to store and track the MIME type, file name, last updated date and character set settings. You can accomplish this by extending your table. For example:

```
ALTER TABLE emp ADD

(ATTACH_MIMETYPE VARCHAR2 (255),

ATTACH_FILENAME VARCHAR2 (255),

ATTACH_LAST_UPDATE DATE,

ATTACH_CHARSET VARCHAR2 (128));
```

#### Note:

The character set of the BLOB is not automatically set on upload. To store the character set value for your BLOB, you must provide an additional page item on your page which is bound to the column you use to store the character set, and where the user will be able to specify the character set for the document they are uploading.

If you manually create a form on a custom table, you can still take advantage of this feature. To do so, use the File Browse item type with a Storage Type setting of BLOB column specified in Item Source Attribute, on a page with a DML Process type of DML\_PROCESS\_ROW. This process determines the table name and primary key columns.

# 9.7.3 About Displaying the BLOB

Learn about displaying the BLOB.

If the BLOB you are working with is an image, you can display it in a form. To handle it declaratively, use the Display Image item type as described in About Item Types. To handle it procedurally, see Understanding BLOB Support in Forms and Reports.

## 9.7.4 About Removing the Image Reference

Learn about removing the image reference.

Because there is no set to  $\mathtt{NULL}$  when using File Browse, if you need to provide a mechanism to remove an image reference, you must include a special Remove Image button to nullify the necessary columns. Consider the following example:

```
UPDATE demo_product_info
   SET product_image = NULL,
        MIMETYPE = NULL,
        FILENAME = NULL,
        IMAGE_LAST_UPDATE = NULL,
        CHARSET = NULL
WHERE product id = :P6 PRODUCT ID;
```



10

# **Managing Application Components**

Oracle APEX supports the creation the following application components: calendars, maps, charts, and application Help.

# Understanding Oracle JET Integration with Oracle APEX Oracle APEX includes the Oracle JET (JavaScript Extension Toolkit) library. This section provides information about JET and how it is integrated with APEX.

#### Creating Calendars

App Builder includes support for creating a calendar with monthly, weekly, daily, and list views. Once you specify the table on which the calendar is based, you can create drill-down links to information stored in specific columns and enable drag and drop capability.

#### Creating Charts

Create charts in App Builder by running a built-in wizard or by creating them manually in Page Designer.

#### Creating Maps

Create maps that visualize location data (real coordinates) based on data in a table.

#### Creating Help for Your Application

Help created in App Builder displays on a dedicated Help page. To access Help, users click a link that takes them to a dedicated Help page. This Help page displays page and field-level Help topics specific to the page they are viewing.



Controlling Page Layout and Adding Navigation

# 10.1 Understanding Oracle JET Integration with Oracle APEX

Oracle APEX includes the Oracle JET (JavaScript Extension Toolkit) library. This section provides information about JET and how it is integrated with APEX.

- About Oracle JET Learn about Oracle JET.
- How Oracle JET is integrated with Oracle APEX
  Learn about how Oracle JET is integrated with Oracle APEX.

### 10.1.1 About Oracle JET

Learn about Oracle JET.

Oracle JET (JavaScript Extension Toolkit) is a collection of open source JavaScript libraries with a set of Oracle contributed JavaScript libraries. Oracle JET is targeted at intermediate and advanced JavaScript developers and provides a rich set of UI components that can be

easily integrated into APEX. Oracle JET is a modular toolkit which enables developers to use as much or as little of the features that they desire.

See Also:

Oracle JET Homepage to learn more about Oracle JET.

## 10.1.2 How Oracle JET is integrated with Oracle APEX

Learn about how Oracle JET is integrated with Oracle APEX.

Currently APEX integrates some parts of Oracle JET, primarily with Chart region types.

Note:

Although Oracle JET provides two-way data binding (using knockout.js), currently APEX does not natively utilize this aspect of the toolkit.

Oracle JET uses a module loader (RequireJS) to only load modules that are required for specific functionality to work. This means that you do not have to load the entire Oracle JET library for certain functionality and also enables each module to define its own dependencies. At runtime, when a module is requested, the module loader looks at the module being requested for any dependencies to other modules. If there are any dependencies, these will also be loaded.

Module loader can however result in a large number of additional resources being individually loaded at runtime, which can have a negative performance impact. For this reason, APEX makes use of the RequireJS Optimization Tool, which:

- provides a way to determine all the dependencies for modules either at design time or as part of a standard build process
- bundles them up into one combined, minified file

RequireJS Optimization Tool is loaded at runtime to avoid the need for all the additional requests.

Find the list of the bundles used for Chart native type:

- jetCommonBundle.min.js
- chartBundle.min.js



### Note:

You can utilize the Common bundle <code>jetCommonBundle.min.js</code> in your plug-ins. This Common Bundle gets included on any APEX page as soon as a file is included with your plug-in, which defines the <code>[require jet]</code> prefix. This means that any module your plug-in uses that is already included in the common bundle does not need to be refetched by <code>requireJS</code>.

### jetCommonBundle.min.js

- **Directory**: /images/libraries/apex/minified/
- Included when: When a JavaScript file is requested that defines itself as requiring JET, by using the [require jet] prefix in APEX, and the page is not in Debug mode
  When debugging, the bundle is not loaded and requireJS loads all the individual resources separately.

### chartBundle.min.js

- **Directory**: /images/libraries/apex/minified/
- Included when: A JET chart is included on a page (for example, when a Chart region, or Interactive Grid region is added to a page), and the page is not in debug mode.

When debugging, the bundle is not loaded and requireJS loads all the individual resources separately.

### See Also:

- requireJS homepage to learn more about RequireJS
- RequireJS Optimization Tool to learn more about RequireJS Optimization Tool

## 10.2 Creating Calendars

App Builder includes support for creating a calendar with monthly, weekly, daily, and list views. Once you specify the table on which the calendar is based, you can create drill-down links to information stored in specific columns and enable drag and drop capability.

- About Supported Calendars
   App Builder supports two types of calendars: Calendar and Legacy Calendar.
- Sample Calendar
   View a sample calendar in the Sample Calendar sample app.
- Creating a Calendar Using the Create Application Wizard Create a new application that contains a calendar.
- Creating a Calendar Using the Create Page Wizard
   Use the Create Page Wizard to add a new page with a calendar.



- Creating a Calendar in Page Designer
   Manually create a calendar in Page Designer by providing the SQL query.
- Managing Calendar Attributes
   Once you create a calendar, you can alter the display by editing attributes in the Property Editor.
- About Dynamic Action Support for Calendar
   Use the Dynamic Action Create Wizard to specify an action that is performed
   when a defined set of conditions occur. You can specify which elements are
   affected by the action and when and how they are affected.



Managing Legacy Calendars

## 10.2.1 About Supported Calendars

App Builder supports two types of calendars: Calendar and Legacy Calendar.

**Calendar** is based on the FullCalendar jQuery library and can only be customized through CSS. **Legacy Calendar** is template-based and may be deprecated in the future release. Although Oracle still supports legacy components, the creation of new calendars is based on the FullCalendar jQuery library.



### Tip:

In previous releases Legacy Calendar was referred to as Calendar (Template), Classic calendar, Easy calendar, and SQL calendar).

You create a calendar based on a table or SQL query you provide. During the creation process, you are prompted to select a date column and display column. Because it offers a better user interface and numerous additional features, Oracle recommends converting all legacy calendars to the latest calendar.

### Calendar

The Calendar option supports:

- Rendering calendar events on multiple views (Month, Week, Day, or List).
- Rendering of duration and non-duration based events.
- Ability to modify the start and end dates by dragging and dropping events on different dates. Drag and drop is only supported for local data sources, that is, database objects in the referenced database schema and not on external data sources such as a Google calendar.
- Ability to change the duration by resizing the length of the events, by changing the end date.
- Ability to Edit or Adding new events on calendar using forms by cllicking either on events or empty calendar cell.



- Rendering events from external sources using web service calls or Google Calendar feeds.
- Ability to render events titles on single or multiple lines.
- Using different CSS classes, developer can choose different styles for different type of events.
- Ability to download events in PDF printable format
- Support of multiple formats for sharing events (iCal, CSV, XML).
- Ability to add tooltip on Month/Week/Day views to make it easier for users to have a quick look at details of each event.

### **Legacy Calendar**

Legacy Calendars option supports:

- Rendering of start date only.
- Look and feel defined by templates.
- Modification of start date by dragging and dropping events.
- Calendars that include daily, weekly, and monthly views.
- The date column determines the days on the calendar which contains entries.
- The display column defines a specific row which displays the calendar.



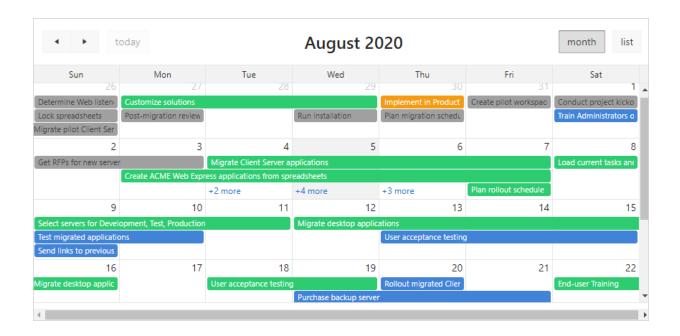
Managing Legacy Calendars

## 10.2.2 Sample Calendar

View a sample calendar in the Sample Calendar sample app.

Sample apps are designed to highlight specific functionality and are intended to serve as a developer guide on how to make use of a particular feature. The following is **Monthly Calendar: Projects** from the *Sample Calendar* sample app.





#### Features of this calendar include:

- Previous Navigates to the previous month.
- Next Navigates to the next month.
- Month Displays a monthly view of all orders.
- List Displays a list of all orders.



To view calendar examples, install the sample app, *Sample Calendar*. To learn more, see Installing Apps from the Gallery.

## 10.2.3 Creating a Calendar Using the Create Application Wizard

Create a new application that contains a calendar.



### Tip:

The Create Application Wizard uses general best practices to generate the application and does not include several advanced options included in the Create Page Wizard.

To create a calendar using the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.



- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- **5.** Name Enter the name used to identify the application to developers.
- **6.** Appearance Accept the default or click **Set Appearance** to change it.
- 7. Click Add Page and select Calendar.
- 8. On Add Calendar Page:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - c. Table or View Select the database object for the calendar.
  - **d.** Display Column Select the column from the table or view to display in the calendar events.
  - e. Start Date Column Select the column which holds the start date for events displayed on this calendar.
  - f. End Date Column Select the date column from the table or view to use as the end date for calendar events. If **End Date** is specified then duration based events will be displayed.
  - g. Show Time Select Yes to show the time portion for events and also enable the Weekly and Daily calendar views. Select No to only show the dates for events.
  - h. Advanced Expand this region to edit the following:
    - Set as Home Page Make this page the home page for the application. Any page previously defined as the home page will be updated.
    - Set as Administration Page Add this page under Administration, rather than as a normal page in the application. Users access this page by clicking Administration in the main menu and then selecting it the Application Administration list.



### Note:

The same page cannot be both a Home page and a page under Administration.

- i. Click Add Page.
- 9. Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to Settings.
- 11. Click Create Application.

## 10.2.4 Creating a Calendar Using the Create Page Wizard

Use the Create Page Wizard to add a new page with a calendar.

To create a calendar using the Create Page Wizard:

1. On the Workspace home page, click the **App Builder** icon.



- 2. Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Calendar.
- 5. Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page.



### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 6. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 7. Source Type Specify the source of the new page. Options include:
  - Table:
    - Table/View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based. When entering manually, note that the table name is case sensitive.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.



#### 9. Click Next.

- **10.** Edit the calendar attributes:
  - a. Display Column Select the column which holds the text displayed for events on this calendar.
  - b. Start Date Column Select the column which holds the start date for events displayed on this calendar.
  - c. End Date Column Select the column which holds the end date for events displayed on this calendar. If **End Date** is specified, then the calendar displays duration based events.
  - d. Show Time Select **Yes** to show the time portion for events and also enable the Weekly and Daily calendar views. Select **No** to only show the dates for events.
- 11. Click Create Page.
- 12. To view page, click Save and Run Page.

The rendered page appears.



To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.

## 10.2.5 Creating a Calendar in Page Designer

Manually create a calendar in Page Designer by providing the SQL query.



### Tip:

To create a calendar in Page Designer, you must provide a SQL Query. To create a calendar by selecting a table, use the Create Page Wizard. See Creating a Calendar Using the Create Application Wizard.

To create a calendar in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. If necessary, click the Layout tab in the central pane.
- 3. In the Gallery, click the **Regions** tab.
- 4. Right-click **Calendar**, click **Add To**, and select the appropriate location.





### Tip:

You can also select **Calendar** with the mouse and drag it to the appropriate location in the Layout tab.

- 5. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the Show Messages icon on the Page Designer toolbar.
     The Messages dialog displays errors that must be addressed.
  - **b.** Select an error to highlight the associated attribute in the Property Editor.
- 6. In the Property Editor, edit the appropriate Region attributes:
  - · Identification, Title Enter a region title.
  - Source, Location Select the location of the database which contains column which holds the CSS Class to style the events displayed on this calendar. Options include:
    - Local Database Data is sourced from a local database.
    - REST Enabled SQL Data is sourced from a remote database where the connection is defined using a REST Enabled SQL service.
    - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. REST Data Source are created and maintained within Shared Components.

What displays next depends upon Source, Location you select.



### Tip:

To learn more, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 7. Edit the calendar Attributes.
  - In the Rendering tab, locate the Calendar region and click Attributes.
     The Property Editor displays the calendar Attributes.
  - Edit the calendar Attributes:
    - Settings, Display Column Select the column which holds the text displayed for events on this calendar.
    - Settings, Start Date Select the column which holds the start date for events displayed on this calendar.
- 8. Click Save.

## 10.2.6 Managing Calendar Attributes

Once you create a calendar, you can alter the display by editing attributes in the Property Editor.



## Each calendar has two sets of editable attributes: **Region attributes** and **calendar Attributes**.

- Editing Calendar Attributes in the Property Editor Access calendar attributes in the Property Editor.
- Editing an Existing Calendar to Include Add and Edit Functionality Edit and existing calendar to include add and edit functionality.
- Adding Calendar Initialization JavaScript Code
   Add a JavaScript function to override the standard jQuery FullCalendar initialization attributes by editing the Initialization JavaScript Code attribute.
- Enabling the Dragging and Dropping of Data in an Existing Calendar
   The Calendar Region supports moving or changing calendar events with drag and drop.

## 10.2.6.1 Editing Calendar Attributes in the Property Editor

Access calendar attributes in the Property Editor.

**Region attributes** define the area of the page which functions as a container for the calendar. **Calendar Attributes** specify the template, date columns, and general calendar formatting.

To edit calendar Attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate and select the calendar.

The Property Editor displays two tabs: Region and Attributes.

- 3. In the Property Editor, select the appropriate tab:
  - Region Region attributes define the area of the page which functions as a container for the calendar.
  - Attributes Calendar Attributes specify the template, date columns, and general calendar formatting.
- Edit the calendar attributes.

To view help for an attribute, select the attribute in the Property Editor and click the Help tab in the central pane.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



### 10.2.6.2 Editing an Existing Calendar to Include Add and Edit Functionality

Edit and existing calendar to include add and edit functionality.



### Tip:

When defining calendar create and edit links for Desktop applications, Oracle recommends defining two separate pages. To create an **Edit Link**, select one of the table or SQL query columns as the Primary Key Column in the Calendar attributes.

To edit an existing calendar to include add and edit functionality:

- View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, locate and select the calendar.
- 3. In the Property Editor, click the **Attributes** tab.

The Property Editor displays the calendar Attributes.

- Edit Settings, Create Link to specify a target page to call when the user clicks an empty cell or an existing calendar entry.
  - Settings, Create Link Click No Link Defined.

The Link Builder dialog appears.

- **b. Type** Select the type of link target. The UI changes depending upon the Type you select.
- Application Only displays if Type is Page in a different application. Enter the application ID.
- d. Page Specify the target page number.
- e. Set Items Configure the values to be passed from the calendar to the target page. The Create Link is called after a date or date range has been selected in the calendar. Therefore, the selected start and end dates must be passed to the Create Page.
  - To pass the selected date or the start date of a selected date range:
    - Name Specify the name of the target page item containing the start date of the event. If a form, this should be a date picker element.
    - Value &APEX\$NEW\_START\_DATE.
  - When a date range has been selected, pass the end date as follows:
    - Name Specify the name of the target page item containing the end date of the event. For a form, this should be a date picker element.
    - Value & APEX\$NEW END DATE.



You can pass additional values in the same way as any other link to an application page.

Click OK.



### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

5. Edit **Settings**, **View/Edit Link** to define a target page to be called when the user clicks an existing entry.



### Tip:

To create an Edit Link, you must pass a primary key value to the target page in order for the form to look up the table row.

a. Settings, Edit Link - Click No Link Defined.

The Link Builder dialog appears.

- Type Select the type of link target. The UI changes depending upon the Type you select.
- c. Application Only displays if Type is Page in a different application. Enter the application ID.
- d. Page Specify the target page number.
- e. Set Items Configure the values to be passed from the calendar to the target page. The Create Link is called after a date or date range has been selected in the calendar. Therefore, the selected start and end dates must be passed to the Create Page.
  - Name Specify the name of the target page item containing the primary key value; typically a hidden item, for example:

PX ID.

 Value - Specify the table or SQL query column containing the primary key value, for example:

&ID.

- Click OK.
- 6. Click Save.

## 10.2.6.3 Adding Calendar Initialization JavaScript Code

Add a JavaScript function to override the standard jQuery FullCalendar initialization attributes by editing the Initialization JavaScript Code attribute.

Note that the function must return a JavaScript Object containing the calendar initialization attributes as parameters.

To add initialization JavaScript code:



- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, locate and select the calendar.

The Property Editor displays Region attributes.

3. In the Property Editor, click the **Attributes** tab.

The Property Editor displays the calendar Attributes.

4. Find Advanced.



### Tip:

To search for a group or an attribute, enter a keyword in the Filter Properties field. The groups and attributes containing the term appear.

5. In **Advanced**, **Initialization JavaScript Code**, enter a JavaScript function to override the standard jQuery FullCalendar initialization attributes.

Example: Calendar based FullCalendar v5:

```
function ( pOptions) {
    pOptions.slotMinTime
"07:00:00";
                                                          // hide
slots before minTime
    pOptions.slotMaxTime
"21:00:00";
                                                          // hide
slots after maxTime
   pOptions.dayHeaderFormat = { weekday: 'short', month:
'numeric', day: 'numeric' }; // week view column headings
   pOptions.slotDuration
"00:15:00";
                                                          // custom
slot duration
    pOptions.weekNumbers
                                                          // show
true;
week numbers
   pOptions.weekText
heading for week numbers
    pOptions.weekNumberCalculation =
"ISO";
                                                          // use
"ISO" week numbers
   pOptions.displayEventTime
                                                          // show
true:
event time ...
    pOptions.displayEventEnd
                                                          // ...
but not the end time
    pOptions.disableKeyboardSupport =
                                                          //
true;
```

### Example: Calendar based FullCalendar v3 (Deprecated):

```
function ( pOptions) {
   pOptions.titleFormat
                          = "[Conference
                          // custom title
Schedulel";
   pOptions.minTime
"07:00:00";
                                       // hide slots before minTime
   pOptions.maxTime =
"18:00:00";
                                      // hide slots after maxTime
   pOptions.columnFormat = {month: '', week: 'dddd', day:
'dddd'}; // week view column headings
   pOptions.slotDuration =
"00:15:00";
                                      // custom slot duration
   pOptions.weekNumbers =
                                      // show week numbers
   pOptions.weekNumberTitle = "CW";
   return pOptions;
```

### 

### Tip:

Calendars based on FullCalendar v3 have been deprecated and will be desupported in a future release.

6. Click Save.

### 10.2.6.4 Enabling the Dragging and Dropping of Data in an Existing Calendar

The Calendar Region supports moving or changing calendar events with drag and drop.

To enable support for drag and drop for a calendar region:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Property Editor, click the **Attributes** tab.

The Property Editor displays the calendar Attributes.

- 3. Find **Settings** and edit the following attributes:
  - a. Settings, Primary Key Column Select a table or SQL Query column.

The Drag and Drop field appears in the Property Editor, below Additional Calendar Views.

b. Settings, Drag and Drop - Select On.

Drag and Drop PL/SQL Code appears.

**c. Settings**, **Drag and Drop PL/SQL Code** - Enter the PL/SQL code to execute when the end user finishes a drag and drop for an event.

Within the PL/SQL code, you can reference the ID of the dragged event, the new start, and end end dates as:

```
:APEX$PK VALUE, :APEX$NEW START DATE amd :APEX$ NEW END DATE
```

For example, the following code changes the event row in the PROJECTS table after the end user has dragged the event to a new date.

```
begin
     update projects
     set start_date = to_date(:APEX$NEW_START_DATE,
'YYYYMMDDHH24MISS'),
          end_date = to_date(:APEX$NEW_END_DATE,
'YYYYMMDDHH24MISS')
     where id = :APEX$PK_VALUE;
end;
```

To learn more, click the **Help** tab in the central pane.

4. Click Save.

## 10.2.7 About Dynamic Action Support for Calendar

Use the Dynamic Action Create Wizard to specify an action that is performed when a defined set of conditions occur. You can specify which elements are affected by the action and when and how they are affected.

Dynamic actions provide a way to define complex client-side behavior declaratively without the need for JavaScript. When working with dynamic actions, you should be mindful of the fact that the more dynamic actions you add to a page, the greater your overall page size. This is because the dynamic action framework emits additional code to the client for each dynamic action defined, which then also must be downloaded and executed by the framework in the client.

Dynamic actions contain a condition that can be specified to control the action. APEX components such as reports or charts can react to specific calendar events. For example, if you view a calendar and click a button to view a subsequent month, you can create a dynamic action to automatically refresh an associated report.

To use this feature, the developer creates a new dynamic action on the Calendar page in Page Designer. Select the new dynamic action in the Dynamic Action tab in the left pane of Page Designer. Once created, the new dynamic action displays in red with the label **New**. Then the developer edits the dynamic action attributes in the Property Editor. In Property Editor, locate and expand **When** attribute. Under the **When** attribute, for **Event**, select one of the following events:

Date Selected [Calendar]



This event fires when the user selects an empty date or date range either with the mouse or with the keyboard. If the developer provides a "create link" in the calendar attributes, no event fires.

Information about the current view is being passed as the "data" object:

```
{ "newStartDate"::: "newEndDate"::: }

{ "newStartDate":{first day of selection} (YYYYMMDDHH24MISS),
    "newEndDate": {last day of selection} YYYYMMDDHH24MISS }
```

### Event Selected [Calendar]

This event fires when the user clicks an existing event with the mouse or selects it with the keyboard. When the developer provided an "edit link" in the Calendar attributes, no event is being fired. The "data" object contains the jQuery FullCalendar JSON representation of the event.



Full Calendar documentation for Event Object.

### View Changed [Calendar]

This event fires when either the view type changes (day, week, month, list) or when the view changes to its previous or next view page. The "data" object contains the following information:

```
{ "viewType": {view type, day, week, month or list},
  "startDate": {first day of view} (YYYYMMDDHH24MISS),
  "endDate": {last day of view} (YYYYMMDDHH24MISS) }
```

### See Also:

Managing Dynamic Actions and Debugging Dynamic Actions for information on how to debug problems

## 10.3 Creating Charts

Create charts in App Builder by running a built-in wizard or by creating them manually in Page Designer.

### About Supported Charts

App Builder supports charts based on the Oracle JavaScript Extension Toolkit (Oracle JET) Data Visualizations.

### Sample Charts

View chart examples in the Sample Charts sample app.

 Creating a Chart Using the Create Application Wizard Create a new application that contains a chart page.



- Creating a Dashboard Page Using the Create Application Wizard
   Create a new application that contains a Dashboard page with up to four charts.
- Adding a Chart Using the Create Page Wizard
   Run the Create Page Wizard to add a new chart to an existing application.
- Adding a Chart in Page Designer
   Add a chart to a page by creating it manually in Page Designer.
- Editing Charts
   You can alter how a chart displays by editing chart attributes in Page Designer.

## 10.3.1 About Supported Charts

App Builder supports charts based on the Oracle JavaScript Extension Toolkit (Oracle JET) Data Visualizations.

Oracle JET empowers developers by providing a modular open source toolkit based on modern JavaScript, CSS3, and HTML5 design and development principles. The Oracle JET data visualization components include customizable charts, gauges, and other components that you can use to present flat or hierarchical data in a graphical display for data analysis. Each Oracle JET visualization supports animation, accessibility, responsive layout, internationalization, test automation, and a range of inter activity features. Charts provide dozens of different ways to visualize a data set.



Work with Data Visualizations in JavaScript Extension Toolkit (JET) Developing Applications with Oracle JET.

### **Chart Creation Methods**

You can create charts by running the Create Application Wizard, Create Page Wizard, or by adding a new chart manually to a page in Page Designer. The Create Page Wizard offers the most supported chart types. The following table summarizes various methods for creating charts.

Method	Description	To Learn More
Create Application Wizard, Chart	Creates a page containing a chart. Supported chart types include:	Creating a Chart Using the Create Application Wizard
Create Application Wizard, Dashboard	Creates a dashboard page with up to four charts. Supported chart types include:  Area Bar Line Pie	Creating a Dashboard Page Using the Create Application Wizard



Method	Description	To Learn More
Create Page Wizard, Chart	Creates a new page containing a chart. Supported chart types include:	See Adding a Chart Using the Create Page Wizard and #unique_823
Create Page Wizard, Dashboard	Creates dashboard page. Choose from four different chart layouts which you can easily customize in Page Designer. Available chart layouts include:  Primary and 2 secondary charts Grid of 4 charts Primary and 3 secondary charts Grid of 6 charts	Adding a New Page to an Application. See online Help when creating this page type.
Page Designer	Add a new chart to an existing page in Page Designer.	Adding a Chart in Page Designer

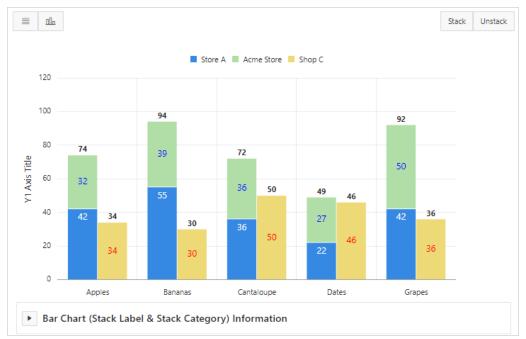


# 10.3.2 Sample Charts

View chart examples in the Sample Charts sample app.

Sample apps are designed to highlight specific functionality and are intended to serve as a developer guide on how to make use of a particular feature. The following is a sample bar chart from *Sample Charts* sample app.





Click **Horizontal** and **Vertical** to toggle between a horizontal or vertical display. Click **Stack** and **Unstack** to view two series of data or three series of data.

This chart displays two series of data, *Store A* and *Acme Store*, stacked and associated with the Y axis, and the third series of data, *Shop C*, associated with an extra Y axis and rendered as a separate chart below the other two series of data.

Expand the **Bar Chart (Stack Label & Stack Category) Information** region at the bottom of the page to view information on the chart.



### Tip:

To view chart examples, install the sample app, *Sample Charts*. To learn more, see Installing Apps from the Gallery.

## 10.3.3 Creating a Chart Using the Create Application Wizard

Create a new application that contains a chart page.

Run the Create Application Wizard and create a new page containing one of the following chart types: Area, Bar, Line, or Pie.



Create up to four charts at once by adding a Dashboard page.

To add a chart page using the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- Click the Create button.



- 3. Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- **5.** Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click Set Appearance to change it.
- 7. Click Add Page and select Chart.
- 8. On Add Chart Page:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - c. Select a chart type: Area, Bar, Line, or Pie.
  - d. Table or View Click the LOV icon (bullet points and lines) and select a table or view on which to build the chart.
  - e. Label Column Select the column name used to define the label(s) of the x-axis on the chart.
  - f. Value Aggregation Select how to aggregate the chart Value Column (Column Value, Sum, or Count.

For example, selecting **Count** bases the aggregation on the selected **Label Column**. For all other aggregation types, if no **Value Column** is selected, the aggregation is based on the select Label Column.

- value Column Select the column name to be used for defining the value on this chart.
- h. Click Add Page.
- 9. Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to Settings.
- 11. Click Create Application.

## 10.3.4 Creating a Dashboard Page Using the Create Application Wizard

Create a new application that contains a Dashboard page with up to four charts.

A Dashboard page can contain up to four charts. To create a chart, select the chart (Chart 1, Chart 2, Chart 3, or Chart 4), the Chart Type, and then define the remaining attributes.

To add a Dashboard page using the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- 3. Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- 5. Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default or click **Set Appearance** to change it.



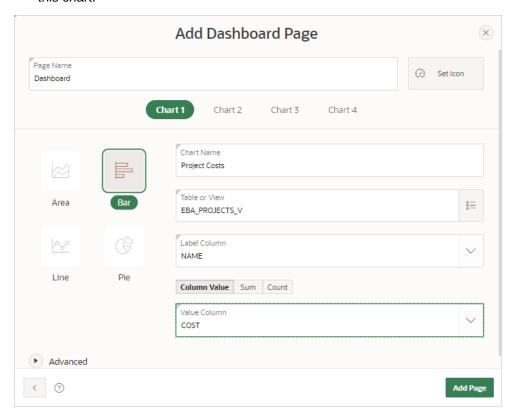
- 7. Click Add Page and select Dashboard.
- 8. Add Cashboard Page:
  - a. Page Name Enter a name for this page.
  - **b.** Set Icon Select an icon to display in the navigation menu for this page.

### 9. Create Chart 1:

- a. Chart Type Select Area, Bar, Line, or Pie.
- **b.** Chart Name Enter the name for the chart.
- c. Table or View Click the LOV icon (bullet points and lines) and select a table or view on which to build the chart.
- **d.** Label Column Select the column from the table or view to use as the label for the chart.
- e. Value Aggregation Select how to aggregate the chart Value Column (Column Value, Sum, or Count.

For example, selecting **Count** bases the aggregation on the selected **Label Column**. For all other aggregation types, if no **Value Column** is selected, the aggregation is based on the select Label Column.

f. Value Column - Select the column name to be used for defining the value on this chart.



### 10. Create Chart 2:

- a. Chart Type Select Area, Bar, Line, or Pie.
- b. Chart Name Enter the name for the chart.
- c. Table or View Click the LOV icon (bullet points and lines) and select a table or view on which to build the chart.



- Label Column Select the column from the table or view to use as the label for the chart.
- e. Value Aggregation Select how to aggregate the chart Value Column (Column Value, Sum, or Count.

For example, selecting **Count** bases the aggregation on the selected **Label Column**. For all other aggregation types, if no **Value Column** is selected, the aggregation is based on the select Label Column.

- f. Value Column Select the column name to be used for defining the value on this chart.
- 11. Repeat the previous step for Chart 3 and Chart 4. When you are done creating charts, click **Add Page**.
- 12. Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **13.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to Settings.
- 14. Click Create Application.

## 10.3.5 Adding a Chart Using the Create Page Wizard

Run the Create Page Wizard to add a new chart to an existing application.

To create a chart by running the Create Page Wizard:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Chart.
- Select a chart type.
- 6. Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 7. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.



- REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
- REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- **8.** Source Type Specify the source of the new page. Options include:
  - Table:
    - Table /View Owner Select the owner of the table on which you are building the page.
    - Table/View Name Select the table or view on which the page will be based.
  - SQL Query:
    - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see fieldlevel Help.
  - **a.** Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 10. Click Next.
- 11. Edit the chart attributes. The options that display vary depending upon the chart type selected. To learn more about an attribute, click the field-level Help.
- 12. Click Create Page.



#### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.

## 10.3.6 Adding a Chart in Page Designer

Add a chart to a page by creating it manually in Page Designer.

To add a chart to an existing page in Page Designer:

- 1. View the page to contain the chart in Page Designer.
- 2. In the Gallery at the bottom of the central pane, click **Regions** and locate **Chart**. The Gallery lists all controls or components you can add to a page. Passing the cursor over a control or component displays a tooltip that describes it.



- 3. From the Gallery,
  - Right-click **Chart** to view the context menu.
  - **b.** Select **Add To** and then the desired location.



### Tip:

You can also click **Chart** in the Gallery and drag it to the appropriate location in the Layout tab.

- Page Designer indicates what to do next. The Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.
    - The Messages dialog displays errors that must be addressed.
  - **b.** Select an error to highlight the associated attribute in the Property Editor.
- Edit the Series:
  - a. In the Rendering tab under the chart, expand the **Series** node and select the new series.
  - Under **Series** node, select a series.
  - c. Source, Location Select the location of the database you want to use. Options include:
    - Local Database Data is sourced from a local database. (This location is selected by default.)
    - **REST Enabled SOL** Data is sourced from a remote database, where the connection is defined using REST Enabled SQL Reference.
    - REST Source Data is sourced from a RESTful web service defined using **REST Data Sources.**
    - Region Source Data is sourced from the location specified in the region source definition.
  - d. Column Mapping, Label Select the column name to be used for defining the label(s) of the x-axis on the chart. For a Stock chart, the column should be of data type Date/Timestamp, to represent the stock information on a time axis
  - e. Column Mapping, Value Select the column name to be used for defining the value on this chart. For a Box Plot chart, this column will be used for defining the minimum, quartiles, median, and maximum values of the numerical data set.



### Note:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

Expand the **Axes** node:





### Tip:

The Axes node only displays for chart types that support axes (such as area, bar, bubble, combination, line, line with area, polar, radar, range, scatter, and stock).

- a. In the Rendering tab under the chart, expand the **Axes** node.
- **b.** Under **Axes** node, select an Axis.
- Edit the required axis attributes and define any data formatting to be applied to the axis values.
- 7. Edit the **Region** attributes.
  - a. In the left pane (or Rendering tab), select the chart.
     The Property Editor, Region tab displays the region attributes
  - **b.** Review and edit the region attributes in the Property Editor.
- 8. Edit the chart **Attributes**:
  - a. In the Property Editor, select the Attributes tab.
  - b. Edit the required chart attributes.
- Click Save or Save and Run Page.

## 10.3.7 Editing Charts

You can alter how a chart displays by editing chart attributes in Page Designer.

- Editing Chart Attributes
  Learn about editing chart Region attributes, chart Attributes, and Series attributes.
- Switching Chart Type
   Change the chart type by editing chart Attributes.
- Enabling Automatic Refresh
   Monitor chart information by enabling the Automatic Refresh, Interval attribute, or by using a dynamic action with the Refresh action.
- Using Custom JavaScript with Charts
   Control the look and feel of a chart by adding custom JavaScript.



### See Also:

Viewing a Page in Page Designer

### 10.3.7.1 Editing Chart Attributes

Learn about editing chart Region attributes, chart Attributes, and Series attributes.

Charts have three types of attributes: **Region attributes**, **chart Attributes**, and **Series attributes**. When you select a chart in the Rendering tab, the Property Editor

displays two tabs: **Region** (which contains Region attributes) and **Attributes** (which contains chart Attributes). **Series** attributes display in the Rendering tab under the chart.

To edit chart attributes:

- 1. View the page containing the calendar in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

The Property Editor in the right pane displays displays two tabs: **Region** and **Attributes**. Attributes are organized in groups. To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 2. To edit the Region attributes.
  - a. In the left pane (or Rendering tab), select the chart.

The Property Editor, Region tab displays the region attributes

- b. Review and edit the region attributes in the Property Editor.
- 3. To edit the chart Attributes.
  - a. In the left pane (or Rendering tab), select the chart.
  - b. In the Property Editor, select the Attributes tab.
  - c. Review and edit the chart Attributes in the Property Editor.
- To edit the Series:
  - a. In the Rendering tab under the chart, select the Series.
  - **b.** Review and edit the Series attributes in the Property Editor.
- 5. Click Save.

### 10.3.7.2 Switching Chart Type

Change the chart type by editing chart Attributes.

To switch a chart type:

- 1. View the page containing the chart in Page Designer.
- 2. In the left pane (or Rendering tab), select the chart.

The Property Editor (right pane) displays two tabs.

- 3. Edit the chart Attributes and select a new chart type:
  - a. In the Property Editor, select the **Attributes** tab.

The Property Editor displays chart Attributes. Attributes are organized in groups. To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- Chart, Type Select the chart type you want to switch to. For example,
   Combination.
- 4. Edit the Series:
  - a. In the Rendering tab under the chart, select the Series.

The **Series** tab appears in the Property Editor.



 Column Mapping - Ensure all required Column Mapping columns have been defined.



Column mappings may differ for different chart types, so you must ensure all required column mappings are defined for the selected chart type.

c. Type - Select the chart series type. For example, Bar Range.

Only certain chart types support combining different types of series on the same data plot. The Series Type attribute only displays for chart types **Combination**, **Polar**, **Radar**, and **Range**.

Click Save or Save and Run Page.

## 10.3.7.3 Enabling Automatic Refresh

Monitor chart information by enabling the Automatic Refresh, Interval attribute, or by using a dynamic action with the Refresh action.

- Enabling the Automatic Refresh Attribute
   Enabling the Automatic Refresh attribute updates the chart to reflect changes in the underlying data within a specified time interval.
- Creating a Refresh Dynamic Action Learn about creating a Refresh dynamic action.

### 10.3.7.3.1 Enabling the Automatic Refresh Attribute

Enabling the Automatic Refresh attribute updates the chart to reflect changes in the underlying data within a specified time interval.

To enable automatic refresh updates:

- 1. View the page containing the chart in Page Designer.
- 2. In the left pane (or Rendering tab), select the chart.
- 3. In the Property Editor, select the Attributes tab.
- Find Automatic Refresh.
- 5. In **Automatic Refresh**, **Interval** Enter the interval in seconds between chart updates.

Very small updates intervals, such as 2 seconds, are discouraged since they may cause serious database performance issues.

6. Click Save.

### 10.3.7.3.2 Creating a Refresh Dynamic Action

Learn about creating a Refresh dynamic action.

To create a Refresh dynamic action:



- 1. View the page containing the chart in Page Designer.
- 2. Click the **Dynamic Actions** tab in the left pane.
- 3. Under Dynamic Actions, right-click Events and select Create Dynamic Action.
- **4.** Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.
    - The Messages dialog displays errors that must be addressed.
  - b. Select an error to highlight the associated attribute in the Property Editor.
- 5. In the Property Editor, edit the following Dynamic Action attributes:
  - a. **Identification**, **Name** Enter a name of the dynamic action.
  - Execution, Sequence Specify the sequence for this component. The sequence determines the order of evaluation.
  - **c. Execution**, **Event Scope** Review the scope of the event. Scope determines when the event is evaluated a second or successive time.
  - **d. Execution**, **Type** Choose the type of execution method for the Dynamic Action. Options include **Immediate** (default), **Debounce**, and **Throttle**.
  - e. When, Event Specify the event that causes the dynamic action to fire.
  - **f. When**, **Selection Type** Select the type of page element or construct to be used to trigger the event. What displays next, depends upon selected element or construct.



### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

- 6. In the Rendering tab, select the first action under **True** and edit the attributes:
  - a. Identification, Name Enter the name of the action to identify what the action does (for example, select Refresh Chart).
  - **b. Identification**, **Action** Specify which action you want to perform (for example, select **Refresh**).
  - **c. Affected Elements**, **Selection Type** Select the type of page components to be affected when this action executes (for example, select **Region**).
  - d. Affected Elements, Region Select the region containing the chart.
  - **e. Execution**, **Sequence** Review the sequence for this component. The sequence determines the order of execution.
  - f. Execution, Event Review the selected dynamic action event (for example, Refresh Chart).
  - g. Execution, Fire When Event Result Is Specifies the selected dynamic action event (for example, Refresh Chart).
  - h. **Execution**, **Fire on Initialization** Enable this option. For a refresh dynamic action, this option causes the dynamic action to fire when the page loads.
- 7. Click Save.





**Managing Dynamic Actions** 

### 10.3.7.4 Using Custom JavaScript with Charts

Control the look and feel of a chart by adding custom JavaScript.

Control the look and feel of a chart by adding custom JavaScript.

To use custom JavaScript:

1. View the page in Page Designer:

Page Designer appears.

- 2. In the left pane (or Rendering tab), select the chart.
- 3. In the Property Editor, select the Attributes tab.
- 4. Find Advanced.
- 5. In Advanced, JavaScript Initialization Code, enter the code to customize your chart.

For example:

```
function( options ){
   // Setup a callback function which gets called
   // when data is retrieved, it allows to manipulate the series
   options.dataFilter = function( data ) {
        // e.g Set the first series of chart to the colour red
       data.series[ 0 ].color = "red";
       return data;
   };
   // Set chart initialization options
   // e.g. Set chart type to Line
   options.type = "line";
   return options;
```

6. Click Save.



### Tip:

For more information on supported chart options, see ojChart in JSDoc pages for the Oracle JavaScript Extension Toolkit (JET).

Note:

The Sample Charts sample app contains a number of examples of using custom JavaScript with chart. To learn more, see Sample Apps and Installing Apps from the Gallery.

## 10.4 Creating Maps

Create maps that visualize location data (real coordinates) based on data in a table.

About Supported Maps

The map component consists of a background map and spatial geometry objects sourced from data in a table or from a REST Data Source.

Sample Maps

View sample map pages.

- Creating a Map Using the Create Application Wizard
   Run the Create Application Wizard to create a new application that contains a map page.
- Adding a Map Region in Page Designer
   Manually create a map regioin in Page Designer by providing the SQL query.
- Adding a Map Using the Create Page Wizard
   Run the Create Page Wizard to create a new page with a map.
- Editing Maps
   Edit map region components in Page Designer.

## 10.4.1 About Supported Maps

The map component consists of a background map and spatial geometry objects sourced from data in a table or from a REST Data Source.

### **About the Background Map**

The background map is static and comes from Oracle Elocation Service. These background maps are ready to use and do not require any API keys. However, in order to display the background map, the end user's browser must have an internet connection and access to <a href="https://maps.oracle.com">https://maps.oracle.com</a>.

Some background maps are also available as Vector Tile Layers which include the layers <code>OpenStreetMap Position</code>, <code>OpenStreetMap Bright</code>, and <code>OpenStreetMap DarkMatter</code>. Vector maps provide superior resolution over raster maps for all map zoom levels. For new applications, Vector Tile Layer usage is enabled by default. For applications created before Oracle APEX release 22.2, you must enable Vector Tile Layers in Shared Components, Component Settings.



Configuring Vector Tile Layers for Maps



### **About Spatial Geometry Objects**

Spatial geometry objects are drawn on the background map based on data in a table. That table can be sourced from local table or a SQL query. Maps created using the Create Page Wizard or in Page Designer, support both local database tables, REST Enabled SQL, and from REST Data Sources. Maps support a rich set of built-in marker icons and shapes. Supported spatial geometry objects include:

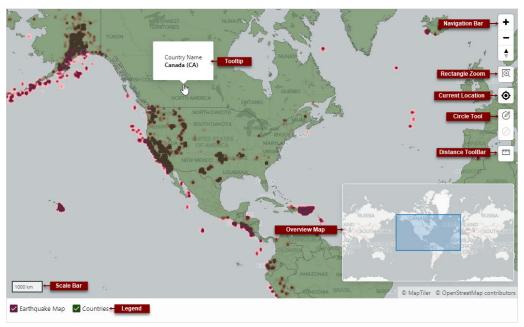
- Points Points (for example, customer or supplier locations) display as markers.
- Lines Lines represent features like roads or paths.
- Polygons Polygons represent areas like parcels, states or countries.
- Heat Map Heat Maps are used to visualize the point density. The more points
  that are clustered together, the more intense the color becomes. Use this option to
  visualize the spatial distribution of population or incidents.
- Extruded Polygons Display as three-dimensional, extruded, objects. The height of the 3D object visualizes a column value.

You can source spatial geometry objects from either:

- Geometry Column Supported datatypes include SDO\_GEOMETRY, VARCHAR2, or CLOB. VARCHAR2 and CLOB columns must contain geometry information in GeoJSON format.
- Two Numeric Columns These columns must contain longitude and latitude values. This option only applies to Point and Heat Map objects.

### **About Map Controls**

From a user's perspective, map regions include a number of controls that enable users to change the display at runtime.



The previous map include the following controls:

Navigation Bar - Options include Zoom, Zoom Out and Reset Bearing to North.



- Rectangle Zoom Zoom the map to an area by drawing a rectangle onto the map.
- Current Location Displays the user's current location from the browser.
- Circle Tool Enables end users to draw a circle onto the map. When finished, an event is triggered, so that the circle can be processed by Dynamic Actions or JavaScript code.
- Distance Tool Zooms the map to an area by drawing a rectangle onto the map.
- Tooltip Displays a scale bar on the map.
- Overview Map Displays a scale bar on the map.
- Scale Bar Displays a scale bar on the map.
- Legend Displays an overview map in the lower right.

Not all of these controls are enabled by default. You can add or remove controls by editing the map region Attributes in Page Designer.



Viewing and Editing a Map in Page Designer

## 10.4.2 Sample Maps

View sample map pages.

### Sample Map with One Layer

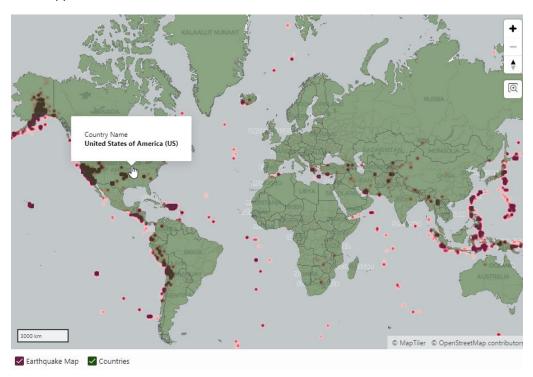
The following sample map is built on a local table called <code>COUNTRIES\_TABLE</code> and includes a Polygon object layer mapped to the <code>GEOMETRY</code> column and tooltips pulled from the <code>COUNTRY</code> NAME column.





### **Sample Map with Two Layers**

The following sample map is built on a local table called <code>EARTHQUAKE\_TABLE</code> and features two object layers. The first layer is a Heat Map based on the <code>SDO\_GEOMETRY</code> column . The second layer features Polygons based on the <code>COUNTRIES\_TABLE</code> column and mapped to the <code>GEOMETRY</code> column.







### Tip:

To view more samples, install the sample app, *Sample Maps*. See Installing Apps from the Gallery.



### See Also:

Viewing and Editing a Map in Page Designer

## 10.4.3 Creating a Map Using the Create Application Wizard

Run the Create Application Wizard to create a new application that contains a map page.



### Tip:

The Create Application Wizard only supports maps created a local database. To create maps based on an external data source, use the Create Page Wizard or add a map region in Page Designer. See Adding a Map Using the Create Page Wizard and Adding a Map Region in Page Designer.

To create a map using the Create Application Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Click the Create button.
- Click New Application.
- 4. Set Icon Click **Set Icon** to select an application icon. The icon you select is used as the Favicon, the PWA icon, the Apple touch icon, and the App Builder icon.
- **5.** Name Enter the name used to identify the application to developers.
- 6. Appearance Accept the default Theme Style and menu layout (Vita, Side Menu), or change it by clicking the **Set Appearance** icon adjacent to the Appearance field.
- Click Add Page and select Map.
- 8. On Create Map Page:
  - a. Page Name Enter a name for this page.
  - b. Set Icon Select an icon to display in the navigation menu for this page.
  - c. Table Select a table on which to build the map.
  - **d.** Select the spatial geometry layer type. Options include:
    - Points Points (for example, customer or supplier locations) are display as markers. The marker shape and color is configurable.
    - **Lines** Lines represent features such as roads or paths. The stroke style and color is configurable.



- Polygons Polygons represent areas like parcels, states, or countries.
   The style and color are configurable for stroke and fill.
- Heat Map Heat Maps are used to visualize the point density. The more
  points that are clustered together, the more intense the color becomes.
  Use this option to visualize the spatial distribution of population or
  incidents.
- **Extruded Polygons** Display as three-dimensional, extruded, objects. The height of the 3D object visualizes a column value.
- e. Geometry Column Type Select how spatial objects are sourced. Options include:
  - Geometry Column Supported datatypes include SDO\_GEOMETRY, VARCHAR2, or CLOB.

VARCHAR2 and CLOB columns must contain geometry information in GeoJSON format.

- **Two Numeric Columns** These columns must contain longitude and latitude values. This option only applies to Point and Heat Map layers.
- **f.** What appears next depends upon the spatial objects (or geometries) and Geometry Type you select. Select the appropriate columns.
- g. Advanced Expand Advanced to configure these options:
  - Set as Home Page Enable this to make this page the home page for the application.
  - Set as Administration Page Enable this to have this page display under Administration.
  - Page Help Enter text to be displayed when the user selects Page Help.
- h. Click Add Page.
- Features Select features to include with the application. Features provide application-level functionality and can only be added once per application. To learn more, click the Help icon adjacent to Features.
- **10.** Settings Specify settings used to generate this application. To learn more about an attribute, click the Help icon adjacent to **Settings**.
- 11. Click Create Application.

The Application home page appears.

**12.** Click **Run Application** to view the map.

## 10.4.4 Adding a Map Region in Page Designer

Manually create a map regioin in Page Designer by providing the SQL guery.

Adding a map in Page Designer supports spatial geometry objects (or layers) based on a local table, SQL query, REST Enabled SQL Service, or REST Data Sources.

- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.



Page Designer appears.

- 2. If necessary, click the Layout tab in the central pane.
- In the Gallery, click the Regions tab.
- 4. Right-click Maps, click Add To, and select the appropriate location.



### Tip:

You also select **Map** with the mouse and drag it to the appropriate location in the Layout tab.

- 5. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- **b.** Select an error to highlight the associated attribute in the Property Editor.
- **6.** Source Idenfity the source of the map:
  - a. Source, Location Select the location of the data: Options include:
    - Local Database Data is sourced from the local database.
    - REST Enabled SQL Service Data is sourced from a remote database, where
      the connection is defined using REST Enabled SQL. To create or maintain REST
      Enabled SQL references, navigate to Shared Components, REST Enabled
      SQL.
    - REST Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.
    - Region Source Data is sourced from the location specified in the region source definition.

What displays next depends upon the Source, Location you select. This task assumes the Source, Location is **Local Database**.

- **b.** Source, Type Select how the data is queried. Options include:
  - Table/View The data is retrievedbased on a table or view.
  - SOL Ouery The data is retrieved based on a SOL Ouery.
  - Function Body returning SQL Query The data is retrieved based on the SQL Query returned by executing a Function Body.

What displays next depends upon the Source, Type you select.

- 7. Column Mapping Identify how and where spatial objects are sourced:
  - Geometry Column Data Type Identify the data type of the geometry column.
     Options include:
    - SDO\_GEOMETRY Oracle SDO GEOMETRY type.

Local databases and REST Data Sources support the SDO\_GEOMETRY column type. However, REST Enabled SQL data sources do not support the SDO GEOMETRY column type.



- GeoJSON GeoJSON, as VARCHAR2 or CLOB types.
- Longitude/Latitude Longitude and Latitude, as two NUMBER columns.

What appears next depends upon the Geometry Column Data Type you select. Select the appropriate columns.

 Primary Key Column - Choose the column containing the unique key to identify a row. Use this to provide the primary key value to custom JavaScript code or map event handlers.

### 8. Layer attributes:

- a. In Rendering tab (left pane), select the New layer.
- b. Identification, Name Enter a descriptive name for this layer.
- c. Identification, Layer Type Select the spatial geometry layer type. Options include:
  - **Points** Points (for example, customer or supplier locations) are display as markers. The marker shape and color is configurable.
  - Lines Lines represent features such as roads or paths. The stroke style and color is configurable.
  - Polygons Polygons represent areas like parcels, states, or countries.
     The style and color are configurable for stroke and fill.
  - Heat Map Heat Maps are used to visualize the point density. The more
    points that are clustered together, the more intense the color becomes.
    Use this option to visualize the spatial distribution of population or
    incidents.
  - **Extruded Polygons** Display as three-dimensional, extruded, objects. The height of the 3D object visualizes a column value.
- 9. Click Save.
- 10. Click Save and Run Page to view the map

## 10.4.5 Adding a Map Using the Create Page Wizard

Run the Create Page Wizard to create a new page with a map.

The Create Page Wizard supports spatial geometry objects based on a local table, SQL guery, REST Enabled SQL Service, or REST Data Sources.

To create a map page by running the Create Page Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select Map.
- 5. Page Definition:
  - Page Number The page number is an integer value that identifies a page within an application.



b. Name - Specify a text name for this page.



### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 6. Data Source Select a Data Source for the page:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the
    connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.



### Tip:

The steps that follow differ depending upon the selected Data Source. This task assumes the Data Source is **Local Database**.

- 7. Source Type Specify the source of the new page. Options include:
  - Select a Source Type. Options include:
    - Table:
      - Table / View Owner Select the owner of the table on which you are building the page.
      - Table/View Name Select the table or view on which the page will be based.
    - SQL Query:
      - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- 8. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 9. Click Next.
- **10.** Map Style Select the type of spatial geometry layer. Options include:
  - **Points** Points (for example, customer or supplier locations) are display as markers. The marker shape and color is configurable.
  - Lines Lines represent features such as roads or paths. The stroke style and color is configurable.



- **Polygons** Polygons represent areas like parcels, states, or countries. The style and color are configurable for stroke and fill.
- **Heat Map** Heat Maps are used to visualize the point density. The more points that are clustered together, the more intense the color becomes. Use this option to visualize the spatial distribution of population or incidents.
- **Extruded Polygons** Display as three-dimensional, extruded, objects. The height of the 3D object visualizes a column value.

#### **11.** Map Attributes:

- Geometry Column Type Select how spatial objects are sourced. Options include:
  - Geometry Column Supported datatypes include SDO\_GEOMETRY, VARCHAR2, or CLOB.

Local databases and REST Data Sources support the  ${\tt SDO\_GEOMETRY}$  column type. However, REST Enabled SQL data sources do not support the  ${\tt SDO\_GEOMETRY}$  column type.

VARCHAR2 and CLOB columns must contain geometry information in GeoJSON format.

- Two Numeric Columns This option only displays for Point and Heat Map layers. These columns must contain longitude and latitude values.
- **b.** What appears next depends upon the spatial objects (or geometries) and Geometry Type you select. Select the appropriate columns.
- c. Create a Faceted Search Page Enable this option to create the map page as a Faceted Search page. The Faceted Search region will contain only a Search facet, other facets can be added later in Page Designer.

### 12. Click Create Page.



### Tip:

To learn more about external data sources, see Managing REST Enabled SQL References and Managing REST Data Sources.

## 10.4.6 Editing Maps

Edit map region components in Page Designer.

- Viewing and Editing a Map in Page Designer
   View and edit the components that comprise a map by viewing attributes in Page Designer.
- Adding a New Layer to an Existing Map
   Edit the map region defintion to add more spatial geometry objects.
- Controlling Layer Visibility
   Control layer visibility by editing attributes in Page Designer.
- Connecting a Map Region with a Report Region Connect a map region with a classic report region.



## 10.4.6.1 Viewing and Editing a Map in Page Designer

View and edit the components that comprise a map by viewing attributes in Page Designer.

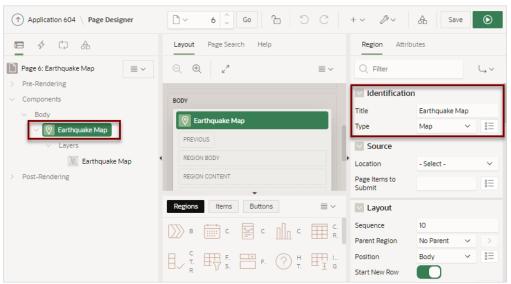
A map features a map region which contains spatial geometry layers. This topic explores an earthquake map built on a local table named <code>EARTHQUAKE\_TABLE</code> which features a Heat Map spatial geometry layer.

To view or edit a map in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears displaying Page attributes in the Property Editor (right pane).

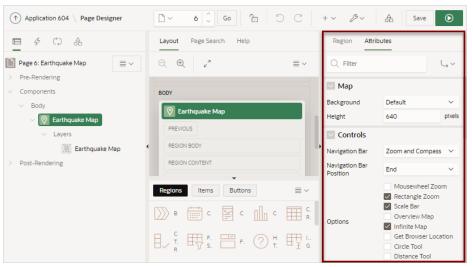
- 2. Review the map region.
  - a. In the Rendering tab select the Map region. The Property Editor (right pane) displays two tabs: **Region** and **Attributes**.



In the previous example, note that Identification, Title indicates the map is named **Earthquake Map** and the Type is **Map**.

b. In the Property Editor, click the **Attributes** tab.





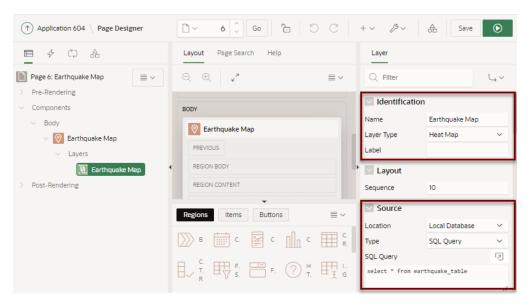
Map Attributes determine basic map characteristics. In the previous example, note the attributes under **Controls**. Controls determine the various ways users can change the map display at runtime, for example:

- Navigation Bar Options include None, Zoom Only and Zoom and Compass.
- Navigation Bar Position Start positions the navigation bar on the starting position (typically to the left side) of the map. End positions the navigation bar on the ending position (typically to the right side) of the map.
- Mousewheel Zoom Zoom in or out by using the mouse wheel.
- Rectangle Zoom Zoom the map to an area by drawing a rectangle onto the map.
- Scale Bar Display a scale bar on the map.
- Overview Map Display an overview map in the lower right.
- · Infinite Map Enables infinite map scrolling.
- Get Browser Displays the user's current location from their browser.
- Circle Tool Enables end users to draw a circle onto the map. When finished, an event is triggered, so that the circle can be processed by Dynamic Actions or JavaScript code.
- Distance Tool Enables end users to measure distances between points on the map.

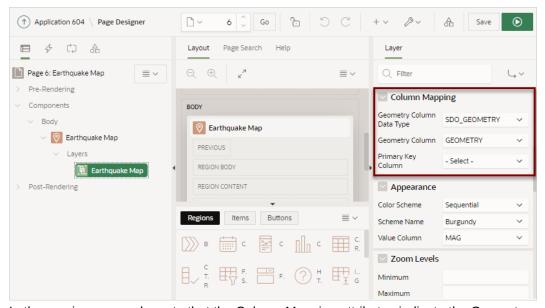
Note that in the previous example only some of these controls are enabled.

- 3. Review the map **Layers**. Maps have spatial geometry objects (or layers) which are drawn on the map based on data in a table.
  - In the Rendering tab, select the Layer, Earthquake Map.
     Note that the following example has a Heat Map layer which is sourced from a local database using a SQL Query.





4. Review the Column Mappings. In the Property Editor, scroll down to Column Mappings.



In the previous example, note that the Column Mapping attributes indicate the Geometry Column Data Type is **SDO\_GEOMETRY** and the Geometry Column is **GEOMETRY**.

## 10.4.6.2 Adding a New Layer to an Existing Map

Edit the map region defintion to add more spatial geometry objects.

Maps have spatial geometry objects which are drawn on the map based on data in a table. This topic demonstates how to add a polygon object layer to an existing map that identifies the county. This topic includes an example which adds an object layer named Countries sourced from a local table named COUNTRIES TABLE and mapped to the GEOMETRY column.

To add a new object layer to an existing map:

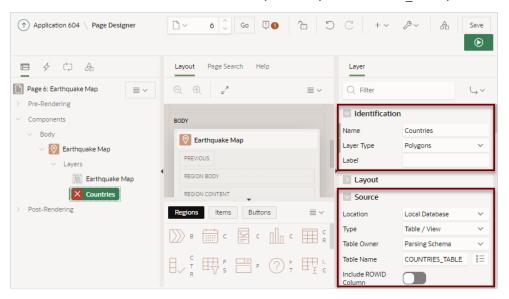
- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.



c. Select a page.

Page Designer appears displaying Page attributes in the Property Editor (right pane).

- Add a spatial geometry layer. In the Rendering tab, right-click Layers and select Create Layer.
- 3. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the Show Messages icon on the Page Designer toolbar.
     The Messages dialog displays errors that must be addressed.
  - **b.** Select an error to highlight the associated attribute in the Property Editor.
- 4. Edit the Identification attributes:
  - a. Identification, Name Enter a descriptive name (for example, Countries).
  - Identification, Layer Type Select spatial geometry type (for example, Polygons).
- 5. Edit the Source attributes.
  - Source, Location Determines the location of the date (for example, Local Database.
  - **b.** Source, Type Select how the data is queried (for example, **Table / View**.
  - c. Source, Table Name Select the table (for example, COUNTRIES TABLE).

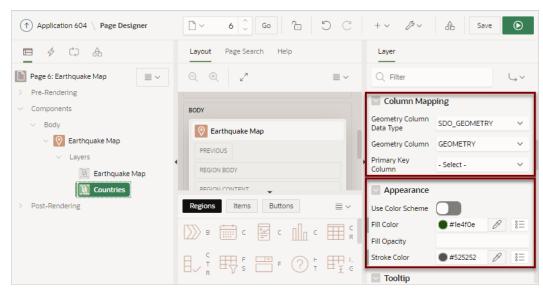


- 6. Edit the Column Mapping attributes:
  - a. Column Mapping, Geometry Column Data Type Select the data type of the geometry column (for example, **SDO\_GEOMETRY**).
  - **b.** Column Mapping, Geometry Column Select the data type of the geometry column (for example, **GEOMETRY**).
- 7. Edit the Appearance attributes:
  - Appearance, Use Color Scheme Specify whether to use a Color Scheme for this layer. A color scheme is a list of colors. Based on a value and the minimum and maximum values, the map widget will pick the actual display



color for this object from the list. In the example that follows, this option is disabled.

- **b.** Appearance, Fill Color Specify the fill color.
- c. Appearance, Fill Opacity Specify fill opacity. Ranges from zero (fully transparent) to 1.0 (opaque).
- d. Appearance, Stroke Color Specify the stroke color.



- 8. Configure the Tool Tip. The Tooltip displays when the user's mouse hovers over a polygon. The following example uses an HTML expression with column substitutions. However, you can also use the Template Directives, as with the Cards Region type.
  - Tooltip, Advanced Formatting Specify whether the tooltip displays using a column or advanced formatting using HTML expressions and supported substitution strings.
     This example enables Advanced Formatting.
  - b. Appearance, HTML Expression Enter HTML expressions to be shown as tooltip when hovering over an object on the map. Use &COLUMN. syntax to show column values in HTML. For example:

```
Country Name<br>
<b>&COUNTRY_NAME. (&ISO_A2.)</b>
```

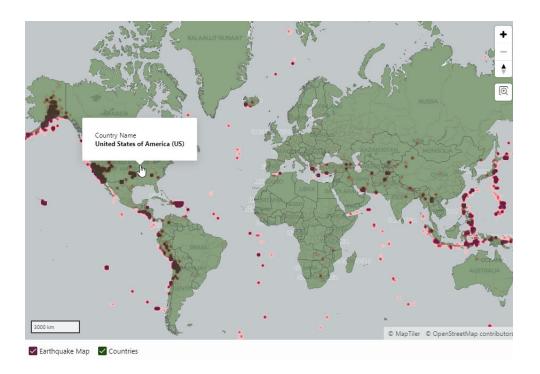


### Tip:

For more information on the supported Template Directives, see applyTemplate in *Oracle APEX JavaScript API Reference*.

- Legend, Enable to Hide Determines whether layer visibility can be toggled by clicking layer name in the legend. Prevent the legend from hiding the country polygons. Disable Enable to Hide.
- 10. Layout, Sequence Change the Sequence so that
- 11. Click Save.
- 12. Click Save and Run Page.

The map appears showing two layers: Earthquake Heat Map and Countries.



## 10.4.6.3 Controlling Layer Visibility

Control layer visibility by editing attributes in Page Designer.

This topic assumes you have a map that has two spatial geometry objects layers: Countries and Earthquake Map. The Countries layer is based on a local table named COUNTRIES\_TABLE. Earthquake Map is sourced from a local table named EARTHQUAKE TABLE and features a Heat Map spatial geometry layer.

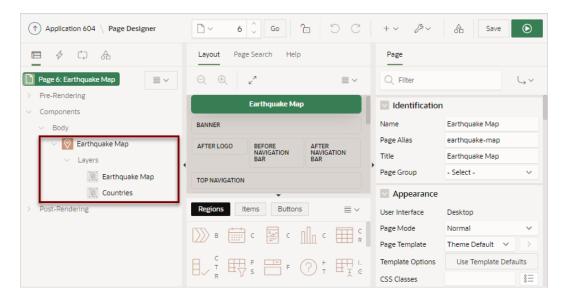
This task demonstrates how to attributes in Page Designer and control the visibility of the Earthquake Map object layer. In this topic you specify zoom levels and add a server-side condition that specifies that only earthquakes with a magnitude of greater than two display.

To control layer visibility:

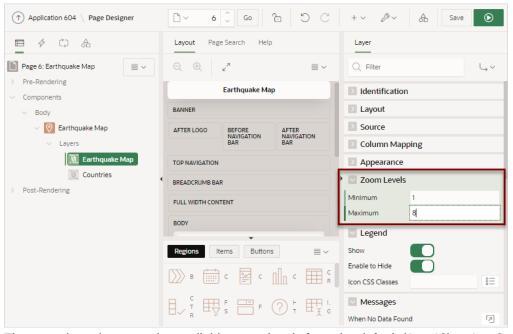
1. View the map page in Page Designer:

Page Designer appears. In the following example, the map has two spatial geometry objects layers: Countries and Earthquake Map.





- In the Rendering tab (left pane), under Layers, select Earthquake Map. Layer attributes display in the Property Editor.
- In the Property Editor, edit Zoom Levels attributes:Zoom Levels must have a Minimum value of 1 and a Maximum value of 18.
  - a. Zoom Levels, Minimum Specify the Minimum zoom level for this layer to become visible (for example, enter 1).
  - b. Zoom Levels, Maximum Specify the Maximum zoom level for this layer to become visible (for example, enter 8).

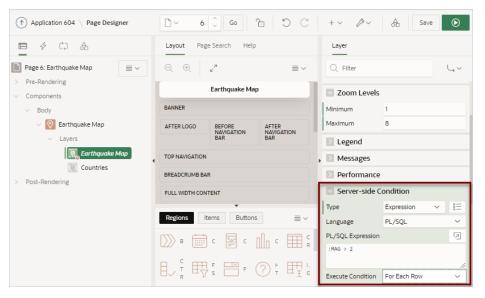


These settings decrease the available zoom levels from the default (1 to 18) to 1 to 8. When the user zooms outside of specified Zoom Levels, the layer disappears.

- 4. Create a server-side condition:
  - a. Server-side Condition, Type Select Expression.



- **b.** Server-side Condition, PL/SQL Expression Enter : MAG > 2
- c. Server-side Condition, Execute Condition Select For Each Row.



Click Save and Run Page to view the application runtime. and only eight zoom levels are available.

The map appears. Only eight zoom levels are available and only earthquakes with a magnitude greater than 2 display.

## 10.4.6.4 Connecting a Map Region with a Report Region

Connect a map region with a classic report region.

This topic explains how to connect a map region with a classic report so that whenever the map region changes (that is, moves or zooms in or out), the report region refreshes to reflect the change. In order to connect a map region with a report region, this example creates a page which includes the following:

- A map containing an object layer named Earthquake Map sourced from a local table named Earthquake Table.
- A classic report based on a SQL query also based on EARTHQUAKE TABLE.
- To sync the map with the report, a hidden page item used to maintain the current map status (also known as a **bounding box**). A bounding box (usually shortened to **bbox**) is an area defined by two longitudes and two latitudes.
- A dynamic action to refresh the report as the map display changes.



Because of a restrictions within Oracle Spatial, this example only works if the map shows less than half of the earth. Therefore, the report will not refresh for zoom levels 1 and 2 of the map. See Coordinate Systems (Spatial Reference Systems) in *Oracle Spatial Developer's Guide*.

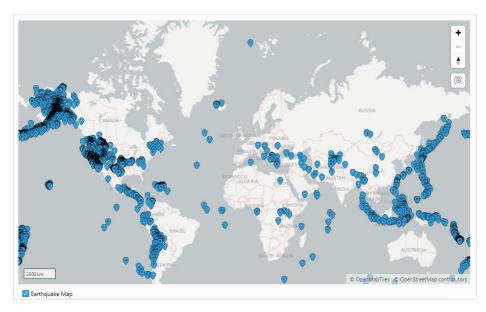
To connect map with a report region:

- 1. Run the Create Application Wizard and create an application.
- 2. Run the Create Page Wizard and create a new map page:
  - a. On the Application home page, click **Create Page**.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- b. Under Component, select Map.
- c. Page Definition:
  - Name Specify a text name for this page (for example, Earthquake Map).
  - Page Mode Accept the default Normal.
- d. Data Source:
  - Data Source Select a Data Source for the page (for example, Local Database).
  - Source Type Specify the source of the new page (for example, **Table**).
  - Table/View Name Select a table on which to build the map (for example, EARTHQUAKE\_TABLE).
- e. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
- f. Click Next.
- g. Map Style Select the spatial geometry layer type (for example, **Points**).
- h. Map Attributes:
  - Geometry Column Type Select how spatial objects are sourced. (for example, Geometry Column).
  - Geometry Column Pick the spatial geometry column (for example, **GEOMETRY**).
  - Tooltip Column Select the column to be used as tooltip (for example, MAG).
- i. Click Create Page.
- j. If you run the page, an earthquake map appears.





**k.** Return to Page Designer. Click **Page X** on the Runtime Developer toolbar, where *X* is the page number.

Page Designer appears.

- **3.** Add a classic report adjacent to the map:
  - a. In the Rendering tab, select **Earthquake Map** region.
  - In the Gallery, Regions tab at the bottom of the central pane, locate Classic Report.
  - c. Right-click Classic Report and select Add To, Body, Earthquake Map, and then Column After.

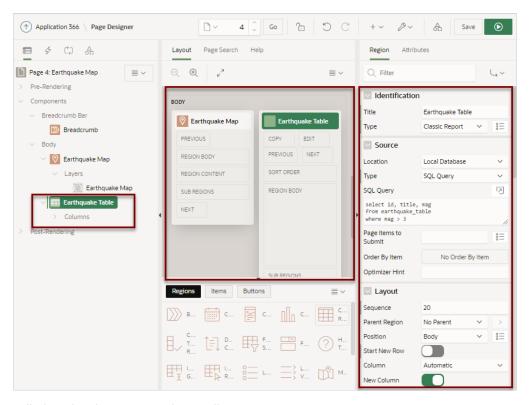
A New Classic Report region appears next to the Earthquake Map in the Layout tab.

- d. In the Property Editor, edit the following Region attributes:
  - Identification, Title Enter Earthquake Table
  - Source, Type Select SQL Query.
  - Source, SQL Query Enter:

```
select id, title, mag
from earthquake_table
where mag > 3
```

Layout, Sequence - Enter 20





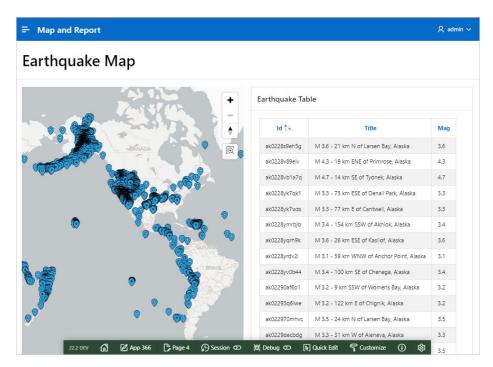
- e. Edit the Classic Report region Attributes:
  - Click the Attributes tab.
  - Messages, When No Data Found Enter:

No features on the map. If you're zoomed out to the whole earth, zoom in to see data.

#### f. Click Save and Run Page.

The new classic report displays to the right of the earthquake map.





- **g.** Return to Page Designer. Click **Page X** on the Runtime Developer toolbar, where *X* is the page number.
- Add a hidden page item to maintain the current map status (also known as a bounding box).
  - In the Rendering tab, right-click Earthquake Table and select Create Page Item Below.
  - b. Edit the following Page Item attributes in the Property Editor:
    - Identification, Name Enter PX BBOX, where *X* is the page number.
    - Identification, Type Select Hidden.
    - Settings, Value Protected Disable this option.
- 5. Update the Earthquake Map region:
  - a. In the Rendering tab, select the **Earthquake Map** region.
  - b. In the Property Editor, click Attributes.
  - Advanced, Bounding Box Item Select PX\_BBOX, where X is the page number.
  - d. Click Save.
- 6. Update the SQL query that defines the classic report to include the spatial filter:
  - a. In the Rendering tab, select the **Earthquake Table** region.
  - b. In the Property Editor, update the following:
    - Source, SQL Query Enter:

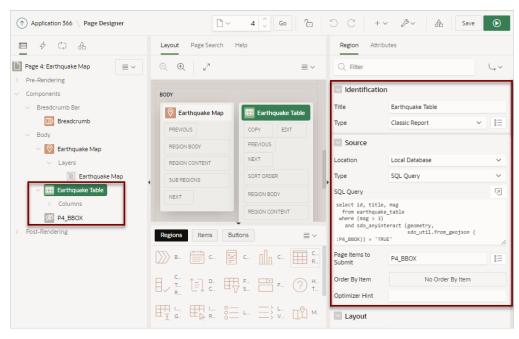
```
select id, title, mag
  from earthquake_table
where (mag > 3)
  and sdo anyinteract (geometry,
```



sdo util.from geojson ( :PX BBOX)) = 'TRUE'

Where X in **PX BBOX** is the page number.

Source, Page Items to Submit - Select PX\_BBOX, where X is the page number.

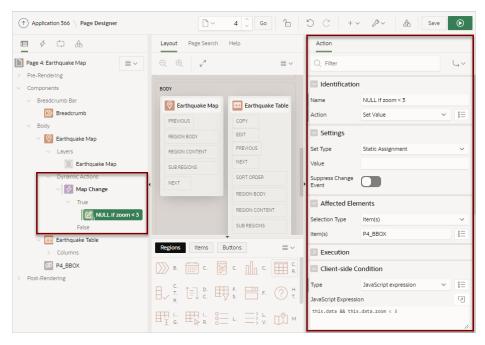


- 7. Add a dynamic action to refresh the report as the map display changes:
  - In the Rendering tab, right-click the map region, Earthquake Map and select Create Dynamic Action.
  - **b.** In the Property Editor, edit the following Dynamic Action attributes:
    - Identification, Name Enter a name for this dynamic action (for example, Map Change).
    - When, Event Select Map Changed [Map].
    - Client-side Condition, Type Select Item is not null.
    - Client-side Condition, Items Select PX\_BBOX, where X is the page number.

Next, add TRUE actions.

- **8.** Add a Set Value Action which resets the PX\_BBOX item (which is set by the map region) to NULL, if the current zoom level is below 3.
  - a. In the Rendering tab, select the existing True action, **Show**.
  - **b.** Edit the following attributes in the Property Editor:
    - Identification, Name Enter the name of the action (for example, NULL if zoom <</li>
       3).
    - Identification, Action Select Set Value.
    - Settings, Set Type Select Static Assignment.
    - Affected Elements, Item(s) Select PX\_BBOX, where X is the page number.
    - Client-side Condition, Type Select JavaScript expression.
    - Client-side Condition, JavaScript expression Enter:



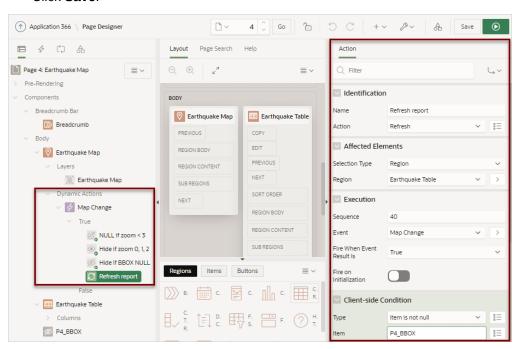


this.data && this.data.zoom < 3

- Add a Show Action to show the report region if PX\_BBOX is not NULL. This action
  in combination with the Set Value action will hide the report for zoom levels 0, 1
  and 2.
  - In the Rendering tab, select the Map Change dynamic action and select Create TRUE Action.
  - b. Edit the following attributes in the Property Editor:
    - Identification, Name Enter the name of the action (for example, Hide if zoom 0, 1, 2).
    - Identification, Action Select Show.
    - Affected Elements, Selection Type Select Region.
    - Affected Elements, Region Select Earthquake Table.
    - Client-side Condition, Type Select Item is not null.
    - Client-side Condition, Item Select PX\_BBOX, where X is the page number.
- 10. Add Hide Action to hide the classic report if PX BBOX is NULL.
  - In the Rendering tab, right-click the Map Change dynamic action and select Create TRUE Action.
  - b. Edit the following attributes in the Property Editor:
    - Identification, Name Enter the name of the action (for example, Hide if BBOX NULL).
    - · Identification, Action Select Hide.
    - Affected Elements, Selection Type Select Region.
    - Affected Elements, Region Select Earthquake Table.
    - Client-side Condition, Type Select Item is null.



- Client-side Condition, Item Select **PX\_BBOX** , where *X* is the page number.
- Click Save.
- **11.** Add Refresh Action to refresh the classic report if it is visible (that is, if P*X*\_BBOX is not NULL).
  - In the Rendering tab, right-click the Map Change dynamic action and select Create TRUE Action.
  - **b.** Edit the following attributes in the Property Editor:
    - Identification, Name Enter the name of the action (for example, Refresh report).
    - Identification, Action Select Refresh.
    - Affected Elements, Selection Type Select Region.
    - Affected Elements, Region Select Earthquake Table.
    - Client-side Condition, Type Select Item is not null.
    - Client-side Condition, Item Select **PX BBOX**, where *X* is the page number.
    - Click Save.



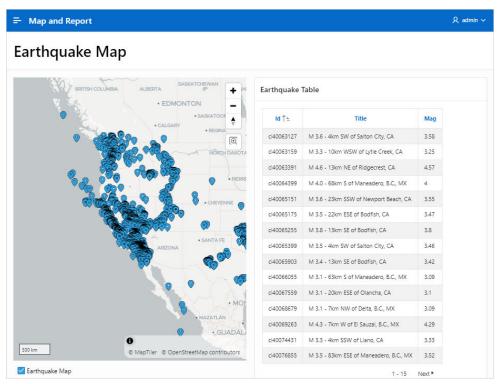
12. Click Save and Run Page.

Initially, the report does not appear.

13. In the navigation bar, click Zoom twice.

The Earthquake Table appears.





If you reposition the map, Earthquake Table updates as well.

## 10.5 Creating Help for Your Application

Help created in App Builder displays on a dedicated Help page. To access Help, users click a link that takes them to a dedicated Help page. This Help page displays page and field-level Help topics specific to the page they are viewing.

- Creating Help
  - Developers can create both a dedicated Help page and item Help text for an application.
- Using the Bulk Edit Item Help Report
   Edit all Help topics within an application at once using the Bulk Edit Item Help report
- Seeding Item Help Topics
   For applications that do not yet contain Help, you can perform a mass update (or seed) of default Help text.
- Creating a Help Navigation Bar Entry
   Once you have created your Help, the next step is to create a navigation bar entry so users can link to it.

## 10.5.1 Creating Help

Developers can create both a dedicated Help page and item Help text for an application.

 About Creating Help Learn about built-in attributes to create Help for your application.

- Creating a Help Page and Region
   Learn about creating a help page and region.
- Defining Page Help Learn defining page Help text.
- Defining Item Help
   Define item Help in Page Designer.

## 10.5.1.1 About Creating Help

Learn about built-in attributes to create Help for your application.

App Builder includes built-in attributes to create Help for your application. Creating Help for your application involves the following steps:

- Step 1: Create a dedicated Help page and Help region. See Creating a Help Page and Region.
- Step 2: Define page Help text. See Defining Page Help.
- Step 3: Define item Help text. See Defining Item Help.
- **Step 4:** Create a navigation bar icon to link to your Help page. See Creating a Help Navigation Bar Entry.

## 10.5.1.2 Creating a Help Page and Region

Learn about creating a help page and region.

To create a Help page and region in Page Designer:

- 1. Create a blank page for your Help.
- 2. View the new page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - Select a page.

Page Designer appears.

3. In the Gallery, right-click **Help Text** region, select **Add To**, and select the appropriate location.



### Tip:

You can also drag and drop from the Gallery. From the Gallery select the **Help Text** region and drag it to the appropriate location in the Layout tab.

- 4. In the Property Editor, edit the following attributes:
  - a. Identification, Title Enter a title for the region.
  - b. Layout, Sequence Enter the display sequence for this item. The sequence and other layout settings determine where this item is displayed in relation to other items within the region.



- c. Layout, Parent Region Select the parent region to which this region belongs. If a parent region is selected then this region is rendered completely inside the parent region.
- d. Layout, Position Specify the Sequence, Parent Region, and Position.
- e. Appearance, Template Select a region template to define the appearance and layout of this region. Region templates are defined in the application theme. When a region is created, the template is automatically set to the default region template defined in the current theme.
- Appearance, Render Components Select if the region components display above or below the main region content.



### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

5. Click Save.



### Tip:

For more information on supported chart options, see ojChart in JSDoc pages for the Oracle JavaScript Extension Toolkit (JET).



#### See Also:

Adding a New Page to an Application

## 10.5.1.3 Defining Page Help

Learn defining page Help text.

To define page Help text:

- 1. View the new page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, click the page name.
- **3.** To find a group or attribute:
  - Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.



- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 4. In Property Editor Page, find **Help** and enter text in **Help Text** attribute.
- 5. Click Save.

## 10.5.1.4 Defining Item Help

Define item Help in Page Designer.

To define item Help:

- 1. View the new page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In the Rendering tab, click item for which you want to define Help.
- 3. To find a group or attribute:
  - Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
  - Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 4. In the Property Editor, find**Help** and enter text in **Help** attribute.
- Click Save.
- 6. Repeat the previous steps for each item requiring Help text.

## 10.5.2 Using the Bulk Edit Item Help Report

Edit all Help topics within an application at once using the Bulk Edit Item Help report

Developers can use the Bulk Edit Item Help report to view the item Label and Name, access the item, or link to the page containing the item to the associate page

If you are including Help in your application, you can edit multiple Help topics at once using the Bulk Edit Item Help report.

To view the Bulk Edit Item Help report:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click the **Utilities** icon.
- 4. From Page Specific Utilities, select Item Utilities.
- 5. Click Grid Edit of All Item Help Text.
- 6. In Bulk Item Help Report, you can:
  - Update existing Help topics. Edit the Help text that appears and click Apply Changes.



- Link to the page containing the item by clicking the page number.
- Link to the Page Item by clicking the item name.



Seeding Item Help Topics

## 10.5.3 Seeding Item Help Topics

For applications that do not yet contain Help, you can perform a mass update (or seed) of default Help text.

To seed Help topics:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- Click the Utilities icon.
- 4. From Page Specific Utilities, select Item Utilities.
- 5. Click Grid Edit of All Item Help Text.
- 6. Click Seed Item Help Text.
- 7. To edit existing item Help:
  - a. In Item Help Text, enter the default text to appear in all Help topics.
  - b. Click Apply Changes.
- 8. To create help text for all items that currently do not have help text, click **Seed Item Help Text** and follow the on-screen instructions.
- Click Apply Changes.

## 10.5.4 Creating a Help Navigation Bar Entry

Once you have created your Help, the next step is to create a navigation bar entry so users can link to it.

To create a navigation bar entry:

- 1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click Classic Navigation Bar Entries.
- 2. Click Create.

The Create Navigation Bar Entry Wizard appears.

3. For Method, select **From Scratch** and click **Next**.



- 4. For Type, select Navigation to URL and click Next.
- **5.** For Attributes, specify the following:
  - a. Sequence Specify the order of evaluation for this component.
  - b. Entry Label Enter display text for this navigation bar entry.
  - c. Icon Image Name Enter an image name. For naming conventions, see field-level Help.
  - **d.** Image ALT Enter ALT text for navigation icons that are images. If you do not specify an image name, then this text displays.
  - e. Image Height Defines the height of the image.
  - f. Width Defines the width of the image.
  - g. Click Next.
- 6. For Target:
  - a. Target is a Select Page in this application.
  - b. Page Specify the page number of the help page you created in Creating Help .
  - c. Request Enter the following:

```
&APP PAGE ID.
```

By specifying substitution string  $\&APP\_PAGE\_ID$  as the Request, you are instructing the Oracle APEX engine to display Help text for the current page when the user clicks this icon.

- d. Click Next.
- 7. To set a condition for displaying the navigation bar entry, select a condition type.
- 8. Click Create.



11

# Using Themes and Theme Styles

Developers can alter an application's user interface and page layout through themes and theme styles.

### Using Themes

Use themes and theme styles to increase your productivity when building an application.

### Managing Themes and Subscriptions

Developers can manage themes directly or through the use of theme subscriptions.

### Creating Custom Themes

Create a custom theme by modifying existing templates.

### Using Custom Cascading Style Sheets

Control the style of a web page by uploading and referencing a cascading style sheet.

## 11.1 Using Themes

Use themes and theme styles to increase your productivity when building an application.

#### About Themes

Themes are collections of templates that enable developers to define the layout and style of an entire application.

### Understanding the Universal Theme

Universal Theme - 42 (Universal Theme) features a responsive design and enables developers to create web applications without extensive knowledge of HTML, CSS, or JavaScript.

#### Using Theme Styles

A theme style is a CSS that is added to the base CSS. Using the Theme Roller utility, developers can change the appearance of an application. Universal Theme - 42 includes theme styles.

### Using Theme Roller

Use Theme Roller to quickly transform the appearance of an application without editing any code.

#### Understanding Template Options

Template options provide developers with a declarative approach to applying different styles to components on an Oracle APEX page.



Managing Themes and Subscriptions

### 11.1.1 About Themes

Themes are collections of templates that enable developers to define the layout and style of an entire application.

Themes provide developers with a complete set of templates that accommodate every UI pattern that may be needed in an application. Templates are organized first by template type and then by template class. Template types include page, region, report, list, button, label, and popup list of values (LOV).

Each template type has a number of template classes. A template class defines the purpose of a template within a template type. For example, a region template can be classified as a form region template, a report region template, and so on. These classifications enable Oracle APEX to map templates among themes, making it easy to quickly change the entire look and feel of an application.

Administrators can add themes to the theme repository as follows:

- Workspace Themes Workspace administrators can create themes that are available to all developers within the workspace. See Managing Workspace Themes.
- Public Themes Instance administrators can create public themes by adding them to the Oracle APEX Administration Services. Once added, these public themes are available to all developers across all workspaces in an instance. See Managing Public Themes in Oracle APEX Administration Guide.

## 11.1.2 Understanding the Universal Theme

Universal Theme - 42 (Universal Theme) features a responsive design and enables developers to create web applications without extensive knowledge of HTML, CSS, or JavaScript.

- About the Universal Theme
  - The Universal Theme features a responsive design, versatile UI components, and can be easily customized.
- About Updating or Migrating to the Universal Theme
   Update or migrate existing apps to the newest Universal Theme to take advantage of new features and updates.
- Refreshing the Universal Theme
   Update an application to use the latest Universal Theme to take advantage of new features, enhancements, and bug fixes as well as styling for new APEX components.

### 11.1.2.1 About the Universal Theme

The Universal Theme features a responsive design, versatile UI components, and can be easily customized.

Applications you create with the Create Application Wizard use the Universal Theme. Advantages of the Universal Theme include:

 Responsive Design - Designed to work just as well on small screen devices (such as smartphones and tablets) as it does on larger screen devices (including laptops and desktops). The UI components in Universal Theme work across varying screen resolutions while maintaining the same or similar functionality. In addition, Universal Theme takes full advantage of ultra high screen resolutions by utilizing vector graphics where possible, and relying upon CSS3 features for UI styling.

• **Versatile User Interface** - Provides all the components and building blocks necessary to build practically any type of business application user interface.



#### Tip:

To browse all of the components provided with Universal Theme go to the Components page in the Universal Theme application.

- Easy Customization Effortlessly customize and fully control the look and feel of your
  applications without becoming an expert in UI design, HTML, CSS, or JavaScript. Using
  Theme Roller and Template Options, you can easily customize your application to fit your
  company's brand and customize the look and feel of various components using Template
  Options.
- Support for Theme Styles The Universal Theme includes support for theme styles. A
  theme style is a CSS style sheet that is added to the base CSS. Developers can change
  the appearance of an application by altering the theme style using the Theme Roller
  utility.

### **About Responsive Design**

The Universal Theme is an example of a responsive user interface theme.

Responsive design enables you to design web pages so that the layout fits the available space regardless of the device on which page displays (for example, a desktop computer, laptop computer, tablet, or smartphone).

By implementing a responsive design, the user gets the same full experience as they would on larger screens. On smartphones and tablets, the layout adjusts to the size of the specific device. During this resizing process, elements shift position, re-size, or become hidden. The goal of responsive design is to present all essential content in a user friendly way for all possible screen sizes. Keep in mind, that responsive design is not just a matter of picking the correct set of templates. As the application developer, you are responsible for using the templates and the available components to design a page that is truly responsive.

## See Also:

- The Design, Components, Icons, and Reference pages in the Universal Theme app
- Understanding Template Options
- Using Theme Styles

## 11.1.2.2 About Updating or Migrating to the Universal Theme

Update or migrate existing apps to the newest Universal Theme to take advantage of new features and updates.



Compared to themes in previous releases of Oracle APEX, the Universal Template features cleaner templates, improved grid support, and responsive behavior.

Universal Theme migration paths include:

Update Existing Apps to the Latest Universal Theme - If your app already uses
the Universal Theme, you can easily update it to take advantages of new features
and enhancements.

See Refreshing the Universal Theme.

Migrate Existing Mobile Apps to the Universal Theme - jQuery Mobile and the
jQuery Mobile User Interface used in previous releases have been desupported. If
you have an existing mobile application that uses the jQuery Mobile User
Interface, you must migrate your existing application to the Universal Theme.

See the Migrating from jQuery Mobile page.

• **Migrate from Other Themes** - You can migrate other themes by running Switch Theme Wizard.

See the "Migrating from Other Themes" section on the Migration Guides page.



Universal Theme application

## 11.1.2.3 Refreshing the Universal Theme

Update an application to use the latest Universal Theme to take advantage of new features, enhancements, and bug fixes as well as styling for new APEX components.



### Tip:

Before starting this procedure, Oracle recommends backing up your application by either exporting it or creating a copy. See Exporting an Application and Copying an Application.

To update an application to use the latest Universal Theme

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.

If the Universal Theme is not up-to-date, the Shared Components page displays a banner at the top of the page.

- 2. Click Refresh Theme.
- 3. Run and test your application.



See Also:

Updating Universal Theme page in the Universal Theme application

## 11.1.3 Using Theme Styles

A theme style is a CSS that is added to the base CSS. Using the Theme Roller utility, developers can change the appearance of an application. Universal Theme - 42 includes theme styles.

- About Theme Styles
  - A theme style is a CSS style sheet that is added to the base CSS to alter the look and feel of an application.
- Creating a Theme Style
   Create a theme style by selecting an existing style and selecting Add Style.
- Editing a Theme Style
   Edit a theme style from the Themes page.
- Selecting a Theme Style on the User Interface Page
   Select a theme style on the application User Interface page.
- Enabling Users to Select a Theme Style
  Enable users to select a theme style in a running application.

## 11.1.3.1 About Theme Styles

A theme style is a CSS style sheet that is added to the base CSS to alter the look and feel of an application.

Newer themes such as *Universal Theme - 42* can have a base CSS file plus the theme style CSS file. The theme style CSS file are referenced in the page template using the #THEME\_STYLE\_CSS# substitution string. The Oracle APEX engine replaces this substitution string with the CSS file references defined in the theme style attributes. Use theme styles to customize themes, to switch to a different color scheme, apply a flat look, or make a theme responsive. A theme can have multiple theme styles with one style set as active. You can modify a theme style CSS file using Theme Roller.

### Selecting a Theme Style

Once defined, developers can select a theme style by:

- Editing the Theme Styles attribute when running the Create Application Wizard. See Understanding Page Types, Features, and Settings.
- Accessing the Create/Edit Theme page. See Editing a Theme Style.
- Select a new theme style on the application User Interface page. See Selecting a Theme Style on the User Interface Page.

## 11.1.3.2 Creating a Theme Style

Create a theme style by selecting an existing style and selecting Add Style.

To create a theme style:



- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.
- 2. Select a theme and click the **Styles** tab.
- Click Add Style.

The Theme Styles page appears.

- 4. For Settings:
  - a. Name Provide a short descriptive name for the theme style.
  - **b.** Is Current Select whether this style is the current style used by the theme.
  - c. Is Public Select whether this style can be chosen by end users.
  - d. Accessibility Tested Specify if this Theme Style has been tested to the applicable accessibility guidelines. For Theme Styles created by Oracle, please see our product VPAT for the accessibility guidelines we follow...
  - e. File URLs Enter Cascading Style Sheet file URLs to be loaded on every page if the theme style is current. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL. File URLs you enter here will replace the #THEME\_STYLE\_CSS# substitution string in the page template. See field-level Help to view examples.
  - f. CSS Classes Enter CSS classes to be appended to the #PAGE\_CSS\_CLASSES# substitution string and applied to every page of the application if this Theme Style is currently active.
- 5. For Theme Roller Attributes:
  - a. Read Only Select **On** to prevent any updates to the theme style. Select **Off** to allow the theme style to be edited and overwritten using Theme Roller.
  - **b.** Input Parameter File URLs Enter the LESS file URLs that will be used to generate this theme style when using Theme Roller.
  - **c.** Output CSS File URL- Enter the URL for the CSS file that will be generated by Theme Roller for this theme style. .
  - **d.** Theme Roller JSON Configuration, JSON Configuration The JSON configuration is generated by Theme Roller when the theme style is saved.
    - Oracle does not recommend manually updating the configuration. However, you can copy a JSON configuration from another theme style, such as a theme style in another application, to manually update the configuration.
- **6.** For Comments Enter any comments or notes here. These comments will never be displayed when running the application.
- 7. Click Create.



## 11.1.3.3 Editing a Theme Style

Edit a theme style from the Themes page.

To edit a theme style:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.
- 2. Click the theme name.
- 3. Select a theme and click the **Styles** tab.
- 4. Select a theme style.
- To make changes to the current theme style, edit the appropriate attributes and click Apply Changes.

To learn more about an attribute, see field-level help.

6. To delete the current theme style, click **Delete**.

## 11.1.3.4 Selecting a Theme Style on the User Interface Page

Select a theme style on the application User Interface page.

To select a theme style from the User Interface page:

- 1. Navigate to the User Interface page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, click User Interface Attributes.

The User Interface page appears.

2. Attributes, Theme Style - Select a new theme style.

The Theme Styles page appears.

3. Click Apply Changes.

## 11.1.3.5 Enabling Users to Select a Theme Style

Enable users to select a theme style in a running application.

Once enabled, a Customize link appears in the running application, typically in the lower left corner. When the user clicks the Customize link a pop-up displays listing available theme styles. When a user selects a theme style, the theme style is stored persistently as a user preference and will be retained during future sessions.

To enable users to select a theme style:

Create an application which has at least two theme styles.



- 2. Go to the application User Interface page:
  - a. Click Shared Components.
  - b. Under User Interface, click User Interface Attributes.

The User Interface Attributes page appears..

- 3. Under Attributes, enable Enable End Users to choose Theme Style.
- 4. Click Apply Changes.

## 11.1.4 Using Theme Roller

Use Theme Roller to quickly transform the appearance of an application without editing any code.

- About Theme Roller
   Learn about the Theme Roller option available on the Customize menu on the Runtime Developer toolbar.
- Using the Theme Roller Dialog
   Access the Theme Roller dialog by clicking Theme Roller from the Customize menu on the Runtime Developer toolbar.
- About Developer Console Integration
   Use the exposed function apex.utr.config(); in your web browser developer's
   console to get and set the custom CSS code and LESS compilation configuration
- About the Redwood Light Theme Style
   The Redwood Light theme style features a number of unique class options in Theme Roller.

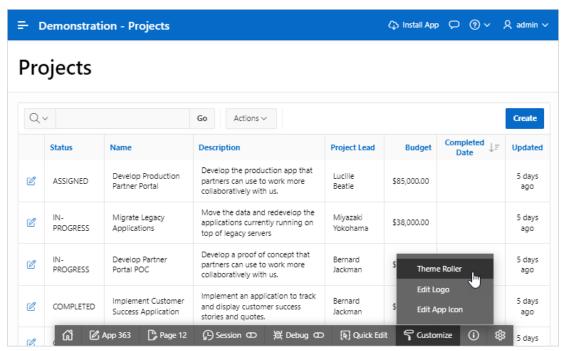
### 11.1.4.1 About Theme Roller

Learn about the Theme Roller option available on the Customize menu on the Runtime Developer toolbar.

**Theme Roller** is a live CSS editor that enables you to quickly change the theme style, colors, rounded corners and other application attributes.

When you run an application from App Builder and view a page, the Runtime Developer toolbar displays at the bottom of any editable running page. To access the Theme Roller dialog, click **Theme Roller** from the Customize menu.





In order for Theme Roller to appear on the Runtime Developer toolbar:

- Theme styles must be defined.
- At least one theme styles must have the Input Parameter File URLs attribute defined.



- Creating a Theme Style
- Editing a Theme Style
- Using the Theme Roller Dialog

## 11.1.4.2 Using the Theme Roller Dialog

Access the Theme Roller dialog by clicking Theme Roller from the Customize menu on the Runtime Developer toolbar.



Concurrent use of the Live Template Options, Theme Roller, and Logo Editor is not supported.

Theme Roller is a live CSS editor that enables developers to quickly change the colors, rounded corners and other attributes of their applications without touching a line of code. Out-of-the-box themes cannot be overwritten but can be saved as a new theme and modified accordingly.



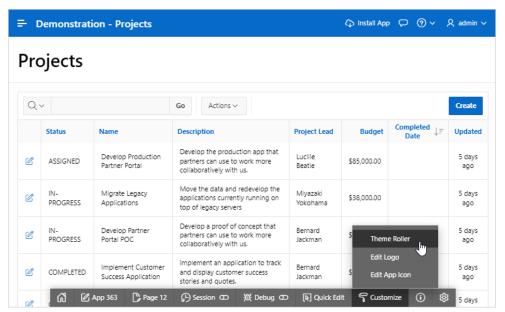


### Tip:

Theme Roller displays on the Runtime Developer toolbar if theme styles have been defined and at least one theme styles has the **Input Parameter File URLs** attribute defined.

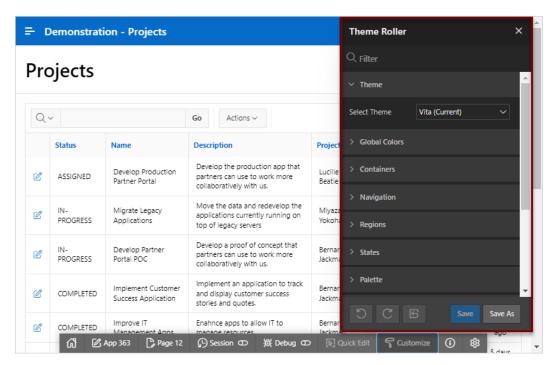
To use the Theme Roller dialog:

- Preview the page by running it.
   The Runtime Developer toolbar displays at the bottom of any editable running page.
- On the Runtime Developer Toolbar, click Customize and then select Theme Roller.



Theme Roller fetches the styles for your application and loads them in the editor. The Theme Roller dialog appears.





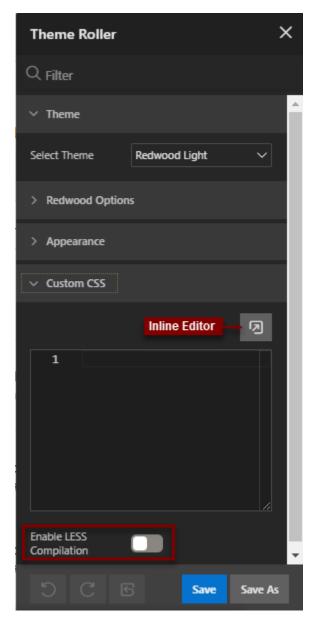
To search for an attribute, enter search terms in the Search field at the top of dialog. Only attributes that contain the search term appear.



To navigate the Theme Roller dialog using keyboard shortcuts, press Ctrl+Fn+M and then release. Then, press Tab to navigate.

- To select or modify a theme:
  - Theme, Select Theme Select a theme from the drop-down list. In the next illustration, the Theme is set to Redwood Light.
  - b. Expand or collapse sections by clicking on the section name.
  - Modify the attributes.
    - When you modify an attribute the following buttons become active at the bottom of the dialog: Undo, Redo, and Reset.
- Custom CSS Enter CSS or or LESS-compatible code in the Code Editor. If you are including LESS-compatible code, you must enable the Enable LESS Compilation switch.





- 6. Save the theme by clicking one of the following:
  - **Save** If the theme is editable, **Save** saves any style change and sets the theme as the application's current style.
  - Save As Click Save As to save the theme as a new style and sets it as the application's current style.

## 11.1.4.3 About Developer Console Integration

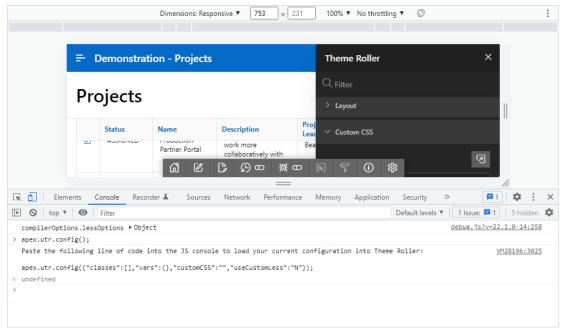
Use the exposed function apex.utr.config(); in your web browser developer's console to get and set the custom CSS code and LESS compilation configuration

Use the exposed function apex.utr.config(); in your web browser developer's console to get and set the custom CSS code and LESS compilation configuration.



To get styles, write apex.utr.config() without parameters into the console:

```
apex.utr.config();
Paste the following line of code into the JS console to load your current
configuration into Theme Roller:
   apex.utr.config({"classes":[],"vars":
{},"customCSS":"","useCustomLess":"Y"});
```



To set styles, add less or css code in the customCSS object of the JSON configuration into the console:

```
apex.utr.config({"classes":[],"vars":{},"customCSS":"h1 { color: #111; font-
family: 'Helvetica Neue', sans-serif; ... }", "useCustomLess":"Y"});
```

The custom CSS will be added to the theme roller Code Editor and applied to the page automatically.

## 11.1.4.4 About the Redwood Light Theme Style

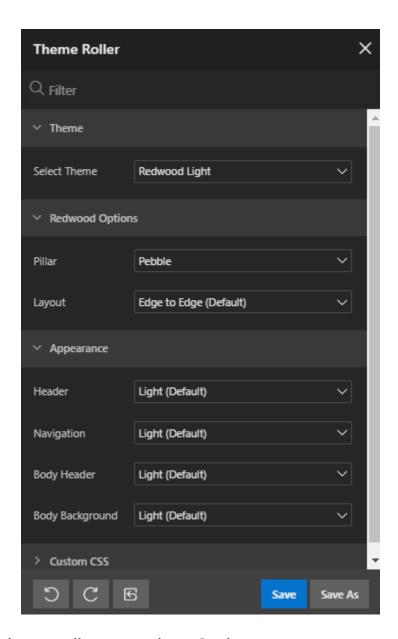
The Redwood Light theme style features a number of unique class options in Theme Roller.

As shown in the following image, selecting the Redwood Light theme style includes a number of unique class options:

- Pillar The Pillar class enables users to change the background and header images.
- Layout The Layout class enables users to switch the following layout options: Edge to Edge, Floating, or Contained.
- Appearance Attributes under Appearance include Header, Navigation, Body Header, and Background.

The following image shows Theme Roller with the Redwood Light theme style selected.





# 11.1.5 Understanding Template Options

Template options provide developers with a declarative approach to applying different styles to components on an Oracle APEX page.

- About Template Options
  - Use template options to declaratively apply CSS modifiers to the templates they have chosen for pages, regions, reports, lists, breadcrumbs, items and buttons.
- About Default Template Options
   Developers can select default template options that are not part of a template option group.
- About Template Option Groups and Presets
   Developers can define the purpose of related template options by creating template option groups.



See Also:

Using Template Options and Using Quick Edit to Modify Live Template Options

## 11.1.5.1 About Template Options

Use template options to declaratively apply CSS modifiers to the templates they have chosen for pages, regions, reports, lists, breadcrumbs, items and buttons.

A **CSS modifier** is a reference to a CSS class defined in a CSS style sheet. CSS modifiers enable a developer to use the same HTML markup but present it in a variety of different styles simply by applying a CSS. Template options reduce the need to have a large number of nearly identical templates defined in a theme in order to achieve different styles for button colors, region widths, font settings, item label markup, and so on.

Examples of how developers can use template options include:

- · Applying different colors or accents
- Applying different spacing and padding
- Rendering buttons in different styles, with and without icons
- Displaying form fields with different alignments.

Without template options, applying these variations would require a large number of nearly identical templates, or in-depth knowledge of CSS. Components that support template options include: pages; regions; classic reports; breadcrumbs; lists; items and labels; and buttons.

## 11.1.5.2 About Default Template Options

Developers can select default template options that are not part of a template option group.

App Builder automatically applies default template options by rendering the component that references the template. Default template options are not written to an actual component. Instead, a #DEFAULT# substitution string is defined for the component, thus enabling developers to centrally modify the template option defaults.

Developers can choose not to use the template option defaults, which removes the #DEFAULT# substitution string from the component. If template option defaults are disabled, then developers can selectively apply available template options to a component. All template options that are selected directly when editing the component are written to the component's metadata, represented by their corresponding CSS classes string. At runtime, the selected template options and default template option are part of the default are combined with the component's CSS classes string and applied to the component.

## 11.1.5.3 About Template Option Groups and Presets

Developers can define the purpose of related template options by creating template option groups.

Examples of template option groups include Button Size, Button Style, List Examples, List Style, and Form Label Position. When developers create a template option group, they can specify a template option preset at the template-level. For example, suppose you have a button template that has the template options *Large* and *Small*. If you define *Small* as the



preset, then any new button referencing the template would automatically have the template option *Small* applied to it when is it created. Template options that are part of a group are optional unless a present is defined at the template-level.

## 11.2 Managing Themes and Subscriptions

Developers can manage themes directly or through the use of theme subscriptions.

Managing Theme Subscriptions
 Developers can manage themes using of theme subscriptions.

### Accessing New Themes

Only themes currently associated with an application display on the Themes page. To access other themes, you run the Create Theme Wizard.

#### Editing Themes

Review or edit a theme by updating theme attributes.

### Switching Themes

Migrate an application to a new theme by running the Switch Theme Wizard.

#### Changing a Theme Identification Number

Use the Change Theme ID utility to change a theme ID to another identification number.

### Copying a Theme

Copying a theme is useful when experimenting with editing a theme or to export a theme with a different ID.

#### Deleting a Theme

Delete inactive themes.

#### Creating a Master Theme Application

Create a master theme application.

#### Managing Workspace Themes

Workspace administrators manage the Theme repository for a workspace.

### Managing Instance Themes

Instance administrators manage the Theme repository for an entire Oracle APEX instance. Only an Instance administrators can add or delete a theme from the repository.

#### About Exporting and Importing Themes

Export a theme in the same way you export any related application files.

#### Viewing Theme Reports

Access the following reports to better manage themes and templates.

## 11.2.1 Managing Theme Subscriptions

Developers can manage themes using of theme subscriptions.

#### About Theme Subscriptions

Subscribing to a master theme enables the theme to be upgraded during future Oracle APEX releases.

#### About Modifying a Theme Subscription

Modify a template without breaking the subscription to the master theme by creating a local copy of the template in your workspace.



### Verifying if a Theme Refresh Is Needed

Use the Verify Theme Subscription Wizard to review all theme attributes, templates, and template options in the subscribing theme and view errors for those that are not in sync with the master theme.

Refreshing a Subscribed Theme

Refresh a subscribed theme on the Create/Edit Theme page.

Unsubscribing to a Theme

Unsubscribe from a theme to remove the subscription from all templates, styles, files and so on that are part of the theme.

Re-subscribing to a Built-in Theme
 If a theme is currently unsubscribed, you can return to a subscribed version of this theme.

## 11.2.1.1 About Theme Subscriptions

Subscribing to a master theme enables the theme to be upgraded during future Oracle APEX releases.

Developers subscribe to a theme when:

### Running the Create Application Wizard.

When a developer runs the Create Application Wizard and selects a built-in theme, the theme is automatically subscribed to a master theme. As an alternative to using a built-in theme, the Create Application Wizard provides the option to copy a theme from an existing application. When copying a theme from an existing applications, developers can choose if they wish to have this theme be subscribed to. See Understanding Page Types, Features, and Settings.

#### Creating a new theme from the Theme repository.

When you create a new theme the associated application automatically subscribes to it. See Accessing New Themes.

Once an application subscribes to a master theme only the default templates can be changed. All theme attributes, subscribed template options, and subscribed templates are set to read-only. In other words, only the default templates can be changed. The advantage of subscribing to a master theme is that the theme can be upgraded during future APEX releases. When a theme is subscribed to, developers cannot modify the theme or template metadata when they access it from the theme or template edit pages.

## 11.2.1.2 About Modifying a Theme Subscription

Modify a template without breaking the subscription to the master theme by creating a local copy of the template in your workspace.

Local template copies are not subscribed to and are therefore editable. You can take the same approach with theme styles. You can create a local copy of a theme style and then add it to a subscribed theme. Theme styles created locally are editable but will be excluded from theme refreshes.



Copying a Theme



### 11.2.1.3 Verifying if a Theme Refresh Is Needed

Use the Verify Theme Subscription Wizard to review all theme attributes, templates, and template options in the subscribing theme and view errors for those that are not in sync with the master theme.

This wizard also highlights any templates that are defined in the master theme but not yet published to the subscribing theme.

To run the Verify Theme Subscription Wizard:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

2. Select the theme.

The Create/Edit Theme page appears.

- 3. Locate Theme Subscription and click Verify.
- 4. Follow the on-screen instructions.

To publish changes from the master theme to the subscribing theme, click **Refresh** at the end of the wizard.

## 11.2.1.4 Refreshing a Subscribed Theme

Refresh a subscribed theme on the Create/Edit Theme page.

To refresh a subscribed theme:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

2. Select the theme.

The Create/Edit Theme page appears.

3. Locate Theme Subscription and click **Refresh Theme**.





### Tip:

If the theme is not subscribed, the Refresh Theme button does not appear. See Re-subscribing to a Built-in Theme.

4. Click Apply Changes.

## 11.2.1.5 Unsubscribing to a Theme

Unsubscribe from a theme to remove the subscription from all templates, styles, files and so on that are part of the theme.



#### Note:

Unsubscribing from a theme prevents future theme updates. Be aware that resubscribing to a theme is multiple step process that involves copying and switching themes. To learn more, see Re-subscribing to a Built-in Theme.

To unsubscribe from a theme:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

2. Select the theme.

The Create/Edit Theme page appears.

- 3. Under Theme Subscription, click **Unsubscribe**.
  - A warning dialog displays.
- Click Unsubscribe Theme.

### 11.2.1.6 Re-subscribing to a Built-in Theme

If a theme is currently unsubscribed, you can return to a subscribed version of this theme.

Re-subscribing to a theme is a multiple step process. First, you change the theme identification number. Second, you run the Create Theme Wizard and create the theme again. Third, you switch the current application to the use the new theme. Fourth, you delete the original theme.

To re-subscribe to a theme.

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.



- b. Select an application.
- c. Click Shared Components.
- d. Under User Interface, select **Themes**.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

- 2. From the Tasks list, select **Change Identification Number** and change the theme to a new identification number. See Changing a Theme Identification Number.
- 3. Run the Create Theme Wizard and create the theme again. See Accessing New Themes.
- 4. Switch the current application to the use the new theme. See Switching Themes.
- 5. Delete the original theme from which you created a new identification number. See Deleting a Theme.

## 11.2.2 Accessing New Themes

Only themes currently associated with an application display on the Themes page. To access other themes, you run the Create Theme Wizard.

Once you create a theme, you can access it on the Themes page. You can create a theme from scratch or select an existing theme from the repository.



#### Tip:

When you create a new theme, the associated application automatically subscribes to it. See Managing Themes and Subscriptions.

To access a new theme by running the Create Theme Wizard:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

- 2. Click Create.
- 3. Select a creation method. Options include:
  - From the Repository View and select a theme from the repository.
  - As a copy from another application Select the application and then the theme.
  - From Scratch Create a theme from scratch.
  - From Export Create a theme to import from the export repository.
- 4. Follow the on-screen instructions.



To learn more about an attribute, see field-level Help.



**Editing Themes** 

## 11.2.3 Editing Themes

Review or edit a theme by updating theme attributes.

• Editing a Theme

Review or edit a theme by selecting the theme name on Themes page in Shared Components.

Theme Attributes
 Learn about Theme attributes available on the Create/Edit Theme Attributes page.



**Creating Custom Themes** 

## 11.2.3.1 Editing a Theme

Review or edit a theme by selecting the theme name on Themes page in Shared Components.

To review or edit a theme:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Shared Components.
- 4. Under User Interface, select **Themes**.

The Themes page appears.

5. On the Themes page, click the **View Report** icon.

The Themes page appears as a report. A check mark in the Is Current column indicates which theme is selected.

6. Click the theme name.

The Create/Edit Theme page appears and is divided into sections.

- 7. Edit the appropriate Theme attributes as described in Theme Attributes.
- 8. To save any changes, click Apply Changes.



### 11.2.3.2 Theme Attributes

Learn about Theme attributes available on the Create/Edit Theme Attributes page.

To learn more about an attribute and view examples, see field-level Help.

- Name
- Theme Subscription
- JavaScript and Cascading Style Sheets
- Component Defaults
- Region Defaults
- Dialog Defaults
- Global Templates Options
- Icons
- Image
- Styles
- Files

### 11.2.3.2.1 Name

Table 11-1 describes the attributes under Name.

Table 11-1 Name

Attribute	Description
Application	Identifies the current application ID.
	See Also: Editing the Application Definition
Theme Number	Identifies the number of a theme. A theme is a collection of templates which define the user interface of an application.
Name	Enter a short descriptive name for the theme.
Navigation Type	Identifies the selected Navigation Type. Valid options include: Tabs or List.
	See Also: Managing Tabs and Creating Lists
Navigation Bar Implementation	Identifies the selected Navigation Bar Implementation. Valid options include: Classic or List.
	See Also: Navigation Bar
Description	Enter a description for the theme.

### 11.2.3.2.2 Theme Subscription

Displays themes to which this application subscribes. When an application subscribes to a theme, all theme attributes, subscribed template options, and subscribed templates are set to read-only.





**Managing Theme Subscriptions** 

## 11.2.3.2.3 JavaScript and Cascading Style Sheets

Table 11-2 describes the attributes under JavaScript and Cascading Style Sheets.

Table 11-2 JavaScript and Cascading Style Sheets

Attribute	Description
JavaScript File URLs	Enter JavaScript file URLs for code to be loaded on every page. Each URL has to be written into a new line. If you provide a minified version of your file, you can use the substitution string #MIN# to include .min or #MIN_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode.JavaScript file URLs you enter here replaces the #THEME_JAVASCRIPT# substitution string in the page template
	To view examples, see field-level Help.
CSS File URLs	Enter Cascading Style Sheet file URLs to be loaded on every page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP_VERSION# if you want to include the application's version in the file URL.File URLs you enter here will replace the #THEME_CSS# substitution string in the page template.
	To view examples, see field-level Help.

## 11.2.3.2.4 Component Defaults

Table 11-3 describes the default templates by component type.

**Table 11-3 Component Default Templates** 

Attribute	Description
Page	Identifies the default template for displaying pages. If a developer does not explicitly choose a template, then the Oracle APEX engine uses the template specified here.
Navigation Bar List	Specifies the default navigation bar list template used when you define the navigation bar type as List in your application. If a developer does not explicitly choose a template, then the APEX engine uses the template specified here.
Navigation Menu List Position	Specifies the default navigation menu list position.
Navigation Menu List (Top)	Specifies the default navigation menu list template used when you create a new list to be displayed on the top of the page.
Navigation Menu List (Side)	Specifies the default navigation menu list template used when you create a new list to be displayed on the side of the page.



Table 11-3 (Cont.) Component Default Templates

Attribute	Description
Login Page	Specifies the default template for displaying pages. If a developer does not explicitly choose a template then the APEX engine uses the template specified here.
Error Page	Optional. Specifies a page template to use for errors that display on a separate page as opposed to those that display inline. Leave this attribute blank if you do not wish to use a template designed to display errors. This setting only applies to Normal pages.
Printer Friendly Page	Identifies the template to be used when the APEX engine is in printer friendly mode.
	When calling the APEX engine to render a page, you have the option to identify a printer friendly attribute with values of <b>Yes</b> or <b>No</b> . If you select <b>Yes</b> , then the page displays using a printer friendly template. The APEX engine displays all text within HTML form fields as text. The printer friendly template does not need to have the #FORM_OPEN# or #FORM_CLOSE# tags. The objective is to be able to display information with few tables and in a format suitable for printing.
Breadcrumb	Identifies the default breadcrumb template used when you create a breadcrumb.
Button	Identifies the default button template used when you create a button.
Legacy Calendar	Specifies the default calendar template used when you create a calendar.
Default Label	Specifies the default label template used when you create new label
Optional Label	Specifies the default optional label template used when you create new label.
Page Template Options	Template options allow for selecting a number of CSS customization settings to be applied to the current page template. Template options and their corresponding CSS classes are defined at the page template level. The page template needs to have the substitution string <code>#PAGE_CSS_CLASSES#</code> defined in either the page header or body. The string <code>#PAGE_CSS_CLASSES#</code> is substituted for any manually entered page CSS classes, which are combined with the CSS classes defined by the selected template options.
Required Label	Specifies the default required label template used when you create new label.
List	Specifies the default list template used when you create a list.
Region	Specifies the default region template used when you create a region.
Classic Report	Identifies the default region template used when you create a report.
Header Toolbar	Identifies the default header toolbar region template used when you create a new page that includes a header or footer tool bars.
Footer Toolbar	Identifies the default header toolbar region template used when you create a new page that includes a header or footer tool bars.

## 11.2.3.2.5 Region Defaults

Table 11-4 describes the default templates available under Region Defaults.



Table 11-4 Region Defaults

Attribute	Description
Breadcrumb	Identifies the default breadcrumb template used when you create a breadcrumb.
Charts	Specifies the default chart template used when you create a chart.
Forms	Specifies the default form template used when you create a form.
Lists	Specifies the default region template used when you create a list.
Reports	Specifies the default region template used when you create a report.
Tabular Forms	Specifies the default region template used when you create a tabular form.
Wizards	Specifies the default region template used when you create a new wizard component.
Interactive Reports	Specifies the default region template used when you create an interactive report

## 11.2.3.2.6 Dialog Defaults

Table 11-5 describes the default templates available under Dialog Defaults.

**Table 11-5** Dialog Defaults

Attribute	Description
Dialog Content Region	Specifies the default region template used when you create a content region on a Dialog using the Create Page Wizard and Create Application Wizard.
Dialog Button Region	Specifies the default region template used when you create a button region on a Dialog using the Create Page Wizard and Create Application Wizard.
Dialog Page	Specifies the default template for displaying modal or non-modal dialog pages. If a developer does not explicitly choose a template then the APEX engine uses the template specified here. This template will also be used for errors that display on a separate page as opposed to those that display inline.

### 11.2.3.2.7 Global Templates Options

Global template options are defined at the theme-level and are available for all components of a given type.



Understanding Template Options and Managing Global Template Options

### 11.2.3.2.8 Icons

Table 11-6 describes attributes under Icons.

Table 11-6 Icons

Attribute	Description
Library	Select the icon library that is loaded when APEX displays a page. The icons within the library are also be listed in the picker for Region and Button Icon CSS Classes, implemented within Page Designer.
Custom Library File URLs	Enter Cascading Style Sheet file URLs for custom icons to be loaded on every page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP_VERSION# if you want to include the application's version in the file URL.File URLs you enter here will replace the #THEME_CSS# substitution string in the page template.
	To view examples, see field-level Help.
Custom Classes	Specify a comma delimited list of CSS class names which is listed in the picker for Region and Button Icon CSS Classes, implemented within Page Designer.
Custom Prefix Class	Specify a CSS class that will at runtime prefix the Icon CSS Classes defined for Regions, Buttons and Lists, if they are not using a class of the Icon Library.
Date Picker Icon Name	Enter the name and location of the image to be used when items of type Date Picker are displayed. For example:
	#APP_FILES#new_cal.bmp
Date Picker Icon Attributes	Enter the image attributes for the Calendar Icon. For example: width="16" height="16" alt="Display Calendar"

## 11.2.3.2.9 Image

Use the **Custom Image** attribute to specify whether this theme uses a default theme image or an uploaded theme image. Select **On** or **Off**.

## 11.2.3.2.10 Styles

Displays theme styles available to the current theme. Theme Styles define the CSS for your application's theme and control the user interface of your application. Theme styles are referenced in the page template using the <code>#THEME\_STYLE\_CSS#</code> substitution string. The Theme Style currently used displays a check mark under **Is Current**.



**Using Theme Styles** 

### 11.2.3.2.11 Files

The **File Prefix** attribute displays the virtual path the Web server uses to point to the files of the theme. Do not specify anything to reference files which are stored with your theme definition in the database. For performance reasons you can also store your theme files on your Web Server. Use #APEX FILES#or any valid URL to reference them.

Do not specify anything to reference files which are stored with your theme definition in the database. If you specify File Prefix and still wish to reference files stored with your theme in the database, use #THEME DB FILES# rather than #THEME FILES# in your templates.

#### Examples:

- /myFiles/
- https://example.com/myFiles/
- #APEX FILES#myFiles/

To upload a file:

Click Create File. On Create File:

- 1. Click Create File.
- 2. On Create File:
  - a. Directory Directory Enter the name of the directory where the file should be stored. For example, css or css/images. If no directory is specified, the file is stored in the root directory.
  - b. File Name If creating a blank file (for example, script.js), enter the name of the file.
  - c. Content If uploading a file, do one of the following:
    - Drag and drop the file to the Content region.
    - Click the Content region and select the file.
  - d. Click Create or Create and Create Another.



Managing Static Application Files and Managing Static Workspace Files

## 11.2.4 Switching Themes

Migrate an application to a new theme by running the Switch Theme Wizard.

- About Switching the Active Theme
   Switching to another theme, assigns all components with assigned templates to
   corresponding templates in the new theme.
- Switching an Active Theme
   Run the Switch Theme Wizard to migrate an application to a new theme.



### 11.2.4.1 About Switching the Active Theme

Switching to another theme, assigns all components with assigned templates to corresponding templates in the new theme.

App Builder accomplishes template mapping through the assignment of template class identifiers.

When switching an active theme, remember:

- You can only switch to a theme if the theme exists. For example, before you can switch to a theme available in the repository, you must first create it. See Accessing New Themes.
- If the wizard locates multiple matches (that is, when several templates share the same template type and templates class), the wizard defaults to a template matching type, class, and name. If no match is found, you must select another template with the same type and class.
- If no matching template is found (that is, no template with the same type and class exists) then you are prompted to select a template with the same type but with a different class. Then, a warning displays explaining this issue might lead to problems with page functionality, or issues with the page display. When no template of the same template type exists, then the theme cannot be switched. You are blocked from switching themes.

### 11.2.4.2 Switching an Active Theme

Run the Switch Theme Wizard to migrate an application to a new theme.

To complete this procedure, you must have at least two themes installed. If you do not have at least two themes installed, on the Themes page click **Create Theme**. You can create a theme from scratch or simply select an existing theme from the repository. See Accessing New Themes.



### Tip:

Before starting this procedure, Oracle recommends creating back up your application by either exporting the application or creating a copy.

To switch an active theme:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

Click Switch Theme.

The Switch Theme page appears.



- **3.** For Identify Theme:
  - a. Currently Active Theme Select the current theme for the application. A theme identifies a collection of templates which define the look and feel of the application.
  - **b.** Switch to Theme Select the new theme for the application.
  - c. Click Next.

The Verify Compatibility page appears.

- 4. Review the Status column to identify problematic mappings:
  - A check indicates the mapping was successful.
  - A warning indicates there are more than one template in the theme you are switching to with the identified class. The warning provides a select list from which to choose the appropriate template.
  - An **error** indicates that App Builder was unable to map the class among the themes. Ensure that a class is identified for the templates in both themes.



Failure to resolve warnings may result in a loss of functionality and applications that do not display well.

- 5. Click Next to continue.
- 6. Click Switch Theme.

### See Also:

- Refreshing the Universal Theme
- Exporting an Application
- Copying an Application

## 11.2.5 Changing a Theme Identification Number

Use the Change Theme ID utility to change a theme ID to another identification number.

Each theme has an identification number (ID). Changing a theme ID is useful when you want to export a theme with a different number and then import it into another application.

To change a theme identification number:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.



- 2. On the Tasks list, click Change Identification Number.
- 3. For Theme Number:
  - a. Identify Theme Select a theme.
  - b. New Theme Identification Number Specify an identification number.
  - c. Click Next.
- 4. Confirm your changes and click Change Theme ID.

## 11.2.6 Copying a Theme

Copying a theme is useful when experimenting with editing a theme or to export a theme with a different ID.

Each theme is identified by a numeric identification number (ID). When you copy a theme, you specify a theme ID.

To copy a theme:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

- 2. On the Tasks list, click Copy Theme.
- 3. For Theme Number:
  - a. Application Identifies the current application.
  - **b.** Copy From Theme Select the theme you want to copy.
  - **c.** Copy to this Theme ID Enter a new ID for the theme.
  - d. Subscribe Theme Select On or Off.
  - e. Click Next.
- 4. Confirm your changes and click **Copy Theme**.



**Managing Theme Subscriptions** 

## 11.2.7 Deleting a Theme

Delete inactive themes.

When you delete a theme, App Builder only removes inactive templates.





### Tip:

Themes are tied to an application. If you modify a theme, those changes only apply to the application being edited. If you delete a theme, any template modifications are lost. To keep template modifications, you must export the theme. See Exporting Themes.

To delete an active theme:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

- On the Tasks list, click **Delete Theme**.
- From Delete Theme, select the theme you want to delete and click **Next**.
- Click **Delete Theme**.

## 11.2.8 Creating a Master Theme Application

Create a master theme application.

Oracle recommends starting with an existing Sample App or Starter App that uses the Universal Theme - 42.

- Creating a Master Theme Application by Creating a New Application Create a master theme application by creating a new application.
- Creating a Master Theme Application from an Existing Application Create a master theme application by copying an existing theme and subscribing to it and then switching to the new theme.



Using the App Gallery

## 11.2.8.1 Creating a Master Theme Application by Creating a New Application

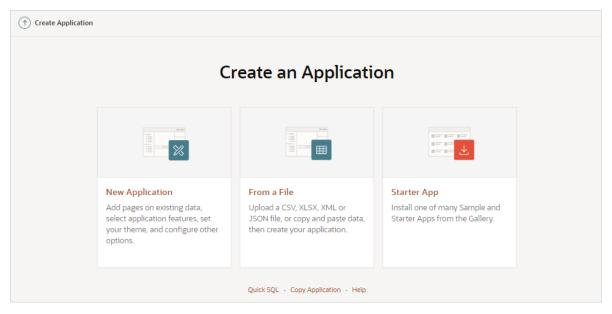
Create a master theme application by creating a new application.

To create a master theme application:

- 1. On the Workspace home page, click the App Builder icon.
- Click the Create button.

The Create Application Wizard appears.





- 3. Select the Copy Application link at the bottom of the window and click Next.
- 4. For Identify Copy Target:
  - a. Copy From Select an application that uses Universal Theme 42.
  - **b.** Copy To Enter a short descriptive name for the application to distinguish the new application in select lists and reports.
  - c. New Application ID Specify an integer value that identifies the application. The application ID must be unique within your Oracle APEX instance. Application IDs in the range of 3000 to 9000 are reserved for internal use by APEX
  - d. Copy Supporting Object Definitions You can copy supporting object definitions, configuration options, and scripts with your application. Select Yes to include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file. Select No to not include supporting object definitions.
- 5. Confirm your selection and click **Create Application**.

### 11.2.8.2 Creating a Master Theme Application from an Existing Application

Create a master theme application by copying an existing theme and subscribing to it and then switching to the new theme.

To create a master theme application from an existing application:

- 1. Copy the theme from an application that uses Universal Theme 42 (for example, *Universal Theme Reference*) and subscribe to it. See Copying a Theme.
- 2. Switch to the new theme. See Switching Themes.
- 3. Follow the on-screen instructions.

## 11.2.9 Managing Workspace Themes

Workspace administrators manage the Theme repository for a workspace.

Adding a Workspace Theme to the Theme Repository

Workspace administrators can add a theme to the Theme repository and make it available to all developers within a workspace.

Viewing an Existing Workspace Theme
 View existing Workspace themes on the Workspace Themes page.

Deleting a Workspace Theme

Workspace administrators can delete workspace themes from the Theme repository .

Modifying a Workspace Theme

Workspace administrators can modify a workspace theme by creating an application using the theme, modifying it, and then manually adding it to the workspace Theme repository

Exporting a Workspace Theme
 Export a theme in the same way you export any related application files.



Managing Public Themes in Oracle APEX Administration Guide

### 11.2.9.1 Adding a Workspace Theme to the Theme Repository

Workspace administrators can add a theme to the Theme repository and make it available to all developers within a workspace.

To add a theme to the Theme repository:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

- 2. On the Tasks list, click Manage Workspace Themes.
- 3. Select Create Workspace Theme and click Next.



### Tip:

If no workspace themes exist, the wizard selects **Create** for you.

- **4.** For Create Workspace Theme:
  - a. Application Select the application.
  - **b.** Application Theme to Copy Select the theme to copy to the workspace theme repository.
  - **c.** Subscribe Theme Select whether to subscribe the workspace theme to the selected application theme. This option enables you to refresh the workspace theme with changes made to the selected application theme.

- d. Click Next.
- a. Theme Number Enter a number with a value greater than 100. This number uniquely identifies this theme within a workspace.
  - **b.** Theme Name Enter a theme name. This name can be the same or different from the application theme name.
  - c. Description Enter a description of the theme.
  - d. Click Next.
- 6. Click Create Workspace Theme.

## 11.2.9.2 Viewing an Existing Workspace Theme

View existing Workspace themes on the Workspace Themes page.

To view an existing workspace theme:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

2. From the Tasks List, click Manage Workspace Themes.

The Workspace Themes page appears.



### Tip:

You cannot edit a workspace theme directly. To modify a workspace theme, you must create an application using the theme, modify it, and then manually add it to the workspace theme repository. See Modifying a Workspace Theme.

### 11.2.9.3 Deleting a Workspace Theme

Workspace administrators can delete workspace themes from the Theme repository .

To delete a workspace theme:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

2. From the Tasks List, click **Manage Workspace Themes**.

The Workspace Themes page appears.



- 3. Select the theme name.
- Click Delete.
- 5. Confirm your delete request and click **OK**.

## 11.2.9.4 Modifying a Workspace Theme

Workspace administrators can modify a workspace theme by creating an application using the theme, modifying it, and then manually adding it to the workspace Theme repository

You cannot edit a workspace theme directly. To modify a workspace theme, you must create an application using the theme, modify it, and then manually add it to the Workspace Theme repository.

To modify a workspace theme:

- Create an application using the theme you want to modify. See Creating Applications.
- Modify the theme. See Editing Themes.
- 3. Delete the existing workspace theme. See Deleting a Workspace Theme.
- 4. Add the modified theme to the Theme repository. See Adding a Workspace Theme to the Theme Repository.

### 11.2.9.5 Exporting a Workspace Theme

Export a theme in the same way you export any related application files.

Exporting a workspace theme involves the following steps:

- 1. Create an application using the theme. See Creating Applications.
- 2. Export the application. See Exporting an Application.
- 3. Import the Export File into the target Oracle APEX instance. See Importing an Application, Page or Component Export.
- 4. If you did not install your Export File after importing, you can install it in the Export Repository. See Installing Export Files.

## 11.2.10 Managing Instance Themes

Instance administrators manage the Theme repository for an entire Oracle APEX instance. Only an Instance administrators can add or delete a theme from the repository.



Managing Public Themes in Oracle APEX Administration Guide

## 11.2.11 About Exporting and Importing Themes

Export a theme in the same way you export any related application files.

Exporting a theme from one development instance to another involves the following steps:



- 1. Create an application using the theme. See Creating Applications.
- 2. Export the theme. See Exporting Themes.
- Import the exported file into the target APEX instance. See Importing Export Files.
- 4. Install the exported file from the Export Repository. See Installing Export Files.

## 11.2.12 Viewing Theme Reports

Access the following reports to better manage themes and templates.

- Viewing All Templates in a Theme
   View all templates that comprise a theme.
- Viewing Theme Template Counts

The Theme Template Count report lists which template classes currently have associated templates.

Viewing File References

The File References report displays a list of all files associated with templates, shared components, or page components in the current application.

Viewing Class References

The Class References report displays a list of classes associated with templates, shared components, or page components in the current application.

Viewing Template Substitution Strings
 Use the Template Substitution Strings report to view all supported substitution strings by component.

### 11.2.12.1 Viewing All Templates in a Theme

View all templates that comprise a theme.

To view all templates that comprise a theme:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

- Click Reports.
- 3. On the Theme Reports page:
  - a. Report Select Application Templates.
  - b. Theme Select either 42. Universal Theme or All Themes.
  - c. Click Go.

A list of templates appears with the template type, template name, theme, and template class.

4. To edit a template, select the template name.



### 11.2.12.2 Viewing Theme Template Counts

The Theme Template Count report lists which template classes currently have associated templates.

To view the Theme Template Count report:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

- 2. Click Reports.
- 3. On the Theme Reports page:
  - a. Report Select Theme Template Counts.
  - b. Theme Select a theme or select All.
  - c. Click Go.

## 11.2.12.3 Viewing File References

The File References report displays a list of all files associated with templates, shared components, or page components in the current application.

To view the File References report:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

- 2. Click Reports.
- **3.** On the Theme Reports page:
  - a. Report Select File References.
  - b. Theme Select a theme or select All.
  - c. Click Go.
- 4. On the File References page:
  - **a.** Show Select the type of component to include in the report. If you do not make a selection, no results are returned.
  - **b.** Show Files Select one of the following:
    - With context displays the component, the theme identification number, the component name, the image (if applicable), and the page number. Select the page number.



- Without context displays only the file name and the image (if applicable).
- **c.** File Extensions Select the type of extensions for which to search.
- d. Click Go.
- To download a comma-delimited file (.csv) version of this report, click **Download** at the bottom of the page.

### 11.2.12.4 Viewing Class References

The Class References report displays a list of classes associated with templates, shared components, or page components in the current application.

To view the Class References report:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

- 2. Click Reports.
- 3. On the Theme Reports page:
  - a. Report Select Class References.
  - b. Theme Select a theme or select All.
  - c. Click Go.
- 4. On the Class References page:
  - Show Select the components to check for a class reference. If you do not make a selection, no results are returned.
  - b. Show Class Names Select one of the following:
    - With context displays the component, the theme identification number, the component name, the image (if applicable), and the page number.
    - Without context displays only the referenced class.
  - c. Click Go.
- 5. To download a comma-delimited file (.csv) version of this report, click **Download** at the bottom of the page.

## 11.2.12.5 Viewing Template Substitution Strings

Use the Template Substitution Strings report to view all supported substitution strings by component.

To view the Substitution String report:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.



- c. Click Shared Components.
- d. Under User Interface, select Themes.

The Themes page appears.

- 2. Click Reports.
- 3. On the Theme Reports page:
  - a. Report Select Template Substitution Strings.
  - **b.** Theme Select which themes to include in the report.
  - c. Click Go.
- **4.** To link to a template definition, select the component name.



**Using Substitution Strings** 

# 11.3 Creating Custom Themes

Create a custom theme by modifying existing templates.

The Oracle APEX engine creates an application user interface based on a named collection of templates called a **theme**. Templates control the look and feel of the components in an application. If you must create a custom template, it is generally easier to start with an existing template and then modify it. Once you have created one or more default templates, you can modify those templates to fit your specific needs.

- About Cascading Style Sheets
  - A Cascading Style Sheet (CSS) provides a way to control the style of a web page without changing its structure.
- About Calling the JavaScript File from the Page Template Reference a .js file in the page template.
- About Using Escaping Syntax in Substitution Strings Use escaping syntax in substitution strings.
- Selecting a Default Page Template
  - Select a default page template by either selecting a default page template within a specific theme, or by selecting a specific page template on a page-by-page basis.
- Creating a New Template
  - To create a custom template, copy and then modify and existing template.
- Using Template Options
  - Template options provide a declarative way for developers to apply different styles to components on an Oracle APEX page.
- Viewing Template Reports
  - View reports describing template utilization, subscriptions, published templates, and edit history.
- Managing Templates
  - Manage templates by navigating to the Templates page in Shared Components.



### Breadcrumb Templates

Breadcrumb templates control the display of breadcrumb entries.

#### Button Templates

Customize the look and feel of a button using button templates. Button templates are optional.

### Legacy Calendar Templates

Control the appearance and placement of a legacy calendar using legacy calendar templates.

#### Label Templates

Centrally manage HTML markup of page item labels using label templates.

#### List Templates

Control the appearance of a list using list templates.

#### Page Templates

Define the appearance of a page using page templates.

### Popup LOV Templates

Use Popup LOV templates control how popup lists display for all items defined as POPUP.

### Region Templates

Region templates control the appearance and placement of region attributes.

#### Report Templates

Report column templates provide you with control over the results of a row from a SQL query. This type of template defines a cell, not an entire row.

### See Also:

- Using Themes
- Managing Themes and Subscriptions
- Managing Theme Subscriptions

## 11.3.1 About Cascading Style Sheets

A Cascading Style Sheet (CSS) provides a way to control the style of a web page without changing its structure.

When used properly, a CSS separates visual attributes such as color, margins, and fonts from the structure of the HTML document. APEX includes themes that contain templates that reference their own CSS. The style rules defined in each CSS for a particular theme also determine the way reports and regions display.

When using built-in themes, you can find the theme specific CSS files in the following locations:

```
/i/themes/theme_xx
/i/themes/theme_xx/css
```

Theme specific image can be found in the following locations:



```
/i/themes/theme_xx
/i/themes/theme xx/images
```

Where xx is the theme number. Theme specific CSS files include the APEX version number to preserve backward compatibility for imported applications using older versions of a theme.



**Using Custom Cascading Style Sheets** 

## 11.3.2 About Calling the JavaScript File from the Page Template

Reference a .js file in the page template.

Referencing a .js file in the page template makes all the JavaScript in that file accessible to the application. This is the most efficient approach since a .js file loads on the first page view of your application and is then cached by the browser.

See Also:

**JavaScript** 

## 11.3.3 About Using Escaping Syntax in Substitution Strings

Use escaping syntax in substitution strings.

Developers can append an exclamation mark (!) followed by a predefined filter name to substitution strings to escape special characters in the substitution value. Output escaping is an important security technique to avoid Cross Site Scripting (XSS) attacks in the browser.

See Also:

Controlling Output Escaping in Substitution Strings

# 11.3.4 Selecting a Default Page Template

Select a default page template by either selecting a default page template within a specific theme, or by selecting a specific page template on a page-by-page basis.

By default, the Oracle APEX engine uses the Page template specified on the Themes page.

Selecting a Page-level Template Within a Theme
 Select a default page template within a theme in Shared Components.

Selecting a Page-level Template for a Specific Page
 Select a page-level template for a specific page in Page Designer.

### 11.3.4.1 Selecting a Page-level Template Within a Theme

Select a default page template within a theme in Shared Components.

To specify a default page template within a theme:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

2. Select a theme name.

The Create/Edit Theme page appears.

- 3. Scroll down to Component Defaults.
- 4. From Page, make a new selection.
- 5. Click **Apply Changes** at the top of the page.

See Also:

**Editing Themes** 

## 11.3.4.2 Selecting a Page-level Template for a Specific Page

Select a page-level template for a specific page in Page Designer.

To specify a page-level template for a specific page:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application.
- Select the application page.

Page Designer displays the page.

- 4. To edit the page-level template:
  - a. In the Rendering tab, click the page title.
  - b. In the Property Editor, locate the Appearance. From Page Template, select a new template.
  - c. Click Save.



## 11.3.5 Creating a New Template

To create a custom template, copy and then modify and existing template.

Once you have created one or more default templates, you can modify those templates to fit your specific needs.

To create a custom template:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application to which you want to copy the template.
- 3. Click Shared Components.
- Under User Interface, select Templates.
- 5. Click Create.
- 6. Select the type of template you want to create and click Next.
- Select a creation method:
  - From Scratch
  - As a Copy of an Existing Template
- 8. Follow the on-screen instructions.



#### Tip:

Make sure you associate your template with the correct theme.

## 11.3.6 Using Template Options

Template options provide a declarative way for developers to apply different styles to components on an Oracle APEX page.

- Managing Global Template Option Groups
  - Developers can define the purpose of related template options by creating template option groups. Examples of template option groups include Button Size, Button Style, List Examples, List Style, and Form Label Position.
- Managing Global Template Options
   Gobal template options are defined at the theme-level.
- Managing Template Options

Template options enable developers to declaratively apply CSS modifiers to the templates they have chosen for pages, regions, reports, lists, breadcrumbs, items and buttons.



Understanding Template Options and About Template Option Groups and Presets



### 11.3.6.1 Managing Global Template Option Groups

Developers can define the purpose of related template options by creating template option groups. Examples of template option groups include Button Size, Button Style, List Examples, List Style, and Form Label Position.

- Creating a Global Template Option Group
   Global template option groups are defined at the theme-level and are available for
   all components of a given type.
- Editing Global Template Option Groups
   Edit global template option groups by navigating to the Themes page.



About Template Option Groups and Presets and Understanding Template Options

### 11.3.6.1.1 Creating a Global Template Option Group

Global template option groups are defined at the theme-level and are available for all components of a given type.

When developers create a template option group, they can specify a template option preset at the template-level. For example, suppose you have a button template that has the template options Large and Small. If you define Small as the preset, then any new button referencing the template would automatically have the template option Small applied to it when is it created. Template options that are part of a group are optional unless defined at the template-level.

To create a global template option group:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

- 2. Select a theme.
- 3. Locate Global Template Options.
- 4. Click Edit Template Option Groups.

Template Options Groups dialog appears.

- To create a group:
  - a. Click Create.
  - **b.** Edit the appropriate attributes.

To learn more about an attribute, see field-level Help.



#### c. Click Create.

### 11.3.6.1.2 Editing Global Template Option Groups

Edit global template option groups by navigating to the Themes page.

To edit global template option groups:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

- 2. Select a theme.
- 3. Locate Global Template Options.
- 4. Click Edit Template Option Groups.

Template Options Groups dialog appears.

- **5.** To edit a group:
  - a. Click the group name.
  - **b.** Edit the appropriate attributes.

To learn more about an attribute, see field-level Help.

- c. Click Apply Changes.
- **6.** To delete a group:
  - a. Click the group name.
  - b. Click Delete.

## 11.3.6.2 Managing Global Template Options

Gobal template options are defined at the theme-level.

- Creating Global Template Options
   Define global template options on the Themes page under Global Template Options.
- Editing Global Template Options
   Edit existing global template options on the Themes page under Global Template Options.



**About Template Options** 

### 11.3.6.2.1 Creating Global Template Options

Define global template options on the Themes page under Global Template Options.



To create a global template option:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

- 2. Select a theme.
- 3. Locate Global Template Options.
- 4. Click Add Template Option.

Template Options Groups dialog appears.

- 5. On Template Options:
  - a. Display Sequence Specify the sequence for this option.
  - Template Type Select the type of template for which the template option is defined.
  - **c.** Group Enter a unique group name. Group names enable you to group template options and avoid the selection of conflicting option.
  - d. Display Name Enter a name for the template option.
  - e. Option Identifier Enter an alphanumeric, upper case identifier for the template option. Identifiers map a template option to a corresponding template option when switching themes.
  - f. CSS Classes Enter one or more CSS classes that define this template option.
  - g. Help Text Enter a description of the template option.
  - h. Click Create or Create and Add Another.

### 11.3.6.2.2 Editing Global Template Options

Edit existing global template options on the Themes page under Global Template Options.

To edit a global template option:

- Navigate to the Themes page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

- 2. Select a theme.
- 3. Locate Global Template Options.
- **4.** To edit a template option:



- a. Click the display name.
- b. Edit the appropriate attributes. To learn more about an attribute, see field-level Help.

### WARNING:

If you edit the name of a CSS class, all components that reference that CSS class name must be updated manually. The Option Identifier cannot be modified since it is needed for mapping purposes.

- c. Click Apply Changes.
- To delete a template option:
  - a. Click the display name.
  - b. Click Delete.

## 11.3.6.3 Managing Template Options

Template options enable developers to declaratively apply CSS modifiers to the templates they have chosen for pages, regions, reports, lists, breadcrumbs, items and buttons.

- **Creating Template Options** Create a template option by declaratively modifying a template.
- **Editing Template Options** Edit an existing template option on the Templates page.
- Using Quick Edit to Modify Live Template Options Using the Live Template Options dialog to alter a component's template options without refreshing the page.



#### See Also:

**Understanding Template Options** 

### 11.3.6.3.1 Creating Template Options

Create a template option by declaratively modifying a template.

To create a template option:

- 1. Navigate to the Templates page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Templates.

The Templates page appears.

2. Select a template.



- 3. Select Template Options.
- 4. Click Add Template Option.
- 5. Edit the appropriate attributes. To learn more about an attribute, see field-level Help.
- 6. Click Create or Create and Add Another.

### 11.3.6.3.2 Editing Template Options

Edit an existing template option on the Templates page.

To edit a template option:

- Navigate to the Templates page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Templates**.

The Templates page appears.

- 2. Select a template.
- 3. Select Template Options.
- 4. Edit the appropriate attributes and click Apply Changes.

To learn more about an attribute, see field-level Help.



### Tip:

If you edit the name of a CSS class, all components that reference that CSS class name must be updated manually. The Option Identifier cannot be modified since it is needed for mapping purposes.

- 5. To delete a template option, click **Delete**.
- 6. To view global template options, expand Global Template Options.

### 11.3.6.3.3 Using Quick Edit to Modify Live Template Options

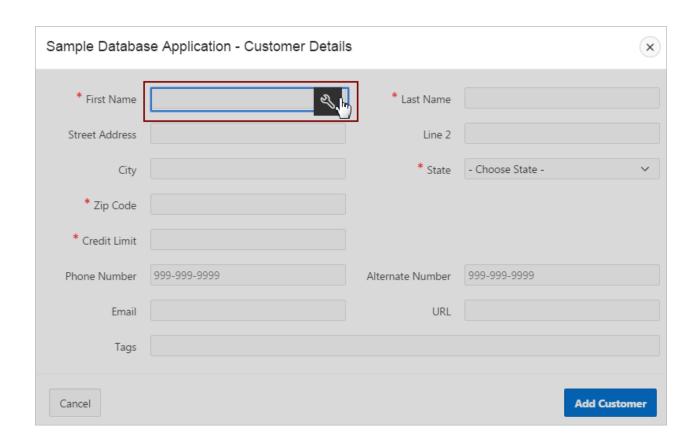
Using the Live Template Options dialog to alter a component's template options without refreshing the page.

Developers can also use Quick Edit on the Runtime Developer toolbar to access the Live Template Options dialog. Using the Live Template Options dialog, developers can alter component's template options without refreshing the page.

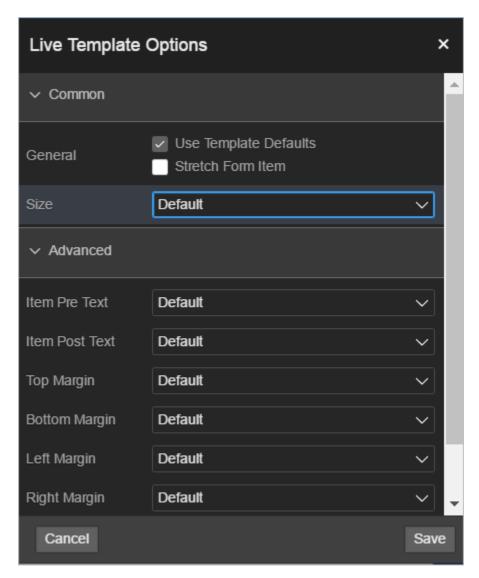
To access the Live Template Options:

- 1. Run the page.
- 2. From the Runtime Developer toolbar, click Quick Edit.
- **3.** Move the mouse over the component for which you want to modify template options. Click the **Wrench** icon in the upper right corner.

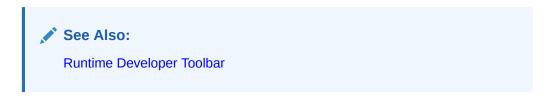




The Live Template Options dialog appears. For region-based components, such as lists and classic reports, the dialog includes an Attributes tab.



4. Select the appropriate tab, edit the appropriate attributes, and click Save.



# 11.3.7 Viewing Template Reports

View reports describing template utilization, subscriptions, published templates, and edit history.

To view template reports for the current application:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- Click Shared Components.

4. Under User Interface, select **Templates**.

The Templates page displays as an interactive report. To customize the view, use the Search bar at the top of the page.

- **5.** To view template reports, click the following tabs:
  - **Subscription** Displays subscribed templates in your application.
  - Publish displays templates that have been subscribed to by other templates in your workspace. To publish master template content to subscribing templates, select those you want to publish and click Publish Checked.
  - **Utilization** Displays template utilization in the current application for all template types. The number in the References column indicates the total number of pages that use the specific template.
  - History Displays recent modifications made to Page and Region Templates in this application.

# 11.3.8 Managing Templates

Manage templates by navigating to the Templates page in Shared Components.

- Viewing Templates on the Templates Page
   View templates on the Templates page in Shared Components
- Viewing Templates Associated with a Specific Page
   View templates associated with a page by viewing the Page Designer.
- Replacing Templates
  Update the template associated with a component using the Replace Templates Wizard.
- Replacing All Templates within an Application
   Replace all templates within an application with templates from another application.
- Viewing Region Position Utilization by Page Template
   View region position utilization by page template.
- Unsubscribing to Templates
   Unsubscribe to templates.
- Publishing Templates
   Publish master template content to subscribing templates.



Viewing All Templates in a Theme

# 11.3.8.1 Viewing Templates on the Templates Page

View templates on the Templates page in Shared Components

To view existing templates:

- 1. Navigate to the Templates page:
  - a. On the Workspace home page, click the **App Builder** icon.



- b. Select an application.
- c. Click Shared Components.
- d. Under User Interface, select **Templates**.

The Templates page appears.

2. To view or edit a template definition, click the template name.

The template definition appears.

3. Edit the appropriate attributes. To learn more about an attribute, see field-level Help.

If you edit a template, you can make changes in one window and run your application in another by selecting the **Return to Page** checkbox on the right side of the template definition page. Selecting this checkbox keeps the page you are editing current after you click **Apply Changes**.

4. Click Apply Changes.

# 11.3.8.2 Viewing Templates Associated with a Specific Page

View templates associated with a page by viewing the Page Designer.

To view templates associated with a specific page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. View the page in Page Designer:
  - a. In the Rendering tab, click the page title.
  - b. In the Property Editor, locate Appearance. Page Template displays the current template.
  - c. To save any changes, click **Save**.



Viewing a Page in Page Designer

# 11.3.8.3 Replacing Templates

Update the template associated with a component using the Replace Templates Wizard.

To replace the template associated with a component:

- 1. On the Workspace home page, click the **App Builder** icon.
- Select the application.
- 3. Click Shared Components.
- 4. Under User Interface, select **Templates**.

To customize the view, use the Search bar at the top of the page.



- 5. From the Task list, select **Replace Templates**.
- **6.** For Template Type:
  - a. User Interface- Select user interface.
  - **b.** Template Type Identifies the template type to be replaced.
  - c. Click Next.
- 7. For Replace Templates:
  - a. Change From Select the template you want to change.
  - **b.** Change To Select the template you want to change to.
  - c. Click Next.
- Click Finish.

# 11.3.8.4 Replacing All Templates within an Application

Replace all templates within an application with templates from another application.

To replace all templates within an application:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the application.
- 3. Click Shared Components.
- 4. Under User Interface, select Templates.

To customize the view, use the Search bar at the top of the page.

- 5. From the Task list, select Replace templates in this application with templates from another application.
- 6. For Replace Templates:
  - Replace from Application Select an application.
  - User Interface Select the type of user interface for which this application has been developed.
  - Click Next.
- On Replace Templates, select a New Template for each component and then select an Action:
  - Replace copies the template definition
  - Replace/Subscribe copies the templates and adds a subscription.
- 8. Click Replace Templates.

# 11.3.8.5 Viewing Region Position Utilization by Page Template

View region position utilization by page template.

Regions are organized on a page by position (or Display Point). The possible display points for a region are determined by the page-level template.

To view region position utilization by page template:

1. On the Workspace home page, click the App Builder icon.



- 2. Select the application.
- 3. Click Shared Components.
- 4. Under User Interface, select **Templates**.

To customize the view, use the Search bar at the top of the page.

5. From the Task list, select View page template region position utilization.

The Region Display Point Utilization report appears.

# 11.3.8.6 Unsubscribing to Templates

Unsubscribe to templates.

A subscribed template is a template that has its definition maintained in another template referred to as the referenced template. If your application uses subscribed templates, you can unsubscribe to templates on the Unsubscribe Templates page.

To unsubscribe to templates:

- 1. Navigate to the Templates page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Templates**.

The Templates page appears.

2. From the Task list, select Unsubscribe Templates.

The Unsubscribe Templates page appears.

- Select a theme.
- **4.** To unsubscribe to a specific template type within the current theme, select the template type and click **Unsubscribe**.

# 11.3.8.7 Publishing Templates

Publish master template content to subscribing templates.

Use the Publish Templates page to view templates that are subscribed to by other templates in your workspace.

To publish master template content:

- 1. Navigate to the Templates page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select **Templates**.

The Templates page appears.

2. Click the Publish tab.

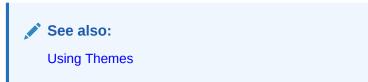
The Published Templates page appears.



3. Select those you want to publish and click **Publish Checked**.

# 11.3.9 Breadcrumb Templates

Breadcrumb templates control the display of breadcrumb entries.

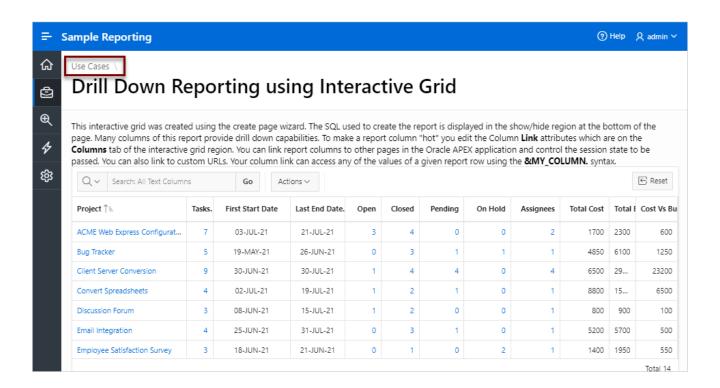


- About Breadcrumb Style Navigation
   Breadcrumbs provide users with hierarchical navigation and can be displayed as a list of links or as a breadcrumb path.
- Breadcrumb Template Attributes
   Learn about common breadcrumb template attributes.

# 11.3.9.1 About Breadcrumb Style Navigation

Breadcrumbs provide users with hierarchical navigation and can be displayed as a list of links or as a breadcrumb path.

You select a breadcrumb template when you create a region. Breadcrumbs usually indicate where the current page is relative to other pages in the application. Users can click a specific page to instantly view it. The following is an example of breadcrumb navigation in *Sample Reporting* Sample App.







**Creating Breadcrumbs** 

## 11.3.9.2 Breadcrumb Template Attributes

Learn about common breadcrumb template attributes.

For more information on an attribute, see field-level Help.

- Name
- Definition
- Substitution Strings

#### 11.3.9.2.1 Name

Name identifies the name of the template. Use the **Translatable** checkbox to indicate that the template contains text strings that require translation. **Theme** indicates the theme to which the template is a member. **Template Class** identifies a specific use for the template. When you switch to a theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class.

#### 11.3.9.2.2 Definition

Definition attributes control how a breadcrumb displays Table 11-7 describes Definition attributes.

Table 11-7 Definition attributes

Attribute	Description	
Before First	Defines text that displays before the first breadcrumb entry. Use the substitution string #COMPONENT_CSS_CLASSES# to apply a CSS class to your breadcrumb template. You edit component CSS classes by editing the region attributes.	
	See Also: Editing Region Attributes	
Current Page Breadcrumb Entry	Defines the look of a breadcrumb entry that corresponds to the current page.	
Non Current Page Breadcrumb Entry	Defines the look of a breadcrumb entry that does not correspond to the current page.	
After Last	Defines text that displays after the last breadcrumb entry.	
Between Level	Defines text that displays between levels of breadcrumb entries.	
Maximum Levels	Specifies the number of levels that appear when displaying breadcrumbs in a breadcrumb style.	

## 11.3.9.2.3 Substitution Strings

Substitution strings are used within templates to reference component values. To view the most current list supported substitution strings for a given template, view the template and find the **Substitution Strings** report.





## Tip:

All template substitution strings must be in uppercase letters and begin and end with a number sign (#).

Table 11-8 Breadcrumb Template Substitution Strings

Referenced From	Substitution String	Description
Before First	#COMPONENT_CSS_CLASSES#	Component CSS classes.  The #COMPONENT_CSS_CLASSES# string must be included in the before-first attribute for templates that have template options defined. The #COMPONENT_CSS_CLASSES# string is where the corresponding template option classes are injected at runtime.
Current Entry	#LINK#	URL Link.
Current Entry	#LONG_NAME#	Breadcrumb Long Name.
Current Entry	#NAME#	Breadcrumb Label.
Current Entry	#NAME_ESC_SC#	Breadcrumb Label (escaping HTML characters).
Non Current Entry	#LINK#	URL Link.
Non Current Entry	#LONG_NAME#	Breadcrumb Long Name.
Non Current Entry	#NAME#	Breadcrumb Label.
Non Current Entry	#NAME_ESC_SC#	Breadcrumb Label (escaping HTML characters).

# 11.3.10 Button Templates

Customize the look and feel of a button using button templates. Button templates are optional.

Button Template Attributes
 Learn about common button template attributes. You can use multiple images or HTML tags to build a button.

# 11.3.10.1 Button Template Attributes

Learn about common button template attributes. You can use multiple images or HTML tags to build a button.

For more information on an attribute, see field-level Help.

Name

- Definition
- Substitution Strings

### 11.3.10.1.1 Name

**Template Name** identifies the name of the template. Use the **Translatable** checkbox to indicate if the template contains text strings that require translation. **Theme** indicates the theme to which the template is a member.

**Template Class** identifies a specific use for the template. When you switch to a theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class.

### 11.3.10.1.2 Definition

**Normal Template** defines the button template that displays if the button type is **Normal**. For example,  $\&ITEM_NAME$ . values can be substituted at rendering time. **Hot Template** defines the button template that displays if the button type is **Hot**. You have the option of including standard application substitutions. For example,  $\&ITEM_NAME$ . values can be substituted at rendering time.

To learn more about supported substitution strings, see field-level Help.



#### Tip:

All substitution string must be in uppercase.

# 11.3.10.1.3 Substitution Strings

Substitution strings are used within subtemplates to reference component values. To view the most current list supported substitution strings for a given template, view the template and find the **Substitution Strings** report.



### Tip:

All template substitution strings must be in uppercase letters and begin and end with a number sign (#).

**Table 11-9 Button Template Substitution Strings** 

Referenced From	Substitution String	Description
Hot Template	#BUTTON_ATTRIBUTES#	Button attributes.
Hot Template	#BUTTON_CSS_CLASSES#	Button CSS classes.
		You must include the #BUTTON_CSS_CLASSES# string for templates that have template options defined. The #BUTTON_CSS_CLASSES# string is where the corresponding template option classes are injected at runtime.



Table 11-9 (Cont.) Button Template Substitution Strings

Referenced From	Substitution String	Description
Hot Template	#BUTTON_ID#	Generated button ID will be either the button's Static ID if defined, or if not will be an internally generated ID in the format 'B'    [Internal Button ID].
Hot Template	#ICON_CSS_CLASSES#	Icon CSS classes.
Hot Template	#JAVASCRIPT#	Used in an onclick attribute.
Hot Template	#LABEL#	Button label.
Hot Template	#LINK#	To be used in a href attribute.
Template	#BUTTON_ATTRIBUTES#	Button attributes.
Template	#BUTTON_CSS_CLASSES#	Button CSS classes.
		You must include the #BUTTON_CSS_CLASSES# string for templates that have template options defined. The #BUTTON_CSS_CLASSES# string is where the corresponding template option classes are injected at runtime.
Template	#BUTTON_ID#	Generated button ID will be either the button's Static ID if defined, or if not will be an internally generated ID in the format 'B'    [Internal Button ID].
Template	#ICON_CSS_CLASSES#	Icon CSS classes.
Template	#JAVASCRIPT#	Used in an onclick attribute.
Template	#LABEL#	Button label.
Template	#LINK#	To be used in a href attribute.

# 11.3.11 Legacy Calendar Templates

Control the appearance and placement of a legacy calendar using legacy calendar templates.

Calendar templates frequently use HTML tables to arrange dates. You place calendar attributes using substitution strings such as #DD# and #MONTH#.

- Supported Legacy Calendar Template Substitution Strings
   Review supported legacy calendar template substitution strings.
- Legacy Calendar Template Attributes
   Learn about legacy calendar template attributes.



Managing Legacy Calendars



# 11.3.11.1 Supported Legacy Calendar Template Substitution Strings

Review supported legacy calendar template substitution strings.

A list of supported substitution strings appears on the right side of the Edit Calendar Template page. Note that template substitution strings must be in uppercase letters and begin and end with a number sign (#).

# 11.3.11.2 Legacy Calendar Template Attributes

Learn about legacy calendar template attributes.

- Name
- Subscription
- Comments

#### 11.3.11.2.1 Name

**Name** identifies the name of the template. Use the **Translatable** checkbox to indicate if the template contains text strings that require translation. **Theme** indicates the theme to which the template is a member.

**Template Class** identifies a specific use for the template. When you switch to a theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class.

## 11.3.11.2.2 Subscription

Use Subscription to apply an existing template to the current application.

Use **Reference Master Label Template From** to select an existing template in this workspace or another template in your workspace's schema. By selecting an existing template, you become a subscriber to that template.

To load a copy of a master template, click **Refresh**.

#### 11.3.11.2.3 Comments

Use this attribute to record comments about this component.

Monthly Calendar, Weekly Calendar, Daily Calendar, Custom Calendar and List Calendar

Use the Monthly Calendar, Weekly Calendar, Daily Calendar, and List Calendar attributes to control the appearance and placement of specific calendars.

# 11.3.12 Label Templates

Centrally manage HTML markup of page item labels using label templates.

Every item can have an optional label. You can control how these labels display using label templates. For example, you could create a label template called Required Field



that references an image (such as an asterisk) to indicate to the user that the field is required.

Label templates also enable you to define a before-and-after text string that gets prepended and appended to the item.

- Label Template Attributes
   Learn about label template attributes.
- About Using #CURRENT\_ITEM\_HELP\_TEXT# to Create Item Help Learn about using #CURRENT\_ITEM\_HELP\_TEXT# to create item help.

# 11.3.12.1 Label Template Attributes

Learn about label template attributes.

To learn more about a specific attribute, see field-level Help.

- Name
- Definition
- Error Display
- Field Container
- Substitution Strings

#### 11.3.12.1.1 Name

**Template Name** identifies the name of the template. Use the **Translatable** checkbox to indicate that the template contains text strings that require translation. **Theme** indicates the theme to which the template is a member.

**Template Class** identifies a specific use for the template. When you switch to a theme, all templates in one theme are mapped to corresponding templates in another theme. App Builderaccomplishes this template mapping through the assignment of a template class.

### 11.3.12.1.2 Definition

Definition attributes include:



#### Tip:

For a list of supported substitution strings and to view examples, see field-level Help.

- Before Label Enter HTML to display before the item label. The #ITEM\_CSS\_CLASSES# substitution string must be included for templates that have template options defined.
- After Label Enter HTML to display after the item label. Since the label automatically
  displays before the HTML in this region, any open HTML tags in the Before Label region
  should be closed.
- Before Item Enter HTML to be displayed directly before the form item. This is typically
  used to wrap an item into a DIV container or to display a help button before or after the
  form item.



- After Item Enter HTML to be displayed directly after the form item. This is typically used to wrap an item into a DIV container or to display a help button before or after the form item.
- **Item Pre Text** Enter HTML for the Item Pre Text subtemplate to format the content stored as Pre Text in the item attributes. This subtemplate can be referenced in the **Before Element** template with the #ITEM PRE TEXT# substitution.
- **Item Post Text** Enter HTML for the Item Post Text subtemplate to format the content stored as Post Text in the item attributes. This subtemplate can then be referenced in the After Element template with the #ITEM POST TEXT# substitution
- Help Template The help sub template enables developers to define the link or button used to invoke the item level help. This sub template is only rendered for items that have help defined. See About Using #CURRENT ITEM HELP TEXT# to Create Item Help.
- Inline Help Template The help sub template enables developers to define inline help text to be displayed immediately with the item. This sub template is only rendered for items that have inline help text defined

## 11.3.12.1.3 Error Display

Error Display attributes include:



### 🕜 Tip:

For a list of supported substitution strings and to view examples, see fieldlevel Help.

- On Error Before Label Enter HTML to precede the item label when an application displays an inline validation error message for the item.
- On Error After Label Enter HTML to be appended to the item label when an application displays an inline validation error message for the item.
- **Error Template** Enter the HTML rendered to display the inline validation error message. Use the #ERROR MESSAGE# substitution string to reference the message text. The error template can be included in the before and after item attributes using the #ERROR TEMPLATE# substitution string.

### 11.3.12.1.4 Field Container

Field Container attributes include:



#### Tip:

For a list of supported substitution strings and to view examples, see fieldlevel Help.

Before Label and Item - Enter HTML to be displayed before the label and item. This is typically used to wrap an item into a DIV container or field set. The Before Label and Item attribute is only rendered for pages that do not use a table grid to display form items. This includes any page using a mobile page template.

After Label and Item - Enter HTML to be displayed after the label and item. This is
typically used to wrap an item into a DIV container or field set. The after item and label
attribute is only rendered for pages that don't use a table grid to display form items. This
includes any page using a mobile page template.

## 11.3.12.1.5 Substitution Strings

Substitution strings are used within templates to reference component values. To view the most current list supported substitution strings for a given template, view the template and find the **Substitution Strings** report.



#### Tip

All template substitution strings must be in uppercase letters and begin and end with a number sign (#).

# 11.3.12.2 About Using #CURRENT ITEM HELP TEXT# to Create Item Help

Learn about using #CURRENT ITEM HELP TEXT# to create item help.

Use the #CURRENT\_ITEM\_HELP\_TEXT# substitution string to create inline page Help text when a page is rendered. For example, you can use this substitution string to create page Help text which displays as a tooltip when the mouse hovers over the page item label. This placeholder enables you to include help text on the page when it is rendered without having to perform an expensive Ajax call.



### Tip:

Only use this placeholder if the Help text is short. The generated page always includes the help text of all page items.

#### **Example Label Template**

#### Before Label:

```
<label for="#CURRENT_ITEM_NAME#" id="#LABEL_ID#">
<span class="helpText">#CURRENT ITEM HELP TEXT#</span>
```

#### After Label:

</label>

# 11.3.13 List Templates

Control the appearance of a list using list templates.

About Hierarchical Lists
 Learn about hierarchical lists.

List Template Attributes
 Learn about list template attributes.

## 11.3.13.1 About Hierarchical Lists

Learn about hierarchical lists.

A list is a shared collection of links. Oracle APEX supports hierarchical lists. To create a hierarchical list, you must:

 Select a list template that supports hierarchical lists. To determine which list templates support hierarchical lists, look for templates having the naming convention "with Sublist."



#### Tip:

To determine which list templates support hierarchical lists, look for templates having the naming convention "with Sublist."

Select a Parent List Entry when you create each list entry.



**Creating Lists** 

# 11.3.13.2 List Template Attributes

Learn about list template attributes.

To learn more about a specific attribute, see field-level Help.

- Name
- Before List Entry
- Template Definition
- Template Definitions for First Entry
- Before Sublist Entry
- Sublist Entry
- After Sub List Entry
- After List Entry
- Substitution Strings

### 11.3.13.2.1 Name

**Name** identifies the name of the template. Use the **Translatable** checkbox to indicate that the template contains text strings that require translation. **Theme** indicates the theme to which the template is a member.

**Template Class** identifies a specific use for the template. When you switch to a new theme, all templates in one theme are mapped to corresponding templates in another theme. App Builderaccomplishes this template mapping through the assignment of a template class.

## 11.3.13.2.2 Before List Entry

Enter HTML that displays before any list elements. You can use this attribute to open an HTML table or HTML table row. The #COMPONENT\_CSS\_CLASSES# substitution string must be included in the List Template Before Rows attribute for templates that have template options defined.

## 11.3.13.2.3 Template Definition

Defines current and noncurrent list templates. Supported substitution strings include #LINK#, #TEXT#, #TEXT\_ESC\_SC#, #ICON\_CSS\_CLASSES#, #APEX\_FILES#, #IMAGE#, #IMAGE\_ATTR#, and #A01#...#A10#.

Template Definition attributes include:

- List Template Current. Enter HTML or text to be substituted for the selected (or current) list template.
- List Template Current with Sub List Items. Enter HTML or text to be substituted for the selected (or current) list template when an item has sublist items. If not specified, the current list item template is used.
- List Template Noncurrent. Enter HTML or text to be substituted for the unselected (or noncurrent) list template.
- List Template Noncurrent with Sub List Items. Enter HTML or text to be substituted for the unselected (or noncurrent) list template used when an item has sublist items. If not specified, the current list item template is used.
- **Between List Elements.** Enter HTML that displays between list elements. This attribute is ignored if no HTML is specified.

# 11.3.13.2.4 Template Definitions for First Entry

Available attributes include:

- **List Template Current (First).** If defined, this is used for the first list item. Enter HTML or text to be substituted for the selected (or current) list template.
- List Template Current with Sub List Items (First). If defined, this is used for the first list item. HTML or text to be substituted for the selected (or current) list template used when item has sub list items.
- **List Template Noncurrent (First).** If defined, this is used for the first list item. Enter HTML or text to be substituted for the unselected (or noncurrent) list template.
- List Template Noncurrent with Sub List Items (First). If defined, this is used for the first list item. HTML or text to be substituted for the unselected (or noncurrent) list template used when item has sub list items.

# 11.3.13.2.5 Before Sublist Entry

Enter HTML that displays before any sublist elements.



## 11.3.13.2.6 Sublist Entry

Defines current and noncurrent list templates. Supported substitution strings include #LINK#, #TEXT#, #ICON\_CSS\_CLASSES#, #APP\_FILES#, #IMAGE#, #IMAGE\_ATTR#, #ICON\_CSS\_CLASSES#, #A01#...#A10#, #LIST\_ITEM\_ID#, and #PARENT\_LIST\_ITEM\_ID#.

Sub List Entry attributes include:

- **Sub List Template Current.** Enter HTML or text to be substituted for the selected (or current) list template.
- Sub List Template Current with Sub List Items. Enter HTML or text to be substituted for the selected (or current) list template when an item has sublist items. If not specified, the current list item template is used.
- **Sub List Template Noncurrent.** Enter HTML or text to be substituted for the unselected (or noncurrent) list template.
- Sub List Template Noncurrent with Sub List Items. Enter HTML or text to be substituted for the unselected (or noncurrent) list template used when an item has sublist items. If not specified, the current list item template is used.
- **Between Sub List Items.** Enter HTML that displays between list elements. This attribute is ignored if no HTML is specified.

## 11.3.13.2.7 After Sub List Entry

Enter HTML that displays after displaying sublist elements.

## 11.3.13.2.8 After List Entry

Enter HTML that displays after displaying all list elements. You can use this attribute to close an HTML table opened in the Before List Elements attribute.

## 11.3.13.2.9 Substitution Strings

Substitution strings are used within templates to reference component values. To view the most current list supported substitution strings for a given template, view the template and find the Substitution Strings report.



#### Tip:

All template substitution strings must be in uppercase letters and begin and end with a number sign (#).

# 11.3.14 Page Templates

Define the appearance of a page using page templates.

- Page Template Attributes
   Learn about page template attributes.
- Required Dialog Page Template Attributes
   Learn about required dialog page template attributes.



# 11.3.14.1 Page Template Attributes

Learn about page template attributes.

A page template consists of a header template, a body template, a footer template, and several subtemplates. If you do not specify a page template as a page-level attribute, then the Oracle APEX engine uses the default page template defined on the Create/Edit Theme page.

Page templates combine static HTML with substitution strings that are replaced at runtime. You use substitution strings to indicate the existence and placement of a component within a page template. You can further specify how a component should display using subtemplates.

This topic describes specific sections of the Edit Page Template page. To learn more about a specific attribute, such as supported substitution strings, see field-level Help.

- Name
- Definition
- JavaScript
- · Cascading Style Sheet
- Subtemplate
- Image Based Tab Attributes
- Layout
- Positions
- Dialog
- Error Page Template Control
- Substitution Strings

#### 11.3.14.1.1 Name

**Name** identifies the name of the template. **Theme** indicates the theme to which the template is a member.

**Template Class** identifies a specific use for the template. When you switch to a new theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class.

Use the **Translatable** checkbox to indicate if this template contains text strings that require translation.

**Template Type** identifies the page template type. If set to **Dialog Page**, the template is only be available for selection by a page with a page mode of **Modal** or **Non-Modal**. If set to **Normal Page**, the template is only be available for selection by a page with a page mode of **Normal**.

See Also:

Creating Dialog Pages and Required Dialog Page Template Attributes



### 11.3.14.1.2 Definition

Each template consists of a header, a body, a footer, and subtemplates. Use substitution strings to include dynamic content. All template substitution strings must be in uppercase letters and begin and end with a number sign (#).



#### Tip:

For a list of supported substitution strings and to view examples, see field-level Help.

#### Definition attributes include:

- Header Enter HTML that defines the <Head> section of the HTML document.
   Oracle recommends you include at least #TITLE# and #HEAD# in this template section.
- Body Enter HTML that makes up the <Body> section of the HTML document.
   Include substitution strings to define where the body content is placed and to define additional positions for regions.
- Footer Enter HTML to define third section in the page template that displays after the Body.

### 11.3.14.1.3 JavaScript



## Tip:

For a list of supported substitution strings and to view examples, see field-level Help.

#### Available attributes include:

• File URLs - Enter JavaScript file URLs for code to be loaded on this page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.

JavaScript file URLs you enter here replaces the #TEMPLATE\_JAVASCRIPT# substitution string in the page template.

Do not include opening or closing script tags, just write the URL.

Function and Global Variable Declaration - Enter JavaScript code (for example, functions or global variable declarations) for code to be used in this page template.
 Consider putting it into an external file to avoid duplication and to leverage browser caching of static files. Code you enter here replaces the #TEMPLATE\_JAVASCRIPT# substitution string in the page template.

Do not include opening or closing script tags, just include the JavaScript code.

To reference a shortcut, use "SHORTCUTNAME".

• Execute when Page Loads - Enter JavaScript code to execute when the page loads. The code is executed after the JavaScript code generated by Oracle APEX. Code you enter here replaces the #GENERATED JAVASCRIPT# substitution string in the page template.

You do not need to add any opening or closing script tags, just the JavaScript code.

- Dialog Initialization Code This attribute only displays if the Template Type is Dialog
   Page. Enter JavaScript code to initialize the page as a dialog. The substitution strings will be replaced with their respective values at rendering time.
- **Dialog Closure Code**. This attribute only displays if the Template Type is **Dialog Page**. Enter JavaScript code to close the dialog page.
- **Dialog Cancel Code**. This attribute only applies if the Template Type is **Dialog Page**. Enter JavaScript code to cancel the dialog page.

## 11.3.14.1.4 Cascading Style Sheet

#### File URLs

Enter Cascading Style Sheet file URLs to be loaded for this page template. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.

Do not include opening or closing script tags, just include the file URL.

#### Inline

Enter Cascading Style Sheet code to be used for this page template. Consider putting it into an external file to avoid duplication and to leverage browser caching of static files. Code you enter here replaces the #TEMPLATE CSS# substitution string in the template.

Do not include opening or closing style tags, just include the cascading style sheet code.

## 11.3.14.1.5 Subtemplate

Enter the HTML for subtemplates below. Subtemplates are placed inside the body of the page template using substitution strings.

Subtemplates include:

- Success Message Enter HTML to replace the string #SUCCESS\_MESSAGE# in the template body, header, or footer.
- Navigation Bar Enter HTML or text to replace the string <code>#NAVIGATION\_BAR#</code> in the template header, body, or footer. Use the substitution string <code>#BAR\_BODY#</code> to indicate where in the Navigation Bar the entries should appear.
- **Navigation Bar Entry** Enter HTML or text to be substituted into the navigation bar #BAR BODY# substitution string for each navigation bar entry.
- Notification Enter HTML or text to be substituted when the #NOTIFICATION\_MESSAGE# substitution string is referenced in the template header, body, or footer.



## 11.3.14.1.6 Image Based Tab Attributes

Use this subtemplate for tabs that are entirely based on images. Available attributes include:

- Current Image Tab Enter HTML to be used to indicate that an image-based tab is currently selected. Include the #TAB\_TEXT# substitution string to show the displayed name of the tab.
- Non Current Image Tab Enter the HTML to be used to indicate that an image tab is not currently selected. Include the #TAB\_TEXT# substitution string to show the displayed name of the tab.

## 11.3.14.1.7 Layout

Specified the type of layout used for the page. The Type you select determines what attributes displays. To learn more about an attribute, see field-level Help.

From Type, select a layout:

- **HTML Table** Uses HTML Tables to position regions, page items, and buttons.
- Fixed Number of Columns Used for grids which divide the screen into a fixed number of grid columns.
- Variable Number of Columns Used for grids which can display up to "n" number of grid columns depending on how the regions, page items and buttons are positioned.

#### 11.3.14.1.8 Positions

Create positions for this page template. Positions enable you to identify where components (that is, regions, items, buttons) display on this page template. The substitution string of a position cannot be one of the reserved page substitution strings, (for example, NOTIFICATION\_MESSAGE).

Navigate to the Edit Page Template, Positions tab to see a complete list of reserved substitution strings.

## 11.3.14.1.9 Dialog

Dialog attributes only appear if you select a Template Type of **Dialog Page**. These settings are overwritten by a similar attributes specified at page-level.

Available Dialog attributes include:

- **Width** Enter the width of the dialog, in pixels or a percentage.
- **Height** Enter the height of the dialog in pixels, for example, 500.
- Maximum Width Enter the maximum width of the dialog, in pixels.
- CSS Classes Enter additional CSS classes you wish to be applied to the dialog, as a space delimited list.
- Allow Embed in Frames Your page template level browser frame options are listed below, along with the current setting for each. Make a selection to control if the browser is allowed to display your application's pages within a frame. The



current setting will be the default for each modal and non-modal page using this page template. To learn more, see field-level Help.

APEX embeds modal dialogs in iframes. If you set the application security attribute Browser Frame to **Deny**, checking **Allow Embed In Frame** for Modal Dialog will instead use **Allow from same origin** for dialog pages that use this template

See Also:

Required Dialog Page Template Attributes

## 11.3.14.1.10 Error Page Template Control

Use this attribute when a page template is designated as an error template.

## 11.3.14.1.11 Substitution Strings

Substitution strings are used within templates to reference component values. To view the most current list supported substitution strings for a given template, view the template and find the **Substitution Strings** report.



#### Tip:

All template substitution strings must be in uppercase letters and begin and end with a number sign (#).

# 11.3.14.2 Required Dialog Page Template Attributes

Learn about required dialog page template attributes.

To create a dialog page template, you must define the following Page Template attributes.

Table 11-10 Required Attributes for Dialog Page Templates

Attribute	Description
Name, Template Type	Must be defined as <b>Dialog Page</b> .
JavaScript, Dialog Initialization Code	Enter JavaScript code to initialize the page as a dialog. See field-level Help for function call syntax.
JavaScript, Dialog Closure Code	Enter JavaScript code to close the dialog page. See field-level Help for function call syntax.
JavaScript, Dialog Cancel Code	Enter JavaScript code to cancel the dialog page. See field-level Help for function call syntax.
Dialog, Width	Sets the default width for dialogs. The page template-level setting can be overwritten at page-level.
Dialog, Height	Sets the default height for dialogs. The page template-level setting can be overwritten at page-level.
Dialog, Maximum Width	Sets the maximum width for dialogs, in pixels. The page template-level setting can be overwritten at page-level.



Table 11-10 (Cont.) Required Attributes for Dialog Page Templates

Attribute	Description
Dialog, CSS Classes	Enter additional CSS classes you wish to be applied to dialogs. The page template-level setting can be overwritten at page-level.
Dialog, Allow Embed in Frame	Select the page mode to use this attribute to control if the browser is allowed to display your application's pages within a frame. APEX embeds modal dialogs in iframes. If you set the application security attribute Browser Frame to <b>Deny</b> , checking <b>Allow Embed In Frame</b> for Modal Dialog will instead use <b>Allow from same origin</b> for dialog pages that use this template.



**Creating Dialog Pages** 

# 11.3.15 Popup LOV Templates

Use Popup LOV templates control how popup lists display for all items defined as  ${\tt POPUP}$ .

You can only specify one popup LOV template for each theme.

Popup List of Values Template Attributes
 Learn about popup list of values template attributes.



Creating Lists of Values at the Application-Level

# 11.3.15.1 Popup List of Values Template Attributes

Learn about popup list of values template attributes.

This section describes some sections of the Edit Popup List of Values Template page. For more information on an attribute, see field-level Help.

- Search Field
- Buttons
- Window
- Pagination
- Result Set
- Page Attributes

### 11.3.15.1.1 Search Field

Use these attributes to specify how a Search field displays. Table 11-11 describes available Search Field attributes.

Table 11-11 Search Field Attributes

Attribute	Description
Before Field Text	Defines text to display before the popup list of values search field displays.
After Field Text	Displays this text after displaying the search field, the search button, and the close button.
Filter Width	Displays the HTML INPUT TYPE = TEXT widget using this width.
Filter Max Width	Displays the $\mathtt{HTML}$ INPUT TYPE = TEXT widget using this maximum width.
Filter Text Attribute	Displays the HTML INPUT TYPE = TEXT widget using these attributes. This is included within the HTML input tag.

## 11.3.15.1.2 Buttons

Use these attributes to define the button name and attributes for the Find, Close, Next, and Previous buttons.

### 11.3.15.1.3 Window

Popup lists of values are executed using JavaScript. Use these attribute to control the values of scrollbars=, resizable=, width=, and height=.

## 11.3.15.1.4 Pagination

Defines how row count results display.

### 11.3.15.1.5 Result Set

Use these attributes to define text or HTML to display before and after a result set.

## 11.3.15.1.6 Page Attributes

Use these attributes to define popup pages.

# 11.3.16 Region Templates

Region templates control the appearance and placement of region attributes.

You place region attributes using substitution strings such as #BODY#. Template substitution strings must be in upper case and begin and end with a pound sign (#).

• Region Template Attributes
Learn about region template attributes.

# 11.3.16.1 Region Template Attributes

Learn about region template attributes.

This topic describes some attributes on the Edit Region Template page. To learn more about a specific attribute, see field-level Help.

- Name
- Definition
- Layout
- Sub Regions
- Image
- JavaScript
- Cascading Style Sheet
- JavaScript
- Substitution Strings



Understanding Template Options and Managing Theme Subscriptions

#### 11.3.16.1.1 Name

**Theme** indicates the theme to which the template is a member. **Name** identifies the name of the template.

**Template Class** identifies a specific use for the template. When you switch to a new theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class. Use the **Translatable** checkbox to indicate that the template contains text strings that require translation.

#### 11.3.16.1.2 Definition

Region templates provide the appearance for a region on a page. Region templates consist of HTML code to wrap the region content and substitution strings to inject the region content. #BODY# is the only required substitution string and identifies where the source of the region should be placed. All other substitution strings are optional. Substitution strings can be either:

- Reserved APEX substitution strings
- Region positions

Region templates provide the appearance for a portion of a page called a region. Use substitution strings to indicate the existence and placement of a component within the region. #BODY# is the only required substitution string and identifies where the source of the region should be placed. All other substitution strings are optional. The following are valid substitution strings:



The following reserved APEX substitution strings are used to substitute content from the region defined in Page Designer:

- #TITLE#
- #PAGE TITLE#
- #SUB REGION HEADERS#
- #FORM OPEN#
- #FORM CLOSE#
- #REGION\_ID#
- #REGION STATIC ID#
- #REGION\_CSS\_CLASSES#
- #REGION ATTRIBUTES#
- #REGION HEADER#
- #REGION\_FOOTER#
- #REGION\_IMAGE#
- #REGION\_IMAGE\_URL#
- #REGION\_IMAGE\_ALT\_TEXT#
- #REGION IMAGE ATTRIBUTES#

The region positions are used to substitute other components inside the region. They are defined in the Positions section of the region template. This is where you will find region positions such as #BODY#, #SUB REGIONS# and other custom positions.



**Using Substitution Strings** 

## 11.3.16.1.3 Layout

Page items can be displayed within regions. If the page template layout uses HTML table, each item in a region is part of an HTML table. You can set the attributes of this table using this attribute. Note that this section is not used if the page template layout uses a fixed grid system.

# 11.3.16.1.4 Sub Regions

#### **Header Template**

Sub region header templates together with sub region header entry templates provide the possibility to generate a list of region titles of all the sub regions of the current region.

#ENTRIES# is the only required substitution string. It identifies where the sub region header entries should be placed. All other substitution strings are optional.



The following are valid substitution strings: #ENTRIES#, #REGION\_ID#, and #REGION\_STATIC\_ID#.Use #SUB\_REGION\_HEADERS# in the region template to place the output of this template.

#### **Header Entry Template**

Sub region header entry templates together with the sub region header templates provide the possibility to generate a list of region titles of all the sub regions of the current region.

The following are valid substitution strings: #SUB\_REGION\_ID#, #SUB\_REGION\_TITLE#, #REGION\_ID#, and #REGION\_STATIC\_ID#. Use #ENTRIES# in the sub region header template to place the output of this template.

#### **Template**

Sub Region templates provide the possibility to wrap the sub regions with additional HTML code. #SUB\_REGION# is the only required substitution string. It identifies where the source of the sub region should be placed. All other substitution strings are optional.

The following are valid substitution strings: #SUB\_REGION#, #SUB\_REGION\_ID#, #SUB\_REGION\_TITLE#, #REGION\_ID#, and #REGION\_STATIC\_ID#. Use #SUB\_REGIONS# in the region template to place the output of this template.

## 11.3.16.1.5 Image

#### **Template**

The Image template provides the possibility of defining a region image with additional HTML code.

#REGION\_IMAGE\_URL# is the only required substitution string and should be used within an img HTML tag. It specifies the img src attribute. All other substitution strings are optional.

The following are valid substitution strings:

- #REGION IMAGE URL#
- #REGION IMAGE ALT TEXT#
- #REGION\_IMAGE\_ATTRIBUTES#
- #REGION ID#
- #REGION STATIC ID#

Use #REGION IMAGE# in the region template to place the output of this template.

## 11.3.16.1.6 JavaScript



#### diT

For a list of supported substitution strings and to view examples, see field-level Help.

#### Available attributes include:

• File URLs - Enter JavaScript file URLs for code to be loaded on this page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.

JavaScript file URLs you enter here replaces the #TEMPLATE\_JAVASCRIPT# substitution string in the page template.

Do not include opening or closing script tags, just write the URL.

**Execute when Page Loads** - Enter JavaScript code to execute when the page loads. The code is executed after the JavaScript code generated by Oracle APEX.

Do not include opening or closing script tags, just include the JavaScript code.

## 11.3.16.1.7 Cascading Style Sheet

#### File URLs

Enter Cascading Style Sheet file URLs to be loaded for this page template. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.

You do not need to include opening or closing link tags. Just include the file URL.

## 11.3.16.1.8 JavaScript



#### Tin:

For a list of supported substitution strings and to view examples, see field-level Help.

#### Available attributes include:

• File URLs - Enter JavaScript file URLs for code to be loaded on this page. Each URL has to be written into a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You also have access to the substitution string #APP\_VERSION# if you want to include the application's version in the file URL.

JavaScript file URLs you enter here replaces the #TEMPLATE\_JAVASCRIPT# substitution string in the page template.

Do not include opening or closing script tags, just write the URL.

• Execute when Page Loads - Enter JavaScript code to execute when the page loads. The code is executed after the JavaScript code generated by Oracle APEX.

Do not include opening or closing script tags, just include the JavaScript code.

## 11.3.16.1.9 Substitution Strings

Substitution strings are used within templates to reference component values. To view the most current list supported substitution strings for a given template, view the template and find the **Substitution Strings** report.



#### Tip:

All template substitution strings must be in uppercase letters and begin and end with a number sign (#).

# 11.3.17 Report Templates

Report column templates provide you with control over the results of a row from a SQL query. This type of template defines a cell, not an entire row.

Each report template identifies column names using the syntax #1#, #2#, #3#, and so on. You can also name columns using column name substitution syntax such as #ENAME# or #EMPNO#. You can reference any item from your application within your template. For example, to reference an item called ABC. in your template, you could include the exact substitution string &ABC.. The actual value of ABC. would be provided by an end user editing an item in your application named ABC.

- Generic Column Templates and Named Column Templates
   Oracle APEX includes two types of report templates: Generic Column Templates and Named Column Templates.
- Report Column Template Attributes for Generic Column Templates
   Learn about report column template attributes for generic column templates.
- Report Column Template Attributes for Named Column Templates
   Learn about report column template attributes for named column templates.
- About Using JavaScript in Column Templates
   Learn about about using JavaScript in column templates.

# 11.3.17.1 Generic Column Templates and Named Column Templates

Oracle APEX includes two types of report templates: Generic Column Templates and Named Column Templates.

- Generic Column Templates
   Learn about generic column templates.
- Named Column Templates
   Learn about named column templates.

## 11.3.17.1.1 Generic Column Templates

Learn about generic column templates.

A generic column template determines the appearance of a report by defining the look of the column once. This look is then repeated as many times as is necessary, based on the number of columns specified in the report's definition. This type of template is

limited to reports that have a standard row and column structure. Additional style can be applied to a report using this type of template through the use of conditions.

The following example demonstrates how to have each column use a specific style:

```
#COLUMN VALUE#
```

This example assumes your page template includes a CSS containing the class tabledata. This example also demonstrates the use the substitution strings #ALIGN# and #COLUMN\_VALUE#. If you actually ran this report, these substitution strings would be replaced with values generated by the results of a SQL query.

If your query uses an expression in the select list, it is a good idea to create an alias for the columns to avoid runtime errors. For example, suppose your query was as follows:

```
SELECT ename, (sal + comm) * 12 FROM emp
```

You could rewrite the query to alias the columns as follows:

```
SELECT ename, (sal + comm) * 12 yearly comp FROM emp
```

## 11.3.17.1.2 Named Column Templates

Learn about named column templates.

Named column templates allow for more flexibility in report design. However, because they reference columns by name, they can only be used by reports that are based on those columns. For example:

```
#ENAME##SAL#
```

Although named column templates offer flexibility, you may need to create a new template for each query. You can also include a position notation. The following example demonstrates how to use following HTML and substitution strings:

```
#ENAME##SAL##1##2#
```

# 11.3.17.2 Report Column Template Attributes for Generic Column Templates

Learn about report column template attributes for generic column templates.

This topic describes specific sections of the Edit Report Template page for Generic Column Templates. To learn more about a specific attribute, see field-level Help.

- Report Template
- Before Rows
- Column Headings
- Before Each Row
- Column Templates
- After Each Row
- After Rows
- Row Highlighting
- Pagination Subtemplate



#### Comments

## 11.3.17.2.1 Report Template

**Template Name** identifies the name of the template. **Template Type** indicates the type of template. Named Column templates reference column names in the template. Generic Column Templates reference the #COLUMN\_VALUE# substitution string in the template.

**Theme** indicates the theme to which the template is a member. **Template Class** identifies a specific use for the template. When you switch to a new theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class. Use the **Translatable** checkbox to indicate the template contains text strings that require translation.

#### 11.3.17.2.2 Before Rows

In **Before Rows**, enter HTML that displays once at the beginning of a report template.

Opening an HTML table is a common use of this attribute as shown in the following example:

You can include pagination above a report by including the substitution string  $\#TOP\_PAGINATION\#$ . This substitution string generates HTML that starts with an opening < tag and ends with a closing < tag. For example, to include an open table tag and the  $\#TOP\_PAGINATION\#$  substitution string, you would enter the following:

```
#TOP PAGINATION#
```

You can also include the substitution string  $\#CSV_LINK\#$  to include support for exporting your report to comma-separated value (CSV) format, a format compatible with most spreadsheet programs.

You can also use the substitution string #REPORT\_ATTRIBUTES#. This substitution string is set per report region on the report attributes page.

# 11.3.17.2.3 Column Headings

Use **Before Column Heading** to display text before report heading.

Use **Column Heading Template** to colorize each column header cell. The text of this attribute must include Help to indicate where the cell heading text should be colorized. For example:

```
Item Help Text
```

If you do not want any column headings, enter the following:

OMIT

If you do use this attribute, APEX engine applies the default column heading template.

Use **After Column Heading** to display text after report headings.



#### 11.3.17.2.4 Before Each Row

In **Before Each Row**, enter text to display before all columns in the report. Use this attribute to open a new HTML row. Before Each Row supports the following substitution strings:

#ROWNUM#

Use this substitution string to specify the current row.

#COLCOUNT#

Use this substitution string to specify the number of columns.

#HIGHLIGHT ROW#

Use this substitution string to specify the number of highlighted rows.

## 11.3.17.2.5 Column Templates

Column templates define the look of each column. You can define up to four column templates; each can be conditional. For example, you can have different background colors for even and odd rows, or highlight rows that meet a PL/SQL defined condition.

In each Column Template, you define the look of each column. Column Templates support the substitution strings described in Table 11-12.

**Table 11-12 Column Template Substitution Strings** 

Substitution String	Description
#ALIGNMENT#	Determines the column alignment. Specified by the user.
#COLCOUNT#	Defines the count of the number of columns.
#COLNUM#	Defines the current column number.
#COLUMN_HEADER#	Defines the column header.
#COLUMN_VALUE#	Replaced with the value of the column.
#ROWNUM#	Specifies the current row number.

### Consider the following example:

#ALIGNMENT#>#COLUMN VALUE#

If you actually ran this report, these substitution strings would be replaced with values generated by the results of a SQL query.

By creating conditions, you can create a report that displays columns differently depending on whether the specified condition is met. To specify a column template be used conditionally, select a condition type from the Column Template Condition list. Valid values include:

- Use Based on PL/SQL Expression. Conditionally formats columns based on data in that row.
- Use for Even Numbered Rows. Conditionally formats even numbered rows.
- Use for Odd Numbered Rows. Conditionally formats odd numbered rows.



If you select **Use Based on PL/SQL Expression**, the next step is to enter a PL/SQL expression in the Column Template Expression field. For example, the following expression displays a value in bold if the value is greater than 2000:

#SAL# > 2000

You could also use the substitution string #ROWNUM#. For example:

#ROWNUM# > 2000

### 11.3.17.2.6 After Each Row

In **After Each Row**, enter HTML that displays after all columns in the report display. This attribute is often used to close an HTML table row. For example:

### 11.3.17.2.7 After Rows

Use **After Rows** to specify text that should display after the last row. A common use of this attribute is to close the HTML table tag. For example:

The After Rows attribute supports the following substitution strings:

#PAGINATION#

Replaced with a pagination attribute.

#COLCOUNT#

Substituted at runtime with the number of columns defined in the report.

#CSV LINK#

Substituted at runtime with CSV download link if CSV export is enabled. Otherwise the string is not shown.

#EXTERNAL LINK#

Substituted at runtime with the download link for exports using external processing engine for (for example, PDF export). If this feature is not enabled, the string is not shown.

## 11.3.17.2.8 Row Highlighting

**Background color for checked row** controls the background color of a report row when the row selector is checked. **Background color for current row** controls the background color of a report row when the user moves the mouse over the row.

## 11.3.17.2.9 Pagination Subtemplate

The Pagination Subtemplate section contains attributes for editing the Pagination Template, Next Page Template, Previous Page Template, Next Set Template, and Previous Template. Pagination Subtemplates support the substitution strings #PAGINATION\_NEXT#, #PAGINATION\_NEXT\_SET#, #PAGINATION\_PREVIOUS# and #PAGINATION PREVIOUS SET#. Table 11-15 describes these templates.



**Table 11-13 Pagination Subtemplate Attributes** 

Pagination Subtemplate Attribute	Description
Pagination Template	Applies to the entire pagination subtemplate. For example:
	<pre><span class="instructiontext">#TEXT#</span></pre>
	Use the substitution string #TEXT# to specify where you want the pagination subtemplate to display.
	Use the other Pagination Subtemplate attributes to modify individual items.
Next Page Template	Enter HTML to modify how the Next Page portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">next</a>
Previous Page Template	Enter HTML to modify how the Previous Page portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">previous</a>
Next Set Template	Enter HTML to modify how the Next Set portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">next set</a>
Previous Set Template	Enter HTML to modify how the Previous Set portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">previous set</a>

## 11.3.17.2.10 Comments

Use this attribute to record comments about this component.

# 11.3.17.3 Report Column Template Attributes for Named Column Templates

Learn about report column template attributes for named column templates.

This topic describes specific sections of the Edit Report Template page for Named Column Templates. You can access the sections of the page by either scrolling down the page, or by clicking a navigation button at the top of the page. When you select a button at the top of the page, the selected section appears and all other sections are temporarily hidden. To view all sections of the page, click **Show All**.

- Name
- Subscription
- Row Templates
- Column Headings
- · Before first and after last row text
- Pagination
- Comments



#### 11.3.17.3.1 Name

**Template Name** identifies the name of the template. **Template Type** indicates the type of template. Named Column templates reference column names in the template. Generic Column Templates reference the #COLUMN\_VALUE# substitution string in the template.

**Theme** indicates the theme to which the template is a member. Use the **Translatable** checkbox to indicate the template contains text strings that require translation. **Template Class** identifies a specific use for the template. When you switch to a new theme, all templates in one theme are mapped to corresponding templates in another theme. App Builder accomplishes this template mapping through the assignment of a template class.

## 11.3.17.3.2 Subscription

Use Subscription to apply an existing template to the current application. When you select an existing template, you become a subscriber to that template.

To load a new copy of a master template, click **Refresh**.

## 11.3.17.3.3 Row Templates

Row templates define the look of each column. You can define up to four row templates, each of which can be conditional.

In each Row Template, you define the look of each row. Row Templates support the substitution strings described in Table 11-14.

Table 11-14 Row Template Substitution Strings

Substitution String	Description
#ALIGNMENT#	Determines the row alignment. Specified by the user.
#COLCOUNT#	Defines the count of the number of columns.
#COLNUM#	Defines the current column number.
#COLUMN_HEADER#	Defines the column header.
#COLUMN_VALUE#	Replaced with the value of the column.
#ROWNUM#	Specifies the current row number.

By creating conditions, you can create a report that displays rows differently depending on whether the specified condition is met. To specify a row template be used conditionally, select a condition type from the Column Template Condition list. Valid values include:

- Use Based on PL/SQL Expression. Conditionally formats columns based on data in that row.
- Use for Even Numbered Rows. Conditionally formats even numbered rows.
- Use for Odd Numbered Rows. Conditionally formats odd numbered rows.

If you select **Use Based on PL/SQL Expression**, the next step is to enter a PL/SQL expression in the Column Template Expression field. For example, the following expression displays a value in bold if the value is greater than 2000:

#SAL# > 2000

You could also use the substitution string #ROWNUM#. For example:

#ROWNUM# > 2000

#### 11.3.17.3.4 Column Headings

Use this template to add color to each column header cell. The text of this attribute must include help to indicate where the cell heading text should be colorized. If you do not enter a Column Heading Template, then a default column header template is applied. If you do not want any column headings, then enter <code>OMIT</code>. For example:

#COLUMN HEADER#

#### 11.3.17.3.5 Before first and after last row text

In **Before Rows**, enter HTML that displays once at the beginning of a report template. Opening an HTML table is a common use of this attribute, as shown in the following example:

You can identify column headers using the syntax #1#, #2#, #3#. For example:

#1##2##3#

You can include pagination above a report by including the substitution string #TOP\_PAGINATION#. This substitution string generates HTML that starts with an opening 
 tag and ends with a closing 
 tag. For example, to include an open table tag and #TOP PAGINATION# substitution string, you would enter the following:

#TOP PAGINATION#

You can also include the substitution string  $\#CSV\_LINK\#$  to include support for exporting your report to CSV format, a format compatible with most spreadsheet programs.

Use **After Rows** to specify text that should display after the last row. A common use of this attribute is to close the HTML table tag. For example:

The After Rows attribute supports the following substitution strings:

#PAGINATION#

Replaced with a pagination attribute.

#COLCOUNT#

Substituted at runtime with the number of columns defined in the report.

#### 11.3.17.3.6 Pagination

The Pagination section contains attributes for editing the Pagination Template, Next Page Template, Previous Page Template, Next Set Template, and Previous Template. Pagination Subtemplates support the substitution strings #PAGINATION\_NEXT#, #PAGINATION\_NEXT\_SET#, #PAGINATION\_PREVIOUS# and #PAGINATION\_PREVIOUS\_SET#. Table 11-15 describes these templates.



**Table 11-15 Pagination Subtemplate Attributes** 

Pagination Subtemplate Attribute	Description
Pagination Template	Applies to the entire pagination subtemplate. For example:
	<pre><span class="instructiontext">#TEXT#</span></pre>
	Use the substitution string #TEXT# to specify where you want the pagination subtemplate to display.
	Use the other Pagination Subtemplate attributes to modify individual items.
Next Page Template	Enter HTML to modify how the Next Page portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">next</a>
Previous Page Template	Enter HTML to modify how the Previous Page portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">previous</a>
Next Set Template	Enter HTML to modify how the Next Set portion of the pagination subtemplate appears. For example:
	<a href="#LINK#">next set</a>
Previous Set Template	Enter HTML to modify how the Previous Set portion of the pagination subtemplate appears. For example:
	<pre><a href="#LINK#">previous set</a></pre>

#### 11.3.17.3.7 Comments

Use this attribute to record comments about this component.

### 11.3.17.4 About Using JavaScript in Column Templates

Learn about about using JavaScript in column templates.

You can conditionally display HTML depending upon values in the database using JavaScript. The following example displays an HTML row only if the <code>GROUP\_DESC</code> query column is not null:

```
<script language="javascript">
IF ( "#GROUP_DESC#" != "" )
document.writeln( "<TR>;
<TD BGCOLOR=#336699>;</TD>
</TR>
</TR>
</TC>
</TR>
</TC>
</TR>
</TR>" );</TR>" );</TC>
```





# 11.4 Using Custom Cascading Style Sheets

Control the style of a web page by uploading and referencing a cascading style sheet.

- **About Cascading Style Sheets** A cascading style sheet (CSS) enables a developer to control the style of a web page without changing its structure.
- Referencing an Uploaded Cascading Style Sheet in the Page Template Reference an uploaded cascading style sheet within the Header section of the page template.

# 11.4.1 About Cascading Style Sheets

A cascading style sheet (CSS) enables a developer to control the style of a web page without changing its structure.

When used properly, a CSS separates visual attributes such as color, margins, and fonts from the structure of the HTML document. Oracle APEX includes themes that contain templates that reference their own CSS. The style rules defined in each CSS for a particular theme also determine the way reports and regions display.



If your application uses *Universal Theme - 42*, you can also take advantage of theme styles and update the appearance of your application using Theme Roller. See Using Theme Styles and Using the Theme Roller Dialog.

#### **About Uploading Cascading Style Sheets**

You can upload files (including CSS files) for use by a specific application or all applications within a workspace. To learn more, see Managing Static Application Files and Managing Static Application Files.

# 11.4.2 Referencing an Uploaded Cascading Style Sheet in the Page **Template**

Reference an uploaded cascading style sheet within the Header section of the page template.

Use the Header section to enter the HTML that makes up the <HEAD> section of the HTML document.

To reference an uploaded cascading style sheet:

Navigate to the Themes page:

- a. On the Workspace home page, click the **App Builder** icon.
- b. Select an application.
- c. Click Shared Components.
- d. Under User Interface, select Themes.

The Themes page appears.

- 2. Select a theme.
- 3. On the Tasks list, click View Templates.
- 4. Select the name of the page template you want to edit.
- Use a <link> tag within the Header section to reference the appropriate style sheet.

To reference an uploaded file that is associated with a specific application, you would use the substitution string #APP FILES#. For example:

To reference an uploaded file that is associated with a specific workspace, you would use the substitution string #WORKSPACE FILES#. For example:

#### See Also:

- About Cascading Style Sheets
- Creating a New Template
- Managing Templates
- Page Templates
- APP\_FILES
- WORKSPACE\_FILES



# Controlling Page Layout

Developers can customize their application's page layout by using a global page, customizing regions, and editing item attributes.

This section also describes how to manage images and static files as well as explains how to render HTML using custom POL/SQL.

#### About Page Layout in Oracle APEX

The Oracle APEX engine renders pages by combining templates with application components defined by the developer and data in the database.

#### Optimizing a Page for Printing

You can optimize a page for printing by creating a specific Printer Friendly template and selecting that template on the Create/Edit Theme page.

Creating a Global Page to Display Components on Every Page
 A global page (previously referred to as Page 0) functions as a master page.

#### Managing Regions

Regions function as containers for content.

#### About Incorporating Content from Other Websites

To incorporate content from other servers, you can create a region based on a URL to display content.

#### About Managing Images

To reference an image within an application, you must upload it to the static file repository. During the upload process, you specify whether the file is available to all applications or just a specific application.

#### Rendering HTML Using Custom PL/SQL

If you must generate specific HTML content not handled by Oracle APEX forms, reports, and charts, you can use the PL/SQL region type.

### See Also:

- Adding Navigation
- Editing User Interface Attributes
- Using Themes and Theme Styles

# 12.1 About Page Layout in Oracle APEX

The Oracle APEX engine renders pages by combining templates with application components defined by the developer and data in the database.

The overall framework (or structure of a page) is determined by the page template. For example, the page template controls if a page uses tabs and a navigation bar. It can also

define if a page includes a bar on the left side that serves as a placeholder for navigation or secondary content. Finally, a page template can include definitions of region positions, which enable precise control over placement of regions using HTML tables or style sheet definitions. The page template itself is composed of HTML combined with substitution strings, which are substituted with the appropriate components at runtime.

As a developer, you add content to a page by creating a region. A **region** is an area of a page that serves as a container for content. Each region contains a different type of content such as HTML, a report, a form, a chart, a list, a breadcrumb, PL/SQL, a tree, a URL, or a calendar. You position a region either relative to other regions (that is, based on its sequence number and column), or by using a region position defined in the page template. The style of the region is also controlled by the region template. Like the page template, the region template defines the structure of the area that the region takes up on a page. It defines if the region title is displayed and where it is displayed relative to the main content or the body. A region can also define absolute positions for buttons.

See Also:

Using Themes and Theme Styles

# 12.2 Optimizing a Page for Printing

You can optimize a page for printing by creating a specific Printer Friendly template and selecting that template on the Create/Edit Theme page.

Generally, a Printer Friendly template optimizes a page for printing. For example, a Printer Friendly template might:

- Not display tabs or navigation bars
- Display items as text instead of as form elements

If the theme you select does not include a printer friendly template, you can create a Printer Friendly template by creating a new page template.

- Selecting a Printer Friendly Template for an Application
   Learn about selecting a printer friendly template for an application.
- Using f?p Syntax to Toggle to Printer Friendly Mode
   Learn about using f?p syntax to toggle to Printer Friendly mode.

See Also:

Editing Themes and Accessing New Themes

# 12.2.1 Selecting a Printer Friendly Template for an Application

Learn about selecting a printer friendly template for an application.



To select a Printer Friendly template:

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under User Interface, select Themes.

The Themes page appears.

- 2. Select a theme.
- 3. Scroll down to Component Defaults.
- 4. Make a selection from the Printer Friendly Page list.
- 5. Confirm your changes and click **Apply Changes**.



**Editing Themes** 

# 12.2.2 Using f?p Syntax to Toggle to Printer Friendly Mode

Learn about using f?p syntax to toggle to Printer Friendly mode.

Once you create a Printer Friendly template and select it, you can use f?p syntax to toggle to Printer Friendly mode. Including the ninth f?p syntax argument (PrinterFriendly) renders the page in printer friendly mode (optimizing printed output). For example, you could include this argument when coding a link or creating a navigation bar icon.



About Using f?p Syntax to Link Pages

# 12.3 Creating a Global Page to Display Components on Every Page

A global page (previously referred to as Page 0) functions as a master page.

- Creating a Global Page
   Create a Gobal page using the Create Page Wizard.
- Viewing or Editing a Global Page
   View or edit a Global page in Page Designer.



#### See Also:

- Managing Pages in an Application
- Understanding Conditional Rendering and Processing
- Available Conditions

# 12.3.1 Creating a Global Page

Create a Gobal page using the Create Page Wizard.

Developers can create a separate Global page for each user interface. The Oracle APEX engine renders all components you add to a Global page on every page within your application. You can further control whether the APEX engine renders a component or runs a computation, validation, or process by defining conditions.

To create a Global page:

- 1. On the Workspace home page, click **App Builder**.
- 2. Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

4. Under Component, select Global Page.



#### Tip:

The **Global Page** option only appears if the application does not have a Global page..

- 5. Page Number The page number is an integer value that identifies a page within an application.
- 6. Click Create Page.

# 12.3.2 Viewing or Editing a Global Page

View or edit a Global page in Page Designer.

To view or edit a Global page:

- 1. On the Workspace home page, click the **App Builder** icon.
  - The App Builder home page appears.
- 2. Select an application.

The Application home page appears.

3. Select Global Page (or Page Zero if this is an older application).

The page displays in Page Designer.



# 12.4 Managing Regions

Regions function as containers for content.

About Regions
 Learn about regions.

Creating a Region in Page Designer

Create a new region manually in Page Designer from either the Rendering tab or the Gallery.

Editing Regions

Alter the appearance of a page by editing Region attributes.

Copying a Region
 Copy a region in Page Designer.

Deleting Regions
 Delete regions on Page Designer.

# 12.4.1 About Regions

Learn about regions.

Each page in an Oracle APEX application contains one or more regions. A region is an area on a page that serves as a container for content. Each page can have any number of regions. You control the appearance of a region through a specific region template. The region template controls the look of the region, the size, determines whether there is a border or a background color, and what type of fonts display. A region template also determines the standard placement for any buttons placed in region positions.

You can use regions to group page controls (such as items or buttons). You can create simple regions that do not generate additional HTML, or create elaborate regions that frame content within HTML tables or images.

Regions display in sequence in the page template body or can be placed explicitly into region positions. The page structure can be defined using HTML tables or more commonly today, using DIV tags.

# 12.4.2 Creating a Region in Page Designer

Create a new region manually in Page Designer from either the Rendering tab or the Gallery.

A region is a container for content. When you create an application or page using a wizard, the wizard creates the appropriate region for you. You can also create regions manually in Page Designer.

- Creating a Region from the Rendering Tab
   Add a region from the Rendering tab by right-clicking a component or container to display a context menu.
- Creating a Region from the Gallery
   Add a region by clicking the Gallery, Region tab and right-clicking a region to display a context menu.
- Supported Region Types
   Learn about supported region types in Page Designer.



### 12.4.2.1 Creating a Region from the Rendering Tab

Add a region from the Rendering tab by right-clicking a component or container to display a context menu.

The Rendering tab displays in the the left pane of Page Designer and displays all components that are rendered on a page.

To create region from the Rendering tab:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.
- 2. In the left pane, select the **Rendering** tab.
- 3. Right-click an existing container to display the context menu.
- 4. From the context menu, select Create Region.
- 5. In the Property Editor, edit the appropriate attributes:
  - **a.** Title Enter a region title. The region title only displays when it is defined in the region template.
  - **b.** Type Specify how the region is rendered.

To learn more about supported region types, see Page Designer Help or Supported Region Types.



#### Tip:

To select a legacy region, select **Show Legacy...** from the Type list. Legacy region types appear in the list. Although Oracle still supports legacy application components, Oracle does not recommend using them.

 Edit the remaining attributes. The attributes that display depend upon the region Type.

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

6. Click Save or Save and Run Page.

### 12.4.2.2 Creating a Region from the Gallery

Add a region by clicking the Gallery, Region tab and right-clicking a region to display a context menu.

The Gallery displays beneath the Layout tab in the central pane of Page Designer. The Gallery contains three tabs: Regions, Items, and Buttons.

To create a region from the Gallery:

- View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.



- b. Select an application.
- c. Select a page.

Page Designer appears.

- 2. In Page Designer, click the **Layout** tab in the central pane.
- 3. In the Gallery at the bottom of the central pane:
  - a. Click the Region tab.
  - **b.** Right-click a region to view the context menu.



To view legacy components, right-click a region and select **Show Legacy Components**. Legacy components appear. Although Oracle still supports legacy application components, Oracle does not recommend using them.

c. Select **Add To** and then the location where you want to add the component.

Page Designer indicates what actions are required next. If there is an error, a **Messages** icon displays in the Page Designer toolbar. Click the **Messages** icon to view a dialog listing all the errors. Select an error to highlight the associated attribute in the Property Editor.

- 4. Edit the appropriate attributes in the Property Editor.
  - **a.** Title Enter a region title. The region title only displays when it is defined in the region template.
  - **b.** Type Specify how the region is rendered.

To learn more about supported region types, see Page Designer Help or Supported Region Types.



#### Tip:

To select a legacy region, select **Show Legacy...** from the Type list. Legacy region types appear in the list. Although Oracle still supports legacy application components, Oracle does not recommend using them.

**c.** Edit the remaining attributes. The attributes that display depend upon the region Type.

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. Click Save or Save and Run Page.



#### Tip:

You can also drag and drop components from the Gallery. Click and hold the mouse on the region to be created and drag it the desired location in the Layout tab. When the mouse is over the appropriate location, the Layout tab displays as a darkened yellow tile. Release the mouse to drop the component. You can only drop components into appropriate drop positions, as determined by the component type.



### 12.4.2.3 Supported Region Types

Learn about supported region types in Page Designer.

The region Type determines how a region is rendered at runtime. When creating a region manually, Page Designer supports the following region types:

- Breadcrumb Display the breadcrumb trail for the current page. See Creating Breadcrumbs.
- Calendar Display date based entries on a variety of calendar views. With the
  inclusion of an end date, the calendar can display duration based events.
   Calendars can also update records directly if **Drag and Drop** is enabled. See
  Creating Calendars.
- Cards Create a report based on a SQL Query that displays data as an orderly layout of information tiles. Developers choose between three layouts: Grid, Float, or Horizontal (Row). You can customize Header, Media, Body or Actions declaratively. See Managing Cards.
- Chart Displays data using various built-in chart types. See Creating Charts.
- Classic Report Create a simplified report based on a SQL Query. Classic reports are similar to interactive reports, but do not include the numerous end-user customization options available with interactive reports. See Managing Classic Reports.
- Column Toggle Report Displays a report where end users can select the columns to display at runtime. End users can then change the columns based on the width and orientation of the screen they are using to display the report. See Managing Classic Reports.
- Dynamic Content Displays the HTML content returned by a function.
- Faceted Search Displays and filters data using an intuitive experience users recognize from ecommerce sites (a left Search region and report region). Displays search results as cards or a classic report. See Managing Faceted Search.
- Form Form region which supports different data sources. This form region holds information on the data source (which can be local, remote or REST service) and has page items assigned to it. Each item is assigned to a form region and a display region. See <u>Developing Forms</u>.
- Help Text Displays a special Help region utilized on the dedicated Help page.
   See Creating Help for Your Application.
- Interactive Grid Presents data in a searchable, customizable report. Includes similar customization capabilities available in interactive reports plus the ability to rearrange the report interactively using the mouse or keyboard.
  - Define a single interactive grid and have end users manipulate the data displayed to meet their specific requirements, rather than you needing to develop several, similar regions with different criteria to meet those same requirements.
  - See Managing Interactive Grids.
- Interactive Report Comprehensive online report based on a SQL Query that
  provides end users with numerous features for customizing the report layout at
  run-time. You can control end-user capabilities by enabling or disabling the various
  report customization options.



Define a single interactive report and have end users manipulate the data displayed to meet their specific reporting requirements, rather than you needing to develop several, similar reports with different criteria to meet those same requirements.

See Managing Interactive Reports.

- List Displays values based on either a static or dynamic list. Generally these are used for navigating to pages in the application. See Creating Lists.
- List View Display data in an easy to navigate list. You can also incorporate numerous features to enhance the list view. See Creating a List View Report.
- Map Report based on a SQL query that displays coordinates data as a map. Supports point, lines, and polygon data. See Creating Maps.
- Reflow Report Display a responsive report which transforms from columns to rows to display reports on smaller browser (screen) sizes. See Creating a Reflow Report.
- Region Display Selector Display region names in a horizontal list, enabling end users to select one region to display and hide other regions. Only page regions with Region Display Selector set to Yes will display in this region.
- Smart Filters Features a single search field at the top of the page and a search results report (classic report, cards, map, or calendar). While a smart filter behaves similarly to faceted search, it features a more space efficient layout.. See Managing Smart Filters.
- Static Content Display text content or a region container for page items. To output HTML markup and not have the content escaped, set Output As to HTML.
- Trees Display data in a hierarchical structure, based on parent-child relationships between records. See Managing Trees.
- URL Display remote content sourced from a URL.



Depending on your application configuration, additional region type plug-ins available may display in your environment with the naming convention, <*My Plug-in*> [*Plug-in*].

# 12.4.3 Editing Regions

Alter the appearance of a page by editing Region attributes.

- Editing Region Attributes Edit Region attributes in Page Designer.
- Controlling Region Positioning
   Use the Layout, Position attribute to select the template position for this region.
- Specifying a Region Header and Footer
   Edit the Header and Footer attributes to specify additional HTML to be placed above and below a region.
- Enabling Region Caching
  Enable region caching to improve the performance of static regions such as regions
  containing lists that do not use conditions or regions containing static HTML.



#### Enabling Users to Customize a Page

Use the Customizable attribute to control whether display attributes in a region can be customized by users.

#### Specifying a Static Region ID

Specifying a static region ID is useful when creating custom JavaScript or cascading style sheets.

#### Adding a Region Image

Use Region Image and Image Tag Attributes to add an image to the upper left side of a region.

#### Creating a Region Display Selector

Create a Region Display Selector region to include show and hide controls for each region on a page. to include the current region in the Region Display Selector.

### 12.4.3.1 Editing Region Attributes

Edit Region attributes in Page Designer.

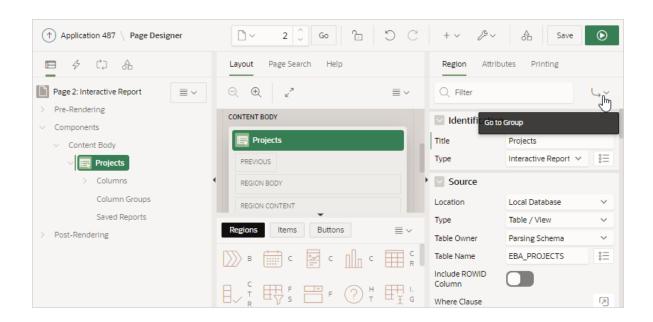
To edit region attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the region.

The Property Editor displays attributes in the **Region** tab in the right pane.



To find a group or attribute:



- **Search for the group or attribute** Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 3. Edit the Region attributes in the Property Editor.

To learn more about an attribute, see field-level Help.

4. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



Right Pane of Page Designer (Property Editor)

### 12.4.3.2 Controlling Region Positioning

Use the Layout, Position attribute to select the template position for this region.

Configure the **Layout**, **Position** attribute to select the position used to display a region. The positions are derived from the appropriate page or region template positions.

### 12.4.3.3 Specifying a Region Header and Footer

Edit the Header and Footer attributes to specify additional HTML to be placed above and below a region.

In the **Header Text** attribute, enter HTML text to display at the top of the region above the #BODY# content. For all report regions, the substitution string #TIMING# shows the elapsed time in seconds used when rendering a region. You can use this substitution string for debugging purposes.

In the **Footer Text** attribute, enter a region footer that displays directly after the body content, after #BODY# in the region template. You may use shortcuts, as well as the substitution string #TIMING#, to display the time consumed to render the region.

For classic report regions, the region footer supports the following substitution strings:

• #ROWS\_FETCHED# shows the number of rows fetched by the Oracle APEX reporting engine (the page size). You can use these substitution strings to display customized messages to the user. For example:

```
Fetched \#ROWS FETCHED# rows in \#TIMING\# seconds
```

 #TOTAL\_ROWS# displays the total number of rows that satisfy a SQL query used for a report. For example:

```
Z in rows X - Y of Z
```

 #FIRST\_ROW\_FETCHED# and #LAST\_ROW\_FETCHED# display the range of rows displayed. For example:

Row(s) #FIRST\_ROW\_FETCHED# through #LAST\_ROW\_FETCHED# of #ROWS\_FETCHED# displayed



### 12.4.3.4 Enabling Region Caching

Enable region caching to improve the performance of static regions such as regions containing lists that do not use conditions or regions containing static HTML.

When you enable region caching, the APEX engine renders a region from a cached (or stored) repository instead of rendering it dynamically. Keep in mind that the actual session identifiers are not cached. Instead, the APEX engine caches a &SESSION. substitution string and the current session rendering the cached region is substituted on display. For example, if a region contains a link and the link includes a session, the exact session is not cached to ensure that the links works for all sessions.

The APEX engine only renders a region from cache if it meets the defined condition. Additionally, regions can be cached specific to a user or cached independent of a user.

To enable region caching:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the region.

The Property Editor displays attributes in the **Region** tab in the right pane.

- 3. Server Cache, Caching Select one of the following:
  - Disabled Content is not cached and computed for each request.
  - Enabled Content is cached and utilized by all users.
  - Cached by User Content is cached specifically for each user.
  - Cache by Session Content is cached specifically for each session.
- 4. Click Save.



Managing Page and Region Caching in Oracle APEX Administration Guide

### 12.4.3.5 Enabling Users to Customize a Page

Use the Customizable attribute to control whether display attributes in a region can be customized by users.

To use this feature, you must include the #CUSTOMIZE# substitution string in the Header, Body, or Footer section of the page template.

If at least one region supports end-user customization, a **Customize** link appears wherever you include the #CUSTOMIZE# substitution string in the page template. When users click this link, a window appears, enabling them to display or hide regions on the page.



To enable end user customization:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Select the region in the Rendering tab or the Layout tab.

The Property Editor displays attributes in the **Region** tab in the right pane.

- 3. Customization, Customizable Select one of the following:
  - Not Customizable By End Users
  - Customizable and Not Shown By Default
  - Customizable and Shown By Default
- 4. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



**Creating Custom Themes** 

# 12.4.3.6 Specifying a Static Region ID

Specifying a static region ID is useful when creating custom JavaScript or cascading style sheets.

You can use the Static ID attribute on the Edit Region page to uniquely identify a region. You can then reference the region using the #REGION\_STATIC\_ID# substitution string in a region templates, the header, the footer, or the body.

A static region ID is included by assigning it as an HTML element ID to the region container object (that is, the table or DIV). The ID of an HTML element must be unique for the entire page. For example, to keep the page HTML valid you cannot have a button and region with the same ID.

To specify a static region ID:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Select the region in the Rendering tab or the Layout tab.

The Property Editor displays attributes in the **Region** tab in the right pane.

3. Advanced, Static ID - Enter the static ID for this region. The Static ID is used as the ID for the region, using the substitution string #REGION\_STATIC\_ID#. #REGION\_STATIC\_ID# is



useful if you are developing custom JavaScript behavior for the region. If this attribute is not defined, the region generates an internal ID.



#### Tip:

The region template must include the  $\#REGION\_STATIC\_ID\#$  substitution string, in order for the region to utilize the static ID entered.

 To save your changes click Save. To save and run the page, click Save and Run Page.

### 12.4.3.7 Adding a Region Image

Use Region Image and Image Tag Attributes to add an image to the upper left side of a region.

Use the Region Image and Image Tag Attributes to add an image to the upper left side of a region.

To add a region image:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Select the region in the Rendering tab or the Layout tab.

The Property Editor displays attributes in the **Region** tab in the right pane.

- **3.** Under **Advanced**, edit the following attributes:
  - Region Image Enter a reference to an image that displays in the upper left of the region. There is no control over the table tag used to display this image.
  - Image Tag Attributes Enter image tag attributes included in the image HTML.
     This can be used for attributes such as height, width or image ALT text (if the image is non-decorative).

If no ALT is defined in the image tag attributes, APEX defaults to rendering the image as a decorative image, for example with an empty ALT tag.

4. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 12.4.3.8 Creating a Region Display Selector

Create a Region Display Selector region to include show and hide controls for each region on a page. to include the current region in the Region Display Selector.

When a user clicks on a region name included in the Region Display Selector, only the selected region shows and all other listed regions are hidden. The first entry within the Region Display Selector is Show All, which enables the user to show all of the available regions rather than only the previously selected region.

To create a Region Display Selector:



- 1. Create the page and regions to be included in the Region Page Selector.
- For each region to be included in the selector, set the Region Display Selector attribute to On.
- In the Gallery, right-click Region Display Selector region, select Add To, and select the appropriate location.



#### Tip:

You can also drag and drop from the Gallery. From the Gallery select the **Region Display Selector** region and drag it to the appropriate location in the Layout tab.

- 4. Edit the Region attributes in the Property Editor:
  - a. In the Rendering tab (left pane), select the region.
    - The Property Editor displays attributes in the **Region** tab. Attributes are organized in groups.
  - **b.** Identification, Title Enter a region title. The region title only displays when it is defined in the region template.
  - c. Advanced, Region Display Selector Select On if you want this region included in the Region Display Selector. This attribute is only utilized if a region type of Region Display Selector is defined and viewable on the page.
  - d. Edit additional attributes as needed.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- **5.** Edit Attributes in the Property Editor:
  - a. In the Rendering tab (left pane), select the region.
  - b. In the Property Editor, select the **Attributes** tab.
  - **c.** Settings, Mode Select how Region Display Selector regions display on the page. Options include:
    - View Single Region Show regions as tabs. Selecting a tab will make the corresponding region visible and hide the other selections.
    - **Scroll Window** Always display all the regions on the page. Selecting a tab will scroll your window to the corresponding region.
  - d. Settings, Include 'Show All' Prepend a "Show All" tab which, when selected, displays all regions on the page.
  - Settings, Remember Last Selection On page load, the region that you last selected will be displayed.
- 6. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



# 12.4.4 Copying a Region

Copy a region in Page Designer.



#### Tip:

You cannot copy a Tree region since this type of region encompasses more than one region.

#### To copy a region:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Right-click the region in Layout tab, select **Copy To**, and select a destination from the submenu.



#### Tip:

To copy a region to another page, select the region in the Rendering tab, right-click, and select **Copy to Other Page**. Follow the on-screen instructions.

# 12.4.5 Deleting Regions

Delete regions on Page Designer.

To delete regions:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Select one or more regions in the Rendering tab.
- 3. Right-click and select **Delete**.
- 4. Click Save.



# 12.5 About Incorporating Content from Other Websites

To incorporate content from other servers, you can create a region based on a URL to display content.

Typically, pages in an application are based on data stored in an Oracle database. For example, suppose you wanted to reference the current Oracle stock price. You could create a region of type URL based on a URL. For example:

http://quote.yahoo.com/q?d=b&s=ORCL

You could then create an item called STOCK\_SYMBOL and base your region on a stock price entered by the user. For example:

http://quote.yahoo.com/q?d=b&s=&STOCK SYMBOL.

Sometimes (as is the case with the previous example) the HTML returned to the region is more than is needed. To restrict the HTML displayed, you can use the following region attributes:

- URL (discard until but not including this text)
- URL (discard after and including this text)



#### Tip:

The previous example may require that you set the Proxy Server application attribute. If you do not set the Proxy Server application attribute, you get an error message. Oracle APEX uses the Oracle utl\_http.request\_pieces function to obtain the HTML generated from the given URL. See Editing the Application Definition.

Developers can also use the Region attribute **Inclusion Mode** to control how APEX retrieves and displays the content. Options include:

- **IFrame** The browser displays the remote content in an HTML iframe. APEX does not have to fetch this content into the database for display.
- Inline (escape special characters) Causes the database to load the remote content at page rendering time. It then displays the fetched data inline, at the position of the region. Special HTML characters in the content are escaped, to prevent cross site scripting.
- Inline (no escaping) This mode is similar to Inline (escape special characters)
   except the HTML characters are not escaped. Developers should only use this mode if
   the remote content is always safe.



See Also:

**Editing Region Attributes** 



#### Working with SSL-Enabled URLs

If you call a SSL-enabled URL (for example, by invoking a Web service), or create a region of type URL that is SSL-enabled, you must create a wallet. A wallet is a password-protected container that stores authentication and signing credentials (including private keys, certificates, and trusted certificates) needed by SSL.



#### Tip:

See Configuring Wallet Information in Oracle APEX Administration Guide

# 12.6 About Managing Images

To reference an image within an application, you must upload it to the static file repository. During the upload process, you specify whether the file is available to all applications or just a specific application.



See Also:

Managing Static Application Files and Managing Static Workspace Files

# 12.7 Rendering HTML Using Custom PL/SQL

If you must generate specific HTML content not handled by Oracle APEX forms, reports, and charts, you can use the PL/SQL region type.

To generate HTML in this type of region, you need to use the PL/SQL Web Toolkit. You can reference session state using bind variable syntax. Keep in mind that when you generate HTML in this way, you do not get the same consistency and control provided with templates.

To give you more control over HTML dynamically generated within a region, you can use PL/SQL. For example, to print the current date, you could create a region with the following source:

```
htp.p(TO CHAR(SYSDATE, 'Day Month DD, YYYY'));
```

#### This next example accesses tables:



✓ See Also:

Oracle Database Development Guide



# Managing Application Controls

Developers can create and manage a variety of application page controls, including page items, dynamic actions, buttons, and trees.

#### Managing Page Items

View existing page items, create new page items, and edit an item to change its appearance or behavior.

#### Managing Dynamic Actions

Dynamic actions enable developers to define complex client-side behavior declaratively without the need for JavaScript.

#### Managing Buttons

You can use buttons to direct users to a specific page or URL, or to post or process information (for example, by creating Create, Cancel, Next, Previous, or Delete buttons). You can also configure buttons to display conditionally or warn users of unsaved changes.

#### Managing Trees

Trees to display hierarchical information in a clear, easy-to-use format. You can create a tree control using a SQL query.

About Incorporating JavaScript into an Application

Oracle APEX includes multiple built-in interfaces especially designed for adding JavaScript.

### See Also:

- Controlling Page Layout
- Adding Navigation
- Manually Refreshing Oracle APEX Components

# 13.1 Managing Page Items

View existing page items, create new page items, and edit an item to change its appearance or behavior.

#### Understanding Page Items

An item is part of an HTML form such as a checkbox, date picker, file browse field, popup list of values (LOV), select list, shuttle, flip toggle switch, text field, text area, and so on.

Viewing Page Items

Configure page items to control how items display.

Creating Page Items

Create page items in Page Designer in either the Rendering tab or by adding an item from the Gallery.

Editing Page Items
 Edit item attributes to control how an item displays on a page.

See Also:

**About Item Types** 

# 13.1.1 Understanding Page Items

An item is part of an HTML form such as a checkbox, date picker, file browse field, popup list of values (LOV), select list, shuttle, flip toggle switch, text field, text area, and so on.

When defining an item, developers must follow defined naming conventions and follow specific rules when referencing item values stored in session state.

- About the Differences Between Page Items and Application Items
   Page items are placed on a page and have associated user interface properties and Application items are not associated with a page.
- About Item Naming Conventions
   When creating an item name, developers must follow very specific item naming conventions.
- Referencing Item Values

You can reference item values stored in session state in regions, computations, processes, validation, and branches.

- About Referencing Items Using JavaScript
   When you reference an item, the best approach is to reference by ID.
- Working with Multiple Select List Item
   Learn how to handle values returned from a multiple select list item.

See Also:

**About Item Types** 

# 13.1.1.1 About the Differences Between Page Items and Application Items

Page items are placed on a page and have associated user interface properties and Application items are not associated with a page.

There are two types of items: page items and application items. **Page items** are placed on a page and have associated user interface properties, such as Display Only, Label and Label Template. Examples of page items include a checkbox, date picker, display as text, file browse field, popup list of values, select list, or a text area. In



contrast **Application items** are not associated with a page and therefore have no user interface properties. You can use an application item as a global variable.



**Managing Application Items** 

### 13.1.1.2 About Item Naming Conventions

When creating an item name, developers must follow very specific item naming conventions.

When specifying an item name, remember the following rules. Item names must:

- Be unique within an application.
- Not include quotation marks.
- Begin with a letter or a number, and subsequent characters can be letters, numbers, or underscore characters.
- Be case-insensitive.
- Should not exceed 30 characters. Items longer than 30 characters cannot be referenced using bind variable syntax. See Referencing Session State Using Bind Variable Syntax.
- Cannot contain letters outside the base ASCII character set.

As a best practice Oracle recommends including the page number when naming items. By default, wizards prefix page item names with  $P<page no>\_<item name>$  (for example,  $P1\_NAME$ ).

# 13.1.1.3 Referencing Item Values

You can reference item values stored in session state in regions, computations, processes, validation, and branches.

Table 13-1 describes the supported syntax for referencing item values.

Table 13-1 Syntax for Referencing Item Values

Туре	Syntax	Description
SQL	:MY_ITEM	Standard bind variable syntax for items whose names are no longer than 30 bytes. Use this syntax for references within a SQL query and within PL/SQL code.
PL/SQL V('MY_ITEM')	V('MY_ITEM')	PL/SQL syntax referencing the item value using the $\mbox{$\mathbb{V}$}$ function. Use this syntax in PL/SQL code of packages or stored procedures and functions.
		Avoid this syntax in SQL statements. It may result in performance problems.
PL/SQL NV('MY_NU	NV('MY_NUMERIC_ITEM')	Standard PL/SQL syntax referencing the numeric item value using the NV function. Use this syntax in PL/SQL code of packages or stored procedures and functions.
		Avoid this syntax in SQL statements. It may result in performance problems.



Table 13-1 (Cont.) Syntax for Referencing Item Values

Туре	Syntax	Description
Static Text (exact)	&MY_ITEM.	Static text. Exact Substitution.
		<b>Note</b> : Exact substitution syntax should be avoided in SQL or PL/SQL code because it can result in SQL Injection vulnerabilities.

You can set the value of an item in your application using any of the following methods:

• For page items, use the Source Attribute to set the item value.

From the page, select the item name to view the Edit Page Item page. Scroll down to Source and edit the appropriate fields.

You can also set the value of an item in any region based on PL/SQL or a process using the following syntax:

```
BEGIN
  :MY_ITEM := 'new value';
END:
```

Pass the value on a URL reference using f?p syntax. For example:

```
f?p=100:101:10636547268728380919::NO::MY ITEM:ABC
```

Set the value using a computation. Computations are designed to set item values.
 For example:

```
TO CHAR (SYSDATE, 'Day DD Month, YYYY');
```

Use the PL/SQL API to set an item value within a PL/SQL context. For example:

```
APEX UTIL.SET SESSION STATE('MY ITEM', SYSDATE);
```

### See Also:

- Clearing Session State
- Understanding Cross-Site Scripting Protection
- Managing Session State Values

# 13.1.1.4 About Referencing Items Using JavaScript

When you reference an item, the best approach is to reference by ID.

If you view the HTML source of an Oracle APEX page in a web browser, you would notice that all items have an id attribute. This ID corresponds to the name of the item, not the item label. For example, if you create an item with the name P1\_FIRST\_NAME and a label of First Name, the ID is P1 FIRST NAME.

You can get and set item attributes and values using the JavaScript functions  $v('P1\_FIRST\_NAME')$  and  $s('P1\_FIRST\_NAME', 'Joe')$ ;. Consider the following example:

```
function showFirstName() {
   alert('First Name is ' +$v('P1_FIRST_NAME'))
};
function setFirstName(pFirstName) {
   $s('P1_FIRST_NAME', pFirstName);
}.
```

These functions can be called by other JavaScript functions or with the Execute JavaScript code dynamic action.



APEX JAVASCRIPT in Oracle APEX API Reference

### 13.1.1.5 Working with Multiple Select List Item

Learn how to handle values returned from a multiple select list item.

- About Handling Values Returned from a Multiple Select List Item
   Learn about handling values returned from a multiple select list item.
- Using APEX\_UTIL.STRING\_TO\_TABLE to Convert Selected Values
   Learn about using APEX\_UTIL.STRING\_TO\_TABLE to convert selected values.

#### 13.1.1.5.1 About Handling Values Returned from a Multiple Select List Item

Learn about handling values returned from a multiple select list item.

A multiple select item renders as a multiple select list form element which can be either a Multiselect List or Shuttle item type. When submitted, selected values are returned in a single colon-delimited string. You can handle values in this format in three ways:

- Using the INSTR function
- Using the APEX STRING.SPLIT function
- Creating a shuttle

### 13.1.1.5.2 Using APEX\_UTIL.STRING\_TO\_TABLE to Convert Selected Values

Learn about using  ${\tt APEX\ UTIL.STRING\_TO\_TABLE}$  to convert selected values.

Suppose you had a report on the EMP and DEPT tables that is limited by the departments selected from a Department multiple select list. First, you create the multiple select item,  $P1\_DEPTNO$ , using the following query:

```
SELECT dname, deptno FROM dept
```

Second, you return only those employees within the selected departments as follows:

```
SELECT ename, job, sal, comm, dname
FROM emp e, dept d
WHERE d.deptno = e.deptno
AND instr(':'||:P1_DEPTNO||':',':'||e.deptno||':') > 0
```



Next, assume you want to programmatically step through the values selected in the multiple select item, P1\_DEPTNO. To accomplish this task, convert the colon-delimited string into a PL/SQL array using the <code>apex\_string.split</code> function. The following example demonstrates how to insert the selected departments into an audit table containing the date of the query.

See Also:

STRING\_TO\_TABLE Function in Oracle APEX API Reference

# 13.1.2 Viewing Page Items

Configure page items to control how items display.

To view page attributes in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor changes to display the attributes. Attributes are organized in groups.



#### Tip:

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

3. Edit the appropriate attributes in the Property Editor.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

4. To save your changes click Save. To save and run the page, click Save and Run Page.

# 13.1.3 Creating Page Items

Create page items in Page Designer in either the Rendering tab or by adding an item from the Gallery.

- Creating a Page Item from the Rendering Tab
   Create a page item in Page Designer from the Rendering tab.
- Adding a Page Item from the Gallery
   Create a page item in Page Designer by adding it from the Gallery.
- Creating a Static List of Values
   Create a static list of values locally with the definition of the item.
- Creating a Cascading List of Values
   Create a cascading list of values locally with the definition of the item.
- Creating a Shuttle Item on the Form Page Create a shuttle item in Page Designer.

### 13.1.3.1 Creating a Page Item from the Rendering Tab

Create a page item in Page Designer from the Rendering tab.

To create a page item from the Rendering tab:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. If necessary, create a region to contain the item.
- In the Rendering tab, right-click the region to contain the item and select Create Page Item.



You can also right-click an existing item and select **Create Page Item Below**.

The Property Editor displays Page Item attributes. Attributes are organized in groups.

To find a group or attribute, enter keywords in the Filter field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

**4.** Edit the appropriate attributes in the Property Editor.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



- About Regions
- About Item Types

### 13.1.3.2 Adding a Page Item from the Gallery

Create a page item in Page Designer by adding it from the Gallery.

To create a page item by adding if from the Gallery:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. If necessary, create a region to contain the item.
- In the central pane, click Layout and then the Items tab in the Gallery.Passing the cursor over an item displays a tooltip that describes it.
- 4. Select an item and drag it to the appropriate location in the Layout tab.



#### Tip:

You also right-click the item, click **Add To** and select the appropriate location.



The Property Editor displays Page Item attributes.

- 5. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- **b.** Select an error to highlight the associated attribute in the Property Editor.
- **6.** Edit the appropriate attributes in the Property Editor.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

7. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



- **About Regions**
- **About Item Types**

### 13.1.3.3 Creating a Static List of Values

Create a static list of values locally with the definition of the item.

Note that local a list of values is not reusable. As a best practice, Oracle recommends creating a list of values as a shared component whenever possible.

To create a static list of values locally:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Create a new item from the Rendering tab or by adding it from the Gallery.

The Property Editor displays the Page Item attributes. Attributes are organized in groups.



#### Tip:

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

3. Edit the appropriate attributes in the Property Editor.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

#### Under **Identification**:

- Name Enter the name of this item. Item names must be valid Oracle identifiers. Oracle recommends that item names be no longer then 30 bytes so they can be used as bind variables in SQL Queries.
- b. Type Select Select List.

#### Under **List of Values**:

- a. Type Select Static Values.
- **b.** Static Values Click the **Display1**, **Display2** button.

In the Static Values dialog:

- **Display Value** Enter the Display Value for each entry.
- Return Value Enter the Return Value for each entry. If you do not include a Return Value, the return value equals the Display Value
- Move Up and Move Down Click the Move Up and Move Down arrow buttons to change the order.
- **Sort** To sort the list at alphabetically at runtime, expand the Sort region and enable Sort at Runtime.



#### Tip:

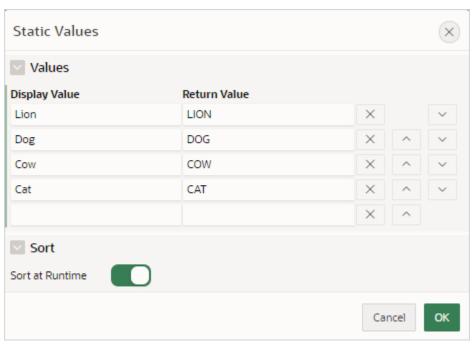
See the sections that follow to view examples.

- c. Click OK.
- 6. Edit the remaining List of Values attributes as appropriate. To learn more about an attribute, select the attribute and click the **Help** tab in the central pane.
- 7. To save your changes click Save. To save and run the page, click Save and Run Page.

#### **Example 13-1** Four Values Displayed in Alphabetical Order

This example shows the Static Values dialog with four values defined: Lion, Dog, Cow, and Cat. The return value of each entry is capitalized. Sort at Runtime is set to On so that the list displays alphabetical order.





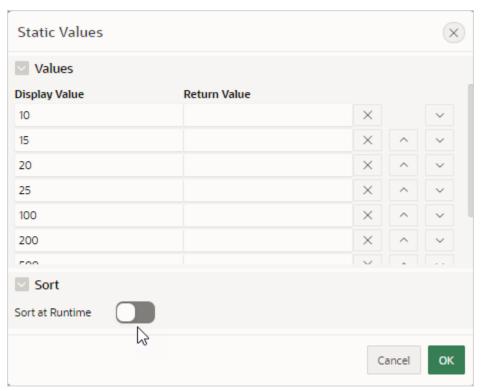
In a running application this select list would look similar to the following illustration.



Example 13-2 Values Displayed in the Order Listed

This example shows the Static Values dialog with ten values defined: 10, 15, 20, 25, 50, 100, 200, 500, 1000, and 10000 which display in the order listed. The return value of each entry equals the display value.





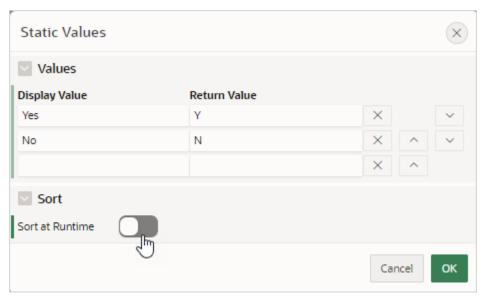
In a running application this select list would look similar to the following illustration.



Example 13-3 A List of Values with Having Both a Return and Display Value

This example shows the Static Values dialog with two values defined. The first value has a **Display Value** of Yes and a **Return Value** of Y. The second value has a **Display Value** of No and a **Return Value** of N **Sort at Runtime** is set to **Off** to make sure Yes always displays first.





In a running application this select list would look similar to the following illustration.





- · Creating Lists of Values at the Application-Level
- About Item Naming Conventions

### 13.1.3.4 Creating a Cascading List of Values

Create a cascading list of values locally with the definition of the item.

By creating a cascading c, one item on a page determines the list of values for another item. App Builder includes cascading list of values support for the following item types: Select List, Shuttle, Checkbox, Radio Group, Popup LOV, and List Manager.

You create a cascading list of values (LOV) by creating two items. To populate the second item, you specify a Cascading LOV Parent Item when running the Create Item Wizard or by editing the item's attributes.

The following example demonstrates how to create two related select lists where the value of the first list populates the second.

To create a cascading list of values:

1. Create the first item, P1\_DEPTNO:



- a. Create a select list item.
- b. In the Property Editor, edit the attributes:
  - Identification: Name Enter P1 DEPTNO
  - Identification: Type Select Select List.
  - Label: Label Enter Department
- c. In the Property Editor, edit the List of Values attributes:
  - List of Values: Type Select SQL Query.
  - · List of Values: SQL Query, enter:

```
SELECT dname as d,
deptno as r
FROM dept
ORDER BY dname
```

- List of Values: Display Null Value Select On.
- List of Values: Null Display Value Enter:

```
- Select Department -
```

- Accept the remaining defaults.
- Click Save.
- 2. Create the second item, P1\_EMPNO:
  - a. Create a select list item.
  - **b.** In the Property Editor, edit the attributes:
    - Identification: Name Enter P1 EMPNO
    - Identification: Type Select Select List.
    - Label: Label Enter Employee
  - c. In the Property Editor, edit the List of Values attributes:
    - List of Values: Type Select SQL Query.
    - List of Values: SQL Query, enter:

```
SELECT ename as d,
empno as r
FROM emp
WHERE deptno = :P1 DEPTNO
```

- List of Values: Display Null Value Select On.
- List of Values: Null Display Value Enter:

```
- Select Employee -
```

- Accept the remaining defaults.
- Click Save.
- 3. To save and run the page, click **Save and Run Page**.

Two select lists appear. Making a selection in the Department select list, determines which individuals display in the Employees select list.



## 13.1.3.5 Creating a Shuttle Item on the Form Page

Create a shuttle item in Page Designer.

This section demonstrates how to create shuttle item type. In this example, you first create a report and form on the  $\mathtt{DEPT}$  table that shows which employees are assigned to a given department. Then, you create a shuttle item that lists employees alphabetically to make it easier to assign employees to a department.

To create a shuttle item on a form:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In Page Rendering, right-click region containing the form and select Create Page Item.
- 3. In the Property Editor, edit the following attributes:
  - a. Identification: Name Enter the name of this item (for example, PX\_EMP\_LIST).
    Where PX in the item name (for example P2\_EMP\_LIST) indicates the page on which the item resides.
  - b. Identification: Type Select **Shuttle**.
- 4. In the Property Editor, edit the List of Values attributes:
  - a. List of Values: Type Select SQL Query.
  - **b.** List of Values: SQL Query, enter:

```
SELECT ename, empno FROM emp ORDER BY 1
```

- 5. In the Property Editor, edit the Source attributes
  - a. Source: Type Select SQL Query (return colon separated value).
  - b. Source: Item Source Value Enter the SQL Query that returns one or more rows to be used as the source for this item value. If the result contains multiple rows then the value from each row is formed into a single colon delimited value. For example:

```
SELECT empno FROM emp WHERE deptno = :P8 DEPTNO ORDER BY ename
```

**6.** To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 13.1.4 Editing Page Items

Edit item attributes to control how an item displays on a page.

For example, the Type attribute determines if the item displays as text field, text area, checkbox, date picker, switch, hidden item and so on. Depending upon the item Type, item attributes can determine where a label displays, how large an item is, and if the item displays next to or below the previous item. Item attributes also control item behavior such as the item's default value, whether the item displays conditionally, or if the item is read-only.

Editing Page Item Attributes in the Property Editor
 Learn about editing page item attributes in the Property Editor.



Positioning Page Items

Position page items at a page or region level.

Defining Default Values for Page Items

Define default values for an item using the Default attribute.

Configuring Page Item Security

Learn about editing page item Security attributes in the Property Editor.

Changing an Existing Item to Use Quick Picks

Change an item to use a quick picks list by edting the Quick Picks attributes in Page Designer.

Displaying Conditional Page Items

Display an item conditionally by editing Server-side Condition attributes.

Displaying Read Only Page Items

Display a read-only item by editing the Read Only attribute in Page Designer.

Applying a Format Mask to an Item

Apply a format mask to an item by editing the Format Mask attribute.

Configuring Item Attributes to Warn Users of Unsaved Changes

Configure the Warn on Unsaved Changes attribute to specify if the page item should be included in the unsaved changes check.

Controlling How Page Items Write Session State

Control how a page item maintains session state by configuring the Session State, Storage attribute.

Viewing Item Utilities

Access the Utilities page to view Grid Edit pages and reports that enable you to edit items on multiple pages within a selected application.

## 13.1.4.1 Editing Page Item Attributes in the Property Editor

Learn about editing page item attributes in the Property Editor.

To edit item attributes in the Property Editor:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays the item attributes.



## Tip:

Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

3. Edit the appropriate attributes.



Edited attributes display a green marker to the left of the attribute name until the page is saved.



## Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

4. To save your changes click Save. To save and run the page, click Save and Run Page.

## 13.1.4.2 Positioning Page Items

Position page items at a page or region level.

To position a page item at the page-level:

- 1. select the page item in Page Designer.
- 2. In the Property Editor leave the **Layout**, **Region** attribute empty.
- 3. To place a page item at a specific location on the page, configure the **Layout**, **Position** attribute.

To position a page item at a region-level:

- 1. Select the page item in Page Designer.
- 2. In the Property Editor, edit the **Layout**, **Region** attribute and select the region where the page item belongs.
- 3. Configure the **Layout**, **Position** within the region to place a Page Item at a specific location inside the region.

## 13.1.4.3 Defining Default Values for Page Items

Define default values for an item using the Default attribute.

The default value is used when the item's value is not derived from session state and when the source value is NULL.

To define a default value for an item:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays attributes for the item.



#### Tip:

Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

- 3. In the Property Editor, find the **Default** group.
- 4. Default, Type Select a default value type for this item. Options include:
  - Static Set to the value entered in Static Value.
  - Item Set to the value returned from the session state for the selected Item.
  - SQL Query Set to the value returned from the entered SQL Query.
  - SQL Query returning Colon Delimited List Set to the colon delimited list of
    values returned from the entered SQL Query . Colon delimited lists are
    required when the column is displayed as a checkbox, radio group, or shuttle.
  - PL/SQL Expression Set to the value returned from the entered PL/SQL Expression.
  - PL/SQL Function Body Set to the value returned from the PL/SQL Function Body entered.
  - **Sequence** Set to the value returned from the Sequence entered.
- 5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 13.1.4.4 Configuring Page Item Security

Learn about editing page item Security attributes in the Property Editor.

To configure page item security:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays the item attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

- 3. Find **Security** and edit the following attributes:
  - Security, Authorization Scheme Select an authorization scheme to control
    this component. The authorization must evaluate to TRUE in order for this
    component to be rendered or executed.

See Also: Providing Security Through Authorization

- Security, Session State Protection level Select a Session State Protection level. Options include:
  - Unrestricted The item can be set by passing the item in a URL or in a form. No checksum is required in the URL.
  - Checksum Required Application Level The item can be set by passing the item in a URL that includes a checksum specific to the workspace and application.



- Checksum Required User Level The item can be set by passing the item in a URL that includes a checksum specific to the workspace, application and user.
- Checksum Required Session Level The item can be set by passing the item in a URL that includes a checksum specific to the session.
- Restricted May not be set from browser The item cannot be altered using the URL or POSTDATA. Select this option to restrict what can set the item value to internal processes, computations, and so on. This attribute only applies to items that are not used as data entry items and is always observed, even if Session State Protection is disabled. Use this attribute for page or application items that have the following Display As types
  - Display Only (Save State=No)
  - \* Text Field (Disabled, does not save state)

#### See Also: Preventing URL Tampering

Security, Store value encrypted in session state - Specify whether to encrypt this item
when stored in session state. If the contents of an item contains sensitive data, then
you should encrypt the value when it is stored in the Oracle APEX session state
management tables. Otherwise, anyone with rights to read the Oracle APEX meta
data tables could potentially write a guery to extract this sensitive data.

#### See Also: Understanding Cross-Site Scripting Protection

 Security, Restricted Characters - Select how to restrict the characters that can be saved in session state. APEX displays an error message if a user tries to save data that does not conform to the selected character restriction. Restricting the characters hardens application security and is a possible counter measure to cross-site scripting (XSS) attacks.

Available options include:

- All characters can be saved No restriction applies.
- Allowlist for a-Z, 0-9 and space Only allow characters a-z, A-Z, 0-9, and space.
- Blocklist HTML command characters (<>") Reserved HTML characters cannot be saved.
- Blocklist &<>"/;,\*|=% and --: The following characters *cannot* be saved:
   &, <, >, ", /, ;, ",", \*, |, =, % and "--" (PL/SQL comment)
- Blocklist &<>"/;,\*|=% or -- and new line The following characters cannot be saved:

```
&, <, >, ", /, ;, ",", *, |, =, %, "--", and new line characters
```

4. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 13.1.4.5 Changing an Existing Item to Use Quick Picks

Change an item to use a quick picks list by edting the Quick Picks attributes in Page Designer.

Quick picks enable users to select predefined values with just one click, rather than typing in text or selecting from a list of available options. If the item type supports quick pick selection, use the Quick Picks attributes to define up to ten selections that display under a give item. Clicking on a quick pick sets the value of item. The following example shows quick picks for 5%, 10%, 15%, and 20%.



To create a quick pick:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays the item attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

- 3. Under Quick Picks:
  - a. Show Quick Picks Select On .
  - Link Attributes Enter HTML attributes that are associated with the display of each Quick Pick link
  - **c. Label** Enter the label for the each Quick Pick. This label is the text the end user of the application sees.
  - **d. Value** Enter the value associated with each Quick Pick. This value replaces the existing item value when the user clicks the quick pick.
  - Repeat the previous two steps until all Quick Pick labels and values have been defined.
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 13.1.4.6 Displaying Conditional Page Items

Display an item conditionally by editing Server-side Condition attributes.

To display a conditional item:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays attributes for the item. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

**3.** Find **Server-side Condition**. Select a condition **Type** and enter appropriate information in the field provided.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

 To save your changes click Save. To save and run the page, click Save and Run Page.



## 13.1.4.7 Displaying Read Only Page Items

Display a read-only item by editing the Read Only attribute in Page Designer.

To display a read-only item:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays attributes for the item. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

- 3. Find the **Read Only** group and edit the following:
  - a. Read Only, Type Select a condition type that must be met in order for this component to render as read-only.
    - Not selecting a condition causes the item to render normally. A read-only item is rendered with the same settings as a Display Only item.
    - To always render the item as an enterable field, set the condition type to **Never**. This setting overwrites any read-only condition setting on the region or page level.
  - **b.** The UI changes based on the Type you select. Edit the appropriate attributes.
    - To learn more, select the attribute in the Property Editor and click the **Help** tab in the central pane
- 4. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

## 13.1.4.8 Applying a Format Mask to an Item

Apply a format mask to an item by editing the Format Mask attribute.

Developers commonly select a format mask to determine how numbers and dates display.

To apply a format mask to an item:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays the item attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

3. Under Appearance, Format Mask - Select a format mask.





## Tip:

Only apply number format masks to items that contain numbers and only apply date format masks to items that contain dates. Otherwise, is raised since the component contains a value that can not be converted using the specified format mask.

 To save your changes click Save. To save and run the page, click Save and Run Page.

## 13.1.4.9 Configuring Item Attributes to Warn Users of Unsaved Changes

Configure the Warn on Unsaved Changes attribute to specify if the page item should be included in the unsaved changes check.

Developers can use the **Warn on Unsaved Changes** item attribute to specify if the page item should be included in the unsaved changes check. This check warns the user when they try to navigate away from a page and when the page contains unsaved changes. Items not based on a database column (for example, a search item) may not need to be checked. For those items, set **Warn on Unsaved Changes** to **Do Not Check**.

To configure the Warn on Unsaved Changes attribute:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays the item attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

- 3. For Advanced, Warn on Unsaved Changes Select one of the following:
  - Page Default Include item in the unsaved changes check if Warn on Unsaved Changes is enabled at the page-level.
  - Ignore Changes to the item are ignored by the unsaved changes check.
     Select this option for items not based on a database column (for example, a search item).
- To save your changes click Save. To save and run the page, click Save and Run Page.



## Tip:

The Warn on Unsaved Changes attribute is implemented using the apex.page.warnOnUnsavedChanges API.



## See Also:

- Configuring Pages to Warn Users of Unsaved Changes
- warnOnUnsavedChanges in Oracle APEX JavaScript API Reference

## 13.1.4.10 Controlling How Page Items Write Session State

Control how a page item maintains session state by configuring the Session State, Storage attribute.

To configure page item writes session state:

- 1. View the page containing the item to be configured in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the item to edit.

The Property Editor displays the item attributes. Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field, or click **Go to Group** and select the group.

- 3. In the Property Editor, find the **Session State** group.
- 4. Session State, Storage Select how session state is maintained:
  - Per Request (Memory Only) Do not save state in the database. State is only
    available when processing the current request. When AJAX requests need to use an
    item, make sure to pass the item name using Page Items To Submit.
  - Per Session (Disk)- Maintain for each session by storing the value in the database, to access it across requests.
  - **Per User (Disk)** Maintain for a user by storing the value in the database, to access it across sessions.



When creating database items that work with a Form region (for example as part of a wizard), **Per Request (Memory Only)** is the default. Per **User (Disk)** is not available for these items.

5. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.



**About Setting Session State** 



## 13.1.4.11 Viewing Item Utilities

Access the Utilities page to view Grid Edit pages and reports that enable you to edit items on multiple pages within a selected application.

To access the Utilities page:

- On the Workspace home page, click the App Builder icon.
- Select an application.
- Click Utilities.
- 4. From Page Specific Utilities region, click Item Utilities.
- 5. Select one of the following reports:
  - Grid Edit of all Item Labels Edit all item labels for all pages in your application.
  - Grid Edit of all Item Help Text Edit item help text to ensure consistency across your application.
  - Item Help Subscriptions Edit item help subscriptions in your application.
  - All Page Items Edit all page items in your application.
  - Password Items Edit password items in your application. Oracle recommends password items not save session state. To learn more, see the Password Items region on the right side of the page.
  - Conditional Items Edit conditional items in your application.

# 13.2 Managing Dynamic Actions

Dynamic actions enable developers to define complex client-side behavior declaratively without the need for JavaScript.

#### About Dynamic Actions

Dynamic actions provide a way to define complex client-side behavior declaratively without the need for JavaScript. Using the Dynamic Action Create wizard, you specify an action that is performed when a defined set of conditions occur. You can also specify which elements are affected by the action, and when and how they are affected.

#### About Dynamic Action Events

You can define dynamic actions to fire based on events that happen on the page. Oracle APEX includes four different categories of events: Browser events, Framework events, Component events, and Custom events. This section describes all supported events, including the internal JavaScript event name in brackets.

#### Creating a Dynamic Action

Creating a dynamic action involves specifying when the action happens (with optional conditions), what action or actions are performed, and what elements are affected by the action. To learn more about any Property Editor attribute, select the attribute and click the **Help** tab in the central pane.



#### Editing Dynamic Actions

Once you create a dynamic action, you can modify attributes defined during the creation process, specify attributes not available during the process (such as specifying an Authorization Scheme) and add additional true actions.

#### Defining Dynamic Action Event Scope

After creating the dynamic action, the scope of the action can be modified to trigger only once, for the lifetime of the current page, or until triggering elements are updated by a Partial Page Refresh (PPR).

## · Deleting a Dynamic Action

Delete a dynamic action by selecting it in Page Designer and selecting Delete from the context menu.

About Calling JavaScript Using a Dynamic Action
 You can execute JavaScript code by creating a dynamic action.

• Debugging Dynamic Actions
Learn how to debug dynamic actions in APEX.



Accessing Page Specific Utilities

## 13.2.1 About Dynamic Actions

Dynamic actions provide a way to define complex client-side behavior declaratively without the need for JavaScript. Using the Dynamic Action Create wizard, you specify an action that is performed when a defined set of conditions occur. You can also specify which elements are affected by the action, and when and how they are affected.

When working with dynamic actions, you should be mindful of the fact that the more dynamic actions you add to a page, the greater your overall page size. This is because the dynamic action framework emits additional code to the client for each dynamic action defined, which then also must be downloaded and executed by the framework in the client.

The process of implementing a dynamic action involves the following steps:

- 1. Create (or use an existing) page component such as an item, button or region. This component is referenced within the dynamic action, in defining when it fires.
- 2. Create a dynamic action from the application page that invokes the action.
- 3. Run your application to test the dynamic action.



#### Tip:

See Debugging Dynamic Actions for information on how to debug problems.



#### Tip

To view dynamic action examples, install the sample app, *Sample Dynamic Actions*. To learn more, see Installing Apps from the Gallery.

## 13.2.2 About Dynamic Action Events

You can define dynamic actions to fire based on events that happen on the page. Oracle APEX includes four different categories of events: Browser events, Framework events, Component events, and Custom events. This section describes all supported events, including the internal JavaScript event name in brackets.

#### **Browser Events**



The events displayed differ according to the page's current User Interface type. If you want to select an event that corresponds to a different type, then you have the option of selecting Show unsupported, which displays all events including those that do not correspond to the current type.

- Change (change) Fires when a control loses the input focus and its value has been modified since gaining focus.
- Click (click) Fires when the pointing device button is clicked over the triggering element.
- Double Click (dblclick) Fires when the pointing device button is double clicked over the triggering element.
- Double Tap (apexdoubletap) Fires when the pointer is doing a double tap/click.
- Get Focus (focusing) Fires when the triggering element receives focus by either a pointing device or by tabbing into the element.
- Key Down (keydown) Fires when a key on the keyboard is pressed. Use this
  event when you want to capture special keystrokes such as arrow keys, after a
  key has been pressed.
- Key Press (keypress) Fires when a key on the keyboard is pressed resulting in text being entered. Use this event when you want to capture actual text entry.
- Key Release (keyup) Fires when a key on the keyboard is released. Use this
  event when you want to capture special keystrokes such as arrow keys, after a
  key has been released.
- Lose Focus (focusout) Fires when the triggering element loses focus either by the pointing device or by tabbing out of the element.
- Mouse Button Press (mousedown) Fires when the pointing device button is pressed over the triggering element.
- Mouse Button Release (mouseup) Fires when the pointing device button is released over the triggering element.



- Mouse Enter (mouseenter) Fires once when the pointing device is moved into the triggering element.
- Mouse Leave (mouseleave) Fires once when the pointing device is moved away from the triggering element.
- Mouse Move (mousemove) Fires when the pointing device is moved while it is over the triggering element.
- Pan (apexpan) Fires when the pointer is down, then moved in a horizontal direction.
- Page Load ready Fires when the page loads.
- Page Unload (unload) Fires when a page is unloaded.
- Press (apexpress) Fires when the pointer is down for greater than 250ms.
- Resize (resize) Fires when the browser window is resized.
- Resource Load (load) When the triggering element is the window element (using a
  JavaScript Expression value of window in the When attributes), the event fires when the
  browser finishes loading all content within a document, including window, frames, objects
  and images. For other elements, this event can only be used for elements associated
  with a URL: images, scripts, frames, iframes.
- Scroll (scroll) Fires when a scrollable triggering element is scrolled. This could be the browser window (using a JavaScript Expression value of window in the When attributes), scrollable frames or elements with the overflow CSS property set to scroll (or auto when the element's explicit height is less than the height of its contents).
- Select (select) Fires when a user selects some text in a text field.
- Swipe (apexswipe) Fires when the pointer is moving fast in a horizontal direction.
- Tap (apextap) Fires when the pointer is doing a small tap click.

#### **Framework Events**

- After Refresh (apexafterrefresh) Fires after the triggering element has been
  refreshed. The event is only valid for triggering elements that perform Partial Page
  Refresh and fire this event. The native components that support this are Interactive
  Reports, Classic Reports, Charts, List View and all item types with cascading LOV
  support. Plug-ins might support this event as well. This event can be sent by the
  apex.server.plugin and apex.server.process APIs when the refreshObject option is
  provided. See apex.server in Oracle APEX API Reference
- Before Page Submit (apexbeforepagesubmit) Fires before a page being submitted.
- Before Refresh (apexbeforerefresh) Fires before the triggering element has been refreshed. The event is only valid for triggering elements that perform Partial Page Refresh and fire this event. The native components that support this are Interactive Reports, Classic Reports, Charts, List View and all item types with cascading LOV support. Plug-ins might support this event as well. This event can be sent by the apex.server.plugin and apex.server.process APIs when the refreshObject option is provided. See apex.server in Oracle APEX JavaScript API Reference.
- Dialog Closed (apexafterclosedialog) Fires when an APEX dialog is closed. This
  event only fires when the dialog is closed using the 'Close Dialog' page process, or the
  'Close Dialog' dynamic action.



#### **Component Events**

These events are available when there is a component (either an item, region, or dynamic action) available to your application that triggers a custom event. These events appear in the following format Event name [Component Name], for example the Change Order event triggered by the Shuttle native item type appears as Change Order [Shuttle]. Component events are either triggered from native components shipped with APEX, or from plug-in components you have installed into your application.

Events triggered by native components:

These will be in the format Event name [Component Name]. For help related to events raised by our native components, see <code>interactiveGrid</code> and <code>treeView</code>. See <code>interactiveGrid</code> and <code>treeView</code> in <code>Oracle APEX JavaScript API Reference</code>.

Events triggered by plug-in components:

These will be available when added to your current application and will be in the format Event name [Component Name]. For help related to events raised by plugins, refer to Help text on the plug-in configuration page, by navigating to Shared Components, Plug-ins, *plug-in name*, Help Text, where the plug-in author may have included documentation.

#### **Custom Events**

Custom Events:

By selecting Custom an additional field displays enabling you to define of a custom event. This is useful when the native or plug-in provided events are insufficient.

## 13.2.3 Creating a Dynamic Action

Creating a dynamic action involves specifying when the action happens (with optional conditions), what action or actions are performed, and what elements are affected by the action. To learn more about any Property Editor attribute, select the attribute and click the **Help** tab in the central pane.

To create a dynamic action:

- View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Dynamic Actions** tab in the left pane.
- 3. Under Dynamic Actions, right-click **Events** and select **Create Dynamic Action**.



#### Tip:

You can also select an event type and then right-click to select **Create Dynamic Action**.



The Property Editor displays Dynamic Action attributes.

Page Designer indicates what actions are required next. If there is an error, a **Messages** icon displays next to the **Save** button. Click the **Messages** icon to view a dialog listing all the errors. Select an error to highlight the associated attribute in the Property Editor.

4. In the Property Editor, edit the following Dynamic Action attributes:



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- a. Identification, Name Enter the name of the dynamic action.
- **b. Execution**, **Sequence** Specify the sequence for this component. The sequence determines the order of execution.
- **c. Execution**, **Event Scope** Select the scope of the event. Event Scope determines when the event is evaluated a second or successive time. Options include:
  - **Static** Binds the event handler to the triggering element(s) for the lifetime of the current page, but is no longer bound if a triggering element is updated using Partial Page Refresh (PPR).
  - Dynamic Binds the event handler to the triggering element(s) for the lifetime of the current page, irrespective of any triggering elements being recreated using Partial Page Refresh (PPR).
  - **Once** Binds the event handler to the triggering element(s) only once. The dynamic action is not triggered again until after the page has been fully refeshed.
- d. Execution, Static Container (jQuery Selector) Only displays if Event Scope is Dynamic. Enter the jQuery Selector of a static container for use by this dynamic action.

You can improve the performance of dynamic actions that have an event scope of Dynamic. This must be an element on the page that itself does not get recreated, but contains the triggering elements that are recreated using Partial Page Refresh (PPR). This element reference needs to be defined as a jQuery selector.

- **e. Execution**, **Type** Choose the type of execution method for the dynamic action. This defines if the actions are fired immediately, debounced, or throttled. Options include:
  - Immediate Actions are executed immediately.
  - **Debounce** Actions are only executed once after a specified time at the end of a single or series of events.
    - Example 1: Update a text field if the user has stopped typing for 2 seconds and use the values last entered.
    - Example 2: Refresh a region once after a click and ignore all other clicks in the next 5 seconds.
  - Throttle Actions are executed at timed intervals when the action is fired multiple times.
    - Example 1: During scrolling, update the current screen position at least every 2 seconds. The action will continue to fire if the user keeps scrolling.



Example 2: As a user types, update a text field with the values entered at least every 2 seconds. The action will continue to fire as the user keeps typing.

- f. When, Event Specify the event that causes the dynamic action to fire.
- **g.** When, Selection Select the type of page element or construct to be used to trigger the event.

## Note:

Only available if the event selected supports definition of a page element. Selecting any of the following events hides this attribute: Page Load, Page Unload, Resize, Before Page Submit, Orientation Change. All other event types show this field.

h. Client-side Condition, Type - Optionally select the type of condition you want to control the true and false action processing of the dynamic action. If no client-side condition is defined, only true actions will fire. If a client-side condition is defined, the true action will fire when the condition is met, and the false action will fire when it is not.

## Note:

Other properties will display conditionally based on the type, to declaratively allow you to define the condition. For example for the condition type Item = Value, you will see an Item and Value property, which will be checked in evaluating the condition.

Next, define the action that to be performed if the event evaluates to True or False.

- 5. To edit an existing action:
  - **a.** Expand the Dynamic Action tree and select an existing action (that is, select either **True** or **False**).
  - **b.** In Property Editor, edit the following **Action** attributes:
    - **Identification**, **Name** Enter the name of the action to help identify what the action does in Page Designer.
    - **Identification**, **Action** Specify which action you want to perform.
    - Affected Elements, Selection Type- Select the page components to be affected when this action is executed. Additional options display depending upon the type of component selected.
    - Execution Options, Fire When Event Result Is Specify whether this
      action fires when the triggering element condition is met by selecting True
      (True Action), or when it is not met by selecting False (False Action). If no
      condition is specified, only True actions fire.
    - Fire on Initialization Specify if the action fires on initialization.

*Initialization* has a slightly different meaning depending on how the dynamic action is defined. For dynamic actions defined to fire on interactive grid columns, this specifies if the action fires when the



interactive grid row is activated for editing. For all other dynamic actions, this specifies if the action fires when the page loads.

- **6.** To add a new action:
  - a. Expand the Dynamic Action tree.
  - Right-click the dynamic action and select either Create TRUE Action or Create FALSE Action.
  - c. Edit the action in the Property Editor as described in the previous step.
- 7. Click Save.



**About Dynamic Action Events** 

# 13.2.4 Editing Dynamic Actions

Once you create a dynamic action, you can modify attributes defined during the creation process, specify attributes not available during the process (such as specifying an Authorization Scheme) and add additional true actions.

To edit a dynamic action:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- Click the **Dynamic Actions** tab in the left pane. Dynamic actions are organized by events.
- 3. Expand the appropriate event and select the dynamic action.

Attributes for the dynamic action display in the Property Editor.

4. In Property Editor, edit the appropriate Dynamic Action attributes.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- **5.** To edit an existing action:
  - a. Expand the Dynamic Action tree to view the True or False nodes.
  - b. Under True or False, select the action.
  - c. Edit the action in the Property Editor.
- To add a new action:



- a. Expand the Dynamic Action tree.
- Right-click the dynamic action and select either Create TRUE Action or Create FALSE Action.
- **c.** Edit the action in the Property Editor.
- Click Save.

# 13.2.5 Defining Dynamic Action Event Scope

After creating the dynamic action, the scope of the action can be modified to trigger only once, for the lifetime of the current page, or until triggering elements are updated by a Partial Page Refresh (PPR).

To specify event scope:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Dynamic Actions** tab in the left pane.
- 3. Under Dynamic Actions, select the dynamic action.

The Property Editor displays attributes for the dynamic action. Attributes are organized in groups.

To find a group or attribute:

- **Search for the group or attribute** Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- **4. Execution**, **Event Scope** Select the scope of the event, which determines when the event is evaluated a second or successive time. Options include:
  - **Static** Binds the event handler to the triggering element(s) for the lifetime of the current page, but is no longer bound if a triggering element is updated using Partial Page Refresh (PPR).
  - Dynamic Binds the event handler to the triggering element(s) for the lifetime
    of the current page, irrespective of any triggering elements being recreated
    using Partial Page Refresh (PPR).
  - Once Binds the event handler to the triggering element(s) only once. The
    dynamic action is not triggered again until after the page has been fully
    refeshed.
- Execution, Static Container (jQuery Selector) Only displays if Sequence is Dynamic. Enter the jQuery Selector, of a static container, for use by this dynamic action.

You can improve the performance of dynamic actions that have an event scope of Dynamic. This must be an element on the page that itself does not get recreated,



but contains the triggering elements that are recreated using Partial Page Refresh (PPR). This element reference needs to be defined as a jQuery selector.

- **6. Execution**, **Type** Choose the type of execution method for the dynamic action. This defines if the actions are fired immediately, debounced, or throttled. Options include:
  - Immediate Actions are executed immediately.
  - Debounce Actions are only executed once after a specified time at the end of a single or series of events.
    - Example 1: Update a text field if the user has stopped typing for 2 seconds and use the values last entered.
    - Example 2: Refresh a region once after a click and ignore all other clicks in the next 5 seconds.
  - Throttle Actions are executed at timed intervals when the action is fired multiple times.
    - Example 1: During scrolling, update the current screen position at least every 2 seconds. The action will continue to fire if the user keeps scrolling.
    - Example 2: As a user types, update a text field with the values entered at least every 2 seconds. The action will continue to fire as the user keeps typing.



If a Client-side Condition is defined, it will be evaluated when the dynamic action and itsActions are executed, not when the event fires.

7. Click Save.

## 13.2.6 Deleting a Dynamic Action

Delete a dynamic action by selecting it in Page Designer and selecting Delete from the context menu.

To delete a dynamic action:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Dynamic Actions** tab in the left pane.
- **3.** Expand the appropriate event and locate the dynamic action to be deleted.
- 4. Right-click the dynamic action and select **Delete**.
- 5. Click Save.

# 13.2.7 About Calling JavaScript Using a Dynamic Action

You can execute JavaScript code by creating a dynamic action.



You can also execute JavaScript code by creating a dynamic action with the **ActionExecute** and **Set Value**. You can also use JavaScript code for the condition of a dynamic action by setting the Client-side Condition type to **JavaScript Expression**.

See Also:

Managing Dynamic Actions

# 13.2.8 Debugging Dynamic Actions

Learn how to debug dynamic actions in APEX.

- About Debugging Dynamic Actions
   Learn about debugging dynamic actions.
- Debugging Dynamic Actions
   Debug an dynamic action by viewing the page in runtime and clicking Debug on the Runtime Developer toolbar.

## 13.2.8.1 About Debugging Dynamic Actions

Learn about debugging dynamic actions.

Debugging dynamic actions in APEX is slightly different than other debugging, because much of the processing done with the dynamic action framework is done on the client, not on the server. To debug dynamic actions, APEX outputs debug information to the browser's JavaScript console if your browser supports it (for example Firefox with Firebug installed shows the debug information in its Console pane). The debug information tells you when an action of a dynamic action fires, along with some additional information about the dynamic action, in the following format:

```
Dynamic Action Fired: [Dynamic Action name] ([Action name]) {JavaScript object containing all Dynamic Action information}
```

This format enables you to identify the dynamic action name, the action name which indicates which action is triggered, and the JavaScript object which contains a lot of information about the dynamic action, including the when element, the affected elements, the event object, and any data that may be associated with the dynamic action.

## 13.2.8.2 Debugging Dynamic Actions

Debug an dynamic action by viewing the page in runtime and clicking Debug on the Runtime Developer toolbar.

To debug a dynamic action:

- 1. Ensure the application containing the dynamic action has Debugging enabled. See Utilizing Debug Mode.
- 2. Run the page containing the dynamic action.
- 3. Open the browser's JavaScript console.



- 4. From the Runtime Developer toolbar, find **Debug**.
- 5. On Runtime Developer toolbar, click **Debug**, **Enable Debug**. Use **Enable Debug** to specify the level of detail included when you click **View Debug**.

Options include:

- No Debug Enables and disables Debug mode
- Info (default) The debug log contains the default or normal amount of information. This corresponds with a log level of 4 and a Debug URL argument of YES.
- App Trace The debug log contains messages up to level 6. This corresponds with a
  Debug URL argument of LEVEL6.
- **Full Trace** The log will contain the maximum amount of information. This corresponds with a Debug URL argument of LEVEL9. **Full Trace** can slow request processing but provides the most amount of detail.

Since debug information is only output when running in Debug mode, leaving Debug mode switched on enables you to further test if dynamic actions are firing when you expect them to. For example if you have defined a dynamic action that fires when a certain item's value changes, change that item's value and the console shows the debug output if the dynamic action fires.

6. On Runtime Developer toolbar, click **Debug**, **View Debug**.

Clicking **View Debug** refreshes the page. If you have any dynamic actions that are set to fire on page load, you will see the debug output in the browser console.

# 13.3 Managing Buttons

You can use buttons to direct users to a specific page or URL, or to post or process information (for example, by creating Create, Cancel, Next, Previous, or Delete buttons). You can also configure buttons to display conditionally or warn users of unsaved changes.

- About Actions Buttons Can Perform
   Use buttons to submit a page or redirect to a different page or different URL.
- Creating a Button
   Create buttons in Page Designer.
- Editing a Button
   Edit buttons in Page Designer.
- About Branching with Buttons Learn about branching with buttons.
- About the Relationship Between Button Names and REQUEST
   The name you give a Submit button (that is, a button with an Action of Submit Page) determines the value of the built-in attribute REQUEST when the page is submitted.
- Displaying a Button Conditionally
  You can choose to have a button display conditionally by editing the Server-side
  Condition attribute in Page Designer.
- Configuring Button Attributes to Warn Users of Unsaved Changes
   Use the Warn on Unsaved Changes attribute to warn users of unsaved changes when
   they attempt to navigate away from a page.



Displaying a Button Confirmation Dialog
 Display a Confirmation dialog after the button is clicked by enabling the Requires
 Confirmation attribute.



Calling a Page from a Button URL and Accessing Page Specific Utilities

## 13.3.1 About Actions Buttons Can Perform

Use buttons to submit a page or redirect to a different page or different URL.

The **Behavior**, **Action** attribute determines the action to be performed when a button is clicked. Available options include:

- Submit Page Submit the current page with a REQUEST value equal to the Button Name.
- Redirect to Page in this Application Redirect to a page in the current application with optional additional attributes for resetting pagination, setting the request value, clearing cache, and setting item values on the target page.
- Redirect to Page in a different Application Redirect to a page in a different application with optional additional attributes for resetting pagination, setting the request value, clearing cache, and setting item values, on the target page.



Redirecting to a page in different application relies on deep linking being enabled in the target application. To enable deep linking, go to the application's Security attributes and enable Deep Linking.

- Redirect to URL Redirect to the target URL you specify.
- **Defined by Dynamic Action** Does not submit the page or redirect to another page. Instead the button's behavior is defined by a Dynamic Action.

## 13.3.2 Creating a Button

Create buttons in Page Designer.

To create a button in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. If necessary, create a region to contain the item.
- 3. In the Gallery, click the **Buttons** tab.



Passing the cursor over a button displays a tooltip that describes it.

4. Right-click the button, select **Add To**, and select the appropriate location.



## Tip:

You also select the button with the mouse and drag it to the appropriate location in the Layout tab.

The Property Editor displays button attributes in the right pane. Attributes are organized in groups.

To find a group or attribute:

- **Search for a group or attribute** Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- **5.** Edit the appropriate attributes in the Property Editor.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

6. Click Save.



See Also:

**About Regions** 

# 13.3.3 Editing a Button

Edit buttons in Page Designer.

To edit a region button in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the button to edit.

The Property Editor displays button attributes in the right pane. Attributes are organized in groups.

To find a group or attribute:

- Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 3. Edit the button attributes.



To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

Click Save.

## 13.3.4 About Branching with Buttons

Learn about branching with buttons.

Each page can include any number of branches. A branch links to another page in your application or to a URL. The Oracle APEX engine considers branching at different times during page processing. You can choose to branch before processing, before computation, before validation, and after processing. Like any other control in App Builder, branching can be conditional. For example, you can branch when a user clicks a button. When you create a branch, you associate it with a specific button. The branch is only be considered if a user clicks the button.

See Also:

**Controlling Navigation Using Branches** 

# 13.3.5 About the Relationship Between Button Names and REQUEST

The name you give a Submit button (that is, a button with an Action of Submit Page) determines the value of the built-in attribute REQUEST when the page is submitted.

You can reference the value of REQUEST from within PL/SQL using the bind variable :REQUEST. By using this bind variable, you can conditionally process, validate, or branch based on which button the user clicks. You can also create processes that execute when the user clicks a button. And you can use a more complex condition as demonstrated in the following examples:

```
If :REQUEST in ('EDIT','DELETE') then ...
If :REQUEST != 'DELETE' then ...
```

These examples assume the existence of buttons named EDIT and DELETE. You can also use this syntax in PL/SQL Expression conditions. Be aware, however, that the button name capitalization (case) is preserved. In other words, if you name a button LOGIN, then a request looking for the name *Login* fails. For example:



```
<input type="BUTTON" value="Finish" onclick="apex.submit('Finish');">
```

In this example Finish is the name of the REQUEST and this example is case-sensitive.

## 13.3.6 Displaying a Button Conditionally

You can choose to have a button display conditionally by editing the Server-side Condition attribute in Page Designer.

To have a button display conditionally:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the button to edit.

The Property Editor displays button attributes in the right pane. Attributes are organized in groups.

To find a group or attribute:

- Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 3. Configure the Server-side Condition:
  - a. Find the Server-side Condition group.
  - b. Server-side Condition, Type Select a condition type that must be met in order for this component to be rendered or processed. What displays next, depends upon selected Type.

What displays next, depends upon the Server-side Condition, Type you select.

c. Configure the remaining attributes.



## Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

4. Click Save.



#### See Also:

Referencing Session State Using Bind Variable Syntax



# 13.3.7 Configuring Button Attributes to Warn Users of Unsaved Changes

Use the Warn on Unsaved Changes attribute to warn users of unsaved changes when they attempt to navigate away from a page.

To configure the Warn on Unsaved Changes attribute:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the button to edit.

The Property Editor displays button attributes in the right pane. Attributes are organized in groups.

To find a group or attribute:

- **Search for a group or attribute** Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 3. Behavior, Warn on Unsaved Changes Select one of the following:
  - Page Default Check for unsaved changes when the button is clicked if Warn on Unsaved Changes is enabled at page level.
  - Do Not Check The unsaved changes check will not be performed when the button is clicked. Use this setting for Cancel, Delete, and Apply Changes buttons.
- 4. Click Save.



#### Tip:

The Warn on Unsaved Changes attribute is implemented using the apex.page.warnOnUnsavedChanges API.



Configuring Pages to Warn Users of Unsaved Changes and warnOnUnsavedChanges in Oracle APEX JavaScript API Reference



## 13.3.8 Displaying a Button Confirmation Dialog

Display a Confirmation dialog after the button is clicked by enabling the Requires Confirmation attribute.

Enabling the **Requires Confirmation** attribute displays a confirmation dialog after a button is clicked. The button action, whether it be it to submit the page, to redirect to another page, or to invoke a dynamic action, will be delayed until the user has confirmed the action. If the user cancels, the action will not be performed. You can configure the dialog message and apply style options such as Information, Warning, Danger, or Success. The dialog's Confirm button label will match the actual button label.

To display a button confirmation dialog:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab or the Layout tab, select the button to edit.

The Property Editor displays button attributes in the right pane. Attributes are organized in groups.

To find a group or attribute:

- Search for a group or attribute Enter keywords in the Filter Properties field. The
  Property Editor displays the group or attributes. To return to the default display, delete
  the keywords.
- Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 3. Behavior, Requires Confirmation Enable this attribute.

The Confirmation group appears.

- 4. Configure the attributes under Confirmation:
  - Confirmation, Message Enter the message to be displayed in the confirmation dialog. This attribute supports substitutions (application, page items, or system variables).
  - b. Confirmation, Style Select a style for the dialog. Options include:
    - Default
    - Information
    - Warning
    - Danger
    - Success
- 5. Click Save.



# 13.4 Managing Trees

Trees to display hierarchical information in a clear, easy-to-use format. You can create a tree control using a SQL query.

About Trees

Tree controls in Oracle APEX use APEX Tree.

- Creating a Tree Using the Create Page Wizard
   Create a tree on a new page by running the Create Page Wizard.
- Creating a Tree in Page Designer
   Create a tree control by providing a SQL query that specifies a hierarchical relationship by identifying an ID and parent ID column in a table or view.
- Editing Tree Attributes
   Control tree behavior by editing region attributes and report Attributes.

## 13.4.1 About Trees

Tree controls in Oracle APEX use APEX Tree.

App Builder includes a built-in wizard for generating a tree hierarchical navigation mechanism. Trees are implemented using a single hierarchical query that identifies the row to be used as the start of your query and the relationship between parent rows and child rows of the hierarchy. Trees use the APEX Tree implementation. This is a JavaScript-based, cross browser tree component that features optional keyboard navigation, and optional state saving.

When you implement a tree control, the SQL query specifies a hierarchical relationship by identifying an ID and parent ID column in a table or view. The tree query must utilizes a START WITH ... CONNECT BY clause to generate the hierarchical query.



## Tip:

The creation of APEX Tree regions is only supported on pages using a Desktop user interface.

#### **About Desupported isTrees**

Prior to release 5.2, APEX supported the rendering of jsTree tree regions. APEX no longer supports jsTree tree regions. APEX now supports the generation of an APEX Tree tree region. APEX Tree is a JavaScript based, cross browser tree component. jsTree regions are automatically upgraded to APEX Tree regions when upgrading from a previous release or when importing to release 18.1.



### Tip:

To view tree examples, install the sample app, *Sample Trees*. To learn more, see Installing Apps from the Gallery.



## 13.4.2 Creating a Tree Using the Create Page Wizard

Create a tree on a new page by running the Create Page Wizard.

A tree is based on a query and returns data that can be represented in a hierarchy. When you create a tree using the Create Page Wizard, the wizard generates the hierarchical guery for you based on the options you select.

To create a tree on a new page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Under Component, select **Tree**.
- 5. Page Definition:
  - Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- **6.** Data Source Select a Data Source for the page:
  - a. Table/View Owner Select the owner of the table on which you are building the page.
  - b. Table/View Name Select the table or view on which the page will be based. When entering manually, note that the table name is case sensitive.
- 7. Navigation Expand the region and enable or disable navigation. If either flag is enabled. additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - b. Use Navigation Enable to create a navigation menu entry for this page. By default, the page name is used as navigation menu name.
- Click Next.
- 9. Tree Attributes:

A tree is based on a query and returns data that can be represented in a hierarchy. A start with ... connect by clause will be used to generate the hierarchical query for your tree. Use this page to identify the column you want to use as the ID, the Parent ID, and text that should appear on the nodes. The Start With column will be used to specify the root of the hierarchical query, and its value can be based on an existing item, static value or SQL query returning a single value.



- a. ID Select the column to use as the ID. For example, select the **EMPNO** column for the EMP table.
- b. Parent ID Select the column to use as the parent ID. For example, select the MGR column for the EMP table.
- c. Node Text Select the text to appear on the tree nodes. For example, select the **ENAME** column for the EMP table.
- d. Start With Select the column to be used to specify the root of the hierarchical tree query. For example, select the MGR column for the EMP table.
- e. Start Tree Choose how to start your query. Options include:
  - Based on Existing Item Select an existing application or page item.
  - Based on a SQL Query Enter a SQL query that returns a single row or single column.
  - Based on a Static Value Enter a static value.
  - Value is NULL.
- f. Click Next.
- g. Include Buttons Select the buttons to include.
- 10. Click Create Page.
- 11. To view page, click Save and Run Page.

The rendered page appears.

## 13.4.3 Creating a Tree in Page Designer

Create a tree control by providing a SQL query that specifies a hierarchical relationship by identifying an ID and parent ID column in a table or view.

The tree query you provide must utilizes a START WITH .. CONNECT BY clause to generate the hierarchical query.

To create a tree in Page Designer

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Layout** tab in the central pane.
- 3. In the Gallery, click the **Regions** tab. Right-click **Tree** and select **Add To**, and select the appropriate location.



#### Tip:

You can also select the Tree region in the Gallery and drag it to the appropriate location in the Layout tab.



- **4.** Page Designer indicates what to do next. If there are errors, the **Show Messages** icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.
    - The Messages dialog displays errors that must be addressed.
  - **b.** Select an error to highlight the associated attribute in the Property Editor.
- 5. Edit the **Region** attributes:
  - a. In the Property Editor, select the **Region** tab (if not already selected).
    - To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.
  - **b. Identification**, **Title** Enter a region title. The region title only displays when it is defined in the region template.
  - c. Under Source -
    - Location Select the location of the data.
    - Type Select how the data is queried.
    - **Table Name** Enter the case-sensitive table or view name. You can type in the name or pick from the list.

Depending upon your selections, additional attributes may appear.

- d. Under Layout -
  - **Sequence** Enter the display sequence for this item. The sequence and other layout settings determine where this item is displayed in relation to other items within the region.
  - **Parent Region** Select the parent region to which this region belongs. If a parent region is selected then this region is rendered completely inside the parent region.
  - **Position** Select the template position used to display this region. The selections available are derived from the appropriate template positions defined within the current theme, for the page's user interface.
- **e. Appearance**, **Template** Specify the template. Select a region template to define the appearance and layout of this region.
- **6.** Edit the tree **Attributes**:
  - a. In the Rendering tab, select the region and click **Attributes** tab.
    - Tree Attributes display in the Property Editor.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- b. Under Settings:
  - Node Label Column Select the data source column containing the value for the node label. The value cannot contain markup.
  - Node Value Column Select the data source column containing the value for the node value. This value is not displayed but added to the tree adapter node id property that can be accessed using JavaScript.
  - Hierarchy Indicate whether APEX should compute the tree hierarchy from the data or whether the data already contains all hierarchy information. The user interface changes depending upon your selection.



#### Computed With SQL:

- Node ID Column Select the data source column containing the ID for a node. This is required when the hierarchy is being computed by APEX. Typically, a primary key column is chosen here.
- \* Parent Key Column Select the data source column containing the value for the parent key of a node. Required when APEX computes the hierarchy.

## – Not Computed:

- \* Node Status Column Select the data source column containing the value for the node status. Required when the **Hierarchy** attribute is set to **Not Computed**. The column must contain **0** for leaf nodes and **1** for nodes with children.
- \* Hierarchy Level Column Select the data source column containing the value for the hierarchy level of the node. Required when the Hierarchy attribute is set to Not Computed.
- Tooltip Select whether tooltips are displayed, and the source for the tooltip.
- Link Specify the link to be executed when a node is clicked.
- Link Column Select the data source column containing the value for the link to be executed when a node is clicked.
- Icon CSS Class Column Select the data source column containing the value for the icon CSS class to be applied to the node.
- 7. Click Save.

## 13.4.4 Editing Tree Attributes

Control tree behavior by editing region attributes and report Attributes.

By default, a tree does not have focus and node links are activated with a single click action.

To access the Tree attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Select the tree region in the Rendering tab or the Layout tab.

The Property Editor displays attributes in the right pane. Attributes are organized in groups.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 3. Edit Region attributes:
  - a. In the Property Editor (right pane), select the **Region** tab.



- **b.** Edit attributes as needed.
- 4. Edit tree Attributes
  - a. In the Property Editor (right pane), select the Attributes tab.
  - **b.** Edit attributes as needed.
- 5. Click Save.

# 13.5 About Incorporating JavaScript into an Application

Oracle APEX includes multiple built-in interfaces especially designed for adding JavaScript.

Adding JavaScript to a web application is a great way to add features that mimic those found in client/server applications without sacrificing all the benefits of web deployment.

Remember that JavaScript is not appropriate for data intensive validations. For example, to verify that a name is contained within a large database table, you must pull down every record to the client, creating a huge HTML document. In general, complex operations are much better suited for server-side APEX validations instead of JavaScript. To learn more, see the JavaScript discussion for the appropriate control or component.

## See Also:

- Supported Shortcut Types for information about referencing a shortcut inside of a JavaScript literal string
- Understanding Validations



# **Adding Navigation**

Add navigation to an application by creating breadcrumbs, branches, tabs, or classic navigation bars.



## Tip:

You can also add navigation by creating a list (or a shared collection of links). Newer themes support the creation of lists that render as a navigation menu or navigation bar. See Managing Navigation Menus and Managing Navigation Bar Lists.

## About Using Lists as Navigation

Add navigation to your application by creating a list (or a shared collection of links). Newer themes, such as Universal Theme - 42, support the creation of navigation menus and navigation bars.

#### **Controlling Navigation Using Branches**

Add navigation to application pages by creating branches. A branch is an instruction to link to a specific page, procedure, or URL after a given page is submitted.

#### Creating Breadcrumbs

Breadcrumbs provide hierarchical navigation and display as a list of links.

## **Managing Tabs**

If your application uses an older theme, add navigation by creating tabs.

#### Managing a Classic Navigation Bar

If your application uses an older theme, add navigation by creating classic navigation bar entries.



- **Managing Trees**
- Adding Search to an Application

# 14.1 About Using Lists as Navigation

Add navigation to your application by creating a list (or a shared collection of links). Newer themes, such as Universal Theme - 42, support the creation of navigation menus and navigation bars.

You add a list to a page by creating a region and specifying the region type as List. You control the appearance of a list through list templates. For example, you can create a static list that functions as navigation using the template Vertical Unordered List with Bullets.

**Navigation menus** are lists that render at the top of the page (similar to tabs) or display as a side bar. A **navigation bar** displays with a list template in the #NAVIGATION BAR# position on your page template.

The *Sample Reporting* sample app, shown below, includes both a navigation menu and a navigation bar.





#### Tip:

To install the sample app, *Sample Reporting*, see Installing Apps from the Gallery.

## See Also:

- Creating Lists
- Managing Navigation Menus
- Managing Navigation Bar Lists

# 14.2 Controlling Navigation Using Branches

Add navigation to application pages by creating branches. A branch is an instruction to link to a specific page, procedure, or URL after a given page is submitted.

- Creating a Branch
   Create a branch in Page Designer.
- About Branching Conditionally
   Make a branch conditional by editing Server-side Condition attributes in Page Designer.

Accessing Page Specific Utilities

## 14.2.1 Creating a Branch

Create a branch in Page Designer.

To create a branch:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Create a branch in the left pane:
  - Rendering tab Right-click and select Create Branch
  - Processing tab Right-click and select Create Branch.

The Property Editor displays the Branch attributes.

- 3. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- b. Select an error to highlight the associated attribute in the Property Editor.
- 4. In the Property Editor, edit the attributes:



## Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- **a. Identification**, **Name** Specify the name of the branch for easy identification by developers.
- b. Execution Options:
  - i. **Sequence** Specify the sequence for this component. The sequence determines the order of execution.
  - ii. **Point** Select the point in the processing at which this branch action is considered. Options include:
    - After Submit (previously named Before Computation)
    - Validating (previously named Before Validation)
    - Processing (previously named Before Processing)



- After Processing (previously named After Processing)
- Before Header (previously named Before Header)
- **c. Behavior**, **Type** Select a page branch type. To learn more, click the **Help** tab in the central pane.

The attributes that display in the Property Editor depend on the branch type you select.

If Type is **Page or URL (Redirect)**, click **Target** and edit the attributes in the Link Builder Target dialog.

#### d. Server-Side Condition:

- i. When Button Pressed If you want this page processing component to execute only when the specified button is clicked, select a button from the list. You can incorporate this button condition with other conditions to further refine when this page processing component executes.
- ii. **Condition Type** Select a condition type from the list that must be met in order for this component to be rendered or processed. To learn more, click the **Help** tab in the central pane.
- Click Save.

## See Also:

- About the When Button Pressed Attribute
- Creating Pre-Rendering Branches, Computations, and Processes
- Creating Page Submission Branches, Validations, Computations, and Processes

# 14.2.2 About Branching Conditionally

Make a branch conditional by editing Server-side Condition attributes in Page Designer.

To make a branch conditional, view the branch attributes in the Property Editor. Under **Server-side Condition**, edit the appropriate attributes.

# 14.3 Creating Breadcrumbs

Breadcrumbs provide hierarchical navigation and display as a list of links.

- About Breadcrumbs
  - Use breadcrumbs to create hierarchical list of links that indicates where the user is within the application from a hierarchical perspective.
- Creating a Breadcrumb While Creating a Page Create a breadcrumb when creating a new page.



#### Creating a Breadcrumb Manually

Create a breadcrumb while creating a new page, as a Shared Component using the Create Breadcrumb Wizard, or by adding a the breadcrumb region in Page Designer. Add breadcrumb entries from Shared Components.

#### Editing Breadcrumbs

Edit breadcrumbs and breadcrumb entries in Shared Components and edit breadcrumb attributes in Page Designer.

#### Accessing Breadcrumb Reports

Access the following reports by clicking the tabs at the top of the Breadcrumbs page: Grid Edit, Utilization, and History.

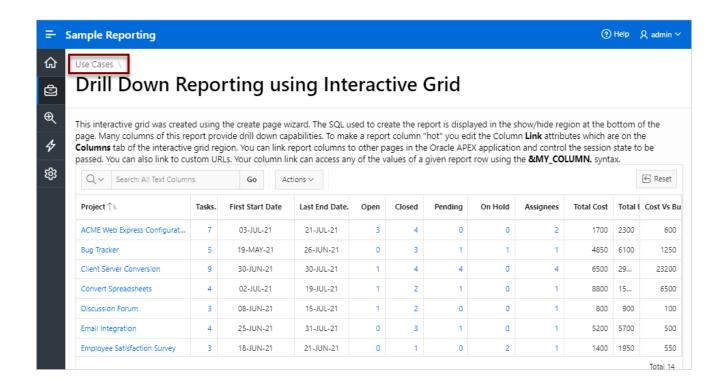


**Breadcrumb Templates** 

## 14.3.1 About Breadcrumbs

Use breadcrumbs to create hierarchical list of links that indicates where the user is within the application from a hierarchical perspective.

A breadcrumb provides navigational context to end users and offer an easy navigation path back to the app home page. Users can click a specific breadcrumb link to instantly view the target page. Within the Universal Theme, breadcrumbs have a special location for placement and should generally be used with the Title Bar region template. A breadcrumb can also display within a blank region. The following example shows breadcrumb in the Sample App, Sample Reporting.





# 14.3.2 Creating a Breadcrumb While Creating a Page

Create a breadcrumb when creating a new page.

Add a breadcrumb while creating a new page using the Create Page Wizard. If the **Breadcrumb** flag is enabled, the **Page Name** is used as **Breadcrumb Entry Name**.

To add a breadcrumb while running the Create Page Wizard:

- 1. Run the Create Page Wizard to add a new page.
  - During the wizard, enable the **Navigation**, **Breadcrumb** flag. The actual page on which this option displays depends upon the type of page you are creating.
- 2. Navigation Expand the region and enable or disable navigation. If either **Use**Breadcrumb or **Use Navigation** is enabled, additional attributes appear.
  - Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - Breadcrumb Parent Entry Select parent breadcrumb entry for the current page. To have the breadcrumb display at the top level, select - No parent entry -.
  - Use Navigation Enable to create a navigation menu entry for this page. By default, the page name is used as breadcrumb entry name.
  - Parent Navigation Menu Entry Identify the parent for this list entry.
  - Icon Identify a icon class for the icon associated with this list entry. To learn more about an attribute, see field-level Help.
- 3. Follow the on-screen instructions.



Adding a New Page to an Application

# 14.3.3 Creating a Breadcrumb Manually

Create a breadcrumb while creating a new page, as a Shared Component using the Create Breadcrumb Wizard, or by adding a the breadcrumb region in Page Designer. Add breadcrumb entries from Shared Components.

- About Creating Breadcrumbs Manually
   Create a breadcrumb manually by creating the breadcrumb, adding breadcrumb entries, and then adding the breadcrumb to a page by creating a region.
- Creating Breadcrumbs from Page Designer
   Create a breadcrumb and breadcrumb entries from Page Designer.
- Creating Breadcrumbs from Shared Components
   Create a breadcrumb and breadcrumb entries in Shared Components.
- Adding a Breadcrumb Region with a Wizard Add a breadcrumb region from the Gallery.



- Adding a Breadcrumb Region from the Gallery Add a breadcrumb region from the Gallery.
- About Creating Dynamic Breadcrumbs

## 14.3.3.1 About Creating Breadcrumbs Manually

Create a breadcrumb manually by creating the breadcrumb, adding breadcrumb entries, and then adding the breadcrumb to a page by creating a region.

The following summarizes the steps needed to create breadcrumbs manually:

- 1. Create the breadcrumb.
  - a. You can create a breadcrumb in two ways:
    - From Shared Components. See Creating Breadcrumbs from Shared Components.
    - From Page Designer. Creating Breadcrumbs from Page Designer.
  - In the Create Breadcrumb dialog, enter a name for the new breadcrumb and click Create.
- 2. Add entries to the breadcrumb.
- 3. Add the breadcrumb to a page by creating a breadcrumb region.

## 14.3.3.2 Creating Breadcrumbs from Page Designer

Create a breadcrumb and breadcrumb entries from Page Designer.

Once you create a named breadcrumb, you can then add breadcrumb entries. The breadcrumb name provides a way to name a collection of breadcrumb entries.

To manually create a breadcrumb from Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Create the breadcrumb:
  - a. In the left pane of Page Designer, click the Page Shared Components tab.
  - b. Right-click Breadcrumb and select Create.
    - The Create Breadcrumb dialog appears.
  - **c.** Breadcrumb Name Enter a name for this new breadcrumb. Once you create a named breadcrumb, you can then add breadcrumb entries.
  - d. Click Create.

The Edit Breadcrumb page appears displaying the breadcrumb in the left pane.

- 3. Next, create a breadcrumb entry. Click **New Entry**.
  - Breadcrumb Entry appears.
- 4. Under Breadcrumb Entry:



- a. Page Select the page where this breadcrumb entry displays.
- **b.** Parent Entry Identify the parent of this entry. Any given breadcrumb should have only one root node, identified as an item with no parent ID.
- **c.** Sequence Indicate the order in which breadcrumb entries appear. The sequence determines the order of evaluation.
- **d.** Short Name Identify the short name of this breadcrumb entry. Both the short and long names can be referenced from the breadcrumb template.
- e. Synchronize page name and title Enable this option to update the corresponding Page Name and Title with breadcrumb short name.
- **f.** Long Name Identify the long name of this breadcrumb entry. Both the short and long names can be referenced from the breadcrumb template.
- 5. Target Specify the target location. For the **Target is a** attribute, select either:
  - Page in this Application
  - URL

The UI changes depending upon what you select.

- **6.** If the Target is **Page in this Application**:
  - a. Target is a Select Page in this Application.
  - **b.** Page Specify the target page number.

To reset pagination for that page, select **reset pagination for this page**.

- c. Request Enter text for which you would like to set the built-in application item called REQUEST. This is also the item that is set with the name of a button that was clicked.
- d. Clear Cache Enter the page numbers (separated by commas) for those pages for which you would like to clear the user's session state.
- e. To set session state (that is, give a listed item a value):
  - Set these items Enter the list of application item names (separated by commas) for which you would like to set the session state (give the listed item a value).
  - With these values Enter a comma delimited list of values for the items specified in Set these items. You can specify static values or substitution syntax (for example, &APP ITEM NAME.).

You can specify static values or substitution syntax (for example, &APP\_ITEM\_NAME.). Note that item values passed to f?p= in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, 1234,56).

- 7. If the Target is **URL**:
  - a. Target is a Select URL.
  - b. URL Target Identify URL to go to when the breadcrumb entry is clicked...
- 8. For Conditions:
  - a. Condition Type Select a condition type from the list. This condition must be met in order for this component to be rendered or processed.
  - **b.** Enter expressions in the fields provided.



- For Authorization Optionally select an authorization scheme. This authorization scheme must evaluate to TRUE in order for this component to be rendered or otherwise processed.
- For Configuration Optionally select a build option for this component. Build options are predefined settings that determine whether or not components within an application are enabled.
- 11. Click Create Entry.

The Edit Breadcrumb page appears. A new entry appears under the breadcrumb in the left pane.

- 12. Create another breadcrumb entry:
  - a. Click New Entry.

The Breadcrumb Entry appears under the breadcrumb in the left pane.

**b.** Starting at step 4, repeat previous steps for each breadcrumb entry you want to create.

Next, add the breadcrumb to a page by creating a region.

## 14.3.3.3 Creating Breadcrumbs from Shared Components

Create a breadcrumb and breadcrumb entries in Shared Components.

Once you create a named breadcrumb, you can then add breadcrumb entries. The breadcrumb name provides a way to name a collection of breadcrumb entries.

To manually create a breadcrumb from Shared Components:

- Navigate to the Breadcrumbs page:
  - a. On the Workspace home page, click App Builder.
  - b. Select the application.
  - c. Click Shared Components.
  - Under Navigation and Search, click Breadcrumbs.

The Breadcrumbs page appears.

- 2. Create the breadcrumb:
  - a. Click Create Breadcrumb.
  - b. In the Create Breadcrumb dialog:

The Create Breadcrumb dialog appears.

- Breadcrumb Name Enter a name for this new breadcrumb. Once you create a named breadcrumb, you can then add breadcrumb entries.
- d. Click Create.

The Edit Breadcrumb page appears displaying the breadcrumb in the left pane.

- 3. Next, create a breadcrumb entry. Click **New Entry**.
  - Breadcrumb Entry appears.
- 4. Under Breadcrumb Entry:
  - a. Page Select the page where this breadcrumb entry displays.



- **b.** Parent Entry Identify the parent of this entry. Any given breadcrumb should have only one root node, identified as an item with no parent ID.
- **c.** Sequence Indicate the order in which breadcrumb entries appear. The sequence determines the order of evaluation.
- **d.** Short Name Identify the short name of this breadcrumb entry. Both the short and long names can be referenced from the breadcrumb template.
- **e.** Synchronize page name and title Enable this option to update the corresponding Page Name and Title with breadcrumb short name.
- f. Long Name Identify the long name of this breadcrumb entry. Both the short and long names can be referenced from the breadcrumb template.
- 5. Target Specify the target location. For the **Target is a** attribute, select either:
  - Page in this Application
  - URL

The UI changes depending upon what you select.

- 6. If the Target is **Page in this Application**:
  - **a.** Target is a Select **Page in this Application**.
  - b. Page Specify the target page number.

To reset pagination for that page, select **reset pagination for this page**.

- c. Request Enter text for which you would like to set the built-in application item called REQUEST. This is also the item that is set with the name of a button that was clicked.
- d. Clear Cache Enter the page numbers (separated by commas) for those pages for which you would like to clear the user's session state.
- e. To set session state (that is, give a listed item a value):
  - Set these items Enter the list of application item names (separated by commas) for which you would like to set the session state (give the listed item a value).
  - With these values Enter a comma delimited list of values for the items specified in Set these items. You can specify static values or substitution syntax (for example, &APP ITEM NAME.).

You can specify static values or substitution syntax (for example, &APP\_ITEM\_NAME.). Note that item values passed to f?p= in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, 1234,56).

- 7. If the Target is **URL**:
  - a. Target is a Select URL.
  - **b.** URL Target Identify URL to go to when the breadcrumb entry is clicked..
- 8. For Conditions:
  - **a.** Condition Type Select a condition type from the list. This condition must be met in order for this component to be rendered or processed.
  - **b.** Enter expressions in the fields provided.



- For Authorization Optionally select an authorization scheme. This authorization scheme must evaluate to TRUE in order for this component to be rendered or otherwise processed.
- 10. For Configuration Optionally select a build option for this component. Build options are predefined settings that determine whether or not components within an application are enabled.
- 11. Click Create Entry.

The Edit Breadcrumb page appears. A new entry appears under the breadcrumb in the left pane.

- 12. Create another breadcrumb entry:
  - a. Click New Entry.

The Breadcrumb Entry appears under the breadcrumb in the left pane.

**b.** Starting at step 4, repeat previous steps for each breadcrumb entry you want to create.

Next, add the breadcrumb to a page by creating a region.

## 14.3.3.4 Adding a Breadcrumb Region with a Wizard

Add a breadcrumb region from the Gallery.



#### Tip:

Before creating a breadcrumb region, create the breadcrumb. The wizard will propmt you to create breadcrumb entry if one has not yet been defined.

To create a breadcrumb region with a wizard:

- 1. View the page in Page Designer.
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

2. On Page Designer Toolbar at the top of the page, click the **Create** menu and select **Breadcrumb Region**.

The Create Breadcrumb Wizard appears.

- 3. For Region Attributes:
  - a. Region Title Enter a title for the region such as Breadcrumb.
  - b. Region Template Select a region template.

For the Universal Theme, the application breadcrumb has a special location for placement. Oracle recommends using **Title Bar** region template.

- c. Display Point Identify the display point.
- d. Sequence Specify the sequence for this component. The sequence determines the order of evaluation.



- e. Click Next.
- 4. Identify the Breadcrumb:
  - **a.** Breadcrumb Select the breadcrumb to be associated with this region.
  - b. Breadcrumb Template Identify breadcrumb template.
  - c. Click Next.
- 5. If no Breadcrumb Entry has been created, the wizard prompts you to create one. For Breadcrumb Entry:
  - a. Breadcrumb Entry Label Specify the label for this breadcrumb entry.
  - b. Parent Entry Select this breadcrumb entry's hierarchical parent...
  - c. Click Next.
- 6. Confirm your selections and click Finish.

## 14.3.3.5 Adding a Breadcrumb Region from the Gallery

Add a breadcrumb region from the Gallery.



## Tip:

Before creating a breadcrumb region, Oracle recommends creating the breadcrumb and adding breadcrumb entries.

To create a breadcrumb region from the Gallery:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.



## Note:

Note the Gallery at the bottom of the page. Pass the cursor over a control or component to view a tooltip that describes it.

- **2.** From the Gallery at the bottom of the page:
  - a. Click the Regions tab.
  - b. Right-click Breadcrumb.
  - Select Add To and then select the appropriate location such as Breadcrumb Bar.





#### Tip:

You can also select the Breadcrumb region in the Gallery and drag it to the appropriate location in the Layout tab.

Page Designer indicates what actions are required next. If there is an error, a **Messages** icon displays next to the **Save** button. Click the **Messages** icon to view a dialog listing all the errors. Select an error to highlight the associated attribute in the Property Editor.

3. In the Property Editor, edit the following Region attributes:



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

- a. Identification, Title Enter a region title. The region title only displays when it is defined in the region template.
- **b.** Source, Breadcrumb Select the breadcrumb to be added to the page.
- **c.** Layout, Sequence Enter the display sequence for this item. The sequence and other layout settings determine where this item is displayed in relation to other items within the region.
- **d.** Layout, Position Select the template position used to display this region. The selections available are derived from the appropriate template positions defined within the current theme, for the page's user interface.
- **e.** Appearance, Template Select a region template to define the appearance and layout of this region.
  - For the Universal Theme, the application breadcrumb has a special location for placement. Oracle recommends using **Title Bar** region template.
- **f.** Appearance, Render Components Select if the region components display above or below the main region content.

#### 4. Click Save.

Repeat these procedures for each page where you would like to add breadcrumbs.

## 14.3.3.6 About Creating Dynamic Breadcrumbs

To give users more exact context, you can include session state in breadcrumbs, making your breadcrumbs dynamic. For example, suppose a page in your application displays a list of orders for a particular company and you want to include the following breadcrumb:

```
Home > Orders > Orders for ACME Inc
```

In this example, ACME Inc not only indicates the page a user is on but also the navigation path. The Oracle APEX engine stores the value of ACME Inc. in session state.

To create this type of dynamic menu, you must include a reference to a session state item in the breadcrumb's short name or long name. For example:



&COMPANY NAME.

# 14.3.4 Editing Breadcrumbs

Edit breadcrumbs and breadcrumb entries in Shared Components and edit breadcrumb attributes in Page Designer.

Editing Breadcrumb and Breadcrumb Entries
 Edit breadcrumbs and breadcrumb entries on the Breadcrumbs page in Shared Components.

Adding Breadcrumb Entries
 Add breadcrumb entries on the Breadcrumb Entry page.

Reparenting Breadcrumb Entries
 Select a new parent for selected breadcrumb entries on the Reparent Entries page.

Deleting Unused Breadcrumb Entries
 Delete unused breadcrumb entries.

Editing Breadcrumb Attributes in Page Designer
 Edit Region attributes and breadcrumb Attributes in Page Designer.

## 14.3.4.1 Editing Breadcrumb and Breadcrumb Entries

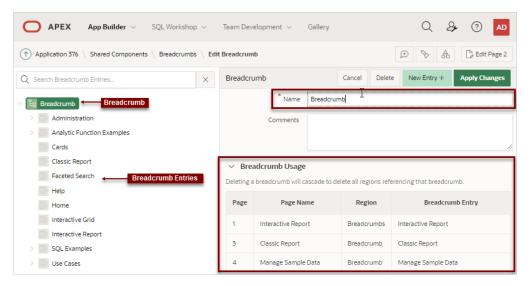
Edit breadcrumbs and breadcrumb entries on the Breadcrumbs page in Shared Components.

To edit a breadcrumb:

- 1. Navigate to the Breadcrumbs page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation and Search, select Breadcrumbs.
     The Breadcrumbs page appears.
- 2. To edit the breadcrumb name:
  - a. On the Breadcrumbs page, select the breadcrumb.

The Edit Breadcrumb page appears. A breadcrumb tree displays in the left pane.





**b.** Select the root node.

The Breadcrumb attributes appear in the right pane.

- Edit the Name attribute and click Apply Changes.
- **3.** To delete a breadcrumb:
  - a. On the Breadcrumbs page, select the breadcrumb.

The Edit Breadcrumb page appears. A breadcrumb tree displays in the left pane.

**b.** Select the parent node.

The Breadcrumb attributes appear in the right pane.

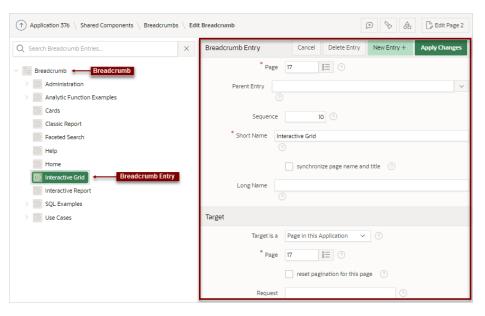
- **c.** Expand and review the **Breadcrumb Usage** region. Deleting a breadcrumb delete all regions referencing that breadcrumb.
- d. Click Delete.
- 4. To edit breadcrumb entries:
  - a. On the Breadcrumbs page, select the breadcrumb.

The Edit Breadcrumb page appears. A breadcrumb tree displays in the left pane.

**b.** In the breadcrumb tree, select a breadcrumb entry.

The Breadcrumb Entry attributes appear in the right pane.





Edit the appropriate Breadcrumb Entry attributes.
 To learn more about a specific attribute, see field-level Help.

d. Click Apply Changes.

## 14.3.4.2 Adding Breadcrumb Entries

Add breadcrumb entries on the Breadcrumb Entry page.

To add entries to a breadcrumb:

- 1. Navigate to the Breadcrumbs page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Navigation and Search, click **Breadcrumbs**.

The Breadcrumbs page appears.

- 2. In the left pane, select the breadcrumb to which to add entries.
- 3. Click New Entry.

The Edit Breadcrumb page appears.

- 4. Under Breadcrumb Entry:
  - a. Page Select the page where this breadcrumb entry displays.
  - b. Parent Entry Identify the parent of this entry. Any given breadcrumb should have only one root node, identified as an item with no parent ID.
  - **c.** Sequence Indicate the order in which breadcrumb entries appear. The sequence determines the order of evaluation.
  - d. Short Name Identify the short name of this breadcrumb entry. Both the short and long names can be referenced from the breadcrumb template.
  - e. Long Name Identify the long name of this breadcrumb entry. Both the short and long names can be referenced from the breadcrumb template.



- 5. Under Target, specify the target location. For the **Target is a** attribute, select either:
  - Page in this Application
  - URL

The UI changes depending upon what you select.

- **6.** If the target is a page in the application:
  - a. Target is a Select Page in this Application.
  - **b.** Page Specify the target page number.

To reset pagination for that page, select **reset pagination for this page**.

- c. Request Enter text for which you would like to set the built-in application item called REQUEST. This is also the item that is set with the name of a button that was clicked.
- **d.** Clear Cache Enter the page numbers (separated by commas) for those pages for which you would like to clear the user's session state.
- e. To set session state (that is, give a listed item a value):
  - Set these items Enter the list of application item names (separated by commas) for which you would like to set the session state (give the listed item a value).
  - With these values Enter a comma delimited list of values for the items specified in Set these items. You can specify static values or substitution syntax (for example, &APP ITEM NAME.).

You can specify static values or substitution syntax (for example, &APP\_ITEM\_NAME.). Note that item values passed to f?p= in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, 1234,56).

- 7. If the target is a URL:
  - a. Target is a Select URL.
  - **b.** URL Target Identify URL to go to when the breadcrumb entry is clicked..
- 8. For Conditions:
  - **a.** Condition Type Select a condition type from the list. This condition must be met in order for this component to be rendered or processed.
  - **b.** Enter expressions in the fields provided.
- For Authorization Optionally select an authorization scheme. This authorization scheme must evaluate to TRUE in order for this component to be rendered or otherwise processed.
- **10.** For Configuration Select a build option for this component. Build options are predefined settings that determine whether or not components within an application are enabled.
- 11. Click Create Entry.

Repeat these procedures for each breadcrumb entry you create.

## 14.3.4.3 Reparenting Breadcrumb Entries

Select a new parent for selected breadcrumb entries on the Reparent Entries page.

To reparent breadcrumb entries:

1. Navigate to the Breadcrumbs page:



- a. On the Workspace home page, click **App Builder**.
- b. Select an application.
- c. On the Application home page, click **Shared Components**.
- d. Under Navigation and Search, click Breadcrumbs.

The Breadcrumbs page appears.

2. On the Breadcrumbs page, select the breadcrumb.

The Edit Breadcrumb page appears. A breadcrumb tree displays in the left pane.

3. Click the Reparent Entries tab.

The Reparent Entries page appears.

- 4. You can reparent entries in two ways:
  - Drag and Drop In the breadcrumb tree, drag and drop entries to a new location in the tree.
  - Reparent Context Menu Right-click the entry and select **Reparent**. In the Select a Parent Node dialog, select a new location..

## 14.3.4.4 Deleting Unused Breadcrumb Entries

Delete unused breadcrumb entries.



## Tip:

The **Delete Unused** button described in this section is conditional and only appears if the application has unused (or orphaned) breadcrumb entries.

To delete unused breadcrumb entries:

- 1. Navigate to the Breadcrumbs page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation and Search, select **Breadcrumbs**.

The Breadcrumbs page appears.

2. Click the **Utilization** tab.

The Utilization report appears. The Orphaned Breadcrumb Entries region displays any unused breadcrumbs.

3. To delete unused breadcrumb entries, click **Delete Unused**.

Delete Unused only appears if there are orphaned breadcrumb entries.



## 14.3.4.5 Editing Breadcrumb Attributes in Page Designer

Edit Region attributes and breadcrumb Attributes in Page Designer.

**Region attributes** define the area of the page which functions as a container for the breadcrumb. Edit **breadcrumb Attributes** to change the Breadcrumb Template, Template Options, and CSS Classes.

To edit region attributes:

- 1. View the page in Page Designer.
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. To edit Region attributes:
  - a. In the Rendering tab, select the region containing the breadcrumb.
  - **b.** The Property Editor displays the region attributes in the **Region** tab.
  - c. Edit the appropriate attributes.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

- 3. To edit breadcrumb Attributes:
  - a. In the Rendering tab, select the region containing the breadcrumb.

The Property Editor displays the region attributes in the **Attributes** tab.

**b.** Edit the appropriate attributes.

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

4. Click Save.

# 14.3.5 Accessing Breadcrumb Reports

Access the following reports by clicking the tabs at the top of the Breadcrumbs page: Grid Edit, Utilization, and History.



Breadcrumb reports only appear after you create a breadcrumb.

To view Breadcrumb reports:

- Navigate to the Breadcrumbs page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.



- c. On the Application home page, click **Shared Components**.
- d. Under Navigation and Search, select Breadcrumbs.

The Breadcrumbs page appears.

- Click the appropriate tab:
  - **Grid Edit** Edit all breadcrumb entry names at once. Click the page number to link to a page.
  - **Utilization** View the Breadcrumb Utilization report. This report lists breadcrumbs by page. Click the page number to go to a specific page.
  - History View the Breadcrumb History report. This report lists recent changes to breadcrumbs.

# 14.4 Managing Tabs

If your application uses an older theme, add navigation by creating tabs.



## Tip:

Tabs only appear in applications using an older theme. Applications using the *Universal Theme - 42* theme provide navigation support through the creation of navigation menus.

#### About Tabs

For applications that use an older theme, tabs are an effective way to navigate users between pages.

About the Tabs Page

The Tabs page describes the tabs defined in your application.

Checking for Tab Template Support

Prior to creating parent and standard tabs, check that your default template has positions defined for both standard and parent tabs using the appropriate substitution strings.

Creating a Tab

Create tabs on the Tabs page.

Editing Tabs

Edit tabs on the Tabs page.

Accessing Tab Reports

Access the following reports by clicking the tabs at the top of the Tabs page: Conditional Display, Utilization, and History.



- Creating Lists
- Managing Navigation Menus
- Creating Applications

## 14.4.1 About Tabs

For applications that use an older theme, tabs are an effective way to navigate users between pages.

The ability to include tabs in your application depends upon your application theme. Older themes, such as *Theme 26 - Productivity Applications*, include tab-based navigation. Newer themes, such a *Universal Theme - 42*, include list-based navigation menus.

An application can have pages with no tabs, one level of tabs, and two levels of tabs. Standard tabs enable you to display only one level of tabs. To display two levels of tabs, you define both Parent tabs and Standard tabs.



#### Tip:

As an alternative to tabs, you can use lists to display tab controls. List templates provide greater control over HTML generation.

App Builder includes two different types of tabs:

#### Standard tabs

An application having only one level of tabs uses a standard tab set. A standard tab can have a one-to-one relationship with a page and is associated with a specific page and page number. You can use standard tabs to link users to a specific page.

#### Parent tabs

Parent tabs can control the display of standard tab sets and can be current for many pages. Clicking a parent tab displays the corresponding standard tab, with the default page as the current page. Parent tabs give users another level of navigation and a context (or sense of place) within the application. You can use parent tabs to link users to a specific URL associated with a specific page.

You can group tabs into collections called a tab set. Each tab must be part of a tab set.

# 14.4.2 About the Tabs Page

The Tabs page describes the tabs defined in your application.

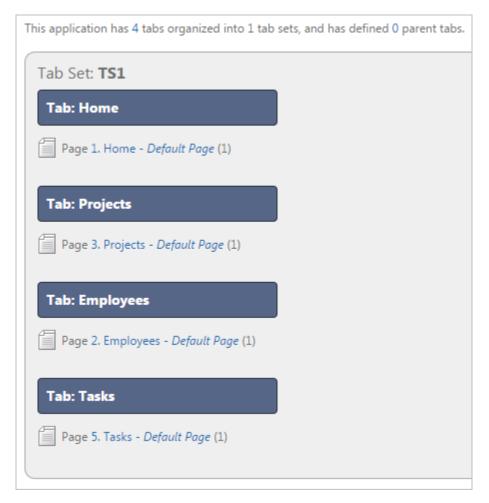
To access the Tabs page:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.



- c. On the Application home page, click Shared Components.
   The Shared Components page appears.
- 2. Under Navigation, click **Tabs**.

The Tabs page appears.



The Tab Display section provides additional information about how the current tabs or tab set are configured to display.

The Page Templates region at the bottom of the page displays a report of page templates associated with the current application. This region is hidden by default. To view it, click the greater than (>) icon to the left of Page Templates.





# 14.4.3 Checking for Tab Template Support

Prior to creating parent and standard tabs, check that your default template has positions defined for both standard and parent tabs using the appropriate substitution strings.

You also must make sure you do not override this template at the page-level.

To view page templates:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
- 2. Under Navigation, click Tabs.

The Tabs page appears.

3. Locate **Page Templates** at the bottom of the page. If needed, expand the Page Templates region.



## Page Templates

Page Template Name	Supports Standard Tabs	Supports Parent Tabs	Template Class
Login	No	No	Login
No Tabs - Left Sidebar (fixed-width / DIV based)	No	No	No Tabs with Sidebar
No Tabs - Left and Right Sidebar (fixed-width / DIV left and optional table-based right)	No	No	No Tabs with Sidebar
No Tabs - Right Sidebar (fixed-width / DIV based)	No	No	No Tabs
No Tabs - Right Sidebar (optional / table-based)	No	No	No Tabs
One Level Tabs - Left Sidebar (fixed-width / DIV based)	Yes	No	One Level Tabs with Sidebar
One Level Tabs - Left and Right Sidebar (fixed-width / DIV left and optional table-based right)	Yes	No	One Level Tabs with Sidebar

## See Also:

- Page Templates
- Using Themes for information about setting a default page template at the application level



# 14.4.4 Creating a Tab

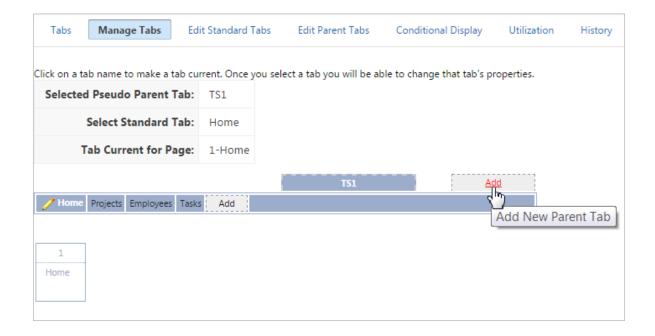
Create tabs on the Tabs page.

An application can have pages with no tabs, one level of tabs, and two levels of tabs. Standard tabs enable you to display only one level of tabs. To display two levels of tabs, you must define both Parent tabs and Standard tabs.

#### To create a tab:

- 1. Access the Tabs page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation, click Tabs.
- Click Manage Tabs.
- 3. To add a Parent tab, click the **Add** button in the upper row.

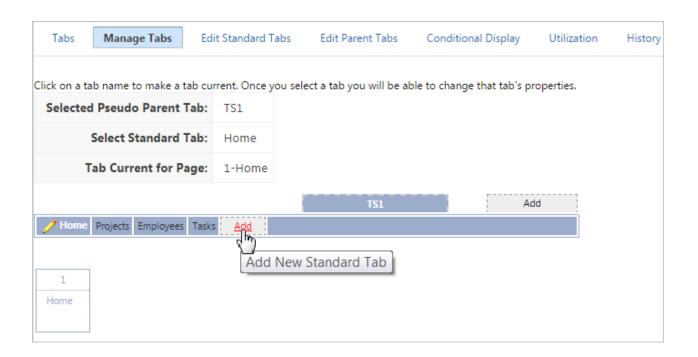
A graphical representation of the tabs defined in your application displays.



Parent tabs can control the display of standard tab sets. Clicking a parent tab displays the corresponding standard tab, with the default page as the current page.

4. To create a Standard tab, click the **Add** button in the lower row.





The Create Parent Tab or Create Standard Tab Wizard appears.

5. Follow the on-screen instructions.



## 14.4.5 Editing Tabs

Edit tabs on the Tabs page.

- Editing Multiple Tabs Simultaneously
  Learn about editing multiple tabs simultaneously.
- Managing Standard Tabs
   Learn about accessing the Standard Tab Task list.

## 14.4.5.1 Editing Multiple Tabs Simultaneously

Learn about editing multiple tabs simultaneously.

To edit multiple tabs simultaneously:

- 1. Navigate to the Tabs page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Navigation, click **Tabs**.



- **2.** Click one of the following tabs at the top of the page:
  - Edit Standard Tabs
  - Edit Parent Tabs

A report appears.

- 3. To edit a specific tab, click the **Edit** icon.
- 4. Edit the appropriate attributes and click **Apply Changes**.

## 14.4.5.2 Managing Standard Tabs

Learn about accessing the Standard Tab Task list.

The Standard Tab Task list displays on the right side of the Tabs page. You can access the links on this list to move a standard tab to different parent tab, rename a standard tab set, resequence the display order, associate pages with a tab set, create a new standard tab, or create a new standard tab set.

To access the Standard Tab Task list:

- Navigate to the Tabs page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Navigation, click Tabs.
- 2. Click Manage Tabs.
- 3. Make a selection from the Standard Tab Task list on the right side of the page:
  - Move Highlighted Standard Tab t a Different Parent Tab
  - Rename Standard Tab Set
  - Resequence Display Order
  - Associate Page(s) with Selected Standard Tab
  - Create New Standard Tab
  - Create New Standard Tab Set

## 14.4.6 Accessing Tab Reports

Access the following reports by clicking the tabs at the top of the Tabs page: Conditional Display, Utilization, and History.

This section describes the Conditional Display, Utilization, and History reports.

To view the Conditional Display report:

- 1. Navigate to the Tabs page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click Shared Components.



e. Under Navigation, click Tabs.

The Tabs page appears.

- Click the appropriate tab:
  - **Conditional Display** The Conditional Display report displays Standard Tabs and Parent tabs that are configured to display conditionally. To filter the display, select tab type and click **Go**.
  - **Utilization** The Utilization report lists the standard tabs used in the current application.
  - History History report displays a history of changes to tab attributes for the current application.

# 14.5 Managing a Classic Navigation Bar

If your application uses an older theme, add navigation by creating classic navigation bar entries.



## Tip:

Applications using the *Universal Theme - 42* theme provide navigation support through the creation of navigation menus.

- About Classic Navigation Bar Entries
  - For applications using older themes, navigation bar entries offer an easy way to move users between application pages.
- Creating a Classic Navigation Bar Entry
   Before adding a navigation bar, you must create entries for the navigation bar.
- Copying a Classic Navigation Bar Entry
   Copy a classic navigation bar entry by selecting As a Copy of an Existing Navigation
   Bar in the Create Navigation Bar Entry Wizard.
- Editing a Classic Navigation Bar Entry
   Edit an existing navigation bar entry on the Navigation Bar Entries page accessible from Shared Components..
- Editing Multiple Classic Navigation Bar Entries Simultaneously
   Edit multiple navigation bar entries simultaneously.
- Accessing Classic Navigation Bar Entry Reports
   Access the Subscription and History reports by clicking the tabs at the top of the Navigation Bar Entries page.



- Creating Custom Themes
- Managing Navigation Menus



# 14.5.1 About Classic Navigation Bar Entries

For applications using older themes, navigation bar entries offer an easy way to move users between application pages.

The associated page template determines the location of a navigation bar. A navigation bar entry can be an image, text, or an image with text beneath it. You must supply the images and text to use in the navigation bar entries.

Navigation bars are different from other shared components in that you do not need to reference them on a page-by-page basis. If your page template includes the #NAVIGATION\_BAR# substitution string, the Oracle APEX engine automatically includes any defined navigation bars when it renders the page.

# 14.5.2 Creating a Classic Navigation Bar Entry

Before adding a navigation bar, you must create entries for the navigation bar.

You can create a navigation bar entry from scratch or by copying an existing entry.

- Creating a Classic Navigation Bar Entry from Scratch Learn about creating a classic navigation bar entry from scratch.
- Creating a Classic Navigation Bar Entry for Feedback
   Learn about creating a classic navigation bar entry for feedback,

## 14.5.2.1 Creating a Classic Navigation Bar Entry from Scratch

Learn about creating a classic navigation bar entry from scratch.

To create a navigation bar entry from scratch:

- 1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click Classic Navigation Bar Entries.
- 2. Click Create.

The Create Navigation Bar Entry Wizard appears.

- 3. For Method, select **From Scratch**.
- 4. For Type, select Navigation to URL.
- **5.** For Attributes, specify the following:
  - a. Sequence Specify the order of evaluation for this component.



#### Tip

To review the existing entries, click the **Existing Navigation Bar Entries** link at the bottom of the page.



- b. Entry Label Enter display text for this navigation bar entry.
- c. Icon Image Name Enter an image name. For naming conventions, see field-level Help.
- **d.** Image ALT Enter ALT text for navigation icons that are images. If you do not specify an image name, then this text displays.
- e. Image Height Define the height of the image in pixels.
- f. Width Defines the width of the image.
- g. Click Next.
- 6. For Target, specify the following
  - a. If the target location is a URL, specify:
    - Target is a Select URL.
    - URL Target Enter a URL. For example:

http://www.yahoo.com

- **b.** If the target location is a page, specify:
  - Target is a Select Page in this Application.
  - Page Specify the target page number.

To reset pagination, select reset pagination for this page.

Select **Printer Friendly** to display the target page using the application's Printer Friendly template. Printer friendly templates optimize a page for printing.

- Request Enter text that defines the built-in application item called REQUEST.
- Clear Cache Enter the page numbers where you would like to clear the user's session state. Separate multiple entries with commas.
- c. To set session state (that is, give a listed item a value):
  - Set these items Enter the list of application item names for which you would like
    to set session state. Separate multiple items with commas. Setting the session
    state gives the listed item a value.
  - With these values Enter a comma-delimited list of values for the items your specified.

You can specify static values or substitution syntax (for example,  $APP_ITEM_NAME$ .). Note that item values passed to f?p= in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, \1234,56\).

- d. Click Next.
- 7. To set a condition for displaying the navigation bar entry, select a condition type.
- 8. Click Create.



#### Tip:

In order for a navigation bar to appear, your page template must include the #NAVIGATION BAR# substitution string. To learn more, see Page Templates.



- Creating a Classic Navigation Bar Entry for Feedback
- Viewing Field-level and Page Designer Help
- Editing Themes
- Optimizing a Page for Printing

## 14.5.2.2 Creating a Classic Navigation Bar Entry for Feedback

Learn about creating a classic navigation bar entry for feedback,

Feedback is the process of gathering real-time comments, enhancement requests, and bugs from your application users. To add a feedback page to an application, you add a Feedback page.

To create a navigation bar entry for feedback:

- 1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click Shared Components.
  - e. Under Navigation, click Classic Navigation Bar Entries.

#### Click Create.

The Create Navigation Bar Entry Wizard appears. Each wizard page displays a series of blocks on the left, representing the sequence of steps. The highlighted block indicates the step you are performing.

- 3. For Method, select From Scratch.
- For Type, select Feedback.
- For Feedback:
  - a. Feedback Page Select your feedback page.
  - **b.** Entry Label Enter the label of the new navigation bar entry.
  - **c.** Display Sequence The sequence for the new navigation bar entry. The sequence determines the order of evaluation.
- 6. Click Create.



## Tip:

In order for a navigation bar to appear, your page template must include the #NAVIGATION BAR# substitution string. SeePage Templates.



Managing Feedback

# 14.5.3 Copying a Classic Navigation Bar Entry

Copy a classic navigation bar entry by selecting **As a Copy of an Existing Navigation Bar** in the Create Navigation Bar Entry Wizard.

To copy a navigation bar entry:

- Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click Shared Components.
  - e. Under Navigation, click Classic Navigation Bar Entries.
- Click Create.

The Create Navigation Bar Entry Wizard appears.

- 3. For Method, select As a Copy of an Existing Navigation Bar and click Next.
- 4. For Copy From Application, select an application and click Next.
- For New Names, enter the name on the new entry, and select whether to copy and subscribe.
- 6. Click Copy Navigation Bar Entries.

## 14.5.4 Editing a Classic Navigation Bar Entry

Edit an existing navigation bar entry on the Navigation Bar Entries page accessible from Shared Components..

To edit a navigation bar entry:

- 1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - Select an application.
  - d. On the Application home page, click Shared Components.
  - e. Under Navigation, click Classic Navigation Bar Entries.
- 2. Select a navigation bar entry.

The Edit page appears.

- Edit the appropriate attributes.
- 4. To learn more about a specific item on a page, see field-level Help.
- Click Apply Changes.



Viewing Field-level and Page Designer Help

# 14.5.5 Editing Multiple Classic Navigation Bar Entries Simultaneously

Edit multiple navigation bar entries simultaneously.

To edit multiple navigation bar entries simultaneously:

- 1. Navigate to the Lists page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder.
  - c. Select an application.
  - d. On the Application home page, click Shared Components.
  - e. Under Navigation, click Classic Navigation Bar Entries.
- 2. Select a list.
- 3. Click Grid Edit at the top of the page.
- 4. Edit the appropriate attributes and click **Apply Changes**.

# 14.5.6 Accessing Classic Navigation Bar Entry Reports

Access the Subscription and History reports by clicking the tabs at the top of the Navigation Bar Entries page.

Note:

The Subscription and History buttons only appear after you create a navigation bar.

To view Classic Navigation Bar Entry reports:

- Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click Classic Navigation Bar Entries.
- Click the appropriate tab:
  - **Subscription** Click **Subscription** to access the Subscribed NavBars report. This report displays subscribed navigation bar entries in your application.



 $\mbox{\bf History}$  - Click  $\mbox{\bf History}$  to view the Navigation Bar History report. This report lists recent changes to navigation bars.



# Managing Computations, Validations, and Processes

Enhance your application by including computations, validations, and processes.

**Computations** enable you to assign values to items. **Validations** are edit checks on specific items, pages, or columns. A **page process** performs an action at a specified point during the rendering or submission of the page. **Application processes** are blocks of PL/SQL logic that are set to run at specific points using processes from multiple pages of an application.

## Understanding Page Computations

Use computations to assign a value to an identified item when a page is submitted or displayed.

## Understanding Validations

Use validations to create edit checks on specific items, pages, or columns.

#### Understanding Page Processes

Create **page processes** to perform an action at a specified point during the rendering or submission of the page.

#### Understanding Application Processes

Create an application process to run a block of PL/SQL logic at a specific point from multiple pages of an application.

## About Branches

A branch is an instruction to go to a specific page, procedure, or URL. For example, you can branch from page 1 to page 2 after page 1 is submitted. When you create a branch, you specify a Branch Point and Branch Type.

## Understanding Application Computations

Create an application computation to set the value of a single page or application-level item. Application computations run at the same point across multiple pages in an application.

#### Using the Attribute Dictionary

Use the Manage Attribute Dictionary page to update values on the current page with those in the Attribute Dictionary, or to update the Attribute Dictionary with the values on the current page.

# 15.1 Understanding Page Computations

Use computations to assign a value to an identified item when a page is submitted or displayed.

## About Page Computations

A page computation assigns a value to an identified item when a page is displayed or submitted (rendered and processed).

## Creating a Page Computation

Create a Page Computation in Page Designer.

- Editing Page Computation Attributes
   Edit a page computation in Page Designer.
- Editing the Computation Point and Source
   Control when a computation executes by editing the Sequence and Point attributes.
- Example: Computation Points and Computation Syntax
   View computation points and computation syntax example.



**Understanding Application Computations** 

# 15.1.1 About Page Computations

A page computation assigns a value to an identified item when a page is displayed or submitted (rendered and processed).

You create a page computation by running the Create Page Computation Wizard. For each computation, specify the item for which you are creating the computation and a computation type.

You can also use application-level computations to assign values to items. Most page-level computations populate page items. In contrast, most application-level computations populate application items.

## 15.1.2 Creating a Page Computation

Create a Page Computation in Page Designer.

To create a page computation:

- 1. Navigate to the appropriate page in Page Designer.
- 2. In the Rendering tab, expand the **Pre-Rendering** or **Post-Rendering** node and locate where the computation should be.
- 3. Right-click the location and select **Create Computation**.

Page Designer appears.

In the Property Editor, attributes are organized into groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 4. Edit the following attributes:
  - Identification, Item Name Enter the page or application item populated by this computation.

- **b.** Execution Options, Sequence Specify the sequence for this computation. The sequence determines the order of execution.
- **c.** Execution Options, Point Select at what point in page rendering or processing this computation is executed. The most typical computation point is **After Submit**.
- d. Computation, Type Select a computation type. To view a list of options, see Help.
- Click Save.

- · Viewing a Page in Page Designer
- · Creating Pre-Rendering Branches, Computations, and Processes
- Creating Page Submission Branches, Validations, Computations, and Processes

# 15.1.3 Editing Page Computation Attributes

Edit a page computation in Page Designer.

To edit a page computation:

- 1. View the page in Page Designer.
- 2. In the Rendering tab, expand the Pre-Rendering or Post-Rendering node and select the computation.

Page Designer appears.

In the Property Editor, attributes are organized into groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

3. In the Property Editor, edit the appropriate attributes.



## Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

4. Click Save.



Viewing a Page in Page Designer.



# 15.1.4 Editing the Computation Point and Source

Control when a computation executes by editing the Sequence and Point attributes.

You control when a computation executes by editing the **Sequence** and **Point** attributes. The **Sequence** attribute determines the order of evaluation. The **Point** attribute determines the point in page rendering or processing at which the computation executes. The most typical computation point is After Submit.

To edit a computation point and source:

- 1. View the page in Page Designer.
- 2. In the Rendering tab, expand the Pre-Rendering or Post-Rendering node and select the computation.

Page Designer appears.

In the Property Editor, attributes are organized into groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

- 3. In the Property Editor, edit the following attributes.
  - a. Execution Options, Sequence Specify the sequence for this component. The sequence determines the order of execution. If two components have the same sequence value, then they may be executed in a different order when the application is exported and imported into another environment.
  - **b.** Execution Options, Point Select at what point in page rendering or processing this computation is executed.

For example, selecting **On New Instance** executes the computation when a new session (or instance) is generated. The most typical computation point is **After Submit.** 

- c. Computation Define expression or guery to compute an item's value.
- **d.** Error, Error Message Enter an error message that displays if this computation fails.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

4. Click Save.



Viewing a Page in Page Designer



## 15.1.5 Example: Computation Points and Computation Syntax

View computation points and computation syntax example.

A good example of using computations can be illustrated by a page containing form fields for entering phone numbers. In this example, the phone number is stored in one database column; however, the data entry form breaks the phone number into three components: area code, prefix, and line number. In this example, the page items are called P10\_AREA\_CODE, P10\_PREFIX, and P10\_LINE\_NUMBER.

Next, suppose you need to combine the values stored in these items into a single string. You could accomplish this by using an After Submit computation and store the combined values in an item called P10 PHONE NUMBER.

To create a computation to store the combined values of P10\_AREA\_CODE, P10\_PREFIX, and P10\_LINE NUMBER in new items:

- 1. Navigate to the appropriate page.
- 2. Create an item named P10\_PHONE\_NUMBER to store the combined values of P10\_AREA\_CODE, P10\_PREFIX, and P10\_LINE\_NUMBER.
- 3. Create the computation:
  - a. In the Rendering tab, expand the Pre-Rendering.
  - **b.** Select a location, and then right-click and select **Create Computation**.

Page Designer appears.

In the Property Editor, attributes are organized into groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.



#### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 4. In the Property Editor, edit the following attributes:
  - a. Identification, Item Name Select P10 PHONE NUMBER.
  - **b.** Execution Options, Sequence Specify the sequence for this computation. The sequence determines the order of execution.
  - **c.** Execution Options, Point Select at what point in page rendering or processing this computation is executed. The most typical computation point is **After Submit**.
- **5.** For Computation Type, you can create the following computation types:
  - a. Static Value:
    - Computation, Type Select Static Value .
    - Computation, Static Value Enter the following computation:

```
(&P10 AREA CODE.) &P10 PREFIX.-&P10 LINE NUMBER.
```



- b. PL/SQL Function Body:
  - Computation, Type Select PL/SQL Function Body .
  - Computation, PL/SQL Function Body Enter the computation:

```
DECLARE
l_return_value VARCHAR2(300) DEFAULT NULL;
BEGIN
    l_return_value :=
'('||:P10_AREA_CODE||')'||:P10_PREFIX||'-'||:P10_LINE_NUMBER;
RETURN l_return_value;
END;
```

- c. SQL Query (return colon separated value):
  - Computation, Type Select SQL Query (return colon separated value) .
  - · Computation Type, SQL Query Enter the computation:

```
SELECT
'('||:P10_AREA_CODE||')'||:P10_PREFIX||'-'||:P10_LINE_NUMBER
FROM DUAL
```

- d. PLSQL Expression:
  - Computation, Type Select PLSQL Expression .
  - · Computation Type, PLSQL Expression Enter the computation:

```
'('||:P10_AREA_CODE||')'||:P10_PREFIX||'-'||:P10_LINE_NUMBER
```

6. Click Save.

See Also:

About the Differences Between Page Items and Application Items

# 15.2 Understanding Validations

Use validations to create edit checks on specific items, pages, or columns.

- About Validations
   Learn about validations.
- What Happens When a Validation Fails?
   Learn what happens when a validation fails.
- Creating a Validation
   Create validations in Page Designer.
- Editing a Validation
   Edit validations in Page Designer.
- About Determining When Validations Execute
   Determine when a validation executes by editing the Always Execute attribute.

- About Defining How Validation Error Messages Display
   Control how validation messages display by editing the Error Message and Error
   Message attributes.
- Processing Validations Conditionally
   Control when and if a validation executes by configuring the Server-side Condition attributes.
- About Altering the Go to Error Link
   Alter the Go to Error text to change the default text or to translate it into a language that is not translated by default.

### 15.2.1 About Validations

Learn about validations.

A validation is an edit check. Validations specific to a single item are **page item validations**. Validations that apply to an entire page are **page validations**. Validations for tabular forms specific to a single column are **column level validations**. Validations for tabular forms that do not apply to a single column are **tabular form row validations**.

You can define a validation declaratively by selecting a validation method. You enter the actual validation edit check in the Validation Messages field. Be aware that if a validation fails, subsequent page processes or computations do not occur. Also remember that the validation you enter must be consistent with the validation type you selected.

## 15.2.2 What Happens When a Validation Fails?

Learn what happens when a validation fails.

If a page is submitted and some of the validations fail, Oracle APEX redisplays the existing page with all inline validation errors. While displaying inline errors, APEX does not execute computations, application processes, or page processes (for example, Automated Row Fetch) which are defined to execute during Page Rendering (in other words, all "On Load %" display points). The one exception is if the computations and processes use the condition type Inline Validation Errors Displayed.

The reason for skipping these computations and processes is that any of they could potentially alter the data entered by the user. For example, an Automated Row Fetch process would fetch and overwrite the modified data with the values from the database when the user actually wants to get the entered data in order to fix the validation error.

If a computation is skipped, the following displays in the debug output:

Do not perform computation because inline validation errors found.

If an application or page process is skipped, the following displays in the debug output:

Skip because inline validation errors found.



## 15.2.3 Creating a Validation

Create validations in Page Designer.



Text entered for validations may not exceed 3,950 characters.

To create a validation in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Processing** tab in the left pane.
- 3. Right-click Validations and select Create Validation.

Validation attributes display in the Property Editor. Attributes are organized in groups.



To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

- **4. Identification**, **Name** Enter the name of the validation. Make this name should be descriptive so that developers can easily identify conditions being checked.
- Execution Options, Sequence Enter the sequence for this validation. The sequence determines the order of execution.
- **6.** Edit the following **Validation** attributes:
  - a. Validation, Editable Region Select the associated region.
  - b. Validation, Type Select the type of equality to be tested for this validation. Depending on your selection, one or more additional attributes are required to fully define this validation.

If the validation passes the equality test, or evaluates to TRUE, then the validation error message does not display. Validation error messages display when the validation fails the equality test, or evaluates to FALSE, or a non-empty text string is returned.

 Validation, Always Execute - Specify whether this validation always executes.

If set to **On**, this validation is always evaluated, irrespective of the Execute Validations setting defined against the button that submitted the page. If set



to **Off**, this validation is only evaluated if the triggering button has an Execute Validations setting of **On**.

- 7. Edit the following **Error** attributes:
  - a. Error, Error Message Enter text for the error message.
  - Error, Display Location Select where the error message displays for this validation.

Validation error messages display on a separate error page, or inline with the existing page. Inline error messages display underneath the Associated Item label and/or in a Notification area, defined as part of the page template.

**c. Error**, **Associated Item** - Select the item where this validation error message displays.

If you select an item and the Error message display location includes **Inline with Field**, the error message displays underneath the label of the specified item. If the Error message display location does not include **Inline with Field**, this attribute has no impact on the display of the error message.

8. Click Save.

### See Also:

- Creating Pre-Rendering Branches, Computations, and Processes
- Creating Page Submission Branches, Validations, Computations, and Processes

### 15.2.4 Editing a Validation

Edit validations in Page Designer.

To edit a validation in Page Designer:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Processing** tab in the left pane.
- 3. Expand **Validating** and then **Validations** and select the validation.

Validation attributes display in the Property Editor. Attributes are organized in groups.



To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.



4. In the Property Editor, edit the appropriate attributes.



#### Tip

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the center pane.

5. Click Save.

## 15.2.5 About Determining When Validations Execute

Determine when a validation executes by editing the Always Execute attribute.

The **Always Execute** attribute determines if validations execute when a page is submitted. Use this attribute for buttons or certain page items that submit a page. The **Always Execute** attribute has two options:

• **On** - The validation always executes independent of validation settings for buttons or items on a page.

For example, select **On** if your validation is a security check which determines if the current user is allowed to modify or delete the current record. This ensures the validation executes for any operation and prevents unprivileged users from modifying data.

• **Off** - The validation only executes if the button or item used to submit the page has the **Execute Validations** attributes set to **On**.

For example, it is not useful to verify that an item be numeric and display an error message if the user is simply deleting a record. In that scenario, the validations should only execute when the user clicks the Create or Apply Changes buttons.

To accomplish this behavior:

- For the validation, set Always Execute to On
- For the Create and Apply Changes buttons, set Execute Validations to On.
- For the Delete button, set Execute Validations to Off to avoid unnecessary validations.



See Also:

**Editing a Validation** 

## 15.2.6 About Defining How Validation Error Messages Display

Control how validation messages display by editing the Error Message and Error Message attributes.

You can choose to have validation error messages display inline (that is, on the page where the validation is performed) or on a separate error page.



You define how a validation error message displays by configuring the following validation attributes:

- 1. Error, Error Message Enter the error message text in this field. You can use #LABEL# as placeholder for the label of the associated page item or #COLUMN\_HEADER# for the heading of the associated editable region column. The placeholders are not supported if error display location is set to On Error Page.
- 2. Error, c Select where the error message displays for this validation. Validation error messages display on a separate error page, or inline with the existing page. Inline error messages display underneath the Associated Item label and/or in a Notification area, defined as part of the page template.

### Options include:

- **Inline with Field and in Notification** Error displays inline within the field label and within a notification area (defined as part of the page template).
- Inline with Field Error displays inline within the field label.
- Inline in Notification Error displays inline within a notification area (defined as part
  of the page template).
- On Error Page Displays the error on a separate error page. To create a hard error that stops all processing (including validations), you must display the error on an error page.
- Error, Associated Item (or Column) Select the item (or column) where this validation error message displays.

If you select an item and the Error message display location includes **Inline with Field**, the error message displays underneath the label of the specified item. If the Error message display location does not include **Inline with Field**, this attribute has no impact on the display of the error message.



**Editing a Validation** 

## 15.2.7 Processing Validations Conditionally

Control when and if a validation executes by configuring the Server-side Condition attributes.

You can control when and if a validation executes by configuring the following **Server-side Condition** attributes:

- Server-side Condition, When Button Pressed If you want this page processing component to execute only when the specified button is clicked, select a button from the list. You can incorporate this button condition with other conditions to further refine when this page processing component executes.
  - If no button is pressed, other conditions are evaluated before performing the validation.
- 2. **Server-side Condition**, **Type** Select a condition type from the list that must be met in order for this component to be rendered or processed.
  - To view a list of options, select the **Type** attribute in the Property Editor and click the **Help** tab in the central pane.



### See Also:

- Editing a Validation
- Understanding Conditional Rendering and Processing

## 15.2.8 About Altering the Go to Error Link

Alter the Go to Error text to change the default text or to translate it into a language that is not translated by default.

If you define an associated item, Oracle APEX renders a **Go to Error** link in the Notification display location next to the corresponding error message. When clicked, the user's focus is set to the associated item.

You can alter the **Go to Error** text to change the default text or to translate it into a language that is not translated by default with APEX. In either case, define a text message called APEX.GO\_TO\_ERROR with the text and language of your choice. Additionally, you can disable this functionality and remove the **Go to Error** link by setting the text of the APEX.GO TO ERROR text message to just a single space.

See Also:

Translating Messages Used Internally by APEX

# 15.3 Understanding Page Processes

Create **page processes** to perform an action at a specified point during the rendering or submission of the page.

- About Page Processes
   A page process performs an action at a specified point during the rendering or submission of the page.
- Creating Page Processes
   Create a page process in Page Designer.
- Editing Page Process Attributes
   Edit a page process in Page Designer.
- Controlling When a Page Process Executes
   Control when a process executes by editing the Sequence and Point attributes.
- Creating Page Process Success and Error Messages
   Define both success and error messages that display when a process runs.
- Making a Page Process Conditional
   Create a conditional page process by editing Server-side Condition attributes.



### 15.3.1 About Page Processes

A page process performs an action at a specified point during the rendering or submission of the page.

For example, you can create a page process to execute logic or to make a call to the APEX engine. A page process is a unit of logic that runs when a specific event occurs, such as loading or submitting a page.

From a functional perspective, there is no difference between page-level and application-level processes. The difference between these two process types is where the process is defined, that is at the page-level or at the application level.

You create a page process in Page Designer. In either the Rendering or Processing tab, locate the node where the process will occur, right-click, and select **Create Process**. The process Type determines what attributes you need to configure.

### **Supported Process Types**



Depending on your application configuration, you may also have additional process type plug-ins. These display as <*My Plug-in*> [*Plug-in*].

Supported page process Types include:

- Clear Session State Process to clear session state stored within Oracle APEX.
- Close Dialog Process to close the current modal or non-modal dialog page.
- Data Loading Process to load data into the target table or collection based on the given data load definition.
- Execute Code Process to execute PL/SQL code.
- Form Automatic Row Processing (DML) Process to insert, update, or delete a form region row(s).
- Form Initialization Process to initialize form region items. Initialization can either be fetching data from the region source, using the primary key value(s) or simple initialization of the form region items. Human Task Create Process to create a human task, using an existing task definition from the application.
- Human Task Manage Process to manage a human task. The different types of task management are Approve, Reject, Claim, Release, Delegate, Forward, Cancel, Comment and Invite Participant.
- Interactive Grid Automatic Row Processing (DML) Process to insert, update, or delete Interactive Grid rows.
- Invoke API Process to invoke a procedure or function stored in the local database.
- **Reset Pagination** Process to reset pagination of reports on the current page.
- Send E-Mail Process to send an email, and optionally one or more attachments, from the application.
- User Preferences Process to set User Preferences for the end user.



Web Service - Process to consume the specified Web service.

### See Also:

- Understanding Application Processes
- Accessing Page Specific Utilities

## 15.3.2 Creating Page Processes

Create a page process in Page Designer.

To create a page process:

- 1. View the page in Page Designer.
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- In either the Rendering or Processing tab, locate the node where the process will occur. Right-click and select Create Process.
- 3. Page Designer indicates what to do next. If there is an error, the Show Messages icon displays in the Page Developer toolbar.
  - a. Click the **Show Messages** icon on the Page Designer toolbar.

The Messages dialog displays errors that must be addressed.

- b. Select an error to highlight the associated attribute in the Property Editor.
  - To learn more about an attribute, select the attribute in the Property Editor and click the Help tab in the central pane.
- Identification, Name Enter the name of the process for easy identification by developers.
- 5. Identification, Type Specify which process type to execute. The Type you select determines what attributes display next.

Consider the following examples.

- If Type is Execute Code:
  - Identification, Type Select Execute Code.
  - Source, Location Select where the process executes. Select either Local Database or REST Enabled SQL.
  - Source, Language Select the language used to execute the entered code.
  - Source, PL/SQL Enter the PL/SQL code to be executed...
- If Type is Invoke API:
  - Identification, Type Select Invoke API.



- Settings, Type Select what process executes. Options include PL/SQL Package or PL/SQL Procedure or Function.
- Settings, Package Enter the case-sensitive PL/SQL package name. You can type in the name or pick from the list.
- Settings, Procedure or Function Enter the case-sensitive procedure or function name defined in the selected PL/SQL package. You can type in the name or pick from the list.

#### Under Execution :

 Execution, Sequence - Specify the sequence for this computation. The sequence determines the order of execution.

If two components have the same sequence value, then they may be executed in a different order when the application is exported and imported into another environment

- **b.** Execution, Point Select the point at which this process is executed.
- **c.** Execution, Run Process Select the frequency that this process executes.

#### Under Success Message:

Success Message, Success Message - Enter the success message for this process.
 If the process runs and does not generate an error, then this process success message displays in the notification section of the resulting page displayed. If you are branching to another page using a URL redirect, you may need to check the preserve success message attribute.

To learn more, select the attribute in the Property Editor and click the Help tab in the central pane.

### 8. Under Error:

a. Error, Error Message - Enter the error message for this process.

This message displays if an unhandled exception is raised. After any error processing stops, a rollback is issued and an error message displays.

- **b.** Error, Display Location Select where this process error message displays, when the process fails to complete successfully.
- Click Save.

### See Also:

- Creating Pre-Rendering Branches, Computations, and Processes
- Creating Page Submission Branches, Validations, Computations, and Processes

## 15.3.3 Editing Page Process Attributes

Edit a page process in Page Designer.

To edit an existing page process:

1. View the page in Page Designer.



- a. On the Workspace home page, click the **App Builder** icon.
- b. Select an application.
- c. Select a page.

Page Designer appears.

- 2. Click the **Processing** tab in the left pane.
- 3. In either the Rendering or Processing tab, expand the nodes to locate and select the process.

Process attributes display in the Property Editor. Attributes are organized in groups.

To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.

4. Edit the appropriate attributes:



### Tip:

To learn more about an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

5. Click Save.

## 15.3.4 Controlling When a Page Process Executes

Control when a process executes by editing the Sequence and Point attributes.

To control when a process executes, edit the Sequence and Point attributes:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Processing** tab in the left pane.
- 3. In either the Rendering or Processing tab, expand the nodes to locate and select the process.

Process attributes display in the Property Editor. Attributes are organized in groups.

- 4. Under Execution :
  - **a.** Execution, Sequence Specify the sequence for this computation. The sequence determines the order of execution.

If two components have the same sequence value, then they may be executed in a different order when the application is exported and imported into another environment.

**b.** Execution, Point - Select the point at which this process is executed.

- **c.** Execution, Run Process Select the frequency that this process executes.
- 5. Click Save.



**Editing Page Process Attributes** 

## 15.3.5 Creating Page Process Success and Error Messages

Define both success and error messages that display when a process runs.

You can define both success and error messages that display when a process runs. How an error message displays depends upon the processing point. For processes with a processing point of On Submit - Before Computation and Validations or On Submit - After Computations and Validations, you can specify whether the error message displays inline on the current page (the default) or on a separate page. For all other page processes, error messages display on a separate error page.

To create a page process error or success message:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Processing** tab in the left pane.
- 3. In either the Rendering or Processing tab, expand the nodes to locate and select the process.

Process attributes display in the Property Editor. Attributes are organized in groups.

- 4. Under Success Message:
  - Success Message, Success Message Enter the success message for this process.
     If the process runs and does not generate an error, then this process success message displays in the notification section of the resulting page displayed. If you are branching to another page using a URL redirect, you may need to check the preserve success message attribute.

To learn more, select the attribute and click the Help tab in the central pane.

#### 5. Under Error:

- a. Error, Error Message Enter the error message for this process. This message displays if an unhandled exception is raised. After any error processing stops, a rollback is issued and an error message displays.
- **b.** Error, Display Location Select where this process error message displays, when the process fails to complete successfully.

Option include:

• **Inline in Notification** - The process error message displays in the Notification area (defined as part of the page template).



- On Error Page Error displays on a separate error page.
- 6. Click Save.



Page Templates

## 15.3.6 Making a Page Process Conditional

Create a conditional page process by editing Server-side Condition attributes.

To create a conditional page process:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Click the **Processing** tab in the left pane.
- 3. In either the Rendering or Processing tab, expand the nodes to locate and select the process.

Process attributes display in the Property Editor. Attributes are organized in groups.

- 4. Under Server-side Condition:
  - a. Server-side Condition, When Button Pressed If you want this page processing component to execute only when the specified button is clicked, select a button from the list. You can incorporate this button condition with other conditions to further refine when this page processing component executes.
  - b. Server-side Condition, Execution Type Select a condition type that must be met in order for this component to be rendered or processed:

To learn more, select the attribute in the Property Editor and click the Help tab in the central pane.

5. Click Save.

# 15.4 Understanding Application Processes

Create an application process to run a block of PL/SQL logic at a specific point from multiple pages of an application.

By default, application processes execute at the same point for every page in the application. However, you can apply conditions for specific pages to control when the process executes.





### Tip:

To learn more about execution behavior in the case of a validation error, see What Happens When a Validation Fails?

- On Demand Application Processes
  - On Demand processes are useful when you have PL/SQL logic that you would like to run from different execution points across multiple pages.
- About Application Processes that Execute On New Instance
   Processes with a Process Point of On New Instance enable you to retrieve information
   once within a user's session.
- About Running an On Demand Process from a Page Request Run an On Demand process from a page request.
- Example: Application Process
   View an application process example.
- Creating an Application Process
   Create an application process from Shared Components.
- Editing Application Process Attributes
   Edit application process attributes from Shared Components.
- Creating Application Process Error Messages
   Learn how to define application process error message.
- Viewing the Application Processes History Report To view the Application Process History report.



**Understanding Page Processes** 

### 15.4.1 On Demand Application Processes

On Demand processes are useful when you have PL/SQL logic that you would like to run from different execution points across multiple pages.

An **On Demand** process is special type of application process which has a Process Point of On Demand, is of type PL/SQL, and executes when called from a page-level On Demand process or from an Ajax call from the browser.

On Demand processes should typically be created on a page and not at the application-level. On Demand processes created at the application-level are created with an initial authorization scheme of **Must Not Be Public User** to prohibit the processes from being invoked from users in unauthenticated sessions.





**Creating Page Processes** 

# 15.4.2 About Application Processes that Execute On New Instance

Processes with a Process Point of **On New Instance** enable you to retrieve information once within a user's session.

Typically an application process runs at the same point across multiple pages in an application. Processes having a Process Point of **On New Instance** are the exception. These types of processes are useful when you only need to retrieve information once within a user's session. For example, if the application items do not depend on the logged in user, you can initialize them using the Process Point **On New Instance**. To look up information that depends on the user, you can also use **After Authentication**.

If you configure applications to share the same session by setting the same cookie name in the authentication scheme, **On New Instance** and **After Login**, the application processes fire whenever Oracle APEX first processes a request for the application (that is, On New Instance), or processes a request of an authenticated user for the application (that is, **After Authentication**).

## 15.4.3 About Running an On Demand Process from a Page Request

Run an On Demand process from a page request.

You can have a page request run an On Demand process by using the following syntax:

f?p=application id:page id:session:APPLICATION PROCESS=process id

#### Where:

- application id is the application ID or alphanumeric alias
- page id is the page number or alphanumeric alias
- session is the session ID
- APPLICATION\_PROCESS=process\_id is the keyword APPLICATION\_PROCESS=
  followed by either the process ID or an alphanumeric name of an application-level
  process having a Process Point of On Demand

When you use this syntax, the APEX engine recognizes the request and processes it using the following rules:

- The page number in the URL can be the current page number or alias. A page number or alias is required in the request only as a syntactic placeholder because no specific page is accessed for this type of request.
- The process authorization scheme, the application's authorization scheme, and the process conditions are supported.
- Session state (that is, item names and values) may be set in the URL, but clear cache options are ignored.



- Any failures of authentication, authorization, or process conditions do not result in visible
  error messages or other indicators of such failures and most often result in a blank page
  being displayed. Note that if you are logged in to App Builder as a developer, an error
  messages displays.
- Specifying the process by name locates the first process with the specified (casepreserved) name.



Clearing Session State

## 15.4.4 Example: Application Process

View an application process example.

A shopping cart application is a good example of when you might use an application process. For example, to display the contents of a user's shopping cart with each page view, you create a region on page zero of your application that displays the values of the application-level items <code>TOTAL\_CART\_ITEMS</code> and <code>TOTAL\_PURCHASE\_PRICE</code>.

Instead of writing a process for each page to set the values of <code>TOTAL\_CART\_ITEMS</code> and <code>TOTAL\_PURCHASE\_PRICE</code>, you could write an application process of type **On Load: Before Header** to compute these values. Then, the APEX engine would execute the process on each page as it renders the application. As a result, each page, would display the most current values for <code>TOTAL\_CART\_ITEMS</code> and <code>TOTAL\_PURCHASE\_PRICE</code>.



Creating a Global Page to Display Components on Every Page

## 15.4.5 Creating an Application Process

Create an application process from Shared Components.

To create an application process:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Application Logic, select **Application Processes**.

The Application Processes page appears.

3. Click Create.



#### 4. For Identification:

- Name Enter a name for the application process.
- b. Sequence Specify the sequence number for this process. The sequence number determines the order in which the process is evaluated relative to other processes that execute at the same point.
- c. Point Identify the point during the processing of each page in the application that this process would run. Note the option, **On Demand**, only runs when requested by a page process.
- d. Click Next.

#### 5. For Source:

- a. Language Select a language that is used to evaluate the entered programming code.
- b. Code Enter the code of your application process.
- c. Do not validate code (parse code at runtime only) Select if applicable.
- d. Click Next.
- 6. For Conditionality:
  - a. Condition Type Select a condition type that must be met in order for this process to execute. Note that the UI changes slightly depending upon the selected Condition Type.
  - b. Expression 1 Use this attribute to conditionally control whether or not a component is rendered or processed. Enter values in this attribute based on the selected condition type. The component will be rendered or processed if the specified condition is met.
  - c. Click Create Process.

### See Also:

**Creating Application Process Error Messages** 

### 15.4.6 Editing Application Process Attributes

Edit application process attributes from Shared Components.

To edit an existing page process:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Application Logic, select **Application Processes**.

The Application Processes page appears.



- 3. Click the process name.
- 4. Edit the appropriate attributes. For more information, see field-level Help.
- 5. Click Apply Changes.

### 15.4.7 Creating Application Process Error Messages

Learn how to define application process error message.

If a process raises an error, you can define an error messages that displays to the user. How the error message displays depends upon the processing point. For processes with a processing point of On Submit - Before Computation and Validations or On Submit - After Computations and Validations, you can specify whether the error message displays inline on the current page (the default) or on a separate page. For all other application processes, error messages display on a separate error page.

To create an application process error message:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Application Logic, select **Application Processes**.

The Application Processes page appears.

- 3. Click the process name.
- **4.** Edit the following attributes:
  - **a. Source**, **Process Error Message** Enter the message that displays when an unhandled exception is raised.
  - b. Error message display location Applies to processes with a processing point of On Submit - After Page Submission - Before Computation and Validations or On Submit - After Page Submission - After Computations and Validations, you can specify where the error message displays.

Select one of the following:

- **Inline in Notification** Error displays inline on the page in the "notification" area (defined as part of the page template).
- On Error Page Error displays on a separate error page.

If the application contains a manually created tabular form (using APEX\_ITEM calls in the SQL statement), select **On Error Page**. Otherwise, changes made by the user are discarded when the page is re-rendered. When errors are displayed on a separate error page, the user can use the browser's Back button to preserve the entered values.

5. Click Apply Changes.



See Also:

**Editing Application Process Attributes** 

## 15.4.8 Viewing the Application Processes History Report

To view the Application Process History report.

The Application Process History report displays recent modifications made to application processes.

#### To view

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Application Logic, select Application Processes.

The Application Processes page appears.

- 3. Select the History tab at the top of the page.
- 4. You can customize the appearance the page using the Search bar at the top of the page. Available controls include:
  - **Select columns to search** Resembles a magnifying glass. Click this icon to narrow your search. To search all columns, select **All Columns**.
  - **Text area** Enter case insensitive search criteria (wildcard characters are implied) to search for a process by name and click **Go**.
  - Go button Executes a search or applies a filter.
  - Actions menu Use the Actions menu to customize the report view.

See Also:

About the Actions Menu

## 15.5 About Branches

A branch is an instruction to go to a specific page, procedure, or URL. For example, you can branch from page 1 to page 2 after page 1 is submitted. When you create a branch, you specify a Branch Point and Branch Type.





**Controlling Navigation Using Branches** 

# 15.6 Understanding Application Computations

Create an application computation to set the value of a single page or application-level item. Application computations run at the same point across multiple pages in an application.



#### Tip:

To learn more about execution behavior in the case of a validation error, see What Happens When a Validation Fails?

- About Application Computations
  - Application Computations are units of logic that set the value of a single page or application-level item and are run at the same point across multiple pages in an application.
- About Application Computations that Execute On New Instance
   Use the On New Instance Computation Point to retrieve information once within a user's
   session.
- Creating an Application Computation
   Create an application computation from Shared Compoents.
- Accessing the Application Computation History Report

### 15.6.1 About Application Computations

Application Computations are units of logic that set the value of a single page or application-level item and are run at the same point across multiple pages in an application.

Similar to page-level computations, application computations can be based on static values, item values, PL/SQL, or SQL. A common use of an application item is to store the value of the last page viewed in the application. By storing the value in an item, you can add a back button and then redirect the user to the page number captured by the computation. This type of computation works well, for example, when you need to enable users to back out of an error page.

### **Example: Storing the Last Visited Page**

The following is an example of a computation that stores the last page visited. In this example, the computation:

- Stores the last application page visited to an item named LAST PAGE
- Checks that the value of a CURRENT\_PAGE\_ITEM is of type PL/SQL Function Body with a Computation body of:

```
BEGIN
  :LAST_PAGE := nvl(:CURRENT_PAGE,:APP_PAGE_ID);
  :CURRENT PAGE := :APP PAGE ID;
```

```
RETURN :LAST_PAGE;
END;
```

V

## 15.6.2 About Application Computations that Execute On New Instance

Use the On New Instance Computation Point to retrieve information once within a user's session.

Typically an application computation runs at the same point across multiple pages in an application. The exception is computations having a **Computation Point** of **On New Instance**. These types of computations are useful when you only need to retrieve information once within a user's session. For example, if the application items do not depend on the logged in user, you can initialize them using the Computation Point **On New Instance**. To look up information that depends on the user, you can also use **After Authentication**.

If you configure applications to share the same session by setting the same cookie name in the authentication scheme, **On New Instance** and **After Login**, the application processes fire whenever Oracle APEX first processes a request for the application (that is, **On New Instance**), or processes a request of an authenticated user for the application (that is, **After Authentication**).

## 15.6.3 Creating an Application Computation

Create an application computation from Shared Compoents.

To create an application computation:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Application Logic, select **Application Computations**.
- 3. Click Create.
- **4.** Edit the following attributes:
  - a. Item, Sequence Specify the sequence for this component. The sequence determines the order of evaluation.
  - **b. Item**, **Computation Item** Select the item this computation affects.
  - c. Frequency, Computation Point Select a process point at which this computation should be performed. Selecting After Submit causes the computation to be performed only after the page is displayed and then submitted.
  - **d. Computation, Computation Type** Select the manner in which this computation is performed.
  - **e. Computation**, **Computation** Enter the computation logic that corresponds to the computation type. See field-level Help for examples.



- f. Computation, Computation Error Message Enter the error message that displays if the computation fails.
- **g. Authorization**, **Authorization Scheme** (optional) Select an authorization scheme which must evaluate to True in order for this computation to execute.
- Conditions, Condition Type (optional) Select a condition type that must be met in order for this computation to execute.
- i. Configuration, Build Option (optional) Select a build option for this component.
- j. Comments, Comments (optional) Enter any comments.
- Click Create Computation.

See Also:

Using Build Options to Control Configuration

### 15.6.4 Accessing the Application Computation History Report

Once you create an application computation, you can view the Application Computation History report. The Application Computation History report displays a history of recently changed application computations by date.

To access the Application Computation History report:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
  - Under Application Logic, select **Application Computations**.
- **3.** Select the **History** at the top of the page.
- 4. You can customize the appearance the page using the Search bar at the top of the page. Available controls include:
  - Select columns to search Resembles a magnifying glass. Click this icon to narrow your search. To search all columns, select All Columns.
  - Text area Enter case insensitive search criteria (wildcard characters are implied) and click Go.
  - Go button Executes a search or applies a filter.
  - Actions menu Use the Actions menu to customize the report view.

See Also:

About the Actions Menu



# 15.7 Using the Attribute Dictionary

Use the Manage Attribute Dictionary page to update values on the current page with those in the Attribute Dictionary, or to update the Attribute Dictionary with the values on the current page.

- About the Attribute Dictionary
   The Attribute Dictionary contains a set of attributes about a column that are used in creating forms and reports.
- Accessing the Manage Attribute Dictionary Access the Manage Attribute Dictionary page:

### 15.7.1 About the Attribute Dictionary

The Attribute Dictionary contains a set of attributes about a column that are used in creating forms and reports.

These definitions are matched by column name and a particular definition can be shared among several columns by using synonyms.

### 15.7.2 Accessing the Manage Attribute Dictionary

Access the Manage Attribute Dictionary page:

To access the Manage Attribute Dictionary page:

- On the Workspace home page, click the App Builder icon.
  - The App Builder home page appears.
- 2. Select an application.
- 3. Click Utilities.
- Click Utilities and click Attribute Dictionary.

The page is divided into two sections: **Page Items** and **Report Columns**.

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 (that is, those in hidden regions and button items) are not counted in the number of candidate Items and Report Columns as these are not used in the updates.

5. To update the current page or update the Attribute dictionary, select the appropriate page link.

The Attribute Dictionary appears.

Only Items and Report Columns that have different values for at least one attribute are shown. You choose which objects to insert or update and which attributes to include. The number of Items and Report Columns that can be used might be less than the total because hidden objects, objects in hidden regions, and button items are not included.



# **Managing Shared Components**

Shared components can display or be applied on any page within an application. Developers can use the tools and wizards on the Shared Components page either at the application-level or on specific pages.

### Accessing the Shared Components Page

Access the Shared Components page by selecting an application and then clicking **Shared Components**.

### Shared Components Page

Use the tools and wizards on the Shared Components page either at the application-level or on specific pages.

### Managing Application Settings

Create Application Settings to define application-level configuration options.

### Creating Lists of Values at the Application-Level

Create a list of values at the application-level that can be referenced by any page item or report field.

#### Creating Lists

Add a shared collection of links (or a list) to an application. To add a list to a page, create a region and specify the region type as List. You control the appearance of a list through list templates.

### Adding Search to an Application

Add declarative searches to an application by creating a search configuration and then a search page that displays the search results.

### Managing Component Settings

Use Component Settings to set application level values for built-in APEX components and installed plug-ins.

### Using Shortcuts

Use shortcuts to avoid repetitive coding of HTML or PL/SQL functions.

#### Managing Email Templates

Enable users to send emails from your application by creating email templates.

### Managing Static Application Files

Navigate to Shared Components to upload, view, download, and delete static application files (including images, CSS files, and other files which must be managed independently).

### Managing Static Workspace Files

Navigate to Shared Components to upload, view, download, and delete static workspace files (including images, CSS files, and other files which must be managed independently).

#### Managing Application Items

Application items do not display, but are used to maintain session state.

## Printing a Report Region by Defining a Report Query

Print a report region by defining a report query.

Formatting a Report Region or Report Query Using Report Layouts
 Create a report layout to format a report region or report layout.

### See Also:

- **App Builder Concepts**
- **Creating Applications**
- Controlling Page Layout
- **Adding Navigation**

# 16.1 Accessing the Shared Components Page

Access the Shared Components page by selecting an application and then clicking **Shared Components.** 

To access the Shared Components page:

- On the Workspace home page, click **App Builder**.
- Select an application.
- On the Application home page, click **Shared Components** in the center of the page.

The Shared Components page appears and is divided into regions. Badges with counts display next to some component list items.

To create or edit a shared component, select the appropriate link.



### Tip:

Once you select an application, you can also access the Shared Components page by clicking the **Shared Components** icon at the top of the page. The Shared Components icon consists of a triangle above a circle and a square. This icon displays at the top of most App Builder pages including the Application home page, Page Designer, Supporting Objects, and Utilities.

# 16.2 Shared Components Page

Use the tools and wizards on the Shared Components page either at the applicationlevel or on specific pages.

The Shared Components page is divided into regions. Badges with counts display next to some components.

- **Application Logic**
- Security
- Other Components
- Navigation and Search
- User Interface
- Files and Reports



- Data Sources
- Workflows and Automations
- Globalization
- Tasks Region
- · Workspace Objects Region

# 16.2.1 Application Logic

The following table describes the links under **Application Logic** on the Shared Components page.

Table 16-1 Application Logic Links on the Shared Components Page

Link	Description
Application Definition	Links to the Edit Application Definition page. Use this page to edit attributes for an application. Attributes are grouped into four categories: Definition, Security, Globalization, and User Interface.
	See Also: Managing Application Attributes
Application Items	Application items do not display, but are used to maintain session state. Application Items can be set using computations, processes, or by passing values on a URL.
	See Also: Managing Application Items
Application Processes	<ul> <li>Use application processes to run PL/SQL logic:</li> <li>At specific points for each page in an application</li> <li>As defined by the conditions under which the process is set to</li> </ul>
	execute
	Upon the creation of a new session
	Note that <b>On Demand</b> processes execute only when called from a page-level On Demand process or when called using Ajax from the browser.
	See Also: Understanding Application Processes
Application Computations	Use application-level computations to assign values to application and page items for each page displayed or upon the creation of a new application session. You can also create an application-level computation and execute it conditionally on multiple pages.
	See Also: Understanding Application Computations
Application Settings	Application Settings enable developers to define application level configuration options.
	See Also: Managing Application Settings
Build Options	Use build options to conditionally display or process specific functionality within an application. You can use build options to control which features of an application are turned on for each application deployment.
	See Also: Using Build Options to Control Configuration

# 16.2.2 Security

The following table describes the links under **Security** on the Shared Components page.

Table 16-2 Security Links on the Shared Components Page

Link	Description
Security Attributes	Use the Edit Security Attributes page to configure general security attributes for all pages within an application.
	See Also: Configuring Security Attributes
Authentication Schemes	Authentication is the process of establishing each user's identity before they can access your application. Authentication may require a user to enter a user name and password or may involve verification of a user's identity or use of a secure key.
	See Also: Establishing User Identity Through Authentication
Authorization Schemes	Authorization restricts user access to specific controls or components based on predefined user privileges.
	See Also: Providing Security Through Authorization
Application Access Control	Manage application access control roles and user role assignments.
	See Also: Managing Roles and User Assignments
Session State Protection	Session State Protection is a built-in functionality that prevents hackers from tampering with the URLs within your application. URL tampering can adversely affect program logic, session state contents, and information privacy.
	See Also: Preventing URL Tampering

# 16.2.3 Other Components

The following table describes the links under **Other Components** on the Shared Components page.

Table 16-3 Other Component Links on the Shared Components Page

Link	Description
List of Values	A list of values (LOV) is a static or dynamic set of values used to display a popup list of values, select list, checkbox, or radio group.
	See Also: Creating Lists of Values at the Application-Level
Plug-ins	App Builder includes built-in item types, region types, dynamic actions, and processes. Use plug-ins to add new declarative types in to your application.
	See Also: Implementing Plug-ins
Component Settings	Use Component Settings to set application-level values for built- in APEX components and installed plug-ins.
	See Also: Managing Component Settings
Shortcuts	Use shortcuts to avoid repetitive coding of HTML or PL/SQL functions. You can create a shortcut to define a page control such as a button, HTML text, a PL/SQL procedure, or HTML. Once you define a shortcut, it is stored in a central repository so you can reference it from various locations within your application.
	See Also: Using Shortcuts



# 16.2.4 Navigation and Search

The following table describes the links under **Navigation** on the Shared Components page.

Table 16-4 Navigation Links on the Shared Components Page

Link	Description
Lists	A list is a shared collection of links. You control the appearance of a list through list templates. Each list element has a display condition that enables you to control when it displays.
	See Also: Creating Lists
Navigation Menu	A navigation menu is a list links that enables users to navigate the pages in an application. Navigation menus are only supported in applications using the <i>Universal Theme - 42</i> .
	See Also: Managing Navigation Menus
Tabs	<b>Note</b> : Tabs only appear if the associated application uses an older theme. In new themes, Tabs have been replaced with Navigation Menu.
	Tabs are an effective way to navigate users between pages in an application. You can create two types of tabs: standard tabs or parent tabs. A standard tab set is associated with a specific page and page number. A parent tab set functions as a container to hold a group of standard tabs.
	See Also: Managing Tabs
Breadcrumbs	Breadcrumbs provide users with hierarchical navigation. A breadcrumb is a hierarchical list of links that display using templates. You can display a breadcrumb as a list of links or as a breadcrumb path.
	See Also: Creating Breadcrumbs
Navigation Bar List	Navigation bar lists offer users a simple navigation path for moving between pages in an application. The location of a navigation bar depends upon the associated page template. A list entry can be an image, an image with text beneath it, or text.
	See Also: Managing a Classic Navigation Bar
Search Configurations	Added declarative searches to an application by creating search configuration that contain information about a searchable data source.
	See Also: Adding Search to an Application

## 16.2.5 User Interface

The following table describes the links under **User interface** on the Shared Components page.

Table 16-5 User interface Links on the Shared Components Page

Link	Description
User Interface Attributes	Use User Interface page to specify user interface options for an application.
	See Also: Editing User Interface Attributes



Table 16-5 (Cont.) User interface Links on the Shared Components Page

Link	Description
Progressive Web App	Progressive Web Apps (PWAs) leverage modern web APIs giving users an experience that looks and feels like a native app
	See Also: Creating a Progressive Web App (PWA)
Themes	A theme is a named collection of templates that defines the application user interface.
	See Also: Using Themes
Templates	Templates control the look and feel of specific constructs within your application, such as pages, regions, items, and menus.
	See Also: Creating Custom Themes
Email Templates	Create templates to define the HTML format and Plain Text formats for the emails you wish to send from an application.
	See Also: Managing Email Templates

# 16.2.6 Files and Reports

The following table describes the links under **Files and Reports** on the Shared Components page.

Table 16-6 Files and Reports Links on the Shared Components Page

Link	Description
Static Application Files	Use this link to upload, edit, and delete static files associated with the current application, including style sheets (CSS), images and JavaScript files.
	See Also: Managing Static Application Files
Static Workspace Files	Use this link to upload, edit, and delete static files associated with the current application, including style sheets (CSS), images and JavaScript files.
	See Also: Managing Static Workspace Files
Report Queries	Use the Report Queries link to view a report of stored queries within the current application.
	See Also: Printing a Report Region by Defining a Report Query
Report Layouts	Use Report Layouts with a report or shared query to render data in a printer-friendly format, such as Adobe Portable Document Format (PDF), Microsoft Word Rich Text Format (RTF), or Microsoft Excel (XLS) format.
	<b>See Also:</b> Formatting a Report Region or Report Query Using Report Layouts

### 16.2.7 Data Sources

The following table describes the links under **Data Source**s on the Shared Components page.



Table 16-7 Links Under Data Sources on the Shared Components Page

Link	Description
Data Load Definitions	Use Data Load Tables to define tables for use in the Data Loading create page wizard. A Data Load Table is an existing table in your schema that has been selected for use in the data loading process to upload data.
	<b>See Also:</b> Creating Applications with Data Loading Capability and Managing Applications with Legacy Data Loading Capability
REST Enabled SQL	Use REST Enabled SQL to execute SQL or PL/SQL defined in APEX components on a remote Oracle database.
	See Also: Managing REST Enabled SQL References
REST Data Sources	REST Data Sources act as a reference to one or multiple external web (REST) services. A REST Data Source can contain one or many Operations which are the references to a concrete external web service. Configurations at the REST source level are shared across all contained operations.
	See Also: Managing REST Data Sources
REST Synchronizations	Enable Data Synchronization to keep the contents of a local table automatically in sync with the data from a REST service.
	See Also: Managing Data Synchronization
Legacy Web Service References (SOAP)	The APEX engine can use Web Service References to access a Web service across the network. The Web service performs an action and then sends back a response.
	See Also: Managing Legacy Web Services

## 16.2.8 Workflows and Automations

The following describes the links under Workflows and Automations on the Shared Components page.

Table 16-8 Workflows and Automations Links on the Shared Components Page

Link	Description
Task Definitions	Task Definitions define the participants, parameters, and actions for a task that requires human action.
	See Also: Managing Task Definitions
Automations	Create automations to initiate a sequential set of actions based on a schedule. Use automations to monitor data and then perform the appropriate action.
	See Also: Managing Automations

## 16.2.9 Globalization

The following table describes the links under **Globalization** on the Shared Components page.



Table 16-9 Globalization Links on the Shared Components Page

Link	Description
Globalization Attributes	Develop applications that can run concurrently in different languages. Click this link to specify globalization options such as the Application Primary Language and Application Language Derived From attributes.
	<b>See Also:</b> Configuring Globalization Attributes and Understanding Application Translation and Globalization Support
Text Messages	Text messages are named text strings that can be called from the PL/SQL code you write. This PL/SQL can be anonymous blocks within page processes and page regions, or in packages and procedures.
	See Also: Translating Messages
Application Translations	Develop applications in Oracle APEX that can run concurrently in different languages. A single Oracle database and Oracle APEX instance can support an application in multiple languages. Translating an application involves multiple steps.
	See Also: Understanding Application Translation and Globalization Support and Understanding the Translation Process

# 16.2.10 Tasks Region

The following table describes the Tasks region on the right side of the Shared Components page.

Table 16-10 Tasks

Link	Description
Export Application Components	Links to the Component Export page. Use this page to identify the components of an application to be exported either for backup purposes or to load the components on another instance.
	See Also: Exporting Application Components
Manage Supporting Objects	Links to the Supporting Objects page. Use this page to create a custom application.
	See Also: How to Create a Custom Application
Edit Application Comments	Links to the Application Comments page. Use this page to enter comments specific to the currently selected application.
	See Also: Adding Application Comments
Developer Comments	Links to Developer Comments page.
	See Also: Adding Developer Comments

# 16.2.11 Workspace Objects Region

The Workspace Objects region displays on the right side of the Shared Components page. Workspace Objects are stored at the workspace-level and are therefore visible in all applications.

Table 16-11 Workspace Objects

Link	Description
Credentials	Use Credentials to connect to REST Enabled SQL or other external REST services. Oracle APEX stores these securely stores and encrypts these credentials for use by Oracle APEX components. Credentials cannot be retrieved back in clear text.
	See Also: Managing Web Credentials
Remote Servers	Links to the Remote Servers page. Remote Servers can be shared among multiple REST Data Sources. Remote Servers are stored at the Workspace-level and therefore visible in all applications. When an application is being exported, the used Remote Servers are being added to the export file.  See Also: Managing Remote Servers

# 16.3 Managing Application Settings

Create Application Settings to define application-level configuration options.



### Tip:

You also use the APEX\_APP\_SETTING API to access application settings. See APEX\_APP\_SETTING in *Oracle APEX API Reference*.

- Creating an Application Setting
   Create an Application Settings to enable developers to define application-level configuration options.
- Editing or Deleting Application Setting
   Edit or delete an existing setting on the Application Settings page.

## 16.3.1 Creating an Application Setting

Create an Application Settings to enable developers to define application-level configuration options.

To create an Application Setting:

- **1.** Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Application Logic, select **Application Settings**.
- 3. Click Create Setting.
- On Application Setting:
  - a. Name Enter a descriptive name for this application setting.



- b. Value Enter the default value for this application setting.
- Value Required Select whether this Application Setting requires a value.
   Select On or Off.
- **d.** Valid Values Enter comma separated valid values. If defined, APEX only accepts valid values when the settings change.
- e. On Upgrade Keep Value Select whether the application setting value in the deployed application should be kept, or overwritten with the specified value when the application is upgraded. Selecting **On** to keep the deployed value is useful if the application supports application setting configuration (using the APEX\_APP\_SETTING.SET\_VALUE API) to change the application setting value in the deployed application, and where you want to respect those values upon upgrade.
- f. Comments Enter comments that describe this setting.
- 5. Click Create Application Setting.

The new Application Setting displays on the Application Settings page.

## 16.3.2 Editing or Deleting Application Setting

Edit or delete an existing setting on the Application Settings page.

To edit or delete an Application Setting:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Application Logic, select Application Settings.

The Application Settings page appears.

- 3. To edit an existing setting:
  - a. Select the setting.

The Application Setting dialog appears.

**b.** Edit the appropriate attributes.

To learn more about an attribute, see field-level Help.

- c. Click Apply Changes.
- To delete an existing setting:
  - a. Select the setting.

The Application Setting dialog appears.

b. Click Delete.

# 16.4 Creating Lists of Values at the Application-Level

Create a list of values at the application-level that can be referenced by any page item or report field.





### Tip:

To learn about defining a column as a list of values, go to Developing Reports and find the "Defining a Column as a List of Values" discussion under the appropriate report type.

#### About Lists of Values

A list of values is a static or dynamic definition used to display a specific type of page item.

- Creating a Static List of Values at the Application-Level
  Run the Create List of Values Wizard to define a named static list of values at the
  application-level.
- Creating a Dynamic List of Values at the Application-Level
  Run the Create List of Values Wizard to define a named dynamic list of values at the
  application-level.
- Editing an Existing List of Values
   Edit an existing list of values from Shared Components.
- About Referencing Session State Within a List of Values
   Reference session state in a list of values by using bind variables.
- Accessing Lists of Values Reports
   Access lists of values reports in Shaed Components.



- Creating Page Items
- Managing Shared Components

### 16.4.1 About Lists of Values

A list of values is a static or dynamic definition used to display a specific type of page item.

A list of values can be static or dynamic. A **static** list of values is based on values the developer enters. A **dynamic** list of values is based on a local data source, REST Enabled SQL reference, or REST Data Source. A list of values can be referenced by page items such popup lists of values, a select list, a checkbox, a radio group, or multiple select lists.

Advantages of creating a list of values as a shared component include:

- A list of values created as a shared component can be added to any page within an application.
- All list of values definitions are stored in one location, making them easy to locate and update.
- You can define lists of values on different data sources and make use of new functionality only included in Shared LOVs, for example multi-column support, icon and grouping columns.

Creating and using a named list of values at the application level, involves two steps:

- 1. Navigate to Shared Components and run the Create List of Values Wizard and add it to the List of Values repository.
- In Page Designer, configure the page item attributes to display the item using the named list of values.

## 16.4.2 Creating a Static List of Values at the Application-Level

Run the Create List of Values Wizard to define a named static list of values at the application-level.

Oracle APEX stores named (or shared) lists of values in the List of Values repository in Shared Components. A static list of values contains display values, return values, and the sort sequence that you specify. Once you add a list of values to the repository, you edit the item in Page Designer and select the display Type.

The following procedure demonstrates how to create a static list of values in Shared Components for the form item, Status, and then display it as a Radio Group. The following example is built on the EBA\_DEMO\_IR\_PROJECTS table which available in the sample dataset, Project Data.

To create a named static list of values:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.



### Tip:

You can also access Shared Components from Page Designer by clicking **Shared Components** 



) on the Page Designer toolbar.

- 2. Run the Create List of Values Wizard. On the Lists of Values page, click **Create**.
- 3. In the Create List of Values Wizard:
  - a. Source:
    - Create List of Values Specify how to create a list of values. For this example, select From Scratch.
    - Click Next.
  - b. Name and Type:
    - Name Enter a name for the list of values. For example:

Status

Type - Select Static.



- Click Next.
- **c.** Static Values: Enter static display and return values. For this example, enter the following
  - Sequence 1:
    - Display Value Pending
    - Return Value Pending
  - Seguence 2:
    - Display Value Open
    - Return Value Open
  - Sequence 3:
    - Display Value On-Hold
    - Return Value On-Hold
  - Sequence 2:
    - Display Value Closed
    - Return Value Closed

Values will display in the order entered. You can display additional attributes including build option controls and item level conditional display by editing the List of Values later.



Return Value does not display, but is the value that is returned to the Oracle APEX engine. If you do not specify a Return Value then it is equal to the Display Value.

d. Click Create List of Values.

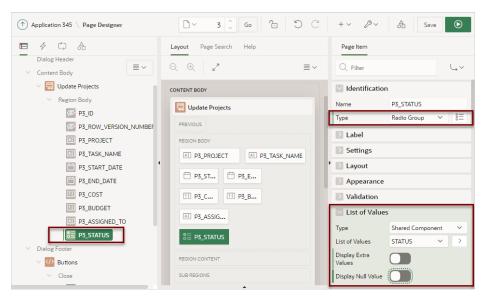
The new list of values appears on the Lists of Values page.

- **4.** In Page Designer, update the form item to reference the list of values:
  - **a.** Return to Page Designer. Click **Edit Page X** on the Page Designer toolbar where *X* is the page number.

Page Designer appears.

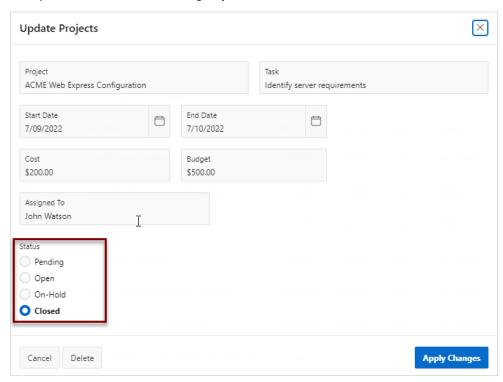
- **b.** In the Rendering tab, select the form page item. For example, select **P3\_STATUS**.
- **c.** In the Property Editor, edit the following attributes:
  - Identification, Type Select Radio Group.
  - List of Values, Type Select Shared Component.
  - List of Values, List of Values Select STATUS.
  - List of Values, Display Extra Values Disable this option.
  - List of Values, Display Extra Values Disable this option.





#### d. Click **Save** and then run the page.

As shown in the following example, the form item, Status, now displays as Radio Group with four values: **Pending**, **Open**, **On-Hold** and **Closed**.



# 16.4.3 Creating a Dynamic List of Values at the Application-Level

Run the Create List of Values Wizard to define a named dynamic list of values at the application-level.

Oracle APEX stores named (or shared) list of values in the List of Values repository. A dynamic list of values retrieves data from a local data source, a remote connection defined using REST Enabled SQL, or from a RESTful web service defined using REST Data Sources.

The following procedure creates dynamic list of values for the form item, **Task Name** and then displays it as a Select List. This following example is built on the <code>EBA\_DEMO\_IR\_PROJECTS</code> table which available in the sample dataset, Project Data.

To create a named dynamic list of values:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.



#### Tip:

You can also access Shared Components from Page Designer by clicking **Shared Components** 



) on the Page Designer toolbar.

- 2. Run the Create List of Values Wizard. On the Lists of Values page, click Create.
- 3. In the Create List of Values Wizard:
  - a. Source:
    - Create List of Values Specify how to create the list of values. For this example, select From Scratch.
    - Click Next.
  - **b.** Name and Type:
    - Name Enter a name for the list of values. For example:

Task

- Type Select Dynamic.
- Click Next.
- c. List of Values Source:
  - Data Source Select Local Database.
  - Source Type Lists using a Local Database can be based on a Table, SQL Query or PL/SQL Function Returning SQL.

For this example, select Table.

- Table / View Owner Select the owner of the table on which you are building the list of values.
- Table / View Name Select the table or view on which the list of values will be based.

Select EBA\_DEMO\_IR\_PROJECTS.

Click Next.



### d. Column Mappings:

- Return Column Defines the column used as the return value for your list of values. Accept the default, ID.
- Display Column Define the column that used as the display value for your list of values. Accept the default, TASK NAME.

You can define additional display columns after creating a list of values for item types that support displaying multiple columns (such as the Popup LOV).

e. Click Create.

The new list of values appears on the Lists of Values page.

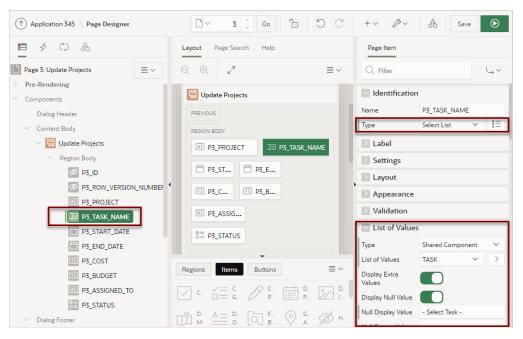
- 4. In Page Designer, update the form item to reference the list of values:
  - **a.** Return to Page Designer. Click **Edit Page X** on the Page Designer toolbar where *X* is the page number.

Page Designer appears.

- b. In the Rendering tab, select the form page item. For example, selectP3 TASK NAME.
- c. In the Property Editor, edit the following attributes:
  - Identification, Type Select Select List.
  - List of Values, Type Select Shared Component.
  - List of Values, List of Values Select TASK.
  - List of Values, Display Extra Values An item may have a session state value which does not occur in the given list of values definition. Select whether this list of values displays this extra session state value. Accept the default.
  - List of Values, Display Null Value When enabled, a NULL value displays at the top of the list. Accept the default.
  - List of Values, Null Display Value Enter the text to be displayed within the list NULL option at the top of this list. Enter:
    - Select Task -

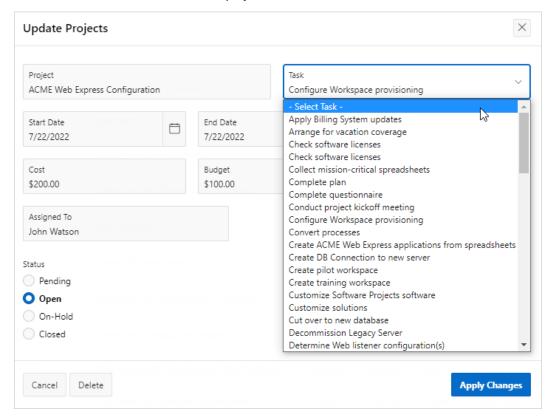
This value also displays when rendering the item if the value is null. If you do not enter any text, it is displayed as a blank line in the list and a blank item when rendered.





d. Click Save and then run the page.

The form item, Task Name, now displays as select list.



# 16.4.4 Editing an Existing List of Values

Edit an existing list of values from Shared Components.

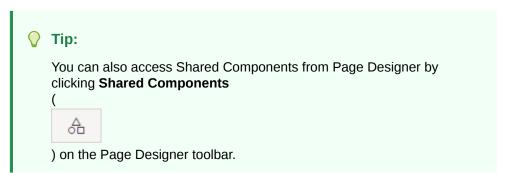
- Editing a List of Values in Shared Components
   Edit a list of values by navigating to Shared Components, Other Components and selecting List of Values.
- Editing List of Values in Bulk
   Edit the display values of all static list of values by clicking the Grid Edit tab on the List of Values page.

## 16.4.4.1 Editing a List of Values in Shared Components

Edit a list of values by navigating to Shared Components, Other Components and selecting List of Values.

To edit a list of values from the Shared Components page:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - C. On the Application home page, click Shared Components.
     The Shared Components page appears.



2. Under Other Components, select List of Values.

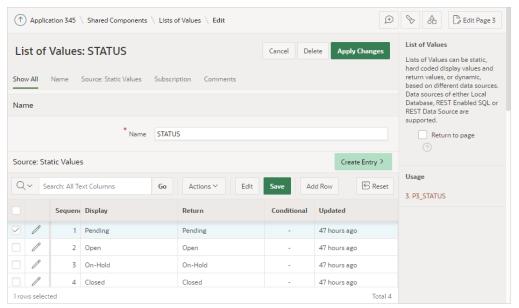
The Lists of Values page appears.

Select a list of values.

The Edit page appears. The appearance of the Edit page changes depending upon the type of list as shown in the following examples:

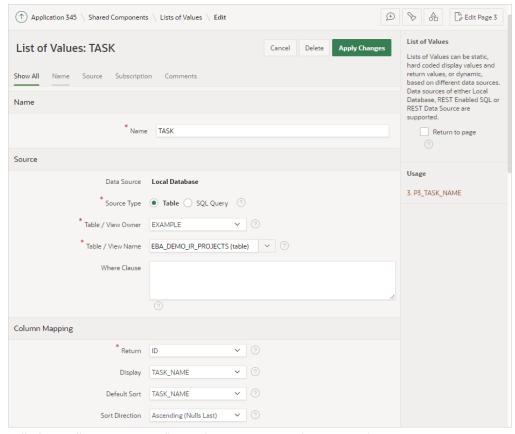
• Static List of Values - For Static lists, the Edit page resembles the following example. In this example, STATUS contains four Display and Return values: Pending, Open, On-Hold, and Closed.





Click the **Edit** icon edit a value or the sequence. Click **Add Row** to add more Display/ Return value combinations.

• **Dynamic List of Values** - For Dynamic lists, the Edit field resembles the following example. In this example, the list is based on the EBA\_DEMO\_PROJECTS table in a local database.



Edit the attributes to reconfigure the Source or Column Mappings.

Use **Additional Display Columns** to define additional display columns for item types that support multiple display columns, such as Popup LOV. If adding additional

display columns, ensure that the return column is included in the column list. If you do not want it displayed to users, set the return column to **Visible No** and **Searchable No**.



#### Tip:

To learn more about an attribute, see field-level Help.

4. Click **Apply Changes** to save your changes.

### 16.4.4.2 Editing List of Values in Bulk

Edit the display values of all static list of values by clicking the Grid Edit tab on the List of Values page.

To perform a bulk edit of static LOVs:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - C. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Other Components, select List of Values.
- 3. Click the **Grid Edit** tab.
- 4. Edit the Display Text and click Apply Changes.

## 16.4.5 About Referencing Session State Within a List of Values

Reference session state in a list of values by using bind variables.

While referencing session state makes a list of values a bit less reusable, Oracle still recommends this approach as a best practice. In the following example, the list of values only works if the item called  $my\_deptno$  contains a valid department number.

SELECT ename, empno FROM emp WHERE deptno = :P1\_DEPTNO

## 16.4.6 Accessing Lists of Values Reports

Access lists of values reports in Shaed Components.

To access lists of values reports:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Other Components, select List of Values.
- **3.** Select one of the following tabs at the top of the page:



- Lists of Values Displays all lists of values that are defined locally with the definition
  of an item. Lists of values that are usable by multiple pages can be converted into
  shared lists of values. Converting locally defined lists of values into a shared list of
  values promotes reuse.
- Edit Null Text Edit null text for all lists of values in your application.
- Locally Defined View all lists of values that are defined locally with the definition of the item. Lists of values that are usable by multiple pages can be converted into shared lists of values. Converting locally defined lists of values into a shared list of values promotes reuse..
- **Grid Edit** Find and edit static list of value entries over all static lists of values. Use this page to standardize display text.
- Conditional Entries Displays all lists of values that display conditionally.
- Subscription Displays all subscribed lists of values in your application.
- Utilization Displays where lists of values are used in the current application.
- **History** Displays displays recent modifications made to lists of values in in the current application.
- 4. Follow the on-screen instructions.

# 16.5 Creating Lists

Add a shared collection of links (or a list) to an application. To add a list to a page, create a region and specify the region type as List. You control the appearance of a list through list templates.

- About Static and Dynamic Lists
   Oracle APEX supports two types of lists: Static Lists and Dynamic Lists.
- Creating Static Lists
- A Static List is based on predefined display and return values.
- Creating Dynamic Lists
   A Dynamic List is based on a SQL guery or a PL/SQL function executed at runtime.
- Copying a List
   Copy a list from the current application or between applications.
- Adding a List to a Page
   Once you create a list and list entries, the next step is to add it to a page by creating a list region.
- Editing List Attributes
   Edit a list from Shared Components.
- Accessing List Reports
   View the Unused, Conditional Entries, Subscriptions, Utilization, and History reports by clicking the appropriate tab at the top of the Lists page.
- Managing Navigation Menus
   Applications using newer themes, such as *Universal Theme 42*, provide navigation with navigation menus.
- Managing Navigation Bar Lists
   Applications using newer themes, such as Universal Theme 42, include navigation bar lists.



### See Also:

- Creating a New Template
- List Templates

## 16.5.1 About Static and Dynamic Lists

Oracle APEX supports two types of lists: Static Lists and Dynamic Lists.

A **Static list** is based on predefined display and return values. When you create a static list you define a list entry label and a target (either a page or URL). You can add list entries when you create the list (creating from scratch), by copying existing entries, or by adding the list entries. You can control when list entries display by defining display conditions.

A **Dynamic list** is based on a SQL query or a PL/SQL function executed at runtime. A dynamic list enables you to dynamically create styled list items that support mobile frameworks.

The list definition displays a specific type of page item, such as progress bars, sidebar, bullet navigation list, or navigation menu. You can control how a list displays through templates.

### See Also:

- Creating Static Lists
- Creating Dynamic Lists

# 16.5.2 Creating Static Lists

A Static List is based on predefined display and return values.

- About Creating a Static List Learn about the steps involved in creating a static list.
- About Adding Entries and Sublists to a Static List Once you create a list, you must add entries to it.
- Creating a Static List from Scratch
   Create a static list from scratch by running the Create List Wizard.
- Adding Entries or Sublists Manually
   Add list entries or sublists from the List Details page.
- Copying Static List Entries Between Lists
   Copy static list entries from one list to another.
- Reparenting Static List Entries
   Reparent static list entries to manage the list entry hierarchy.
- Managing Orphaned Static List Entries
   Manage orphaned list entries by removing the parent entry.



Resequencing Static List Entries
 Resequence list entries in increments of 10 on the Clean Up page.

## 16.5.2.1 About Creating a Static List

Learn about the steps involved in creating a static list.

A **Static list** is based on predefined display and return values. When you create a static list you define a list entry label and a target (either a page or URL). You can add list entries when you create the list, by copying existing entries, or by adding the list entries. You can control when list entries display by defining display conditions.

The process of creating a static list involves the following steps:

- **Step 1**: Create the static list by either:
  - Creating a list from scratch by running the Create List Wizard. When prompted enter the list name and select the list type, **Static**.
  - Copying an existing static list by running the Copy List Wizard.

Each list element has a display condition, which enables you to control when it displays. You can define a list element to be *current* for a specific page or for multiple pages.

- Step 2: Add list entries. You can add list entries:
  - When running the Create List Wizard.
  - By copying entries from within an existing list. If you copy an entire list, you also copy all of its list entries.
  - By adding list entries manually.
- Step 3: Add the list to a page by creating a List region.

How you perform these steps is a personal preference. You can perform all of these steps when you run the Create List Wizard. Alternatively, you can perform these steps one at a time.

## See Also:

- Adding a List to a Page
- Editing List Attributes
- Accessing List Reports

## 16.5.2.2 About Adding Entries and Sublists to a Static List

Once you create a list, you must add entries to it.

You can add list entries when running the Create List Wizard, copying a list entry from within a list, or copying existing entries from one list to another.

You can also create hierarchical lists that contain sublists. To create a hierarchical list, you must:

Select a list template that supports hierarchical lists.





### Tip:

To determine if a list template supports hierarchical lists, go to Shared Components, Templates. On the Templates page, find and click the list template name. The List Template Current with Sublist Items attribute on the Edit List Template page determines whether the list template supports hierarchical lists. If this attribute is not null, the list template supports hierarchical lists. If this attribute is null, then the list template does not support hierarchical lists.

Select a Parent List Item when you create each list entry.

### See Also:

- **Managing Templates**
- **Creating Custom Themes**
- **List Templates**

## 16.5.2.3 Creating a Static List from Scratch

Create a static list from scratch by running the Create List Wizard.

To create a static list by running the Create List Wizard:

- Access the Create List Wizard:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
  - Under Navigation and Search, click **Lists**.
  - e. Click Create.

The Create List Wizard appears.

- For Name and Type:
  - a. Name Enter a numeric or alphanumeric name for the list.
  - **b.** Type Select **Static**.
  - c. Click Next.
- For Query or Static Values:
  - a. List Entry Label Enter a numeric or alphanumeric name for the list.
  - Target Page ID or custom URL Select a target page or enter a custom URL.
  - c. Click Next.
- For Confirm:
  - a. Create List Regions Select whether to create a list region. Options include:



- Do not create list region(s)
- Create list region on current page
- Create list region for each target page
- b. Region Position If creating a new region, select the region position.
- c. Region Template If creating a new region, select a region template.
- d. List Template Select the list template to use to control the appearance of your list.
- e. Click Create List.

## 16.5.2.4 Adding Entries or Sublists Manually

Add list entries or sublists from the List Details page.

To add an entry or sublist manually:

- 1. Navigate to the Lists page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
  - d. Under Navigation and Search, click **Lists**.

The Lists page appears.

Select a list.

The List Details page appears.

- 3. Click Create Entry.
- Under Entry:
  - a. Parent List Entry If applicable, select the parent for this list entry. Use this attribute if you are creating a hierarchical list that contains a sublist.
    - Note this attribute does not appear if you are creating the parent list entry.
  - Sequence Indicate the order in which list the list entry appears. The sequence determines the order of evaluation.
  - **c.** Image/Class Identify an image file name or the the icon class for the icon associated with this list entry.

Most Universal Theme apps use the Font APEX icon library. To pick an icon, use the built-in icon picker and select an icon from the popup window. See examples below:

- fa-cloud Displays the cloud icon.
- fa-exclamation-circle u-danger-text Displays a red exclamation icon.

To learn more, see field-level Help.

d. Attributes - Identify the image attributes (such as width="12" height="12") for the list element image.

Use the #LIST\_LABEL# substitution string to reference the list label text. This substitution string enables the title image attribute to be automatically set based on the value of the list label text. For example:

title="#LIST LABEL#"



e. Alt Attribute - Identify the image alt attribute for the list element image.

Use the  $\#LIST_LABEL\#$  substitution string to reference the list label text. This substitution string enables the Alt attribute to be automatically set based on the value of the list label text. For example:

```
...alt="#LIST_LABEL#"...
```

- f. List Entry Label Enter the label text for this link.
- **5.** Specify a target type. Options include: **URL** or **Page in this Application**.

If the target location is a **URL**, specify the following:

- a. Target Type Select URL.
- b. URL Target Enter a URL. For example:

http://www.example.com

If the target location is a page:

- a. Target Type Select Page in this Application.
- b. Page Specify the target page number.

Other options include:

- **reset pagination for this page** Select this option to have the page to return to the first set of data meeting a user's new query.
- Printer Friendly This option displays the target page using the application's Printer Friendly template. Printer friendly templates optimize a page for printing.
- c. Request Enter text to set the built-in application item REQUEST. This is also the item that is set with the name of a button that was clicked.
- d. Clear Cache Enter the page numbers, separated by commas, for which you would like the user's session state to be cleared. To learn more, see field-level Help.
- e. To set session state (that is, give a listed item a value):
  - Set these items Enter a comma-delimited list of item names for which you would like to set session state.
  - With these values Enter a comma-delimited list of values for the items specified in the previous step.

You can specify static values or substitution syntax (for example, &APP\_ITEM\_NAME.). Note that item values passed to f?p= in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, 1234,56).

- Under Current List Entry:
  - a. List Entry Current for Pages Type Specify when this list entry should be current based on the page type.
    - List items can be current or non-current. Current list items use the current template; non-current list items use the non-current list item template. The actual condition and templates are defined in subsequent attributes.
  - b. List Entry Current for Condition Displays conditionally. Based on the selection above, define a condition to evaluate. When this condition is true, then the list item becomes current. To learn more, see field-level Help.



- 7. Under Conditions, specify the appropriate information to make the list entry conditional.
- 8. Under Authorization, you can specify an authorization scheme.
  - This authorization scheme must evaluate to TRUE in order for this component to be rendered or otherwise processed.
- 9. Under Configuration, select a build option for this component.
  - Build options are predefined settings that determine whether components within an application are enabled.
- **10.** Under Click Counting, specify if you want the list entries to be included in the click count. If this is a link to an external page, you can count clicks.
- 11. In User Defined Attributes, specify additional attributes. To learn more, see field-level Help.
- 12. When you are finished defining list attributes, click Create List Entry.

### See Also:

- Editing Themes
- · Optimizing a Page for Printing
- COUNT\_CLICK Procedure in Oracle APEX API Reference

## 16.5.2.5 Copying Static List Entries Between Lists

Copy static list entries from one list to another.

To copy list entries between lists:

- 1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation and Search, click **Lists**.
    - The Lists page appears.
- 2. Select the list.
- 3. From Tasks list, click Copy List Entries from one List to Another.
- 4. On Copy List Entries:
  - a. Copy List Entries Select the list to copy.
  - b. Click Next.
- 5. Click Copy List Entries.



## 16.5.2.6 Reparenting Static List Entries

Reparent static list entries to manage the list entry hierarchy.

To reparent list entries:

- 1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation and Search, click Lists.The Lists page appears.
- 2. Select the list.
- 3. From the Tasks list, click Reparent List Entries within this List.
- 4. Use the navigation bar to customize the display and click Go.
  - List Select the list you would like to edit.
  - Start With Restrict your view to a subset of the hierarchy.
- 5. To reparent entries:
  - a. Select entries to reparent.
  - b. Reparent To Select a new parent.
  - c. Select the entries to move and click Reparent Checked Entries.

## 16.5.2.7 Managing Orphaned Static List Entries

Manage orphaned list entries by removing the parent entry.

An orphaned list entry is a list entry which has a parent, but the parent is no longer a member of the current list. When a list entry becomes orphaned, remove the parent entry.

To manage orphaned list entries:

- 1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click Shared Components.
  - e. Under Navigation and Search, click Lists.
    - The Lists page appears.
- 2. Select the list.
- 3. From the Tasks list, click Manage Orphaned List Entries.
- 4. On Manage Orphaned List Entries:



- a. Select the entries to remove.
- b. Click Clear Parent Entries.

## 16.5.2.8 Resequencing Static List Entries

Resequence list entries in increments of 10 on the Clean Up page.

To resequence list entries:

- Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation and Search, click Lists.The Lists page appears.
- 2. Select the list.
- 3. From the Tasks list, click Resequence List Entries.
- Click Resequence.

## 16.5.3 Creating Dynamic Lists

A Dynamic List is based on a SQL query or a PL/SQL function executed at runtime.

- About Creating a Dynamic List Learn about the steps involved in creating a dynamic list.
- Understanding Dynamic List Syntax Learn about dynamic list syntax.
- Creating a Dynamic List from Scratch
   Create a dynamic list from scratch by running the Create List Wizard.

## 16.5.3.1 About Creating a Dynamic List

Learn about the steps involved in creating a dynamic list.

A **Dynamic list** enables you to create a List component based on items from a SQL query or a PL/SQL function returning a SQL query. These dynamic lists can then be rendered on a page using any List Template from your theme.

The process of creating a dynamic list involves the following steps:

- **Step 1**: Create the dynamic list by either:
  - Run the Create List Wizard and select the **Dynamic** list type.
  - Copying an existing dynamic list by running the Copy List Wizard.
- Step 2: Define the List Query:
  - Select a Query Source Type. Options include:
    - \* SQL Query



#### Function Returning a SQL Query

- Enter a SQL query.
- **Step 3:** Add the list to a page by creating a List region.

### See Also:

- · Adding a List to a Page
- Editing List Attributes
- Accessing List Reports

## 16.5.3.2 Understanding Dynamic List Syntax

Learn about dynamic list syntax.

You create a dynamic list using a SQL query or a function returning a SQL query. Oracle APEX interprets your query's results by using the <code>SELECT</code> list column position as indicated in the table below. Since column aliases are ignored, choose any names that best document the information your query returns. Your SQL statement must include a minimum of two columns in its <code>SELECT</code> list, but can return up to 17 columns depending on your needs. All optional columns accept a <code>NULL</code> value as a placeholder to allow you to specify a non-null value for a later column position. For example, if you select <code>Badge list</code> for your list region's Appearance, List Template attribute, then the value of column 8 corresponding to User Attribute 1 determines the text that will appear inside the badge.



#### Tip:

The documentation for the List region explains which user attribute values are used by different Appearance template options.

Column	Purpose	Datatype	Required?	Notes	
1	Level	NUMBER	Yes	Depth level for hierarchical lists, otherwise use NULL	
2	Label	VARCHAR2	Yes	Text to appear at list entry	
3	Target URL	VARCHAR2	No	Target URL to branch to when list entry is selected	
4	Is Current?	VARCHAR2	No	Controls the behavior of the list entry. Valid values include 'YES', 'NO', and NULL	
5	Icon Name	VARCHAR2	No	The name of icon to be displayed on the list entry	
6	Image attributes	VARCHAR2	No	Attributes of the image, such as the width or height	
7	Image ALT Text	VARCHAR2	No	Value for Image ALT tag, required for accessibility purposes in templates where the user must click the image.	



Column	Purpose	Datatype	Required?	Notes
8	User attribute 1	VARCHAR2	No	N/A
9	User attribute 2	VARCHAR2	No	N/A
10	User attribute 3	VARCHAR2	No	N/A
11	User attribute 4	VARCHAR2	No	N/A
12	User attribute 5	VARCHAR2	No	N/A
13	User attribute 6	VARCHAR2	No	N/A
14	User attribute 7	VARCHAR2	No	N/A
15	User attribute 8	VARCHAR2	No	N/A
16	User attribute 9	VARCHAR2	No	N/A
17	User attribute 10	VARCHAR2	No	N/A

For example, a simple query for a dynamic list of employee names might look like this:

To include a person icon next to each employee's name in the list, select  $\mathtt{NULL}$  for the intervening columns and return the name of an icon like  $\mathtt{fa-user}$  in the fifth column position like this:

```
select null c1_level,
ename c2_name_for_label,
null c3_target_url,
null c4_is_current,
'fa-user' c5_icon_name
from emp
order by ename
```

To have the list entries link to page 10, passing the value of EMPNO for the P10\_EMPNO page item, adjust the query to provide a value for the target URL in the third column like this:



```
null c4_is_current,
    'fa-user' c5_icon_name
from emp
order by ename
```

The following query returns a value for a user attribute. It expands on the previous query to return each employee's salary (sal) in the column 8 slot as User Attribute 1. The List region's **Appearance**, **List Template** option, **Badge List**, uses this User Attribute 1 value as the text to display on the badge.

```
select null
                c1 level,
      ename
                c2 name for label,
      apex page.get url(p page => 10,
                        p items => 'P10 EMPNO',
                        p values => EMPNO) c3 target url,
      null
                c4 is current,
      'fa-user' c5 icon name,
                c6 icon attrs,
      null
      null
              c7 icon alt text,
                c8 user attr1 badge text
      sal
from emp
order by ename
```

To create a hierarchical list, return a non-null value for the first column that indicates the depth level of the hierarchy. This example returns a hierarchical list of employees starting with the employee(s) having no manager at the top of the tree.

If you need to return a SQL query defined by a function, the same rules apply. You may find it useful to use PL/SQL's multi-line string literal syntax  $q'[\ \dots\ ]$ ' as shown in the following example to more easily return query text that spans multiple lines. Note that any syntax that returns a correctly-formatted SQL statement is allowed.



```
order by ename
]';
```

## 16.5.3.3 Creating a Dynamic List from Scratch

Create a dynamic list from scratch by running the Create List Wizard.

To create a dynamic list:

- 1. Access the Create/Edit Lists Wizard:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
  - d. Under Navigation and Search, click Lists.
  - e. Click Create.

The Create List Wizard appears.

- 2. For Name and Type:
  - a. Name Enter a numeric or alphanumeric name for the list.
  - b. Type Select **Dynamic**.
  - c. Click Next.
- 3. For Query or Static Values:
  - a. Query Source Type Select SQL Query or Function Returning SQL Query.
  - **b.** Query Enter a SQL query or function returning a SQL query. To view SQL Query examples, expand the Examples region.

Build Query - Click **Build Query** to use a wizard to build a query on the table or view you select. Follow the on-screen instructions.

- c. Click Next.
- 4. For Confirm:
  - a. Create List Regions Select whether to create a list region. Options include:
    - Do not create list region(s)
    - Create list region on current page
  - **b.** Region Position If creating a new region, select the region position.
  - **c.** Region Template If creating a new region, select a region template.
  - d. Click Create.



**Understanding Dynamic List Syntax** 



# 16.5.4 Copying a List

Copy a list from the current application or between applications.

To copy a list:

- 1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation and Search, click Lists.The Lists page appears.
- 2. Click Copy.



You can also access the Copy List Wizard, on the List Details page under Tasks.

- 3. In the Copy List Wizard:
  - a. Copy From Choose where to copy the list from:
    - This Application
    - Other Application

Choosing **Other application** displays the **Subscribe** flag. Enable **Subscribe** to provide users with the ability to subscribe to the list.

- **b.** Copy List Select the list to copy.
- c. New List Name Enter the name of the list you would like to create.
- d. Click Copy.

## 16.5.5 Adding a List to a Page

Once you create a list and list entries, the next step is to add it to a page by creating a list region.

To add a list to a page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. Create a new list region:



- a. In the Gallery at the bottom of the central pane, click **Regions** and locate **List**.
- b. Right-click **List** and from the context menu, select **Add To** and then the location.



### Tip:

In addition using the context menus, you can also use your mouse to drag and drop components to the appropriate location.

3. In the Property Editor, edit the appropriate attributes:



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

#### 4. Identification:

- a. Identification, Title Enter a region title. The region title only displays when it is defined in the region template.
- **b.** Identification, Type Select **List**.
- 5. Source, List Select the source for this list.
- 6. Layout:
  - a. Layout, Sequence Enter the display sequence for this item. The sequence and other layout settings determine where this item is displayed in relation to other items within the region.
  - **b.** Layout, Parent Region Select the parent region to which this region belongs. If a parent region is selected then this region is rendered completely inside the parent region..
  - c. Layout, Position Identify a display point for this region.
- 7. Appearance, Template Choose a template to control the look of the region.
- 8. Server-side Condition, Type Optionally select a condition type from the list that must be met in order for this component to be rendered or processed. Additional attributes appear based on your selection.
- Security, Authorization Scheme Optionally select an authorization scheme to control this
  component. The authorization must evaluate to TRUE in order for this component to be
  rendered or executed.
- 10. Click Save.

Repeat these procedures for each page where you would like to add a list.



### See Also:

- Understanding Conditional Rendering and Processing
- Providing Security Through Authorization
- Creating a New Template
- List Templates for information about altering list display

# 16.5.6 Editing List Attributes

Edit a list from Shared Components.

Each list may contain any number of list entries. Edit the List to set the list name and list template.

#### To edit a list:

- 1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation and Search, click **Lists**.

The Lists page appears.

2. Select a list.

The List Details page appears.

- **3.** Edit the list attributes. The attributes that appear change depending upon the list type.
- 4. Static lists attributes include:
  - Name Name for the list. Both numeric or alphanumeric list names are supported.
  - List Entries To edit a list entry,
    - Find the list entry Name and click the Edit icon.
    - On the Create/Edit page, edit the appropriate attributes. To learn more about an attribute, see field-level Help.
    - Click Apply Changes.
  - Subscription From Reference Master List From, select a master list to subscribe from. When you select a master list and click **Apply Changes**, then the list details are automatically refreshed from the master list.
    - If the list is already subscribed, then click **Refresh List** to refresh list details from the master list.
  - Configuration From Build Option, select a build option for this component.
     Build options are predefined settings that determine whether or not components within an application are enabled.



- Comments Enter any comments or notes for developers.
- Click Apply Changes.
- 5. Dynamic list attributes include:
  - Name Name for the list. Both numeric or alphanumeric list names are supported.
  - List Query:
    - Query Source Type Select the query source type. Options include SQL Query or Function Returning a SQL Query.
    - Query Enter a list SQL Query or Function Returning a SQL Query to generate a dynamic list. To learn more and view examples, see field-level Help.
  - Subscription From Reference Master List From, select a master list to subscribe from. When you select a master list and click **Apply Changes**, then the list details are automatically refreshed from the master list.

If the list is already subscribed, then click **Refresh List** to refresh list details from the master list.

- Configuration From Build Option, select a build option for this component. Build
  options are predefined settings that determine whether or not components within an
  application are enabled.
- Comments Enter any comments or notes for developers.
- Click Apply Changes.
- **6.** The **Tasks** region displays different options depending upon the list type:
  - For Static lists:
    - Copy List
    - Copy List Entries from one List ot Another
    - Reparent List Entries within this List
    - Manage Orphaned List Entries
    - Resequence List Entries



#### Tip:

If the list is Subscribed, Reparent List Entries within this List, Manage Orphaned List Entries, and Resequence List Entries do not display.

- For Dynamic lists:
  - Copy List

## 16.5.7 Accessing List Reports

View the Unused, Conditional Entries, Subscriptions, Utilization, and History reports by clicking the appropriate tab at the top of the Lists page.

Note that these reports only display after you create a list.

To view list reports:

Navigate to the Lists page.



- a. Navigate to the Workspace home page.
- b. Click the App Builder icon.
- c. Select an application.
- d. On the Application home page, click Shared Components.
- e. Under Navigation and Search, click Lists.

The Lists page appears.

- 2. Click the appropriate tab:
  - Unused Click the Unused tab to identify lists that are not used in the current application.
  - Conditional Entries Click the Conditional Entries tab to view conditional lists.
  - Subscription Click the Subscription tab to view subscribed Lists in your application. To refresh Lists, select one or more lists and click Refresh Checked.
  - **Utilization** Click the **Utilization** tab to view all lists included in the current application. From the Utilization report, you can:
    - Edit list entries by selecting the list name.
    - View the pages on which the list appears by clicking the number in the Pages column.
  - History Click the History tab to view recent modifications made to lists and list entries in this application.

## 16.5.8 Managing Navigation Menus

other list.

Applications using newer themes, such as *Universal Theme - 42*, provide navigation with navigation menus.

- About Navigation Menus
  - A **navigation menu** is list with hierarchical list entries.
- About Editing Navigation Menu Lists
   Since a Navigation menu is a list, you create and edit in the same way as any
- Changing Where and How Navigation Menus Display
   Change how and where a navigation menu displays by editing Navigation Menu attributes on the User Interface page.
- About Switching from Tabs to Navigation Menus
   You can switch from a theme using tabs to a theme using navigation menus if the
   existing application used one level of tabs was used.

## 16.5.8.1 About Navigation Menus

A navigation menu is list with hierarchical list entries.

When you create an application, the Create Application Wizard automatically creates a navigation menu for you and populates it with list entries linking to the application pages you have created. Navigation menus are controlled at the theme and user interface level. You can change how and where a navigation menu displays by editing

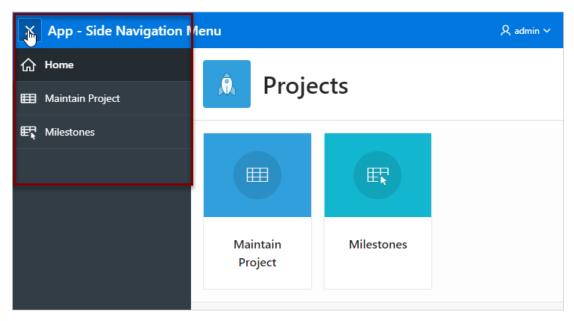


Navigation Menu attributes on the User Interface page. Types of navigation menus include **Side Menu**, **Top Menu**, or **Mega Menu**.

### **Side Navigation Menu**

Users can expand or collapse the **Side Navigation Menu** by clicking on the menu icon from the header. This navigation menu renders the navigation items using a tree component that enables users to expand or collapse sub items. Based on the available space, Side Navigation Menu displays a full menu (as show below), or collapses to a narrow icon bar. You can also configure a navigation menu to be completely hidden (default) or to display a narrow icon bar when collapsed using Template Options.

The following example shows an application with a Side Navigation Menu.



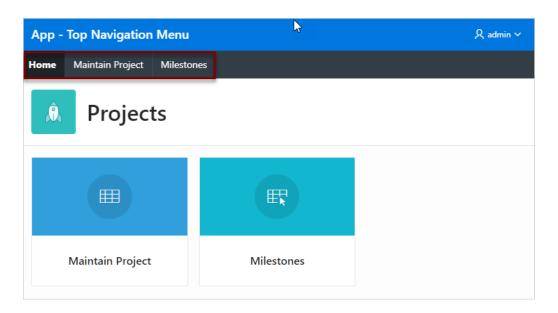
#### **Top Navigation Menu**

A **Top Navigation Menu** displays at the top of the application. You can control how the menu displays by choosing between two templates:

- Top Navigation Tabs The Top Navigation Tabs template renders your application
  navigation as tabs and is ideally suited for simple applications where you have six or
  fewer tabs. This template automatically positions to the bottom of the screen for small
  screen or mobile devices.
- Top Navigation Menu The Top Navigation Menu template renders your application navigation as a menu bar, similar to what you find on most desktop applications.
   Developers commonly use this option for more complex applications with several layers of hierarchy within the navigation.

The following example shows an application with a Top Navigation Menu that uses the Top Navigation Menu template.

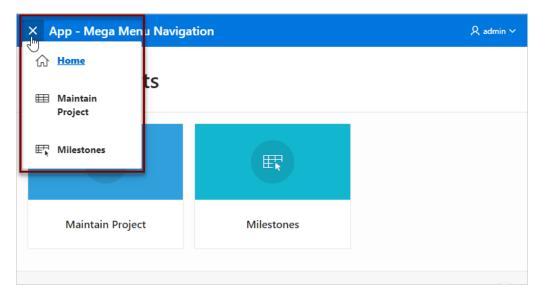




### Mega Menu Navigation

The **Top Navigation Mega Menu** template renders your application navigation in a pop-up panel that can be opened or closed from the header menu button. Users can expand or collapse a Mega Menu by clicking on the menu icon from the header. Mega menus are especially useful when you want to display all navigation items at once to your user.

The following example shows an application with a Mega Menu using the Top Navigation Mega Menu template.



## 16.5.8.2 About Editing Navigation Menu Lists

Since a Navigation menu is a list, you create and edit in the same way as any other list.

You can access Navigation menus in Shared Components in the Navigation region in two ways:



- Select the application and then click **Shared Components**. Under Navigation and Search, select **Navigation Menu**.
- Select the application and then click Shared Components. Under the Navigation region, select Lists.

Once you select the Navigation Menu, you edit it as you would any other list.



**Creating Lists** 

## 16.5.8.3 Changing Where and How Navigation Menus Display

Change how and where a navigation menu displays by editing Navigation Menu attributes on the User Interface page.

Navigation menus are controlled at the theme and user interface level.



#### Tip:

You can access the User Interface page from the Application Definition as described in the following procedure, or by navigating to **Shared Components**, **User Interface** and selecting **User Interface Attributes**.

To edit the Navigation menu attributes:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.

The Application home page appears.

3. Click the **Edit Application Definition** button.

The Edit Application Definition page appears.

- 4. Click the **User Interface** tab.
- 5. Edit the attributes under **Navigation Menu**:
  - Display Navigation Turn navigation on or off by selecting On or Off.
  - **Navigation Menu List** Select the list utilized for the navigation menu for the application.
  - Position Select the position where you would like your navigation menu to be placed in this application.
    - Side Setting the position to Side renders the navigation menu list template in the #SIDE GLOBAL NAVIGATION LIST# position on your page template.
    - Top Setting the position to Top renders the navigation menu list template in the #TOP\_GLOBAL\_NAVIGATION\_LIST# position on your page template.



For example, if you choose **Side**, your navigation could be rendered as a tree on the left side of your pages. In contrast, choosing **Top** can render your navigation as a menu bar in the header of your pages.

- **List Template** Select the List Template used to render the navigation menu for the application.
- **Template Options** Set Template Options for the List Template used for the navigation menu list for the application.
- 6. Click **Apply Changes** to save your changes.
- 7. Run the application to view your changes.

### See Also:

- Editing User Interface Attributes
- List Templates
- Understanding Template Options

## 16.5.8.4 About Switching from Tabs to Navigation Menus

You can switch from a theme using tabs to a theme using navigation menus if the existing application used one level of tabs was used.

If an existing applications uses two levels of tabs, you must convert it to one level before changing the theme.



**Editing Themes** 

# 16.5.9 Managing Navigation Bar Lists

Applications using newer themes, such as *Universal Theme - 42*, include navigation bar lists.

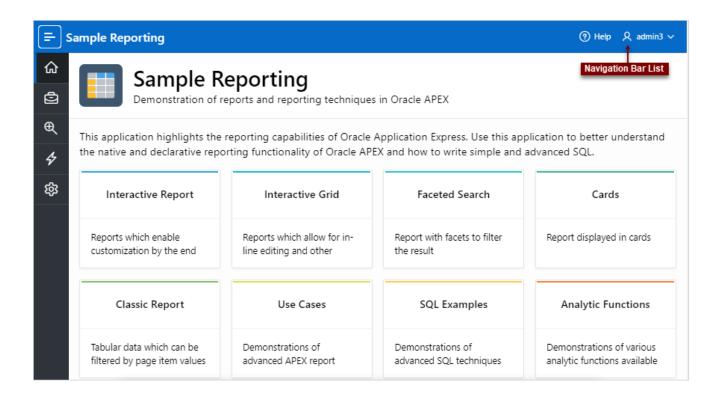
- About Navigation Bars
  - A navigation bar list displays with a list template in the  $\#NAVIGATION\_BAR\#$  position on your page template.
- Editing Navigation Bar Lists
   Since a navigation bar is a list, you create and edit in the same way as any other list.
- Editing Navigation Bar Attributes
  Change how navigation bar displays by editing Navigation Menu attributes on the User Interface page.



## 16.5.9.1 About Navigation Bars

A navigation bar list displays with a list template in the #NAVIGATION\_BAR# position on your page template.

The example below shows the *Sample Reporting* Sample App with a navigation bar displaying in the upper right corner.



## 16.5.9.2 Editing Navigation Bar Lists

Since a navigation bar is a list, you create and edit in the same way as any other list.

You can access navigation bars in Shared Components in the Navigation region in two ways:

- Select the application and then click Shared Components.
- Under Navigation and Search, select one of the following:
  - Navigation Bar List
  - Lists

Once you select the navigation bar list, you edit it as you would any other list.



## 16.5.9.3 Editing Navigation Bar Attributes

Change how navigation bar displays by editing Navigation Menu attributes on the User Interface page.

Selecting the Implementation Classic uses tabs instead of a list.

To edit the navigation bar attributes:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.

The Application home page appears.

- 3. Access the User Interfaces page:
  - a. Click Shared Components.
  - b. Under User Interface, click User Interface Attributes.

The User Interfaces page appears.

- 4. Under Navigation Bar, edit the following attributes:
  - **Implementation** Select how to you wish to implement the navigation bar in this application. Options include:
    - List renders the navigation bar as a list, using the selected list and list template in the #NAVIGATION BAR# position on your page template.
    - Classic renders the navigation bar as a classic navigation bar in the #NAVIGATION BAR# position on your page template.
  - Navigation Bar List Select the list utilized for the navigation bar on this application.
  - **List Template** Select the List Template used to render the navigation menu for the application.
  - **Template Options** Set Template Options for the List Template used for the navigation menu list for the application.
- Click Apply Changes to save your changes.
- 6. Run the application again to view your changes.



**Editing User Interface Attributes** 

# 16.6 Adding Search to an Application

Add declarative searches to an application by creating a search configuration and then a search page that displays the search results.

Example Searches
 View search examples.



About Creating Application Searches

Create a declarative search for an application by creating a search configuration on a data source and then creating a page that displays the search results.

Creating a Standard Search

Learn how to create a Standard search.

Creating an Oracle Text Search

Create an Oracle TEXT search on table that has an Oracle TEXT index.

Creating a List Search

Create a List search of an APEX List.

Creating a Search Page Manually

Learn how to create a Search page manually in Page Designer.

Editing a Search Configuration

Edit an existing search configuration in Shared Components on the Search Configurations, Edit page.

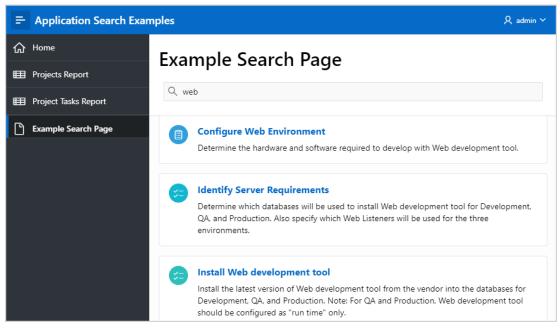
Editing a Search Page

Learn how attributes can change search page behavior

## 16.6.1 Example Searches

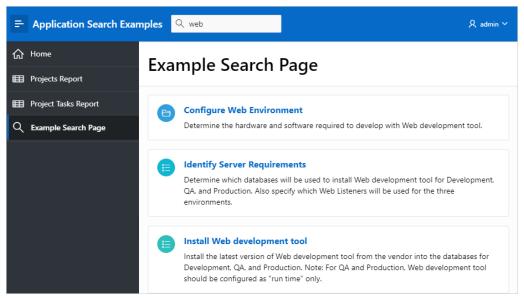
View search examples.

The following example shows a sample search page created with the Create Page Wizard. Notice a search field displays at after the page title and is followed by a Search Results region. In Page Designer, the search field is positioned in the Breadcrumb region and the Search Results region displays in the Body Position. This example has two search configurations that map to two separate tables, EBA PROJECTS and EBA PROJECT TASKS.

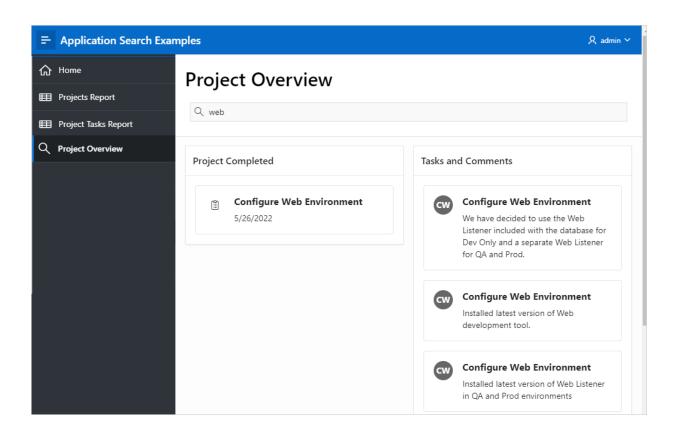


The next example is the same page but with the search field is in a different position. Notice that the search field displays in the Position, After Logo, which is between the logo and the navigation bar. As in the previous example, the Search Results region displays in the Body of the page. However, the icons are different.





You can also create a search components by adding them manually to a page in Page Designer. The following example shows a search page named Project Overview. Note that the search field displays after the page title and contains the search term, web. The page includes two search result regions: **Projects Completed** and **Tasks and Comments** which use the Standard Template so the region Title appears.



See Also:

Creating a Search Page Manually

# 16.6.2 About Creating Application Searches

Create a declarative search for an application by creating a search configuration on a data source and then creating a page that displays the search results.

Adding search to an application involves two basic steps:

1. Create a search configuration in Shared Components.

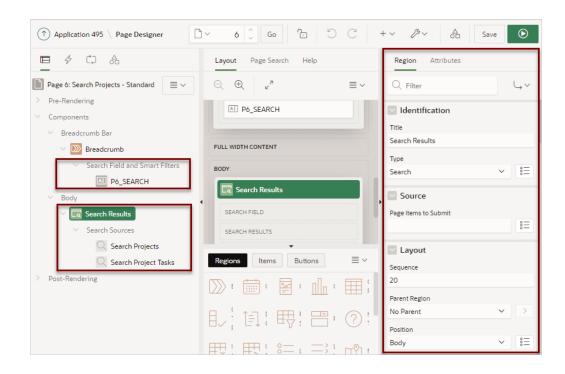
A **search configuration** contains information about searchable data source. Supported search types include:

- Standard Create a search based on table, SQL Query, or REST Data Source. You
  can select the table in the wizard, or enter a SQL Query.
- List Search within a selected List from Shared Components.
- Oracle TEXT Define a searchable table or SQL Query, which already has an Oracle TEXT index created. Search is executed by using Oracle TEXT functionality, which provides linguistic and fuzzy search capabilities.
- 2. Create a Search page.

You can create a search page by running the Create Page Wizard and selecting **Search Page**, or by adding search components manually. A Search page features a search field (or page item) which enables users to submit search terms and a Search Results region. The Search Results region contains Search Sources which map to search configurations.

The following example shows a search page in Page Designer. In the Rendering tab, notice the page item, **P6\_SEARCH** and the **Search Results** region. **P6\_SEARCH** is the search field which enables users to submit search terms. The Search Results region contains both the search results and two **Search Sources** which map to search configurations maintained in Shared Components. You can further refine and control the search display and behavior by editing attributes in the Property Editor.





### See Also:

- Creating a Search Page Manually
- Editing a Search Page

# 16.6.3 Creating a Standard Search

Learn how to create a Standard search.

You can create Standard search on a searchable data source which can be a table, a SQL query, or REST Data Source.

This topic demonstrates how to create a search page on two different tables available in the sample dataset, Project Data. This example assumes you have already created an application and two interactive reports built on EBA\_PROJECTS and EBA\_PROJECT\_TASKS tables.

- Creating Standard Search Configurations
   Create two Standard search configurations based on two separate tables.
- Editing Search Configurations to Include Links
   Learn how to edit search configurations to include links to existing pages.
- Creating a Standard Search Page
   Create a Search page by running the Create Page Wizard.





Using Sample Datasets in Oracle APEX SQL Workshop Guide

## 16.6.3.1 Creating Standard Search Configurations

Create two Standard search configurations based on two separate tables.

A **search configuration** contains information about a searchable data source. In this task, you create two search configurations and then a search page using the Create Page Wizard. The first search configuration maps to the EBA\_PROJECTS table. The second search configuration maps to the EBA\_PROJECT\_TASKS table. Both tables are available in the Project Data sample dataset.

### Note:

This task assumes you have already created an application and two interactive reports built on EBA\_PROJECTS and EBA\_PROJECT\_TASKS tables available in the sample dataset, Project Data.

To create two Standard search configurations:

- 1. Create an application.
- Access the Search Configurations page:
  - a. On the Workspace home page, click the App Builder icon.
  - **b.** Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation and Search, click Search Configurations.

The Search Configurations page appears.

Create the first search configuration that maps to the EBA PROJECTS table:

- 3. On the Search Configurations page, click Create.
  - The Create Search Configuration Wizard appears.
- 4. Detail:
  - a. Name Enter a name for the search configuration (for example, Search Projects).
  - b. Search Type Select a type of search. Options include:
    - Standard Defines a searchable data source such as a table, SQL Query, or REST Data Source. Searches are executed by a SQL Query using LIKE expressions.
    - List Search within a selected List from Shared Components.
    - Oracle TEXT Define a searchable table or SQL Query which already has an Oracle TEXT index created. Search is executed by using Oracle TEXT functionality, which provides linguistic and fuzzy search capabilities.

For this example, select Standard.



#### c. Click Next.

#### 5. Source:

- Data Source Select the Data Source for the search configuration. Options include:
  - Local Database Data is sourced from a local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where the connection is defined using REST Enabled SQL. To create or maintain REST Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The UI changes depending upon the Data Source you select. For this example, select **Local Database**.

- **b.** Source Type Specify the source type. UI changes depending on selected Source Type. For this example, select **Table**.
- **c.** Table / View Owner Select the owner of the table on which you are building the search configuration.
- **d.** Table / View Name Select the table or view on which the search configuration is based (for example, select EBA PROJECTS).
- e. Click Next.

### Column Mapping:

- **a.** Primary Key Column Select the primary key column for the search configuration data source (for example, **ID**).
- **b.** Title Column Select the column to be used as title (for example, **NAME**).
- **c.** Description Column Select the column to be used as the description (for example, **DESCRIPTION**).
- **d.** Icon Source Configure the icon that displays in the header of the search result. Options include:
  - Initials Use the Title column to display the icon as initials.
  - CSS Classes Use the entered CSS classes to display the icon.
  - Class Column Use the selected column containing the icon CSS class to display the icon.

For this example, accept the default, Initials.

### 7. Click Create Search Configuration.

The search configuration is created and the Search Configuration, Edit page appears and displays the message Search configuration created.

Create a second search configuration that maps to the EBA PROJECT TASKS table:

- 8. Click the **Search Configurations** breadcrumb to return to the Search Configurations page.
- 9. Click Create on the Search Configurations page.

The Create Search Configuration Wizard appears.



### 10. Detail:

- a. Name Enter a name for the search configuration (for example, Search Project Tasks). This name displays in the search result.
- **b.** Search Type Select a type of search.

Since this example is built on a table, select **Standard**.

c. Click Next.

#### 11. Source:

a. Data Source - Select a Data Source for the search configuration.

The UI changes depending upon the Data Source you select. For this example, select **Local Database**.

- **b.** Source Type Specify the source type. UI changes depending on selected Source Type. For this example, select **Table**.
- **c.** Table / View Owner Select the owner of the table on which you are building a search configuration.
- d. Table / View Name Select the table or view on which the search configuration is based. For this example, select the EBA PROJECT TASKS table.
- e. Click Next.

#### 12. Column Mapping:

- **a.** Primary Key Column Select the primary key column for the search configuration Data Source (for example, **ID**).
- b. Title Column Select the column to be used as title (for example, **NAME**).
- Description Column Select the column to be used as the description (for example, DESCRIPTION).
- **d.** Icon Source Select the type for the icon that is displayed in the header of the search result.

For this example, accept the default, Initials.

### 13. Click Create Search Configuration.

The search configuration is created and the Search Configuration, Edit page appears.

**14.** Click the **Search Configurations** breadcrumb to return to the Search Configurations page.

## 16.6.3.2 Editing Search Configurations to Include Links

Learn how to edit search configurations to include links to existing pages.



This example assumes you have previously created the search configurations described in Creating Standard Search Configurations.

To edit search configurations to include links:

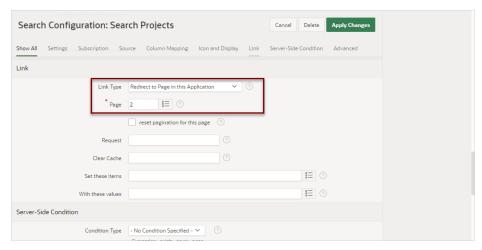
1. Access the Search Configurations page:



- a. On the Workspace home page, click the **App Builder** icon.
- b. Select an application.
- On the Application home page, click Shared Components.
- d. Under Navigation and Search, click Search Configuration.
   The Search Configurations page appears.
- 2. Edit the Search Projects search configuration to link to a report on another page:
  - a. Select the search configuration (for example, **Search Projects**).
  - Link Select the type of link. The UI changes depending upon the Link Type you select.

For this example, select Redirect to Page in this Application.

**c.** Page - Select or enter the page to redirect to (for example, **2**).



- d. Configure the remaining attributes as needed. For example, you can use Set these items in conjunction with With these values to pass values from the search page to the target page.
  - reset pagination for this page Select this option to reset the pagination that is linked to.
  - Request Enter text that you would like to set the built-in application item REQUEST. This is also the item that is set with the name of a button that was clicked.
  - Clear Cache Enter the page numbers, separated by commas, for which
    you would like the user's session state to be cleared (for example:
    10,11,12). You can also reset a collection by passing including a
    collection name.
  - Set these items Enter the list of application item names, separated by a comma, for which you would like to set the session state.
  - With these values Enter a comma delimited list of values for the items specified in Set these items. You can specify static values or substitution syntax; for example:

&APP ITEM NAME.



Item values passed to f?p= in the URL must never contain a colon (:). Item values may also not contain commas unless you enclose the entire value in backslash characters. This is useful when decimal values must be passed where the NLS decimal separator character is a comma. For example:

\1234,56\

e. Click Apply Changes.

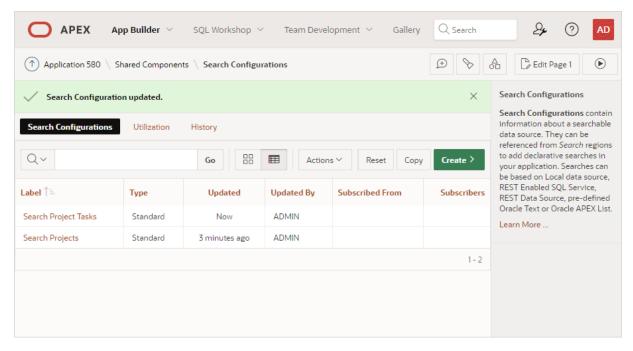
The Search Configurations page appears with the message Search Configuration updated.

- 3. Edit the **Search Project Tasks** search configuration to link to a report on another page:
  - a. Select the search configuration (for example, **Search Project Tasks**).
  - Link Select the type of link. The UI changes depending upon the Link Type you select.

For this example, select Redirect to Page in this Application.

- c. Page Select or enter the page to redirect to (for example, 4).
- d. Click Apply Changes.

The Search Configurations page appears with the message Search Configuration updated.



4. Click the **Application ID** breadcrumb to return to the Application home page.

## 16.6.3.3 Creating a Standard Search Page

Create a Search page by running the Create Page Wizard.

Whether you are creating a Standard search or Oracle TEXT search, creating a search page by running the Create Page Wizard involves the same steps. The Create Page Wizard creates a Search field for you and prompts you to select search configurations. Note that you can also add additional search configurations later in Page Designer.

A Search page features a Search field and a Search Results region. In Page Designer, the Search Results region contains **Search Sources** which map to the search configurations defined in Shared Components.

To create a search page by running the Create Page Wizard:

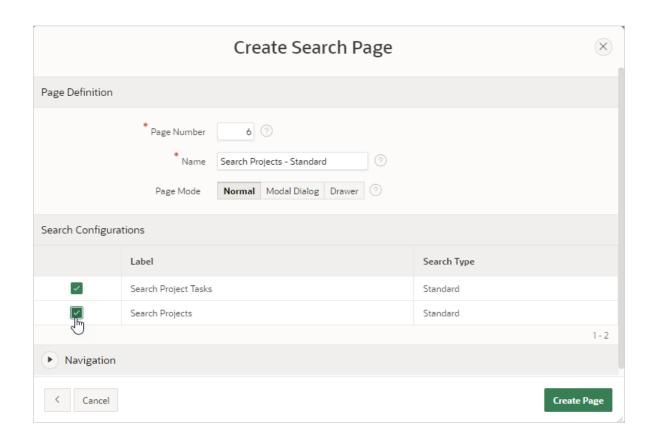
- 1. Navigate to the Application home page:
  - a. On the Workspace home page, click the App Builder icon.
  - **b.** Select the application.
- 2. On the Application home page, click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 3. Under Component, select Search Page.
- 4. Page Definition:
  - **a.** Page Number The page number is an integer value that identifies a page within an application.
  - Name Specify a text name for this page (for example, Search Projects -Standard).

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

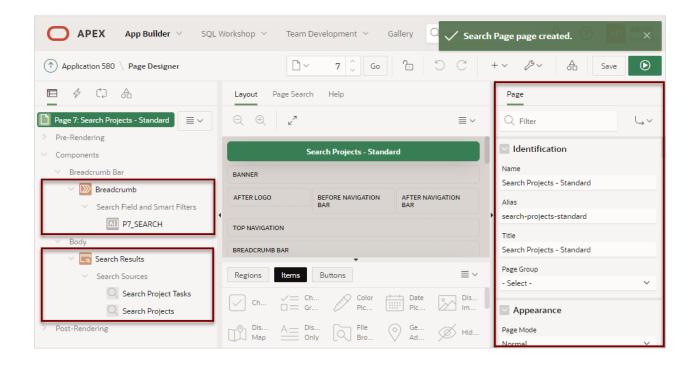
- c. Page Mode Identify the page mode. Accept the default, Normal.
- **5.** Search Configurations Select the search configurations to be used by this page (for example, **Search Project Tasks** and **Search Projects**).





- 6. Navigation Accept the default and enable Use Breadcrumb and Use Navigation.
- 7. Click Create Page.

Page Designer appears with the message, Search Page page created



In the Rendering tab, notice the page item, P7\_SEARCH and the Search Results region. P7\_SEARCH is the search field which enables users to submit search terms. The Search Results region contains both the search results and two Search Sources which map to search configurations maintained in Shared Components. You can further refine and control the search display and behavior by editing attributes in the Property Editor.

Also notice that if you select a search source, Search Source attributes display in the Property Editor.

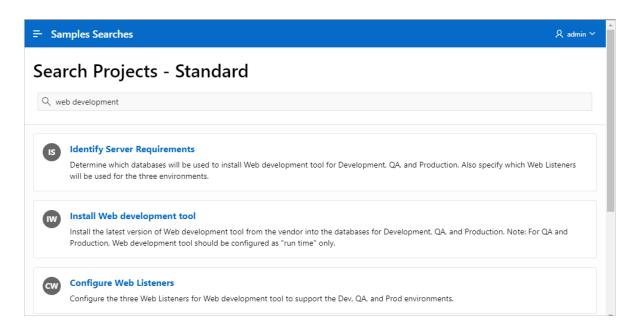
- 8. Run and test the page:
  - a. Click Save and Run Page.

The Search Projects page appears.

b. In the search field, enter a search (for example, web development) and press Enter.

The search results appear.





# 16.6.4 Creating an Oracle Text Search

Create an Oracle TEXT search on table that has an Oracle TEXT index.

This topic demonstrates how create a search page on a table that has an Oracle TEXT index. In this task, you create a simple Oracle TEXT index, then a search configuration using that Oracle TEXT index, and then a search page using the Create Page Wizard.



This task assumes you have already created an application and two interactive reports built on EBA\_PROJECTS and EBA\_PROJECT\_TASKS tables available in the sample dataset, Project Data.

- Creating an Oracle Text Index
   Learn how to create a simple Oracle Text index on a table.
- Creating an Oracle TEXT Search Configuration
   Create a search configuration on existing Oracle TEXT index created on a table.
- Creating an Oracle TEXT Search Page
   Create a Search page by running the Create Page Wizard.

## 16.6.4.1 Creating an Oracle Text Index

Learn how to create a simple Oracle Text index on a table.

This topic describes how to create a very simple Oracle Text index on the EBA PROJECT TASKS table available in the sample dataset, Project Data.





### Tip:

Oracle Text provides indexing, word and theme searching, and viewing capabilities for text in query applications and document classification applications. To learn more, see *Oracle Text Application Developer's Guide* 

To create a simple Oracle Text index on a table:

- 1. On the Workspace home page, click **SQL Workshop**.
- 2. Click SQL Commands.

The SQL Commands home page appears.

3. Enter the following SQL command in the command editor:

```
CREATE INDEX eba_project_tasks_ctx ON eba_project_tasks(DESCRIPTION)
INDEXTYPE IS CTXSYS.CONTEXT;
```

4. Click Run (Ctrl+Enter) to execute the command.

The results appear in the Results pane.

## 16.6.4.2 Creating an Oracle TEXT Search Configuration

Create a search configuration on existing Oracle TEXT index created on a table.

A **search configuration** contains information about searchable data source. This task creates a search configuration using an existing Oracle TEXT index created on the EBA PROJECT TASKS table.

To create an Oracle TEXT search configuration:

- Access the Search Configurations page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
  - Under Navigation and Search, click Search Configurations.

The Search Configurations page appears.

2. On the Search Configurations page, click **Create**.

The Create Search Configuration Wizard appears.

- 3. Detail:
  - Name Enter a name for the search configuration (for example, Projects Tasks -TEXT).
  - b. Search Type Select a type of search. Options include:
    - Standard Defines a searchable data source such as a table, SQL Query, or REST Data Source. Searches is executed by a SQL Query using LIKE expressions.
    - List Search within a selected List from Shared Components.



 Oracle TEXT - Define a searchable table or SQL Query which already has an Oracle TEXT index created. Search is executed by using Oracle TEXT functionality, which provides linguistic and fuzzy search capabilities.

For this example, select **Oracle TEXT**.

c. Click Next.

#### 4. Source:

a. Source Type - Specify the source of the search configuration. Oracle Text search data source can be based on a Table or SQL Query.

For this example, select **Table**.

- **b.** Table / View Owner Select the owner of the table on which you are building a search configuration.
- c. Table / View Name Select the table or view on which the search configuration is based. For this example, select EBA PROJECT TASKS.
- d. Click Next.

#### 5. Column Mapping:

- **a.** Primary Key Column Select the primary key column for the search configuration Data Source (for example, **ID**).
- **b.** Oracle Text Index Column Select the Oracle Index enabled column (for example, **DESCRIPTION**).
- **c.** Title Column Select the column to be used as title (for example, **NAME**).
- **d.** Description Column Select the column to be used as the description (for example, **DESCRIPTION**).
- **e.** Icon Source Configure the icon that displays in the header of the search result. Options include:
  - Initials Use the Title column to display the icon as initials.
  - CSS Classes Use the entered CSS classes to display the icon.
  - Class Column Use the selected column containing the icon CSS class to display the icon.

For this example, accept the default, Initials.

### 6. Click Create Search Configuration.

The search configuration is created. The Search Configuration, Edit page appears and displays the message Search configuration created.

- 7. Edit the search configuration to link to a report:
  - a. Link, Link Type Select the type of link (for example, Redirect to Page in this Application).
  - **b.** Page Select or enter the page to redirect to (for example, **4**).
  - c. Click Apply Changes.

The Search Configurations page appears with the message Search Configuration updated.

8. Click the **Application ID** breadcrumb to return to the Application home page.



## 16.6.4.3 Creating an Oracle TEXT Search Page

Create a Search page by running the Create Page Wizard.

Whether you are creating a Standard search or Oracle TEXT search, creating a search page by running the Create Page Wizard involves the same steps. The Create Page Wizard creates a Search field for you and prompts you to select search configurations. Note that you can also add additional search configurations later in Page Designer.

A Search page features a Search field and a Search Results region. In Page Designer, the Search Results region contains **Search Sources** which map to the search configurations defined in Shared Components.

To create a search page by running the Create Page Wizard:

- 1. Navigate to the Application home page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select the application.
- 2. On the Application home page, click Create Page.

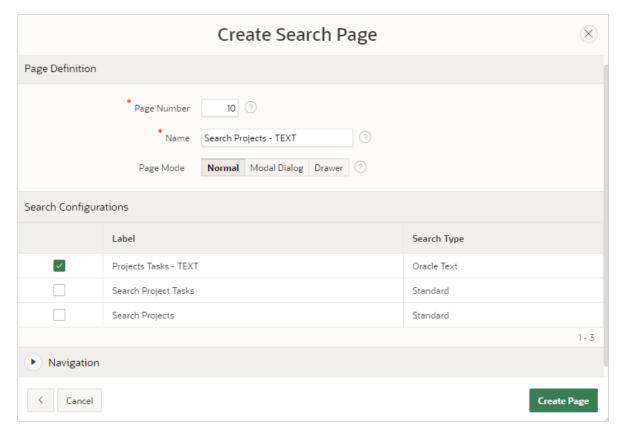
Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 3. Under Component, select **Search Page**.
- 4. Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page (for example, Projects Tasks CTX).

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. Accept the default, **Normal**.
- Search Configurations Select the search configuration to be used by this page (for example, select Projects Tasks - TEXT).





Navigation - Accept the default and enable Use Breadcrumb and Use Navigation.

### 7. Click Create Page.

Page Designer appears.

In the Rendering tab, notice the page item, PX\_SEARCH (where *X* is the page number) and the Search Results region. PX\_SEARCH is the search field which enables users to submit search terms. The Search Results region contains both the search results and the Search Source which maps to search configurations maintained in Shared Components. You can further refine and control the search display and behavior by editing attributes in the Property Editor.

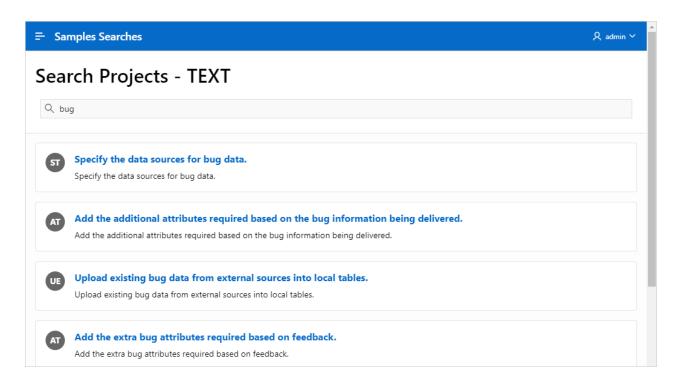
- 8. Run and test the page:
  - a. Click Save and Run Page.

The search page appears.

b. In the search field, enter a search (for example, bug) and press Enter.

The search results appear.





# 16.6.5 Creating a List Search

Create a List search of an APEX List.

This topic demonstrates how create a search page based on an APEX list of search pages.



This example assumes you have already created the search pages in Creating a Standard Search Page and Creating an Oracle Text Search.

- Creating an APEX List Create an APEX list in Shared Components.
- Creating a List Search Configuration Create a List search configuration.
- Creating a List Search Page
   Create a List Search page by running the Create Page Wizard.

## 16.6.5.1 Creating an APEX List

Create an APEX list in Shared Components.

The following task demonstrates how to create a list on which to base a List search.



**Creating Static Lists** 



#### To create a static list:

- Access the Create List Wizard:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation and Search, click Lists.
  - e. Click Create.

The Create List Wizard appears.

- 2. For Name and Type:
  - a. Name Enter a numeric or alphanumeric name for the list (for example, Project Pages List).
  - b. Type Select Static.
  - c. Click Next.
- 3. For Query or Static Values Enter the labels and target pages. For example:
  - a. Row 1:
    - List Entry Label Search Projects Standard
    - Target Page ID or custom URL 7
  - **b.** Row 2:
    - List Entry Label Search Tasks TEXT
    - Target Page ID or custom URL 10
  - c. Click Next.
- 4. Click Create List.
- 5. Click the **Application ID** breadcrumb to return to the Application home page.

## 16.6.5.2 Creating a List Search Configuration

Create a List search configuration.

A search configuration contains information about searchable data source. This task creates a search configuration using the list you created in Creating an APEX List.

To create a List search configurations:

- 1. Access the Search Configurations page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation and Search, click **Search Configurations**.
    - The Search Configurations page appears.
- 2. On the Search Configurations page, click **Create**.

The Create Search Configuration Wizard appears.



### 3. Detail:

- Name Enter a name for the search configuration (for example, Search Project Page - List).
- **b.** Search Type Select a type of search. Options include:
  - Standard Defines a searchable data source such as a table, SQL Query, or REST Data Source. Searches is executed by a SQL Query using LIKE expressions.
  - List Search within a selected List from Shared Components.
  - Oracle TEXT Define a searchable table or SQL Query which already has an Oracle TEXT index created. Search is executed by using Oracle TEXT functionality, which provides linguistic and fuzzy search capabilities.

For this example, select List.

- c. List Select this list you previously created (for example, **Project Pages List**).
- d. Click Next.

### 4. Column Mapping:

- a. Primary Key Column Select the primary key column for the search configuration Data Source (for example, **LIST\_ENTRY\_ID**).
- b. Title Column Select the column to be used as title (for example, ENTRY\_TARGET).
- Description Column Select the column to be used as the description (for example, ENTRY\_TEXT).
- **d.** Icon Source Configure the icon that displays in the header of the search result. Options include:
  - Initials Use the Title column to display the icon as initials.
  - CSS Classes Use the entered CSS classes to display the icon.
  - Class Column

For this example, accept the default, Initials.

### 5. Click Create Search Configuration.

The search configuration is created and the Search Configuration, Edit page appears and displays the message Search configuration created.

**6.** Click the **Application ID** breadcrumb to return to the Application home page.

## 16.6.5.3 Creating a List Search Page

Create a List Search page by running the Create Page Wizard.

A Search page features a Search field and a Search Results region. In Page Designer, the Search Results region contains **Search Sources** which map to the search configurations defined in Shared Components.

When you create a search page with the Create Page Wizard, the wizard creates a Search field for you and prompts you to select search configurations. You can also add additional search configurations later in Page Designer.

To create a search page by running the Create Page Wizard:

1. Navigate to the Application home page:



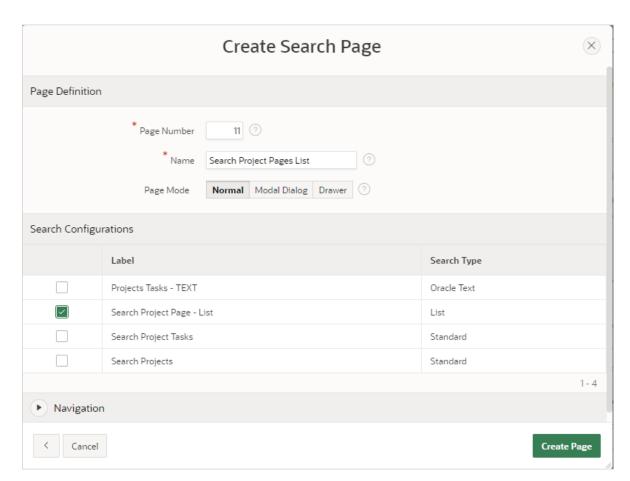
- a. On the Workspace home page, click the **App Builder** icon.
- **b.** Select the application.
- 2. On the Application home page, click **Create Page**.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 3. Under Component, select Search Page.
- 4. Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page (for example, Search Project Pages List).

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

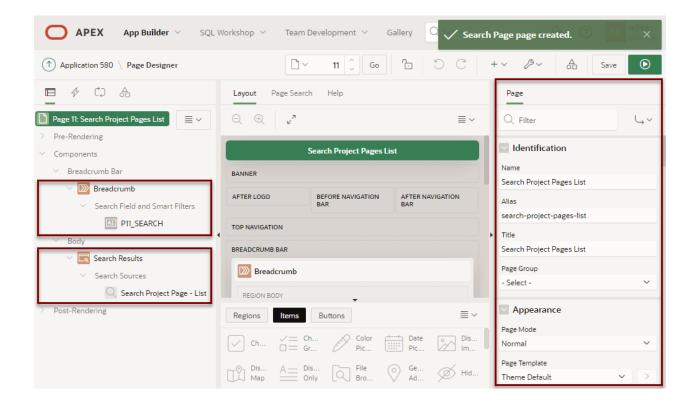
- c. Page Mode Identify the page mode. Accept the default, Normal.
- 5. Search Configurations Select the search configuration to be used by this page (for example, select **Search Project Page List**).



- Navigation Accept the default and enable Use Breadcrumb and Use Navigation.
- Click Create Page.



### Page Designer appears.



In the Rendering tab, notice the page item, P11\_SEARCH and the Search Results region. P11\_SEARCH is the search field which enables users to submit search terms. The Search Results region contains both the search results and the Search Source (Search Project Page - List) which maps to search configurations maintained in Shared Components. You can further refine and control the search display and behavior by editing attributes in the Property Editor.

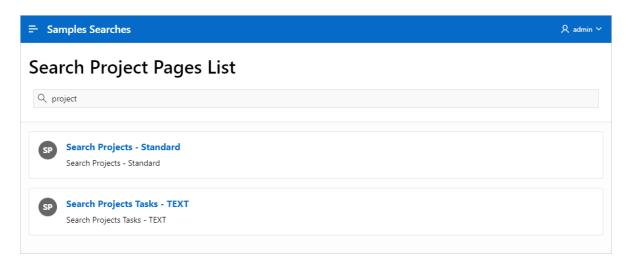
- 8. Run and test the page:
  - a. Click Save and Run Page.

The search page appears.

b. In the search field, enter a search (for example, bug) and press Enter.

The search results appear.





# 16.6.6 Creating a Search Page Manually

Learn how to create a Search page manually in Page Designer.

In previous examples, you create a search page by running the Create Page Wizard. You can also create a blank page and add search components to it manually.



### Tip:

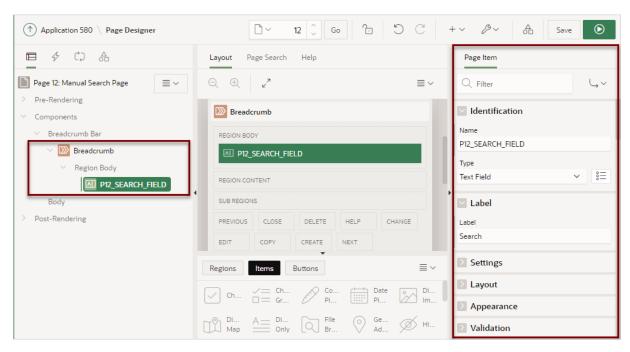
This task uses the tables and search configurations described in Creating Standard Search Configurations. Once you create your new application, access Shared Components and click Copy to copy them from another application.

To create a search page manually:

- 1. Create an application and then your search configurations.
- Run the Create Page Wizard and create a blank page.
  - a. On the Application home page click the **Create Page** button.
  - b. Under Component, select Blank Page.
  - c. Page Definition:
    - Page Number The page number is an integer value that identifies a page within an application.
    - Name Specify a text name for this page (for example, Manual Search Page).
      - This text is also used for page Title. After page creation, you can modify the Title in Page Designer.
    - Page Mode Identify the page mode. For this example, select **Normal**.
  - d. Navigation Accept the defaults and enable navigation.
  - e. Click Create Page.
- 3. Create a text field for the search input:

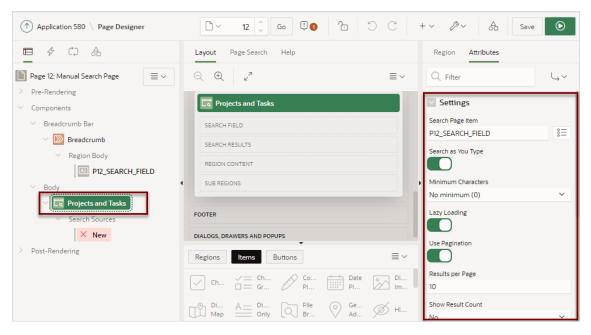


- a. In the Rendering tab, right-click Breadcrumb and select Create Page Item.
   The New item appears.
- **b.** Select the new item and edit following attributes in the Property Editor:
  - Identification Name Enter the name of this item (for example, PX\_SEARCH\_FIELD, where X is the page number).
  - Label, Label Enter the field label for the page item (for example, Search).
  - Advanced, Warn on Unsaved Changes Select Ignore.
  - Click Save.



- 4. Create a search region:
  - a. In the Rendering tab, right-click **Body** and select **Create Region**.
    - The New region appears.
  - b. Select the **New** region and edit the following Region attributes:
    - Identification, Title Enter a region title (for example, Projects and Tasks).
    - Identification, Type Select **Search**.
    - Click Save.
  - c. Click the **Attributes** tab and edit the following:
    - Settings, Search Page Item Select or enter the page item in to which users type their search (for example, **P12\_SEARCH\_FIELD**).
    - Settings, Results per Page Specify the results to display on the page (for example, 10).



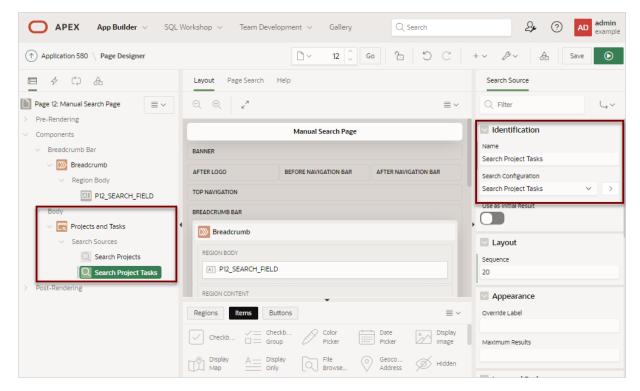


- Define the first Search Source:
  - a. In the Rendering tab under Search Sources, select New.
  - b. Edit the following attributes in the Property Editor:
    - Identification, Name Enter a descriptive name for this search source (for example, Search Projects).
    - Identification, Search Configuration Select a search configuration to search within (for example, Search Projects).
- 6. Define the second Search Source:
  - In the Rendering tab, right-click Search Sources and select Create Search Source.

The **New** Search Source appears.

- b. In the Rendering tab under Search Sources, select New and edit the following Region attributes in the Property Editor:
  - Identification, Name Enter a descriptive name for this search source (for example, Search Project Tasks).
  - Identification, Search Configuration Select a Search Configuration to search within (for example, Search Project Tasks).



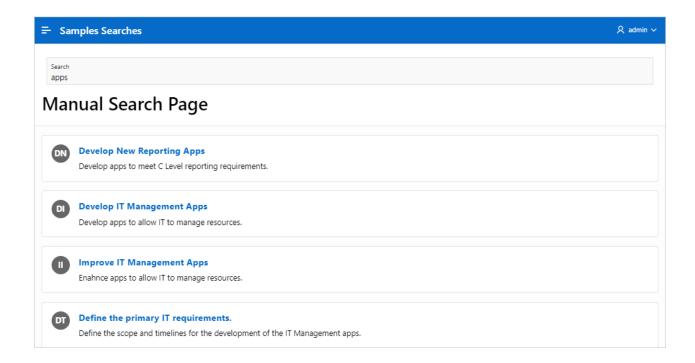


- 7. Run and test the page:
  - a. Click Save and Run Page.

The Search Projects page appears.

**b.** In the search field, enter a search (for example, apps).

The search results appear.





# 16.6.7 Editing a Search Configuration

Edit an existing search configuration in Shared Components on the Search Configurations, Edit page.

To access the Search Configurations, Edit page:

- 1. Access the Seach Configurations page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation and Search, click **Search Configurations**.
- 2. Select the appropriate search configuration label.

The Search Configurations page appears.

The Edit page appears.

3. On the Edit page, configure the attributes.

To learn more about an attribute or view examples, see field-level Help.

- 4. Settings:
  - Search Type Displays the search type (Standard, List, or Oracle TEXT).
  - Label Enter the label to be displayed in Search results. When using a search configuration within a search region, the label can be overridden in Page Designer.
  - Search Query Prefix Enter a prefix to be used by end users in search
    queries. A search term which is prefixed will only be used for search
    configurations with the same prefix. If a prefix is used in a search query, but
    not defined in any search configuration, the prefix is ignored and the whole
    term is used for searching.
  - Static ID Use the Static ID to reference the search configuration definition in API calls (for example, when using the APEX SEARCH SEARCH function).
- 5. Subscription Select a master search configuration from which to subscribe. When you select a master search configuration and click Apply Changes, this search configuration will be automatically refreshed from the master.
- 6. Source:
  - Data Source Displays the Data Source.
  - Source Type Specify the source of the search configuration. Search configuration can be based on a Table, SQL Query, or Function Body returning a SQL Query. For example, select SQL Query.

    The UI changes depending upon the Source Type you select. This topic assumes Source Type is set to SQL Query. To learn more about an attribute, see field-level Help.
  - Order By Clause Enter a valid SQL ORDER BY expression, used to sort the records retrieved.
  - Optimizer Hint Enter the Oracle Optimizer hint (that is, an instruction to the Optimizer) which is added to the top-level statement when executing the SQL query. To learn more or view an example, see field-level Help.



- Searchable Column(s) Select the column(s) to search within this list of columns.
- 7. Column Mapping Select the appropriate columns To learn more or view an example, see field-level Help.
- 8. Icon and Display Cofigure icon and icon display options. The UI changes depending upon the **Icon Source** you select. To learn more, see field-level Help.
- 9. Link Select the type of link. The UI changes depending upon the **Link Type** you select. To learn more, see field-level Help.



### Tip:

To see an example of linking to another page, see Editing Search Configurations to Include Links.

10. Server-Side Condition - Select a condition type from the list that must be met in order for this component to be rendered processed. The UI changes depending upon the Condition Type you select.

#### 11. Advanced:

- Authorization Scheme Optionally select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed.
- Build Option Select a build option for this component. Build options are predefined settings that determine whether or not components within an application are enabled.
- Comments Enter developer comments or notes.
- 12. Click Apply Changes to save your changes.

# 16.6.8 Editing a Search Page

Learn how attributes can change search page behavior



### Tip:

The examples in this section use the tables and search configurations described in Creating Standard Search Configurations.

- Reviewing Search Page Components
  - Review the components that comprise a search page by viewing attributes in Page Designer.
- Editing Search Results Region Attributes
   Edit Search Results region attributes to change region behavior.
- Editing Search Results Attributes
   Edit Search Results Attributes to control how a search works.
- Editing Search Source Attributes
   Edit the behavior of a search source by editing Search Source attributes in Page Designer.



## 16.6.8.1 Reviewing Search Page Components

Review the components that comprise a search page by viewing attributes in Page Designer.

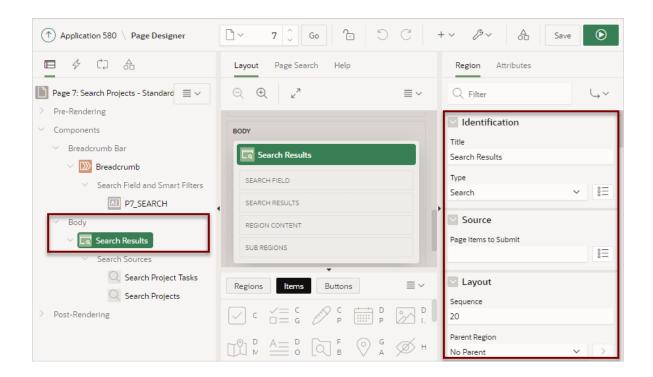
A search page features a **Search Results** region which contains **Search Sources** that map to search configurations defined in Shared Components.

To review the components of a search page:

- 1. View the search page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

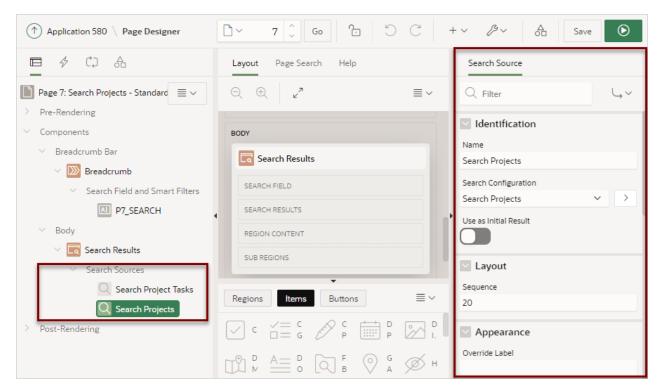
2. Review the Search Results. In the Rendering tab under **Body**, locate and select the **Search Results** region.



Note that the Property Editor contains two tabs: **Region** and **Attributes**. Under Region, note that the region Type is **Search**.

3. In the Rendering tab, select a Search Source (for example, Search Projects).





4. In the Property Editor, review the Search Source attributes.

In the previous example, note that the attributes indicate that the Search Source maps to the Search Configuration, **Search Projects**.

## 16.6.8.2 Editing Search Results Region Attributes

Edit Search Results region attributes to change region behavior.

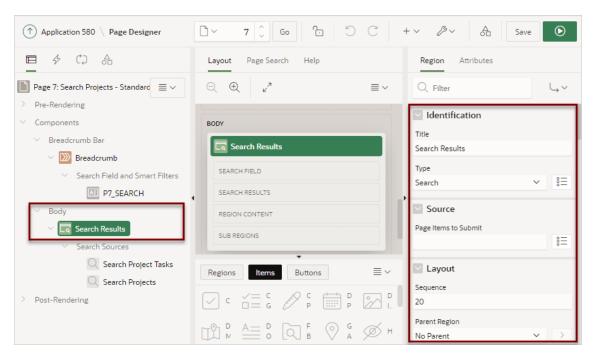
To edit Search Results Region attributes:

- 1. View the search page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- View the Search Results Region attributes:
  - a. In the Rendering tab (or left pane), select the Search Results region.
  - b. In the Property Editor, select the **Region** tab (if not already selected).





Edit the attributes.

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

 To save your changes click Save. To save and run the page, click Save and Run Page.

# 16.6.8.3 Editing Search Results Attributes

Edit Search Results Attributes to control how a search works.

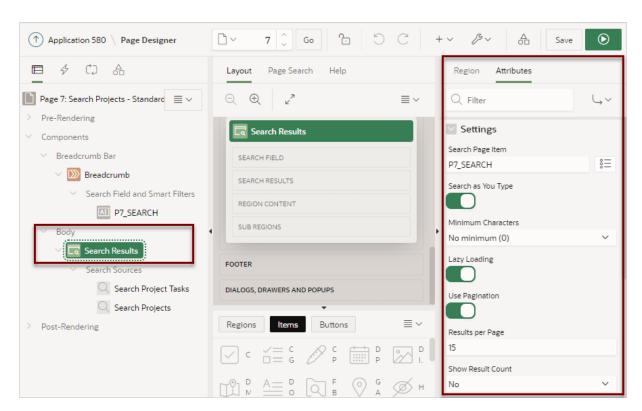
To edit Search Results Attributes:

- 1. View the search page in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. View the Search Results Attributes:
  - a. In the Rendering tab (or left pane), select the Search Results region.
  - b. In the Property Editor, select the **Attributes** tab.





3. Edit the Setting attributes.

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- Settings, Search Page Item Reference the page item for end users to type their searches in (for example, P11\_SEARCH).
- Settings, Search as You Type When enabled, the search is executed as you type in the search field. Otherwise the search is not executed until the user presses Enter or a button.
- Settings, Minimum Characters Specify the minimum number of characters required in a search term before the search executes. This setting can be useful to reduce the amount of searching done when queries are expensive.
- Settings, Lazy Loading Specify whether to load the region independently of the data for the region.
  - When lazy loading is enabled, the page renders immediately, showing an empty region until the data loads. Generally, the page does not display until the entire page loads and is ready to be rendered. For example, if it takes 5 seconds to load all of the data for a region, without lazy loading, the end user would have to wait 5 seconds before the page started to render.
- Settings, Use Pagination Specify whether to use pagination for displaying search results.
- Settings, Results per Page Determine the amount of results that display on each page.
- Settings, Show Result Count Specify where to display the search results row count.
   See Help in the central pane for more details.
- Settings, Custom Layout Specify whether to use a custom template for search results, instead of the display templates specified within the search configuration.

- Settings, Custom Layout Specify whether to use a custom template for search results, instead of the display templates specified within the search configuration.
- Settings, Last Modified Format Mask Provide the format mask to use for displaying the Last Modified attribute of a search result. Values are returned as the TIMESTAMP WITH LOCAL TIME ZONE data type.
- Settings, Overall Sort Search results are returned in the order they appear on the Search Configurations page. The order within each search configuration is defined on the Shared Components, Edit page. To override the default order, select a column from the list.
  - See the Help tab in the central pane for more details.
- Settings, No Query Entered Message Enter a message to display when no query is entered and no Search Source has the Use as Initial Result switch enabled.
  - See the Help tab in the central pane for examples.
- Settings, No Results Found Message Enter a message to display when no results are found. If specified, messages defined in the search configurations are ignored.
- To save your changes click Save. To save and run the page, click Save and Run Page.

## 16.6.8.4 Editing Search Source Attributes

Edit the behavior of a search source by editing Search Source attributes in Page Designer.

A search configuration contains information about searchable data source. When you add a search configuration to a search page, it displays under Search Sources in the Rendering tab in Page Designer. You can further refine search behavior by selecting the search source in Page Designer and editing attributes in the Property Editor.

The following task demonstrates how to edit the search source so that the each result is prefaced by an icon.

To edit Search Source attributes:

- 1. View the search page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. Edit the first Search Source:
  - a. In the Rendering tab (or left pane), select the Search Source (for example, Search Project Tasks).

The Search Source attributes display in the Property Editor.

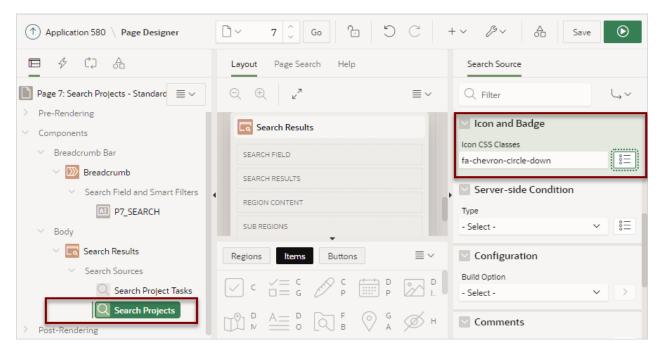
- b. Icon and Badge Select an icon to display with the search result (for example, fa-tasks-alt).
- 3. Edit the first Search Source:



a. In the Rendering tab (or left pane), select the Search Source (for example, **Search Projects**).

The Search Source attributes display in the Property Editor. To view help for an attribute, select the attribute in the Property Editor and click the Help tab in the central pane.

**b.** Icon and Badge - Select an icon to display with the search result (for example, **fa-chevron-circle-down**).

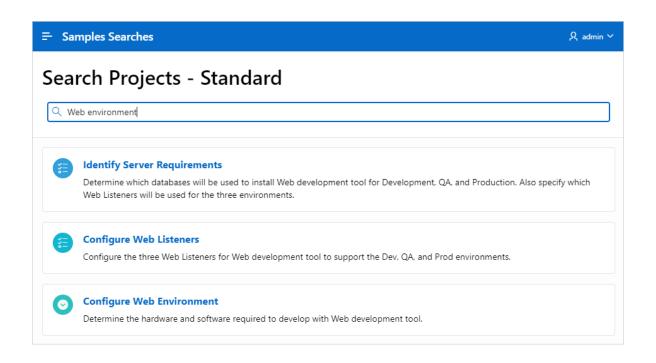


- 4. Run and test the change:
  - a. Click Save and Run Page.

The Search Projects page appears.

 $\textbf{b.} \quad \textbf{In the search field, enter a search (for example, \texttt{Web environment}) and press \, \textbf{Enter}.}$ 

The search results appear.



Note that each search result is prefaced by a new icon.

# 16.7 Managing Component Settings

Use Component Settings to set application level values for built-in APEX components and installed plug-ins.



## Tip:

The Component Settings in your environment will vary based on the currently selected application.

- Configuring Component Settings
  - Configure Component Settings to set application-level values for built-in APEX components and installed plug-ins.
- Configuring Checkbox
  - Configure the default value stored in a page item for an enabled or disabled checkbox in Component Settings, Checkbox.
- Configuring Color Picker Display
  - Configure the default display behavior for a Color Picker in Component Settings, Color Picker.
- Configuring Date Picker
  - Configure default Date Picker behavior in Shared Components, Component Settings.
- Date Picker (JET) (Deprecated)
   Configure default Date Picker (JET) behavior in Shared Components, Component Settings.

Configuring Geocoded Address

Configure Geocoded Address behavior Component Settings, Geocoded Address.

Configuring Interactive Report Action Menu Structure

Configure if interactive reports use the new Action Menu or keep the legacy structure from earlier releases.

Configuring Vector Tile Layers for Maps

Configure Map component settings to include Vector Tile Layers as the background map.

Dynamically Adding Sliders to Regions

Dynamically add a slider to regions if the displayed region name exceeds the width of the region by configuring the Component Settings, Region Display Selector.

Configuring Star Rating

Configure default Star Rating behavior in Component Setting, Star Rating.

Configuring Switch Defaults

Configure default Switch item type behavior Component Settings, Switch.

Viewing the Component Settings History Report
 View a report of recent modifications made to Component Settings in the current application.

# 16.7.1 Configuring Component Settings

Configure Component Settings to set application-level values for built-in APEX components and installed plug-ins.



### Tip:

To learn more about a specific component type, see the sections that follow.

To configure Component Settings:

- **1.** Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.



### Tip:

You can also access Shared Components from Page Designer by clicking **Shared Components** 



) on the Page Designer toolbar.

- 2. Under Other Components, click Component Settings.
- **3.** On the Component Settings page, click the component name.



4. On Component Settings, configure the appropriate settings and click **Apply Changes**.



#### Tip

To learn more about a specific setting, see item Help.

# 16.7.2 Configuring Checkbox

Configure the default value stored in a page item for an enabled or disabled checkbox in Component Settings, Checkbox.

To configure the default value stored in a checkbox page item:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click **Checkbox**.
- Checked Value Enter the value stored in the page item if the end user checks the checkbox. The value can be up to 255 characters long.
- 5. Unchecked Value Enter the value stored in the page item if the user deselects the checkbox. This attribute can also be left blank if you want to store NULL when checked. The value can be up to 255 characters long.
- 6. Click Apply Changes.

## 16.7.3 Configuring Color Picker Display

Configure the default display behavior for a Color Picker in Component Settings, Color Picker.

To configure the default display behavior for a Color Picker:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click Color Picker.
- 4. **Display As** Select how the color picker displays. Options include:
  - Popup A color can be entered in the text field or chosen from the popup color picker.



- Inline A color picker is shown inline.
- Color-only Popup A button opens a popup color picker.
- Native Color Picker A native browser color input. The UI is dependent on the browser.
- 5. Mode Select the amount of information shown in the color picker. Options include:
  - Simple Shows just the color spectrum controls and color presets if any are defined.
  - Full Shows additional fields to view or enter colors as Hex, HSL, or RGB values with optional Alpha value depending on Return Value As. Also shows the Initial and Current colors.
- 6. Click Apply Changes.

# 16.7.4 Configuring Date Picker

Configure default Date Picker behavior in Shared Components, Component Settings.

To configure default Date Picker behavior:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click **Date Picker**.
- 4. Appearance & Behavior Control the appearance and behavior of the calendar used to select dates. Only applies to Date Pickers when Display As is either Popup or Inline.

Options include:

- Show Week Determines if the week of the year is shown.
- Month Picker- Controls if the month is rendered as a button which allows selection instead of text.
- Year Picker- Determines whether the year is rendered as a button which allow selection instead of text.
- Paginate by Multiple Months Determines whether the pagination size when displaying several months is only one month or the number of months.
- Show Today Button Controls whether the today button displays to select the current date.
- **Show Clear Button** Controls whether the clear button displays to clear the value of the date picker. Note: This is only used when **Display As** is **Inline**.
- 5. **Days Outside Month** Dictates the behavior of days outside the current viewing month. Only applies to Date Pickers when **Display As** is either **Popup** or **Inline**.

Options include:

- Hidden Days outside the current viewing month will be hidden.
- Selectable Days outside the current viewing month will be visible and selectable.



- Visible Days outside the current viewing month will be visible.
- 6. Time Increment Time increment in minutes used by the time selection control. Use this attribute to select the time of increments that can still be manually entered and saved. Only applies to Date Pickers when Display As is either Popup or Inline.
- Show On Controls when the calendar popup displays. Only applies to Date Pickers when Display As is Popup.

### Options include:

- Item Focus When the item receives focus or when the calendar icon is clicked.
- Icon Click Only when the calendar icon is clicked.
- Click Apply Changes.

## 16.7.5 Date Picker (JET) (Deprecated)

Configure default Date Picker (JET) behavior in Shared Components, Component Settings.

To configure default Date Picker (JET) behavior:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click Date Picker (JET) [Deprecated].
- 4. Appearance & Behavior Control the appearance and behavior of the calendar used to select dates. Only applies to Date Pickers when Display As is either Popup or Inline.

### Options include:

- Show Week Controls whether the week of the year is shown.
- Month Picker Controls whether the month is rendered as a button to allow selection instead of text.
- Year Picker Controls whether the year is rendered as a button to allow selection instead of text.
- Days Outside Month Dictates the behavior of days outside the current viewing month. Only applies to Date Pickers when Display As is either Popup or Inline.

### Options include:

- Hidden Days outside the current viewing month will be hidden.
- Selectable Days outside the current viewing month will be visible and selectable.
- Visible Days outside the current viewing month will be visible.



- 6. **Time Increment** Time increment in minutes used by the time selection control. This attribute just determines the control used for selecting the time, any time outside of these increments can still be manually entered and saved. Note that this is only used when **Display As** is either **Popup** or **Inline** and if **Show Time** is enabled.
- 7. **Show On** Controls when the calendar popup is displayed. Only applies to Date Pickers when **Display As** is **Popup**.

Options include:

- Item Focus When the item receives focus or when the calendar icon is clicked.
- Icon Click Only when the calendar icon is clicked.
- 8. Click Apply Changes.

# 16.7.6 Configuring Geocoded Address

Configure Geocoded Address behavior Component Settings, Geocoded Address.

To configure default Geocoded Address behavior:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click **Geocoded Address**.
- 4. Configure the following Component Settings:
  - a. Geocoder Match Mode Determines how closely the attributes of an input address must match the data being used for geocoding. Options include:
    - Exact All provided address parts must match. However, if the house number, street name, or street type do not all match, the first match in the following is returned: postal code, city or town, and state. For example, if the street name is incorrect but a valid postal code is specified, a location in the postal code is returned.
    - Relax Street Type The provided street type can be different from the data used for geocoding. For example, Main Street or Main Blvd match Main St, if there is no other Main Blvd or Main Street in the relevant area.
    - Relax House Number The house number and street type can be different from the data used for geocoding. For example, 123 Main St matches 123 Main Lane and 124 Main St, as long as there are no ambiguities or other matches.
    - Relax Street Name The base name of the street, the house number, and the street type can be different from the data used for geocoding. For example,
       Pleasant Vale matches Pleasant Valley as long as there are no ambiguities or other matches in the data.
    - Relax Postal Code The postal code (if provided), street name, street type and house number can be different from the data used for geocoding.
    - Relax All The address can be outside the city specified as long as it is within the same county. Also includes the characteristics of Relax Postal Code.



- b. **Display As** Select how the geocoding results display. Options include:
  - List View The results display in a list view.
  - Grid View The results display in a grid view.
- c. Map Preview Determines whether to support previewing the geocoded address on a map. Options include:
  - Results Popup Show the map in the Geocoding results popup, so that
    users can review the position before selecting a result. This is only
    supported when Display As, Grid View is enabled.
  - **Item** Show a map visualizing the address location at the item position.
- **d. Background** Pick the background map to show geocoding results on. Options include:
  - Default
  - OpenStreet Map Bright
  - OpenStreet Map Dark
  - OpenStreetMap Positron
  - Oracle World Map

See item Help for more details.

- **e. Height** Specify the height (in pixels) of the displayed map. Map's default height is calculated based on it's width with an 3:2 aspect ratio.
- f. Click Apply Changes.

## 16.7.7 Configuring Interactive Report Action Menu Structure

Configure if interactive reports use the new Action Menu or keep the legacy structure from earlier releases.

The structure of the interactive report Actions menu has changed to be consistent with interactive grids.

To configure how the Actions menu displays in interactive reports:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click Interactive Report.
- **4. Actions Menu Structure** Specify how the Actions menu displays in interactive reports. Options include:

Options include:

• Interactive Grid - Select Interactive Grid to have the interactive report Actions menu match interactive grid.



- Legacy Select Legacy to have the interactive report Actions menu use the legacy structure.
- 5. Click Apply Changes.

## 16.7.8 Configuring Vector Tile Layers for Maps

Configure Map component settings to include Vector Tile Layers as the background map.

Some of the background maps are also available as Vector Tile Layers which include the layers: OpenStreetMap Position, OpenStreetMap Bright, and OpenStreetMap DarkMatter. Vector maps provide superior resolution over raster maps for all map zoom levels. Started with Oracle APEX release 22.2, all new applicationsVector Tile Layer usage is enabled by default. For aapplications created before release 22.2, you must enable Vector Tile Layers in Shared Components, Component Settings.

To enable Vector Tile Layers for maps:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click Maps.
- 4. Use Vector Tile Layers Select Yes to use Vector Tile Layers as the background map. If maps.oracle.com provides a Vector Tile Layer for the chosen background map and this attribute is enabled, the map region will use it.
- Click Apply Changes.

# 16.7.9 Dynamically Adding Sliders to Regions

Dynamically add a slider to regions if the displayed region name exceeds the width of the region by configuring the Component Settings, Region Display Selector.

To dynamically add a slider to a region if the displayed region name exceeds the width of the region:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- On the Component Settings page, click Region Display Selector.
- 4. **Include Slider** Select **Yes** to dynamically add a slider to the region if the displayed region name exceeds the width of the region.
- Click Apply Changes.



## 16.7.10 Configuring Star Rating

Configure default Star Rating behavior in Component Setting, Star Rating.

To configure default Star Rating behavior:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings.
- 3. On the Component Settings page, click Star Rating.
- 4. On Component Settings:
  - a. **Default Icon Choose the default icon to use (such as** fa-star, fa,-thumbs-up, or fa-database).
  - b. Active Color Choose the default color for active stars.
  - c. Inactive Color Choose the default color for inactive stars.
  - **d. Tooltip** Specify the template for the tooltip when end users hover the mouse over the item. This rating value replaces the #VALUE# substitution (for example, the movie rating is #VALUE#).
- 5. Click Apply Changes.

## 16.7.11 Configuring Switch Defaults

Configure default Switch item type behavior Component Settings, Switch.

Display options include On/Off switch toggle, pill button, or select list.

To configure default Switch item type behavior:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - On the Application home page, click Shared Components.

The Shared Components page appears.

- 2. Under Other Components, click Component Settings
- 3. On the Component Settings page, click **Switch**.
- 4. Display Style Options include:
  - Switch
  - Pill Button
  - Select List
- On Value Enter the value stored in the page item if the end user picks the On option. The value can be up to 255 characters long.



- **6. On Label** Enter the text displayed for the **On** option. If no text is entered, the system default label is used.
- 7. **Off Value** Enter the value stored in the page item if the user picks the **Off** option. The value can be up to 255 characters long. This value is used if the page item is populated with a value which does not match either the **On Value** or **Off Value**.
- 8. Off Label Enter the text displayed for the Off option. If no text is entered, the system default label is used.
- 9. Click Apply Changes.

## 16.7.12 Viewing the Component Settings History Report

View a report of recent modifications made to Component Settings in the current application.

To view the Component Settings History report:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Other Components, click Component Settings.
- Click the History tab.

The History page displays as an interactive report. To customize the report, use the Search bar at the top of the page.

# 16.8 Using Shortcuts

Use shortcuts to avoid repetitive coding of HTML or PL/SQL functions.

What is a Shortcut?

Use a shortcut to define frequently used code once and then reference it in many places thus reducing code redundancy. For example, you can create a shortcut to define a page control such as a button, HTML text, a PL/SQL procedure, or HTML.

Supported Shortcut Types

Oracle APEX supports six types of shortcuts.

Defining a Shortcut from Scratch

Define a shortcut on the Shortcuts page.

Copying an Existing Shortcuts

Copy existing shortcuts from the Shortcut repository.

Editing Existing Shortcuts

Once you create a shortcut, you can alter it by editing attributes on the Edit Shortcut page.

Accessing Shortcut Reports

View the shortcut Subscription and History reports.



## 16.8.1 What is a Shortcut?

Use a shortcut to define frequently used code once and then reference it in many places thus reducing code redundancy. For example, you can create a shortcut to define a page control such as a button, HTML text, a PL/SQL procedure, or HTML.

You can use a shortcut within the following locations:

- The Region Source attribute of regions defined as HTML Text (with shortcuts).
- Region Header and Footer Text attribute.
- Item Label attributes, Pre Element Text, Post Element Text, and Default Value attribute.
- Region Templates attributes.

#### Referencing a Shortcut

Once you define a shortcut, you can invoke it using specific syntax unique to the location in which the shortcut is used.

You reference shortcuts using the following syntax:

"MY SHORTCUT"

The shortcut name must be capitalized and enclosed in quotation marks.



- About Regions
- Specifying a Region Header and Footer
- Creating Custom Themes

## 16.8.2 Supported Shortcut Types

Oracle APEX supports six types of shortcuts.

When you create a shortcut you select a shortcut type. Supported shortcut types include:

- PL/SQL Function Body
- HTML Text
- HTML Text with Escaped Special Characters
- Image
- Text with JavaScript Escaped Single Quotes
- Message
- Message with JavaScript Escaped Special Quotes



#### **Text with JavaScript Escaped Single Quotes**

Use this type of shortcut to reference a shortcut inside of a JavaScript literal string. This shortcut defines a text string. When the shortcut is referenced, it escapes the single quotation marks required for JavaScript.

#### Message

Use this type of shortcut to reference a translatable message at runtime. Since this shortcut does not have a shortcut body, the name of the shortcut must match the corresponding message name. At runtime, the name of the shortcut expands to the text of the translatable message for the current language.

#### Message with JavaScript Escaped Single Quotes

Use this type of shortcut to reference a shortcut inside of JavaScript literal string and reference a translatable message at runtime.



**Understanding Application Translation and Globalization Support** 

## 16.8.3 Defining a Shortcut from Scratch

Define a shortcut on the Shortcuts page.

To define a shortcut:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

- 2. Under Other Components, select **Shortcuts**.
- 3. Click Create.
- For Create Shortcut, select From Scratch and click Next.
- On Shortcut Attributes:
  - a. Name Enter the name by which the shortcut will be referenced.
  - b. Type Select a shortcut type. Options include:
    - PL/SQL Function Body
    - HTML Text
    - HTML Text with Escaped Special Characters
    - Image
    - Text with JavaScript Escaped Single Quotes



- Message
- Message with JavaScript Escaped Special Quotes
- **c.** Shortcut Enter the text of the shortcut. The shortcut must be less then 30,000 characters in length.
- **d.** Error Text Enter the text to display if an error should occur during the processing of a shortcut.
- e. Build Option Select a build option for this component.
- Click Create.

New shortcuts are added to the Shortcuts page (also referred to as the Shortcut repository).

## 16.8.4 Copying an Existing Shortcuts

Copy existing shortcuts from the Shortcut repository.

To copy an existing shortcut:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- Under Other Components, select Shortcuts.
- Click Create.
- 4. On Creation Method, select As a Copy of an Existing Shortcut and click Next.
- From Copy From Application, select the application you want to copy shortcuts from and click Next.
- 6. On New Shortcuts:
  - a. To Name Enter the new name of the shortcut to be copied.
  - b. Copy Select Yes, No, or Copy and Subscribe.
  - c. Click Copy Shortcut.

New shortcuts are added to the Shortcuts page (also referred to as the Shortcut repository).

## 16.8.5 Editing Existing Shortcuts

Once you create a shortcut, you can alter it by editing attributes on the Edit Shortcut page.

To edit an existing shortcut:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.



c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, select Shortcuts.
- 3. Select a shortcut.

The Edit Shortcut page appears.

4. Edit the attributes.

To learn more about an attribute, see field-level Help.

5. Click Apply Changes.



Viewing Field-level and Page Designer Help

## 16.8.6 Accessing Shortcut Reports

View the shortcut Subscription and History reports.

To access shortcut reports:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, select Shortcuts.
- 3. Click one of the following tabs:
  - Subscription Displays the Subscribed Shortcuts page which displays all subscribed shortcuts in your application.
  - **History** Display the Shortcut History page which displays a history of recently changed shortcuts by date.



The Subscription and History tabs only appear after you create a shortcut.

# 16.9 Managing Email Templates

Enable users to send emails from your application by creating email templates.



#### Note:

Before you can send email from an application, your Instance administrator must sign in to Oracle APEX Administration Services, navigate to the Instance Settings page and configure Email attributes.

#### Defining an Email Template

Define email templates for your application. Email templates include both an HTML Format and a Plain Text Format.

#### Viewing Sample Email Templates

View the sample email templates: Load Order Details, Load Event Reminder, or Load Scheduled Outage.

#### • About Including Dynamic Text

Provide dynamic text in your email templates using existing substitution modifiers.

# Editing or Deleting Email Templates Edit or delete existing email templates.

Copying an Email Template
 Copy existing email templates.

#### See Also:

- Sending Email from an Application
- Configuring Email in Oracle APEX Administration Guide
- APEX\_MAIL in Oracle APEX API Reference

## 16.9.1 Defining an Email Template

Define email templates for your application. Email templates include both an HTML Format and a Plain Text Format.

To define an email template:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, select **Email Templates**.
- 3. On the Email Templates page, click **Create Email Template**.

The Details page appears.





#### Tip:

To get started, review the sample email templates available under **Sample Templates** on the right side of the page. To load a sample email template, simply select it. See Viewing Sample Email Templates.

4. Next, define your template.



#### Tip:

For Email Subject, HTML Format or Plain Text Format, insert substitution strings using the format #STRING NAME#. You can pass in values for these strings using the Placeholder Values dialog for the process in Page Designer or the APEX MAIL API.

- **Under Identification:** 
  - a. Template Name Enter a descriptive name for this template.
  - b. Static Identifier Static string identifier used to refer to the template when calling the APEX MAIL APIS.
  - c. Email Subject Enter the text to display for the email subject. You may use substitution strings with the #STRING NAME# format. You can pass in values for these strings using Placeholder Values dialog for the process in Page Designer or the APEX MAIL API.
- 6. Under HTML Format:



#### Tip:

You may use substitution strings with the #STRING NAME# format. You can pass in values for these strings using the Placeholder Values dialog for the process in Page Designer or the APEX MAIL API.

- a. Header Define the Header.
- b. Body Define the Body. You can use basic markup to format the body of your HTML email.
- c. Footer Define the Footer.
- d. Advanced, HTML Template See item Help for a list of supported substitution strings.
- e. (Optional) Click Load Default HTML. The default HTML appears in the HTML Template. If needed, edit the default HTML Template.
- 7. Plain Text Format Enter the appropriate template defaults. You may use substitution strings with the #STRING NAME# format. You can pass in values for these strings using the Placeholder Values dialog for the process in Page Designer or the APEX MAIL API.
- 8. (Optional) Comments Enter comments that describe this template.
- Click Create Email Template.

Next, create a button and process to call the APEX MAIL API.



#### 10. Add a Send Mail button:

- a. Return to the application from which you want to send email.
- **b.** Navigate to the appropriate page or create a new page.
- c. In Page Designer, add a button to send the email.
- d. Create a Process of the Identification, Type: Send E-Mail.

The Settings field displays configuration fields for sending email.

e. Complete the required fields. Address fields (To, Cc, Bcc, Reply To) can contain substitution strings in the format &P2 CUST EMAIL. (include the period).

#### **11**. Do one of the following:

#### Apply the Email Template

Under Settings, Email Template, select the template you defined earlier.

(Optional) Click the **Placeholder Values** button to open the Set Placeholder Values dialog. This dialog shows all placeholders defined in the Email Template and enables you to assign a static value or the value of a page or application item to it. In the dialog, click the LOV icon right to the "Item or Value" input field to pick a page item.

#### Apply a PL/SQL Process

Create a PL/SQL process which calls the APEX MAIL API.

Consider the following example:

```
begin
    apex mail.send (
                             => 'steven.king@example.com',
        p_template_static id => 'ORDER CONFIRMATION',
       p placeholders
                           => q'~
            "CUSTOMER NAME": "Steven King",
            "ORDER NUMBER": 1234,
            "ORDER DATE": "02-Feb-2018",
            "SHIP TO": "Steven King",
            "SHIPPING ADDRESS LINE 1": "2004 Charade Rd",
            "SHIPPING ADDRESS LINE 2": "Seattle, Washinton",
            "ITEMS ORDERED": 3,
            "ORDER TOTAL": "$ 1,200.99",
            "ORDER URL": "http://domain/apex/f?p=&APP ID"
         } ~ ' );
    apex mail.push queue;
end;
```

#### 12. Save the page.

**13.** Run the page and click the **Send Mail** button.



#### See Also:

- Managing Pages in an Application
- Managing Buttons
- Understanding Page Processes
- APEX MAIL in Oracle APEX API Reference

## 16.9.2 Viewing Sample Email Templates

View the sample email templates: Load Order Details, Load Event Reminder, or Load Scheduled Outage.

To view sample email template:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, select Email Templates.
- 3. On the Email Templates page, click Create Email Template.

The Details page appears.

4. On the right side of the page, find the **Sample Templates** region.

The Sample Templates region contains three templates:

- · Load Order Details
- Load Event Reminder
- Load Scheduled Outage
- Select a template. For example, select Load Order Details.

The template appears.

**6.** Expand the **Sample API Usage** region at the bottom of the page to see an example. The following is the **Load Order Details** API example.



7. See Defining an Email Template for information edting attributes, creating a template, and creating a **Send Mail** button.

## 16.9.3 About Including Dynamic Text

Provide dynamic text in your email templates using existing substitution modifiers.



Template directives are supported by specific attributes of email templates. See Using Template Directives.

For security reasons, the values substituted for the placeholders (#NAME#) in the email templates are automatically escaped based on the context. In other words, HTML formatted templates include HTML escaping and Plain Text templates do not. If this is not the desired behavior for your environment, you can provide dynamic text which contains HTML tags using the existing substitution modifiers:

- #NAME!RAW# Text is substituted as is.
- #NAME!STRIPHTML# All HTML tags are removed.

#### **Extending the Email Templates**

For example, you can extend the **HTML Format - Body** template with:

Similarly, you can extend the **Plain Text Format** template with:

```
Additional Info: #ADDITIONAL INFO!STRIPHTML#
```



#### Sample PL/SQL

The PL/SQL code would look similar to this:

```
begin
    apex mail.send (
        p to
                            => 'steven.king@example.com',
        p template static id => 'ORDER CONFIRMATION',
        p placeholders
            "CUSTOMER NAME": "Steven King",
            "ORDER NUMBER": 1234,
            "ORDER DATE": "02-Feb-2018",
            "SHIP TO": "Steven King",
            "SHIPPING ADDRESS LINE 1": "2004 Charade Rd",
            "SHIPPING ADDRESS LINE 2": "Seattle, Washinton",
            "ITEMS ORDERED": 3,
            "ORDER TOTAL": "$ 1,200.99",
            "ORDER URL": "http://domain/apex/f?p=&APP ID"
               "ADDITIONAL INFO": "We plan to deliver your ordered items
<strong>tomorrow morning between 08:00 and 09:00</strong>
         }~');
    apex mail.push queue;
end;
```

## 16.9.4 Editing or Deleting Email Templates

Edit or delete existing email templates.

To edit or delete an email template:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

2. Under Other Components, select Email Templates.

The Email Templates page appears.

- 3. To edit an email template:
  - a. Click the email template name.

The Template Details appear.

- b. Edit the appropriate attributes.
- c. Click Apply Changes.
- 4. To delete an email template:
  - a. Click the email template name.

The Template Details appear.



- b. Click Delete.
- c. Confirm your selection and click **Delete**.

## 16.9.5 Copying an Email Template

Copy existing email templates.

To copy an email template:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Other Components, select **Email Templates**.

The Email Templates page appears.

3. Click Copy.

The Copy Email Template Wizard appears.

- 4. Copy Email Template:
  - a. Copy From Select where to copy the email template from. Options include:
    - This Application
    - Other Application
  - Application This option only displays if Copy From is set to Other Application. Choose the application to copy the email template from.
  - c. Copy Email Template Choose an email template to copy.
  - d. New Name Enter a name for the new email template.
  - e. New Static Identifier Provides a unique static identifier for the copied email template.
  - f. Click Copy Email Template.

# 16.10 Managing Static Application Files

Navigate to Shared Components to upload, view, download, and delete static application files (including images, CSS files, and other files which must be managed independently).

- Specifying the Location of Static Application Files
   Specify the location of static application files.
- Referencing Static Application Files
   Reference a static application file in your application using #APP\_FILES# substitution string.
- Creating Static Application Files
   Create static application files from Shared Components.



- Viewing the Static Application Files Report View the Static Application Files report.
- Downloading Static Application Files
   Download an uploaded static application file, or download all static application files in a Zip.
- Deleting Static Application Files
   Delete uploaded static application files.

#### See Also:

- Managing Static Workspace Files
- About Managing Images

## 16.10.1 Specifying the Location of Static Application Files

Specify the location of static application files.

Application files are stored with your application definition in the Oracle database. For performance reasons, you can also store your application files on your Web server. Edit the #APP FILES# Path attribute to change the location.

To edit the #APP\_FILES# Path attribute:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - **b.** Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under User Interface, select User Interface Attributes.

The User Interface page appears.

- Click the Advanced tab:
  - #APP\_FILES# Path Determines the virtual path the Web server uses to point to the static files when using the #APP\_FILES# substitution string.

Do not specify anything to reference files which are stored with your application definition in the database.

For performance reasons you can also store your application files on your Web server or a Content Delivery Network (CDN). Use any valid URL to reference them. For example:

```
/myFiles/
https://www.example.com/myFiles/
```

Click Apply Changes.



## 16.10.2 Referencing Static Application Files

Reference a static application file in your application using #APP\_FILES# substitution string.

Static application files are only available to the currently selected application. To view sample syntax for uploaded images, see the Reference column on the Static Application Files report.



**About Using Substitution Strings** 

## 16.10.3 Creating Static Application Files

Create static application files from Shared Components.

To create a static application file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Files and Reports, select Static Application Files.
- 3. On Static Application Files page, click **Create File**.

The Create page appears.

- 4. On the Create page:
  - Directory Enter the name of the directory where the file should be stored. For example, css or css/images.

If no directory is specified, the file is stored in the root directory.

- b. File Name If creating a blank file (for example, script.js), enter the name of the file.
- c. Content If uploading a file, do one of the following:
  - Drag and drop the file to the Content region.
  - Click the Content region and select the file.
- d. Click Create or Create and Create Another.

## 16.10.4 Viewing the Static Application Files Report

View the Static Application Files report.

To view Static Application Files as a report:



- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

2. Under Files and Reports, select Static Application Files.

The Static Application Files page appears.

3. If not already selected, click View Report icon.

A report appears. To customize the report, use the Search bar at the top of the page.

The Static Application Files report includes the following columns: Name, Mime Type, Size, Reference, File, Updated, and Updated By.

- 4. To view or edit file details, click the file Name. On the Edit page:
  - a. Directory Enter the name of the directory where the file should be stored. For example, css or css/images.

If no directory is specified, the file is stored in the root directory.

- b. File Name Edit the name of the file.
- c. To save your changes, click **Save Changes**.

## 16.10.5 Downloading Static Application Files

Download an uploaded static application file, or download all static application files in a Zip.

- Downloading a Static Application File
   Learn how to download an uploaded static application file.
- Downloading All Static Application Files in a Zip Learn how to download all static application files in a zip.

### 16.10.5.1 Downloading a Static Application File

Learn how to download an uploaded static application file.

To download an uploaded static application file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, select Static Application Files.

The Static Application Files page appears.

3. If not already selected, click View Report icon.

A report appears. To customize the report, use the Search bar at the top of the page.

4. Locate the file to be downloaded and click the **Download** link.



#### 16.10.5.2 Downloading All Static Application Files in a Zip

Learn how to download all static application files in a zip.

To download all static application files in a Zip:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Files and Reports, select Static Application Files.

The Static Application Files page appears.

3. Click Download as Zip.

### 16.10.6 Deleting Static Application Files

Delete uploaded static application files.

- Deleting a Static Application File
   Delete an uploaded static application file on the Static Application Files, Edit page.
- Deleting Multiple or All Static Application Files
   Learn how to delete multiple or all static application files.

#### 16.10.6.1 Deleting a Static Application File

Delete an uploaded static application file on the Static Application Files, Edit page.

To delete an uploaded static application file:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, select Static Application Files.

The Static Application Files page appears.

3. If not already selected, click View Report icon.

A report appears. To customize the report, use the Search bar at the top of the page.

- 4. Click the name of the file to be deleted.
- 5. On the Edit page, click **Delete**.

### 16.10.6.2 Deleting Multiple or All Static Application Files

Learn how to delete multiple or all static application files.



To delete multiple files or all static application files:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, select Static Application Files.

The Static Application Files page appears.

- 3. To delete multiple files at once, select the files to be deleted and click **Delete Checked**.
- To delete all files, click Delete All.

# 16.11 Managing Static Workspace Files

Navigate to Shared Components to upload, view, download, and delete static workspace files (including images, CSS files, and other files which must be managed independently).

- About Referencing Static Workspace Files
   Reference a static workspace file in your application using #WORKSPACE\_FILES# substitution string.
- Creating Static Workspace Files
   Create static workspace files from Shared Components.
- Viewing the Static Workspace File Report View the Static Workspace Files report.
- Downloading Static Workspace Files
   Download an uploaded static workspace file, or download all static application files in a Zip.
- Deleting Static Workspace Files
   Delete uploaded static workspace files.

#### See Also:

- Managing Static Application Files
- About Managing Images

## 16.11.1 About Referencing Static Workspace Files

Reference a static workspace file in your application using  $\#WORKSPACE\_FILES\#$  substitution string.

You can reference static workspace files in any application in the current workspace. To view sample syntax for uploaded images, see the Reference column on the Static Workspace Files report.



See Also:

Using Built-in Substitution Strings

## 16.11.2 Creating Static Workspace Files

Create static workspace files from Shared Components.

To create a static workspace file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

2. Under Files and Reports, select Static Workspace Files.

The Static Workspace Files page appears.

- 3. To upload a file, click Create File.
- 4. On the Create page:
  - Directory Enter the name of the directory where the file should be stored. For example, css or css/images.

If no directory is specified, the file is stored in the root directory.

- b. File Name If creating a blank file (for example, script.js), enter the name of the file.
- c. Content If uploading a file, do one of the following:
  - Drag and drop the file to the Content region.
  - · Click the Content region and select the file.
- d. Click Create or Create and Create Another.

## 16.11.3 Viewing the Static Workspace File Report

View the Static Workspace Files report.

To view the static workspace file as a report:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

2. Under Files and Reports, select Static Workspace Files.

The Static Workspace Files page appears.



3. If not already selected, click View Report icon.

A report appears. To customize the report, use the Search bar at the top of the page.

The Static Application Files report includes the following columns: Name, Mime Type, Size, Reference, File, Updated, and Updated By.

- 4. To view or edit file details, click the file Name. On the Edit page:
  - a. Directory Enter the name of the directory where the file should be stored. For example, css or css/images.

If no directory is specified, the file is stored in the root directory.

- b. File Name Edit the name of the file.
- c. To save your changes, click Save Changes.

## 16.11.4 Downloading Static Workspace Files

Download an uploaded static workspace file, or download all static application files in a Zip.

- Downloading a Static Workspace File Learn how to download a static workspace file.
- Downloading All Static Workspace Files in a Zip Learn how to download all static workspace files in a Zip.

#### 16.11.4.1 Downloading a Static Workspace File

Learn how to download a static workspace file.

To download an uploaded static workspace file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, select Static Workspace Files.

The Static Workspace Files page appears.

- 3. If not already selected, click **View Report** icon.
  - A report appears.
- 4. Locate the file to be downloaded and click the **Download** link.

#### 16.11.4.2 Downloading All Static Workspace Files in a Zip

Learn how to download all static workspace files in a Zip.

To download all static workspace files in a Zip:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select an application.



c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, select Static Workspace Files.

The Static Workspace Files page appears.

3. Click Download as Zip.

# 16.11.5 Deleting Static Workspace Files

Delete uploaded static workspace files.

- Deleting a Static Workspace File Learn how to delete a static workspace file.
- Deleting Multiple or All Static Workspace Files
   Learn how to delete multiple or all static workspace files.

#### 16.11.5.1 Deleting a Static Workspace File

Learn how to delete a static workspace file.

To delete an uploaded static workspace file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Files and Reports, select Static Workspace Files.

The Static Workspace Files page appears.

3. If not already selected, click the View Report icon.

A report appears. To customize the report, use the Search bar at the top of the page.

- 4. Click the name of the file to be deleted.
- 5. On the Edit page, click **Delete**.

#### 16.11.5.2 Deleting Multiple or All Static Workspace Files

Learn how to delete multiple or all static workspace files.

To delete multiple files or all static workspace files:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, select Static Workspace Files.



The Static Workspace Files page appears.

- 3. To delete multiple files at once, select the files to be deleted and click **Delete Checked**.
- 4. To delete all files, click Delete All.

# 16.12 Managing Application Items

Application items do not display, but are used to maintain session state.

Application items can be set using computations, processes, or by passing values on a URL. Use **On New Instance** computations to set the value of items once for a session. Use application items to maintain session state that is not displayed and is not specific to any one page.

- Creating an Application Item
   Create a application item on the shared Shared Components page.
- Viewing Application Item Usage
   You can view a list of where application items are used by clicking the Utilization tab at
   the top of the Application Items page.
- Editing Application Item Attributes
   Once you create an application item, you can edit it on the Create/Edit Application Item page.
- About Creating an Application Item that Functions as a Global Variable
   You can create a global variable by creating an application item with the same name
   across all applications and setting the scope to Global.



- About the Differences Between Page Items and Application Items
- Referencing Item Values

## 16.12.1 Creating an Application Item

Create a application item on the shared Shared Components page.

To create an application item:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Application Logic, select **Application Items**.

The Application Items page appears.

To create an application item, click Create.

The Create/Edit page appears.



- 4. For Name:
  - a. Name Enter a name for the application item.
  - **b.** Scope Options include:
    - Global Select this option if the Oracle APEX session is shared by more than one application and the item's value should be the same for all applications.

Applications can share the same session if their authentications have the same Session Cookie Attributes. The Scope attribute of application items has to be the same across these applications.

- **Application** Select this option if the application does share session state with another application.
- 5. Security, Session State Protection Set session state protection for this item. Options include:
  - **Unrestricted** The item's session state may be set by passing the item name/ value in a URL or in a form. No checksum is required in the URL.

#### Note:

If you must set this item's value in session state using Ajax, then an Unrestricted protection level must be used for the item (for example in Dynamic Actions, Set Value, Page Items to Submit or Cascading LOVs, Page Items to Submit).

- Restricted May not be set from browser The item may not be altered
  using the URL or POSTDATA. Use this option when you want to restrict the
  way that the item value can be set to internal processes, computations, and so
  on. This attribute is only applicable only to items that cannot be used as data
  entry items and is always observed even if Session State Protection is
  disabled. This attribute may be used for application items or for page items
  with any of these Display As types:
  - Display Only (Save State=No)
  - Display Only (Save State=No)
  - Stop and Start Grid Layout (Displays label only)
- Checksum Required: Application Level The item's session state may be
  set by passing the item name/value in a URL if a checksum specific to the
  schema is provided. A user-level checksum or a session-level checksum will
  also suffice (see next bullets). Use this option when you want to allow the item
  to be set only by URLs having checksums that were generated by any user
  running the same application in the current workspace but in a different
  session.
- Checksum Required: User Level The item's session state may be set by passing the item name/value in a URL if a checksum specific to the workspace, application, and user is provided. A session-level checksum will also suffice (see next bullet). Use this option when you want to allow the item to be set only by URLs having checksums that were generated by the same named user, running the same application in the current workspace but in a different session.



- Checksum Required: Session Level The item's session state may be set by
  passing the item name/value in a URL if a checksum specific to the current session is
  provided. Use this option when you want to allow this item to be set only by URLs
  having checksums that were generated in the current session.
- 6. Security, Escape Special Characters Controls whether the application item's value is automatically escaped in substitutions (for exmple, when referencing the item using &ITEM. syntax.

To prevent Cross-Site Scripting (XSS) attacks, set Escape Special Characters to **On**. If you need to render HTML tags stored in the application item, you can set this flag to **Off**.

- Configuration, Build Option Select a build option for this component. Build options are predefined settings that determine whether components within an application are enabled.
- 8. Comments Enter any notes regarding this item.
- 9. Click Create Application Item.



About Creating an Application Item that Functions as a Global Variable

## 16.12.2 Viewing Application Item Usage

You can view a list of where application items are used by clicking the **Utilization** tab at the top of the Application Items page.

To view the Utilization report:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Application Logic, select **Application Items**.

The Application Items page appears.

3. Click the **Utilization** tab at the top of the page.

#### 16.12.3 Editing Application Item Attributes

Once you create an application item, you can edit it on the Create/Edit Application Item page.

To edit application item attributes:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.



The Shared Components page appears.

2. Under Application Logic, select **Application Items**.

The Application Items page appears.

3. Select an application item.

The Create/Edit page appears.

4. Edit the attributes.

To learn more about an attribute, see field-level Help

5. Click Apply Changes.

#### See Also:

- Viewing Field-level and Page Designer Help
- Understanding Cross-Site Scripting Protection

# 16.12.4 About Creating an Application Item that Functions as a Global Variable

You can create a global variable by creating an application item with the same name across all applications and setting the scope to Global.

Large applications are often separated into several physical applications that reside in the same workspace. These applications often share session state by configuring the same cookie name in each application.

Another requirement of this type of architecture is the need to share a few global variables. While the number global variables should be kept small, global variables function as an effective means to facilitate communicate between the applications. For example:

- Properties of the current user (such as email address, employee number, and so on).
- Current company in a multitenant application.

To create an application item that functions as a global variable:

- 1. Create an application item with the same name in each application to share session state.
- 2. For Scope, select Global.
- 3. For Security, Session State Protection, select **Restricted**.



Creating an Application Item



# 16.13 Printing a Report Region by Defining a Report Query

Print a report region by defining a report query.

- About Report Queries
   Learn about report queries.
- Creating a Report Query
   Create a report query in Shared Components.
- Editing a Report Query
   Edit a report query in Shared Components.
- Copying a Report Query
   Copy a report query in Shared Components.

## 16.13.1 About Report Queries

Learn about report queries.

You can print a report region by defining a report query as a Shared Component. A report query identifies the data to be extracted. Unlike SQL statements contained in regions, report queries contain SQL statements that are validated when you save the query. Note that report queries must be SQL statements, not functions returning SQL statements.

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

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

## 16.13.2 Creating a Report Query

Create a report query in Shared Components.

Note that the availability of the report query options depends on how your service administrator configures report printing for your instance. All options described in these steps may not be available to you.

To create a report query:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Files and Reports, click Report Queries.
- 3. Click Create.



- 4. Report Query Definition Specify the following:
  - a. Report Query Name Enter a name to identify the report query. When referencing a report query as a link target, the report query name is part of the request string.
  - b. Output Format Select the report output format. Valid options include:
    - PDF Adobe Portable Document Format.
    - Word Microsoft Word Rich Text Format.
    - Excel Microsoft Excel format. Note that this is not a true .xls file because the content is HTML-based.
    - HTML
    - XML Extensible Markup Language.
  - **c.** Item Select the item to hold the format value. You can use this item to determine the output format at runtime.
  - d. View File As Select how the web browser opens the report query document. Options include:
    - Attachment Displays a File Open/Save dialog box when the user clicks the report query download button.
    - Inline Displays the report query document inside the Browser window.
  - e. Session State Select this checkbox to reference session state values, such as the values of page items in the XML structure of your report.
  - f. Click Next.
- 5. Source Queries For SQL Query, .
  - a. SQL Query Enter a SQL statement to define the report query.
  - b. Set Bind Variables Click Set Bind Variables to be able to enter in values for each bind variable and test the query to ensure the expected output is returned.
  - c. Click Next.
- 6. Download Definition:
  - Data Source for Report Layout Use this option to download a report definition export file.



#### Tip:

The report query definition is what a developer would use as the source for tools like BI Publisher Desktop or Altova Stylevision to create the report layout. Some tools accept both an XML export of the data as well as an XML scheme definitions as source, other tools may only accept one or the other. If the source query does not return data at design time, then XML schema provides a way to export the definition without data.

#### Select XML Data or XML Schema and click Download.

XML Schema creates XSD file (that is, a XML schema definition of your XML structure.)



- b. Add Query Click this button to add another query to the report query. Adding another query enables the production of complex reports with more than one output component (for example, a chart and a report based on two different queries).
- **c.** Create Report Query Click this button to exit the wizard early. The Report Layout Source defaults to use the generic report layout.
- d. Click Next.
- 7. Upload Report Layout:
  - a. Report Layout Source Specify whether to use the generic built-in report layout or a custom report layout.
  - b. Layout Name Enter a layout name (optional). The default is the report query name.
  - c. Report Layout File Select the file to upload.
  - d. Click Next.
- 8. Confirm displays the following information:
  - a. Query Name Identifies the query.
  - **b.** Report Layout Identifies the report layout you selected.
  - c. Output Format Identifies the format for this report query.
  - d. Derive from Item Identifies the item to hold the format information.
  - e. URL Report queries can be integrated with an application by using the URL shown as the target for buttons, navigation list entries, list items, or any other type of link. Click into the URL field to copy & paste the URL.
  - f. Test Report Click this to preview your report. If you have chosen to use a generic report layout then the Test Report does not produce an output.
  - a. Click Create.

The Report Query is created and saved to Shared Components.



**About Report Printing** 

## 16.13.3 Editing a Report Query

Edit a report query in Shared Components.

To edit a report query:

- **1.** Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Files and Reports, click Report Queries.



- 3. Select the appropriate report query.
- 4. On the Edit page, edit the appropriate attributes.
- 5. Click Apply Changes.

### 16.13.4 Copying a Report Query

Copy a report query in Shared Components.

To copy a report query:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Files and Reports, click Report Queries.
- 3. On the Report Queries page, click Copy.
- On the Copy Report Query, select the query you want to copy, enter a name for the report query, and click Copy.

The copy appears in the query list.

# 16.14 Formatting a Report Region or Report Query Using Report Layouts

Create a report layout to format a report region or report layout.

- About Report Layouts
   Learn about report layouts.
- About Report Layout Options
   Learn about report layout options.
- Creating a Report Layout
   Create a report layout in Shared Components.
- Editing a Report Layout
   Edit a report layout in Shared Components.
- Copying a Report Layout
   Copy a report layout to edit and save.

#### 16.14.1 About Report Layouts

Learn about report layouts.

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

When creating and using report layouts, you can:



- Take advantage of the default layouts for report regions and generic layouts for report queries provided with Oracle APEX.
- Utilize the built-in XSL-FO-based layouts for report regions by copying and customizing the code. You can edit several attributes for report regions that control page size, fonts, colors, and so on.
- Create RTF or XSL-FO report layouts to customize the report look and feel. To use RTF report layouts, your APEX service administrator must select the Advanced setting for your site.



Interactive reports do not support a custom report layout.

#### See Also:

Configuring Report Printing in Oracle APEX Administration Guide

## 16.14.2 About Report Layout Options

Learn about report layout options.

You can create a report layout based on one of these options:

- Generic Columns A generic report layout works with most query result sets. With this
  layout, the number of columns is automatically adjusted when generating the printable
  document.
  - Many report layout attributes can be defined declaratively for report regions using the built-in XSL-FO default layout. This step allows for creating customizable copies of the built-in default XSL-FO layout, if additional control over the report layout is needed.
- Named Columns A named column report layout is a query-specific report layout
  designed to work with a defined list of columns in the query result set. This type of layout
  is used for custom-designed layouts when precise control of the positioning of page items
  and query columns is required.

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



Configuring Report Printing in Oracle APEX Administration Guide



### 16.14.3 Creating a Report Layout

Create a report layout in Shared Components.

To create a report layout:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Files and Reports, click Report Layouts.
- 3. Click Create.

The Create Report Layout wizard appears.

- 4. For Report Layout Type, select an option and click Next:
  - Generic Columns (XSL-FO) Uses the default template to populate the report. In the next step, you can customize the default code.
  - Named Columns (XSL-FO) Requires that you upload an XSL-FO or RTF file in the next step.
- **5.** For Layout Source, review and edit the appropriate information. The options that appear on this page depend on the layout type you select:
  - If you selected Generic Columns:
  - a. Report Layout Name Enter a name to identify the report layout when associating it with a report query or report region.
  - b. Report Layout The report layout is the XSL-FO based definition of the page formatting. All attributes defining page size, orientation, fonts, styles, and so on, are defined in this section.
  - **c.** Report Column Heading Defines the look of each cell in the report heading row.
  - d. Report Column Defines the look of each cell for all report rows.
  - e. Report Column Width This width is computed at runtime or can be derived from the report column definition of a report region.
    - If you selected Named Columns:
  - a. Layout Name Enter a name to identify the report layout when associating it with a report query or report region.
  - b. Report Layout File Upload the file containing the report layout.
- 6. Click Create Layout.



## 16.14.4 Editing a Report Layout

Edit a report layout in Shared Components.

You can edit a generic column report layout directly in Oracle APEX. However, to edit a named column report layout, you must download the current file, edit it, and then upload it again.

To edit a report layout:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Files and Reports, click Report Layouts.
- 3. On the Report Layouts page, select the layout you want to edit.
- 4. For generic column layouts, edit the layout directly on the Edit Report Layout page and click **Apply Changes**.
- 5. For named column layouts, click **Download** and save the file to your computer.

Edit the file and then upload the updated version as a new report layout.

#### 16.14.5 Copying a Report Layout

Copy a report layout to edit and save.

To copy a report layout:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Files and Reports, click Report Layouts.
- 3. On the Report Layouts page, click Copy.
- 4. On the Copy Report Layout page:
  - a. Copy Report Layout Select the layout you want to copy.
  - b. Report Layout Name Enter a name for the copy.
  - c. Click Copy.



# Managing Application Data

Learn how to manage application data such as adding data loading capability to applications, using collections to temporarily store information, using REST Enabled SQL references to execute SQL or PL/SQL defined at the component-level on a remote database, use REST Data Sources to manage external web services, store REST Data Source server information as a Remote Server object, and store authentication credentials using Web Credentials, manage legacy Web services, access data with database links, and utilize DML to update or delete rows of a table.

# Creating Applications with Data Loading Capability Create applications with data loading capability to enable end users to dynamically import data into a table within any schema to which the they have access.

About Using Collections

Use collections to temporarily capture one or more nonscalar values. Collections enable you to store rows and columns currently in session state so they can be accessed, manipulated, or processed during a user's specific session.

- Managing REST Enabled SQL References
   Execute SQL queries or PL/SQL defined at the component-level on a remote database using REST Enabled SQL references.
- Managing REST Data Sources
   REST Data Sources enable developers to access to REST services or generic JSON data feeds in applications.
- Managing Remote Servers
   Store REST Data Source server information as a Remote Server object.
- Managing Web Credentials
   Store authentication credentials for external REST services or REST Enabled SQL services.
- Accessing Data with Database Links
   Access data remotely by creating a database link.

# 17.1 Creating Applications with Data Loading Capability

Create applications with data loading capability to enable end users to dynamically import data into a table within any schema to which the they have access.

- About Creating a Page with Data Loading Capability
   Add data loading capability to an application by creating a Data Load Definition and then a Data Load page.
- Creating a Data Load Definition
   Create a Data Load Definition in Shared Components.
- Creating a Data Loading Page Using the Create Page Wizard
   If a Data Load Definition exists, run the Create Page Wizard to add a Data Loading page.

- Editing a Data Load Definition
   Edit a Data Load Definition in Shared Components.
- Example: Log Errors to a DML Error Log
   Edit the Data Load Definition so that errors are logged into a DML error log.

See Also:

Managing Applications with Legacy Data Loading Capability

# 17.1.1 About Creating a Page with Data Loading Capability

Add data loading capability to an application by creating a Data Load Definition and then a Data Load page.

A Data Load Definition is comprised of a Data Load Definition, Data Profile, and Data Profile Columns. Data can be loaded either to an existing table in your schema or to a collection. You can define SQL Expression, SQL Query, Lookups, or Transformation Rules for each data profile column. These definitions are used in the Native Data Loading page process type.

When you create a Data Load Definition, the wizard prompts you to add a Data Loading page in your application. However, if a Data Load definition exists, you can also add a Data Loading page later by running the Create Page Wizard. A Data Loading page consists of a single page with a Native Data Loading page process which enables users to upload data from a file or by copy and paste, preview the data, and then upload the data.

Key features of application new data loading include:

- New application data loading supports CSV, XLSX, XML, and JSON formats.
- Column mapping occurs at design time, removing the burden for end users.
- Flexible column mappings based on simple names or regular expressions.
- Data conversion with transformation rules or lookup queries.
- Easy work flow for end users: upload the file, verify the preview, and load data.
- CSV, XLSX, XML, and JSON data formats can be loaded to tables or collections.
- Configure data loading to Append, Merge or Replace data, with or without Error Handling.
- Simple new Process Type Data Loading: Customize Data Loading pages as you wish.
- APEX DATA LOADING PL/SQL API available for custom processing.
- Maximum number of columns to load is 300. Note that Legacy data load supports up to 45.



#### Note:

A Data Load Wizard is not designed or intended to load hundreds of thousands of rows of data. While it is possible to use a Data Load Wizard to load this high volume of data, you may encounter performance issues with both transmitting and loading large data files. Tools like Oracle SQL Developer and Oracle SQL\*Loader are better suited to loading large volumes of data.

#### **Supported Data Types**

New Data Load supported data types:

- VARCHAR2
- NUMBER
- DATE
- TIMESTAMP
- TIMESTAMP WITH LOCAL TIMEZONE
- TIMESTAMP WITH TIMEZONE
- CLOB



Creating a Legacy Data Load Page

# 17.1.2 Creating a Data Load Definition

Create a Data Load Definition in Shared Components.

When you create a Data Load Definition, the wizard prompts you to create a Data Loading page. You can also create it later by running the Create Page Wizard later as described in Creating a Data Loading Page Using the Create Page Wizard.

The Create Data Load definition wizard supports uploading of the following sample file formats: CSV, XLSX, XML or JSON. The uploaded file format is saved as data load definition data profile format. This format dictates the type of file end users can upload. For example, if you create a data load definition using a CSV sample file, only TXT or CSV file types can be uploaded from a page using the data load definition. Similarly, if you create a data load definition using a XLSX sample file, only XLSX file types can be uploaded from a page using the data load definition. The following task includes sample images in which the Data Load Definition is created on the EMP table using EMP .csv file.



You can load this sample table by installing the EMP/ DEPT Sample Dataset. See Using Sample Datasets in *Oracle APEX SQL Workshop Guide* 



#### To create a Data Load Definition:

- 1. Create a new application.
- 2. Navigate to the Data Load Definitions page:
  - a. On the Application home page, click **Shared Components**.
    - The Shared Components page appears.
  - b. Under Data Sources, click Data Load Definitions.
- Click Create.
- 4. On Method:
  - a. Create Data Load Select the method by which you would like to create the Data Load Definition. Options include: From Scratch and As a copy of an existing Data Load Definition.

This task assumes you select **From Scratch**.

- b. Click Next.
- 5. On Target:
  - a. Name Enter a name for the Data Load Definition.
  - **b.** Target Type Specify whether the data will be uploaded to a table or an APEX collection (for example, select **Table**).
  - **c.** Table Owner Specify the owner of the table to load data. If nothing is selected, the application parsing schema is used.
  - **d.** Table Name Select the table to which the data will be loaded (for example, select EMP).

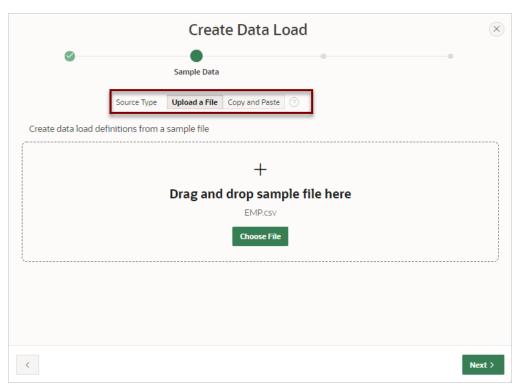
If entering the table name manually, the table name is case sensitive.

- e. Click Next.
- 6. On Sample Data:
  - Source Type Select how the sample data will be uploaded from a file. The Source Type you select determines what appears next.

Options include:

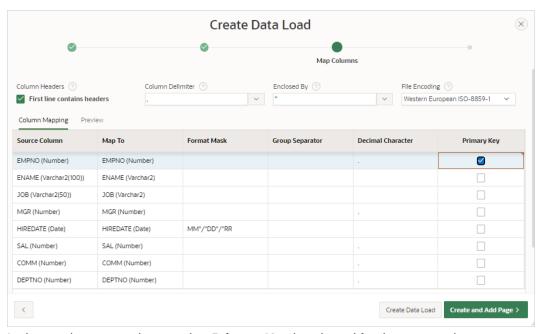
- If **Upload a File** Drag and drop or click Choose File to navigate to the file. Supported formats include CSV, XLSX, XML or JSON.
- If Copy and Paste Copy and paste delimited text data.





Note that  ${\tt EMP.csv}$  displays in the center of region indicating the  ${\tt EMP.csv}$  sample file has been uploaded.

- b. Click Next.
- 7. On Map Columns Column mapping is done automatically by matching the Sample Data columns with the table column. Accept the defaults.



In the previous example, note that **Primary Key** is selected for the EMPNO column.

Determine whether to create just the Data Load Definition or the Data Load Definition and the Data Load page. Click one of the following buttons:

- Create Data Load Creates just the Data Load Definition. If you select this
  option, you can create a Data Load page later by running the Create Page
  Wizard.
- Create and Add Page Creates the Data Load Definition and then prompts you to create the Data Load page.

This task assumes you select Create and Add Page.

#### 8. For Page Definition:

- a. Page Number Displays the page number which is an integer value that identifies a page within an application.
- **b.** Name Specify a text name for this page. This name is visible only during the application development process.
- c. Page Mode Identify the page mode. To learn more, see field-level Help.

#### 9. For Data Load Attributes:

- a. Data Load Select the data load definition to use.
- **b.** Upload Data From Select if application users will provide data by uploading files or by using copy and paste of delimited text data.
- **c.** Maximum File Size ( MB ) Enter the maximum file size (in MB) that should be accepted for the file upload.

#### 10. For Navigation:

- a. Breadcrumb Select whether you want to use a breadcrumb navigation control on your page and which breadcrumb navigation control you want to use.
- **b.** Select how you want this page integrated into the Navigation Menu. To learn more, see field-level Help.

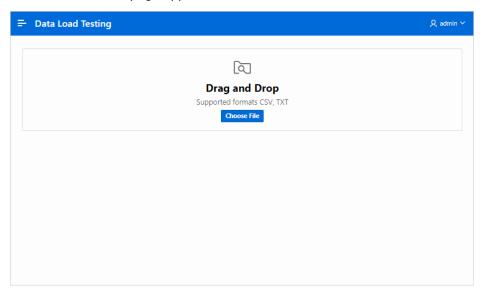
#### 11. Click Create Page.

Page Designer appears displaying the new page.

#### **12.** Test the new page:

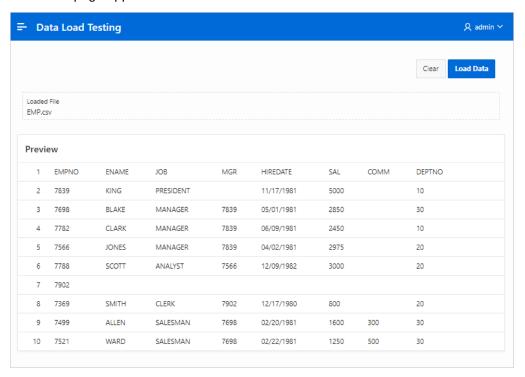
a. Click Save and Run Page.

The new Data Load page appears.





Upload a sample file. Drag and Drop a file or click Choose File.
 A Preview page appears.



c. Click Load Data. The sample data is loaded into the target table with Merge loading method.



# 17.1.3 Creating a Data Loading Page Using the Create Page Wizard

If a Data Load Definition exists, run the Create Page Wizard to add a Data Loading page.

When you create a Data Load Definition, the wizard prompts you create Data Loading page. You can also create it later by running the Create Page Wizard.

The Create Page Wizard creates a single page with a Native Data Loading page process to provide the ability to upload data from a file or copy and paste. The copy and paste option is available only if selected data load definition data profile format is CSV. The type of file users can upload depends on the data load definition data profile format.

To create a Data Loading page by running the Create Page Wizard:

- 1. Create a Data Load Definition as described in Creating a Data Load Definition.
- Run the Create Page Wizard:
  - a. On the Workspace home page, click the App Builder icon.
  - **b.** Select the application.
  - c. Click Create Page.



Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 3. Under Component, select **Data Loading**.
- 4. Page Definition:
  - **a.** Page Number Displays the page number which is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page. This name is visible only during the application development process.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 5. Data Load Attributes:
  - a. Data Load Select the data load definition to use.
  - **b.** Upload Data From Select if application users will provide data by uploading files or by using copy and paste of delimited text data.
  - c. Maximum File Size (MB) Enter the maximum file size (in MB) that should be accepted for the file upload.
- 6. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 7. Click Create Page.

Page Designer appears displaying the new page.

- 8. Test the new page:
  - a. Click Save and Run Page.

The new Data Load page appears.

- b. Upload a sample file. Drag and Drop a file or click **Choose File**.
  - A Preview page appears.
- Click Load Data. The sample data is loaded into the target table with Merge loading method.

# 17.1.4 Editing a Data Load Definition

Edit a Data Load Definition in Shared Components.

A Data Load Definition is comprised of a target data load table, loading method, error handling attributes, and data profile.

#### To edit a Data Load Definition:

- 1. Select the application associated with the Data Load Definition.
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select the application.
- 2. Navigate to the Data Load Definitions page:
  - a. On the Application home page, click Shared Components.
     The Shared Components page appears.
  - b. Under Data Sources, click Data Load Definitions.
- 3. Click the Data Load Definition you want to edit.

The Data Load Definition Details page appears.

- 4. For Data Load:
  - a. Name Defines the name for the data load definition.
  - b. Static ID Use the Static ID to reference the Data Load definition in API Calls.
- 5. For Target:
  - a. Target Type Select whether data is to be loaded into a table or an APEX collection.
  - b. Table Owner Defines the owner of the table into which the data is loaded.
  - c. Table Name Defines the name of the table into which the data is loaded.
- For Settings:
  - a. Loading Method Specifies the loading method to use. Options include:
    - Append Append rows to the table or collection. If one or more primary key
      columns are defined in the Data Profile, existing rows are not changed and new
      rows are appended. If the data profile has no primary key definition, all rows will
      be simply appended.
    - Merge Merge rows into the table. To use this option, the data profile must have a Primary Key defined. If a row for the given primary key value exists, the row is updated. Otherwise the row will be created. This option is only available for loading data into tables.
    - Replace Existing data in the target table or collection is removed before new data is loaded.
  - b. Commit Interval Specify the commit interval to use during data load. If no commit interval is specified, the whole data load is one transaction, with a commit after the last row. If an interval is specified, APEX commits each time after the specified amount of rows have been processed.
- 7. For Error Handling:
  - When on Error Specify how to handle errors during data load. Options include:
    - Ignore The error rows are silently ignored and Data Loading simply continues.
    - Stop Data loading stops on the first error and raises an error message.
    - Log Error into Collection Error rows are logged into an APEX collection.
    - Log into Error Log Error rows are logged into a DML error logging table using the DML Error Logging database functionality. This is only available when loading into a table and only if the Append method is used without a primary key.



8. Data Profile - Displays the Data Profile format and number of columns. Click **Edit Profile** to view and edit the Data Profile.

Data Profiles describe how Data Source format are being parsed and converted to rows and columns. For XML or JSON data format, the Row Selector attribute stores an XML or JSON path expression pointing to the node containing the collection of rows. Data Profile Columns determine how one row is parsed and converted to multiple columns.

- 9. Subscription Lists the Data Load Definitions that subscribe to this definition.
- **10.** Comments Add comments that describe this Data Load Definition. Comments only display within App Builder and never display when running the application.
- 11. Click Apply Changes.

### 17.1.5 Example: Log Errors to a DML Error Log

Edit the Data Load Definition so that errors are logged into a DML error log.

The following example demonstrates how to edit a Data Load Definition that loads data into the EMP table. If the data load fails, errors are logged into a DML error log named ERR\$ EMP.

To edit the Data Load Definition and log errors are logged into a DML error log:

Create a DML error log:

- 1. Create a DML error log table in SQL commands:
  - a. On the Workspace home page, click SQL Workshop and then SQL Commands.
  - b. In the Command Editor, enter the SQL command to create a DML error log named ERR\$ EMP. For example:

```
begin
   dbms_errlog.create_error_log( dml_table_name => 'EMP' );
end;
```

c. Click Run (Ctrl+Enter) to execute the command.

The results appear in the Results pane.



#### Tip:

The table ERR\$ EMP now appears in Object Browser.

Edit the Data Load Definition and change the Loading Method and define the Error Handling:

- 2. Navigate to the Data Load Definitions page:
  - a. Select the application associated with the Data Load Definition.
  - b. On the Application home page, click **Shared Components**.
    - The Shared Components page appears.
  - c. Under Data Sources, click Data Load Definitions.



3. Click the Data Load Definition you want to edit.

Data Load Definition Details page appears.

- 4. Change the Loading Method and specify the Error Handling:
  - a. Settings, Loading Method Click Replace.
  - b. Error Handling, When on Error Select Log into Error Log.
  - c. Error Handling, Error Logging Table Select the DML error log table (for example, ERR\$ EMP (TABLE).
  - d. Click Apply Changes.

Create another Data Loading page:

- 5. Run the Create Page Wizard:
  - a. Click **Edit Page X** in the toolbar in the header region (where **X** represents the page number).

Page Designer appears.

b. Select the **Create** menu in the Page Designer toolbar and select **Page**.

The Create Page Wizard appears.

- 6. On Create a Page, select Data Loading.
- 7. For Page Definition:
  - Page Number Displays the page number which is an integer value that identifies a
    page within an application.
  - **b.** Name Specify a text name for this page. This name is visible only during the application development process.
  - c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 8. For Data Load Attributes:
  - a. Data Load Select the data load definition you edited previously.
  - **b.** Upload Data From Select if users will provide data by uploading a file, or by using copy and paste of delimited text data. For this example, select **File**.
  - c. Maximum File Size ( MB ) Enter the maximum file size (in MB) that should be accepted for the file upload.
- 9. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - **a.** Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 10. Click Create Page.

Page Designer appears displaying the new page.

- **11.** Test the new page:
  - a. Click Save and Run Page.

The new Data Load page appears.

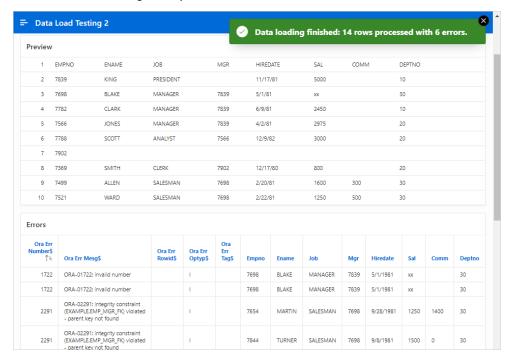


b. Upload a sample file that fails loading to see the error log report. For example, load string value for the SAL column where a NUMBER column type is expected. Drag and drop a file, or click Choose File.

A Preview page appears.

c. Click Load Data.

An error message appears and the errors display at the bottom of the page as shown in the following example.



# 17.2 About Using Collections

Use collections to temporarily capture one or more nonscalar values. Collections enable you to store rows and columns currently in session state so they can be accessed, manipulated, or processed during a user's specific session.

Think of a collection as a bucket in which you temporarily store and name rows of information.

The following are examples of when you might use collections:

- When you are creating a data-entry wizard in which multiple rows of information first need to be collected within a logical transaction. You can use collections to temporarily store the contents of the multiple rows of information, before performing the final step in the wizard when both the physical and logical transactions are completed.
- When your application includes an update page on which a user updates multiple detail rows on one page. The user can make many updates, apply these updates to a collection and then call a final process to apply the changes to the database.
- When you are building a wizard where you are collecting an arbitrary number of attributes. At the end of the wizard, the user then performs a task that takes the information temporarily stored in the collection and applies it to the database.



You insert, update, and delete collection information using the PL/SQL API APEX COLLECTION.

#### See Also:

- APEX\_COLLECTION in Oracle APEX API Reference
- To view an example, install the sample app, *Sample Collections*. To learn more, see Installing Apps from the Gallery.

# 17.3 Managing REST Enabled SQL References

Execute SQL queries or PL/SQL defined at the component-level on a remote database using REST Enabled SQL references.

- Understanding REST Enabled SQL Service References
   Create REST Enabled SQL Service references to execute SQL or PL/SQL defined on a remote database.
- Before You Begin: REST Enabled SQL Service Requirements
   Prior to creating a REST enabled SQL reference, developers must complete these requirements.
- Creating a REST Enabled SQL Service Reference
   Create REST Enabled SQL service references on the REST Enabled SQL page.
- Example: Creating a REST Enabled SQL Service Reference
   Review an example of creating REST Enabled SQL service reference on a remote database.
- Editing a REST Enabled SQL Service Reference
   Edit existing REST Enabled SQL references on the Edit page.
- Deleting a REST Enabled SQL Service Reference
   Delete REST Enabled SQL references on the Edit page by clicking Delete.
- Creating or Updating Components to Use a REST Enabled SQL
   Create or update reports (classic reports, interactive reports, interactive grids, List View
   report, Toggle Column reports, and Reflow Reports), forms, CSS calendars, JET charts,
   and Tree regions to point to data on a remote database using a REST Enabled SQL
   reference.

### 17.3.1 Understanding REST Enabled SQL Service References

Create REST Enabled SQL Service references to execute SQL or PL/SQL defined on a remote database.

- About REST Enabled SQL Service References
   Use REST Enabled SQL Service references to execute SQL or PL/SQL defined on a
   remote database.
- REST Enabled SQL Service Reference Requirements
   Review the minimum requirements for using REST Enabled SQL Service references.
- Differences between REST Enabled SQL Service References and Database Links Learn how REST Enabled SQL Service references differ from database links.

Exporting and Importing REST Enabled SQL Services
 Create REST Enabled SQL Service references to execute SQL or PL/SQL defined on a remote Oracle database.

### 17.3.1.1 About REST Enabled SQL Service References

Use REST Enabled SQL Service references to execute SQL or PL/SQL defined on a remote database.

Oracle APEX installations that meet the minimum Oracle REST Data Services (ORDS) requirements can execute any SQL or PL/SQL through a REST endpoint.

Developers create REST Enabled SQL references by defining a name, the endpoint URL, and authentication information within Shared Components. APEX passes the SQL or PL/SQL query to ORDS over REST, and a self-describing JSON response is returned. The JSON object contains result set meta data, the result data, and pagination details.

Because REST Enabled SQL services are stored at the workspace-level within APEX components, they are available to all applications within a workspace. Developers can utilize REST Enabled SQL references for interactive reports, interactive grids, classic reports, forms, master detail forms, calendars, JET charts, trees, and PL/SQL processes. References can also be used with Calendars, JET Charts, Trees, and PL/SQL processes.

### 17.3.1.2 REST Enabled SQL Service Reference Requirements

Review the minimum requirements for using REST Enabled SQL Service references.

Requirements for using REST Enabled SQL Service references include:

- A remote Oracle Database that includes Oracle REST Data Services (ORDS) 20.x or later on the front-end.
- A remote MySQL Database that includes Oracle REST Data Services (ORDS)
   22.1 or later on the front-end.
  - See Using the REST Enabled SQL Service with MySQL Database in *Oracle REST Data Services Installation and Configuration Guide* and REST Enabled SQL Service and MySQL Database in *Oracle REST Data Services Developer's Guide*.
- An administrator must enable RESTful Services either at the workspace or instance-level as described in Enabling RESTful Services and Defining a Path Prefix for a Workspace and Enabling RESTful Services for an Instance in Oracle APEX Administration Guide.

# 17.3.1.3 Differences between REST Enabled SQL Service References and Database Links

Learn how REST Enabled SQL Service references differ from database links.

Both REST Enabled SQL Service references and database links enable developers to access data remotely. However, these features access remote data differently. Key differences between database links and REST Enabled SQL Service references include:

Database Link



- Functions at the SQL-level which enables developers to use remote tables and local tables in the same SQL query.
- Works over SQL\*Net, which can be problematic when connecting to a Cloud instance over the internet.

#### REST Enabled SQL Service References

- Functions at the workspace-level. Developers can create an APEX component with a query on a REST enabled SQL Service but cannot join it to a local table.
- Works with JSON over HTTP(s) which makes it easy-to-use it in Cloud environments or over the internet.

Both Database Links and REST Enabled SQL fetch data over the network which is significantly slower than fetching data from a table in the local database. When evaluating the best approach for your environment, be sure to evaluate the impact on page view performance and always consider replicating remote data in local tables, with an appropriate refresh algorithm.

### 17.3.1.4 Exporting and Importing REST Enabled SQL Services

Create REST Enabled SQL Service references to execute SQL or PL/SQL defined on a remote Oracle database.

When you export an application, used REST Enabled SQL references are added to the export file. If you export an application and import it into another workspace, APEX checks whether the target workspace already contains REST Enabled SQL references with the same static ID. If a REST Enabled SQL reference already exists, the application uses the existing reference. If the reference does not exist, it is created in the target workspace.

### 17.3.2 Before You Begin: REST Enabled SQL Service Requirements

Prior to creating a REST enabled SQL reference, developers must complete these requirements.

Complete the following requirements before creating REST enabled SQL reference:

- 1. Set up a remote Oracle database.
- 2. On the remote Oracle database, install Oracle REST Data Services (ORDS) 20.x or later.



#### Tip:

This ORDS installation is completely independent from the Oracle REST Data Services used as the Oracle APEX web server

- 3. Configure and enable the REST Enabled SQL service feature. See Installing and Configuring Oracle REST Data Services in Oracle REST Data Services Installation and Configuration Guide.
- 4. Activate REST Enabled SQL for the target schema on the remote database to be accessed by running ORDS.ENABLE SCHEMA.



Log in to the database schema to be enabled for REST Enabled SQL and execute the following:

```
begin
    ords.enable_schema;
end;
/
commit
/
```

The REST Enabled SQL service is then available with a URL in the following format:

http://host:port/ords/schema

#### Where:

- host is the name of the system where Oracle REST Data Services is installed.
- *port* is the port number assigned when configuring Oracle REST Data Services. In a default installation, this number is 8080.
- ords is the service name defined when configuring Oracle REST Data Services.
- schema is the target schema.



#### Tip:

When providing the URL for the target schema in APEX, do not append  $/\_/$   ${\tt sql}$  ; .

You will use a URL using the above format when creating the REST Enabled SQL service reference in APEX.

For example, the following is a REST Enabled SQL service for the  $scott_obe$  schema with ORDS running in standalone mode:

http://server.example.com:8080/ords/scott obe

# 17.3.3 Creating a REST Enabled SQL Service Reference

Create REST Enabled SQL service references on the REST Enabled SQL page.



#### Tip:

Before creating a REST enabled SQL reference, developers must complete the requirements described in Before You Begin: REST Enabled SQL Service Requirements.

To create a REST Enabled SQL service reference:

- Navigate to the REST Enabled SQL page:
  - a. On the Workspace home page, click **App Builder**.



- **b.** Select a existing application.
- c. On the Application home page, click **Shared Components** in the center of the page.
- d. Under Data Sources, select **REST Enabled SQL**.



#### Tip:

You can also access the REST Enabled SQL page from Workspace Utilities. From the App Builder home page, before selecting an application, click **Workspace Utilities** and then **REST Enabled SQL Services**.

- 2. On the REST Enabled SQL page, click Create.
- 3. On General, specify:
  - a. Name Enter a descriptive name for this REST Enabled SQL service.
  - b. Endpoint URL Enter the base URL for this REST Enabled SQL service.



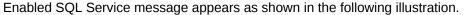
#### Tip:

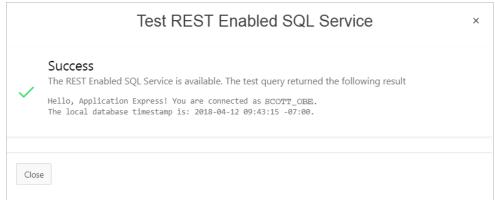
The URL must be in the format http://host:port/ords/schema. You obtain the URL by enabling the target schema on the remote database to be accessed by running ORDS.ENABLE\_SCHEMA. To learn more, see Before You Begin: REST Enabled SQL Service Requirements.

- c. Click Next.
- 4. For Authentication, specify the appropriate credentials:
  - a. Credentials Select an existing credential to authenticate against, or select Enter new and complete the remaining steps.
  - **b.** Credential Name Enter a descriptive name for the credentials.
  - Authentication Type Specify the Authentication type. Select either Basic Authentication or OAuth2 Client.
  - d. Client ID:
    - For **Basic Authentication**, enter the database user name. User names for Basic Authentication are converted to upper case. To include a case-sensitive user name, prefix it with the exclamation mark (!).
    - For OAuth2, enter the client ID. This information will not be encrypted.
  - e. Client Secret Enter the password, or OAuth2 Client Secret. This information is stored encrypted and cannot be retrieved in clear text.
  - f. Verify Client Secret Enter the password or client secret again to verify your input. When the two values are not identical, an error message displays.
- 5. Click Create.

APEX tests the REST Enabled SQL service. If everything has been done correctly (that is, you have included the correct URL, schema name, and password), the Test REST







#### 6. Click Close.

The REST Enabled SQL service appears on the REST Enabled SQL page.

# 17.3.4 Example: Creating a REST Enabled SQL Service Reference

Review an example of creating REST Enabled SQL service reference on a remote database.

The following example builds a fictional REST Enabled SQL service reference named SCOTT\_OBE Example using the Base URL http://server.example.com:8080/ords/scott\_obe.



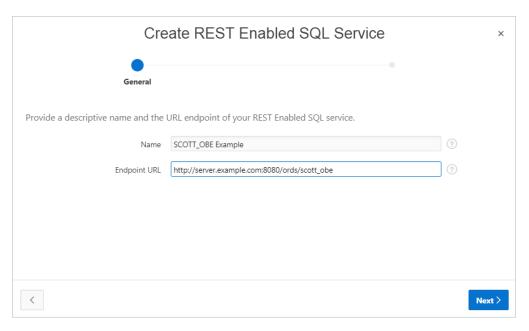
#### Tip:

Before creating a REST enabled SQL reference, developers must complete the requirements described in Before You Begin: REST Enabled SQL Service Requirements.

To create a REST Enabled SQL service reference:

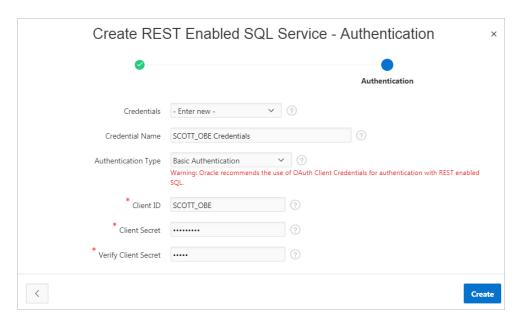
- 1. Navigate to the REST Enabled SQL page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources (bottom left of the page) select REST Enabled SQL.
- 2. On the REST Enabled SQL page, click **Create**.
- 3. On General, specify:
  - a. Name Enter a descriptive name for this REST Enabled SQL service. For example: SCOTT OBE Example.
  - b. Endpoint URL Enter the base URL for this REST Enabled SQL service. For example: http://server.example.com:8080/ords/scott obe





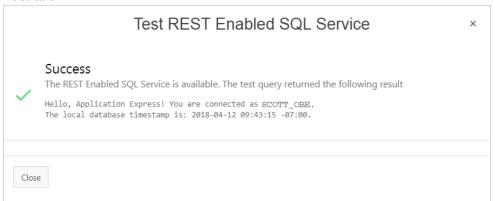
- c. Click Next.
- 4. For Authentication, specify the appropriate credentials:
  - **a.** Credentials Select an existing credential to authenticate against. For example: To create new credentials, select **Enter New**.
  - **b.** Credential Name Enter a descriptive name for the credentials. For example: SCOTT OBE Credentials.
  - Authentication Type Specify the Authentication type. For example: Basic Authentication.
  - d. Client ID Enter the database user name. For example: SCOTT OBE.
    - User names for Basic Authentication are converted to upper case. To include a case-sensitive user name, prefix it with the exclamation mark (!).
  - e. Client Secret Enter the database user name.
  - f. Verify Client Secret Enter the password.





#### 5. Click Create.

APEX tests the REST Enabled SQL service. If everything has been done correctly (that is, you have included the correct URL, schema name, and password), the Test REST Enabled SQL Service message appears as shown in the following illustration.



#### 6. Click Close.

The REST Enabled SQL service appears on the REST Enabled SQL page.

## 17.3.5 Editing a REST Enabled SQL Service Reference

Edit existing REST Enabled SQL references on the Edit page.

To edit a REST Enabled SQL service:

- Navigate to the REST Enabled SQL page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select a existing application.
  - **c.** On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select REST Enabled SQL.

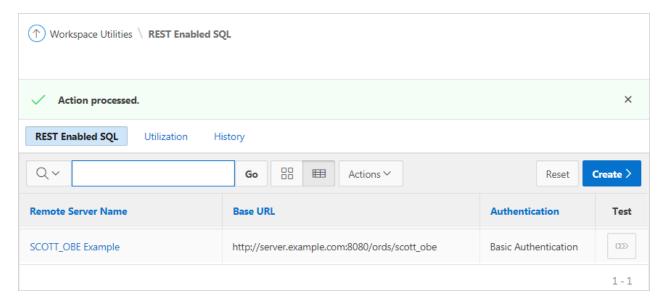




#### Tip:

You can also access the REST Enabled SQL page from Workspace Utilities. From the App Builder home page, before selecting an application, click **Workspace Utilities** and then **REST Enabled SQL Services**.

The REST Enabled SQL page appears listing the Remote Server Name, Base URL, and Authentication.



2. Click the remote server name.

The Edit page appears. Edit the attributes.

- 3. REST Enabled SQL attributes:
  - a. Name Enter a descriptive name for this REST Enabled SQL service.
  - b. Endpoint URL Enter the base URL for this REST Enabled SQL service.
  - **c.** Prompt on Install Choose whether prompts for this REST Enabled SQL service should display when the application is being imported on another APEX instance.
  - **d.** Authentication Required Choose whether this REST Enabled SQL aervice requires authentication.
  - e. Credential Select the credential to authenticate against.



#### Tip:

To edit credentials, go to **Shared Components**, **Credentials**.

- 4. Session attributes:
  - a. Initialization Code Enter code to be executed immediately after connecting to the REST Enabled SQL service and before the component SQL is being executed.
  - **b.** Cleanup Code Enter code to be executed immediately after the component SQL is being executed.

#### 5. Advanced attributes:

- a. Static ID Use the Static ID to reference the Remote Server in API Calls. Static IDs are also used to identify an existing Remote Server when the application is being exported and imported to another workspace.
- b. Server Time Zone Time Zone which the REST Enabled SQL service uses to decode DATE and TIMESTAMP values. This value is updated each time you click Save and Test.
- 6. Click Apply Changes or Save and Test.



**Managing Web Credentials** 

### 17.3.6 Deleting a REST Enabled SQL Service Reference

Delete REST Enabled SQL references on the Edit page by clicking **Delete**.

You cannot delete a REST Enabled SQL reference if it is being used by an APEX component.

To edit a REST Enabled SQL service:

- 1. Navigate to the REST Enabled SQL page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select a existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select REST Enabled SQL.

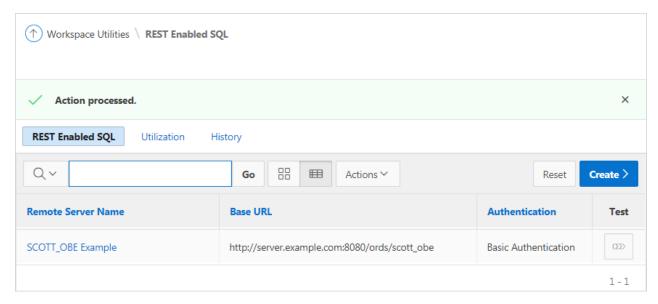


#### Tip:

You can also access the REST Enabled SQL page from Workspace Utilities. From the App Builder home page, before selecting an application, click **Workspace Utilities** and then **REST Enabled SQL Services**.

The REST Enabled SQL page appears listing the Remote Server Name, Base URL, and Authentication.





2. Click the remote server name.

The Edit page appears.

3. Click **Delete**.

### 17.3.7 Creating or Updating Components to Use a REST Enabled SQL

Create or update reports (classic reports, interactive reports, interactive grids, List View report, Toggle Column reports, and Reflow Reports), forms, CSS calendars, JET charts, and Tree regions to point to data on a remote database using a REST Enabled SQL reference.

- Creating a Report Using a REST Enabled SQL Reference
   Create a report on a remote database using a REST Enabled SQL reference.
- Creating a Chart Using a REST Enabled SQL Reference
   Create a chart on a remote database using a REST Enabled SQL reference.
- Creating a Calendar Using a REST Enabled SQL Reference
   Create a calendar on a remote database using a REST Enabled SQL reference.
- Specifying a REST Enabled SQL Reference in an Existing Component
   Configure existing components to point to a remote database using a REST Enabled
   SQL service reference.

### 17.3.7.1 Creating a Report Using a REST Enabled SQL Reference

Create a report on a remote database using a REST Enabled SQL reference.

The following example demonstrates how to create an interactive report based on a table using a REST Enabled SQL reference. The procedures for creating other report types is similar.





#### Tip:

Before creating a report using a using a REST Enabled SQL reference, you must complete the tasks described in Before You Begin: REST Enabled SQL Service Requirements and create the reference as described in Creating a REST Enabled SQL Service Reference.

To create an interactive report using a REST Enabled SQL reference:

- Create a REST Enabled SQL reference.
- 2. Run the Create Page Wizard:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- Under Component, select Interactive Report.
- Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page Title. After page creation, you can modify the Title in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- d. Include Form Page Enable this flag to create a form page along with the report page.

Form pages are always created as Modal Dialog pages. Enabling this flag displays additional attributes. To learn more about an attribute, see field-level Help.

- 5. Under Data Source:
  - a. Data Source Select REST Enabled SQL Service.
  - **b.** REST Enabled SQL Service Select a previously defined reference.
  - c. Source Type Specify the source of the new page. The UI changes based on your selection. Options include:
    - Table:
      - Table /View Owner Select the owner of the table on which you are building the page.
      - Table/View Name Select the table or view on which the page will be based.



#### SQL Query:

- Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- **d.** Select Columns Select one or more columns to be included in the region. Selected columns will display in the report.
- 6. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - **a.** Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- Click Create Page.
- 8. Click Save and Run Page to view the chart.

### 17.3.7.2 Creating a Chart Using a REST Enabled SQL Reference

Create a chart on a remote database using a REST Enabled SQL reference.



#### Tip:

Before creating a report using a using a REST Enabled SQL reference, you must complete the tasks described in Before You Begin: REST Enabled SQL Service Requirements and create the reference as described in Creating a REST Enabled SQL Service Reference.

To create a chart using a REST Enabled SQL reference:

- 1. Create a REST Enabled SQL reference.
- 2. Run the Create Page Wizard:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Create Page**.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 3. Under Component, select Chart.
- 4. Select a chart type (for example, Pie).
- Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - b. Name Specify a text name for this page.





#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 6. Under Data Source:
  - a. Data Source Select REST Enabled SQL Service.
  - **b.** REST Enabled SQL Service Select a previously defined reference.
  - **c.** Source Type Specify the source of the new page. The UI changes based on your selection. Options include:
    - Table:
      - Table /View Owner Select the owner of the table on which you are building the page.
      - Table/View Name Select the table or view on which the page will be based.
    - SQL Query:
      - Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- 7. Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see field-level Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 8. Click Next.
- **9.** Edit the chart attributes. The options that display vary depending upon the chart type selected. To learn more about an attribute, click the field-level Help.
- 10. Click Create Page.
- 11. Click Save and Run Page to view the chart.



#### See Also:

**Creating Charts** 



### 17.3.7.3 Creating a Calendar Using a REST Enabled SQL Reference

Create a calendar on a remote database using a REST Enabled SQL reference.



#### Tip:

Before creating a report using a using a REST Enabled SQL reference, you must complete the tasks described in Before You Begin: REST Enabled SQL Service Requirements and create the reference as described in Creating a REST Enabled SQL Service Reference.

To create a calendar using a REST Enabled SQL reference:

- 1. Create a REST Enabled SQL reference.
- 2. Run the Create Page Wizard:
  - a. Navigate to the Workspace home page.
  - b. Click the App Builder icon.
  - c. Select an application.
  - d. On the Application home page, click **Create Page**.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 3. Under Component, select Calendar.
- 4. Under Page Definition:
  - a. Page Number The page number is an integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page.



#### Tip:

This text is also used for page **Title**. After page creation, you can modify the **Title** in Page Designer.

- c. Page Mode Identify the page mode. To learn more, see field-level Help.
- 5. Under Data Source:
  - a. Select how you want this page integrated into the Navigation Menu. To learn more, see field-level Help.
  - b. Click Next.
- 6. On Source:
  - a. Data Source Select REST Enabled SQL Service.
  - b. REST Enabled SQL Service Select a previously defined reference.
  - c. Source Type Specify the source of the new page. The UI changes based on your selection. Options include:



#### Table:

- Table /View Owner Select the owner of the table on which you are building the page.
- Table/View Name Select the table or view on which the page will be based.

#### SQL Query:

- Enter a SQL SELECT statement Enter the SQL query. To see an example, expand the SQL Query Example region.
- Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see fieldlevel Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- 8. Click Next.
- Edit the calendar attributes:
  - Display Column Select the column which holds the text displayed for events on this calendar.
  - **b.** Start Date Column Select the column which holds the start date for events displayed on this calendar.
  - c. End Date Column Select the column which holds the end date for events displayed on this calendar. If **End Date** is specified, then the calendar displays duration based events.
  - d. Show Time Select Yes to show the time portion for events and also enable the Weekly and Daily calendar views. Select No to only show the dates for events.
- 10. Click Create Page.
- 11. Click Save and Run Page to view the chart.

See Also:

**Creating Calendars** 

### 17.3.7.4 Specifying a REST Enabled SQL Reference in an Existing Component

Configure existing components to point to a remote database using a REST Enabled SQL service reference.

Before configuring a component to use a REST Enabled SQL service reference, , you must complete the tasks described in Before You Begin: REST Enabled SQL Service Requirements and create the reference as described in Creating a REST Enabled SQL Service Reference.



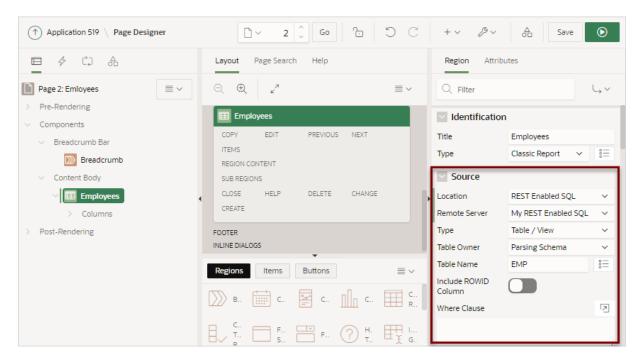
To configure existing components to point to a remote database using a REST Enabled SQL service reference:

- 1. View the page containing the components to be reconfigured in Page Designer:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In Page Designer, select the region containing the component (if not already selected) and edit the Source attributes.
- **3.** To specify a remote database for a report:
  - a. In the Rendering tab (left pane), select the region (for example, Classic Report).
  - b. In the Property Editor under Source, edit the following:
    - Location Select REST Enabled SQL.
    - Remote Server Select the defined REST Enabled SQL Service reference (for example, My REST Enabled SQL.
    - Type Select how the data is queried. Select Table/View or SQL Query.
    - Configure the table or provide a SQL Query.
    - Configure the remaining attributes as needed.

In the following example, **Classic Report** is selected and the Source points to a Remote Server called **My REST Enabled SQL**.

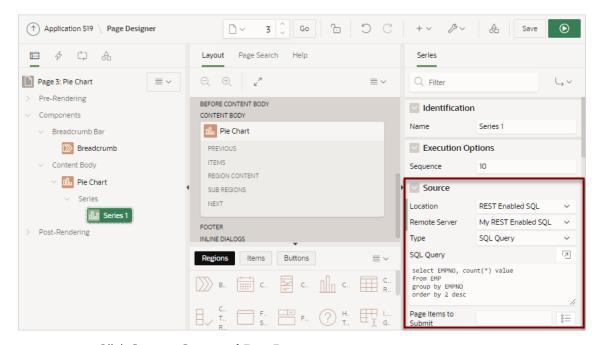


- 4. To specify a remote database for chart:
  - In the Rendering tab (left pane), find and expand the region containing the chart.
  - b. Expand **Series** and select the Series that defines the chart.



- c. In the Property Editor under Source, edit the following:
  - Location Select REST Enabled SQL.
  - Remote Server Select the defined REST Enabled SQL Service reference (for example, My REST Enabled SQL.
  - Type Select how the data is queried. Select Table/View or SQL Query.
  - Configure the table or provide a SQL Query.
  - Configure the remaining attributes as needed.

In the following example, **Series 1** is selected and the Source points to a Remote Server called **My REST Enabled SQL**.



5. Click Save or Save and Run Page.

# 17.4 Managing REST Data Sources

REST Data Sources enable developers to access to REST services or generic JSON data feeds in applications.

- Understanding REST Data Sources
  - REST Data Sources enable developers to access to Representational State Transfer (REST) services or generic JSON data feeds in applications and use the data in Oracle APEX components.
- Creating a REST Data Source
   Create a REST Data Source from Shared Components.
- Editing or Deleting a REST Data Source
   Edit or delete a REST Data Source from Shared Components.
- Copying a REST Data Source
   Copy a REST Data Source by selecting Copy on the REST Data Sources page.



#### Managing REST Source Catalogs

Create a catalog of REST Data Source metadata that can be used by all applications in a workspace to create REST Data Sources.

#### Managing Data Synchronization

Enable Data Synchronization to keep the contents of a local table automatically in sync with the data from a REST service.

- Viewing REST Data Source Utilization
   View the REST Data Sources Utilization report.
- Viewing REST Data Sources History
   View the REST Data Sources History report.

# 17.4.1 Understanding REST Data Sources

REST Data Sources enable developers to access to Representational State Transfer (REST) services or generic JSON data feeds in applications and use the data in Oracle APEX components.

#### About REST Data Sources

Use REST Data Sources to access to REST services or generic JSON data feeds in applications and use the data Oracle APEX components.

- How REST Data Sources Differ from Legacy Web Service References
   Learn how REST Data Sources differ from Legacy Web Service References.
- About Authentication and Credentials in REST Data Sources
   Learn about supported authentication types and credentials in REST Data Sources.

#### 17.4.1.1 About REST Data Sources

Use REST Data Sources to access to REST services or generic JSON data feeds in applications and use the data Oracle APEX components.

Oracle APEX provides direct integration of REST Data Sources in classic reports, interactive reports, CSS Calendar, and JET Charts. A REST Data Source can contain one or many Operations which are the references to a concrete external web service. Configurations at the REST source level are shared across all contained operations.

Oracle APEX supports the following built-in REST Data Sources types:

- **Simple HTTP** Select this option for a simple HTTP data feed. Oracle APEX assumes that all data is returned with the first request and that the server does not support server-side filtering, ordering, or other advanced REST service feature. All invocation details and parameters must be configured manually.
- Oracle REST Data Services Denotes Oracle REST Data Services (ORDS). These REST services follow the Oracle REST standard, which means that GET, POST, PUT, or DELETE operations are standardized. Server-side filtering and ordering are supported. Oracle APEX can leverage these features by delegating report order-bys and filters to the REST service.
- REST Enabled SQL Query Denotes a REST Source on top of a SQL Query executed on a REST Enabled SQL Reference. Oracle APEX supports filtering and pagination, but no DML on these endpoints.
- Oracle Cloud Applications (SaaS) REST Service Denotes RESTful web services provided by Oracle Cloud SaaS Applications. Use this web service type to integrate



Oracle SaaS REST Services into your Oracle APEX application. Oracle Oracle APEX pagination for these services.

 Oracle Cloud Infrastructure (OCI) REST Service - Denotes RESTful web services provided by Oracle Cloud Infrastructure. Use this web service type to integrate OCI REST Services (for example, accessing the Object Store) into your Oracle APEX application. Oracle APEX supports pagination for these Services.

### 17.4.1.2 How REST Data Sources Differ from Legacy Web Service References

Learn how REST Data Sources differ from Legacy Web Service References.

Unlike Legacy Web Service References, a REST Data Source contains metadata about the Web service which can be used by APEX Components or PL/SQL processes to invoke the service and to process the responses.

REST Data Sources contain multiple operators that differ depending upon the Web service target. For a REST services, an operation is a specific service handler (such as, GET, PUT, POST, or DELETE). Developers assign Operation a Database Action such as Fetch Multiple Rows, Fetch Single Row, Insert Row, Update Row, and Delete Row. However, you can assign each Database Operation only once to a REST Data Source Operation.



Managing Legacy Web Services

#### 17.4.1.3 About Authentication and Credentials in REST Data Sources

Learn about supported authentication types and credentials in REST Data Sources.

REST Data Sources supports various authentication types. Authentication credentials can be specified at the Remote Server-level for all REST Data Sources using the Remote Server). If credentials are set at the REST Data Source-level, that setting supersedes credentials stored at the Remote Server level.

A Credential denotes the Authentication method, a Client ID (or user name) and a Client Secret (or password). Credentials are stored as a named entity within Shared Components and can be re-used across multiple REST Data Sources or Remote Servers.

### See Also:

- About Supported Authentication Types in Protecting Web Credentials by Defining Valid URLs
- Managing Web Credentials



### 17.4.2 Creating a REST Data Source

Create a REST Data Source from Shared Components.

To create a REST Data Source:

- 1. Navigate to the REST Data Sources page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select REST Data Sources.
- 2. On the REST Data Sources page, click Create.
- Method Select From Scratch and click Next.



#### Tip:

If you select **As copy of an existing REST Data Source**, select the application to copy from and follow the on-screen instructions.

#### General:

- a. REST Data Source Type Determines the REST Data Source type, which is either a built-in type or a type defined by a REST Source Plug-In. Available built-in REST Data Sources types include:
  - Simple HTTP Select this option for a simple HTTP data feed. Oracle APEX
    assumes that all data is returned with the first request and that the server does
    not support server-side filtering, ordering, or other advanced REST service
    feature. All invocation details and parameters must be configured manually.
  - Oracle REST Data Services Denotes Oracle REST Data Services (ORDS).
     These REST services follow the Oracle REST standard, which means that GET,
     POST, PUT, or DELETE operations are standardized. Server-side filtering and ordering are supported. Oracle APEX can leverage these features by delegating report order-bys and filters to the REST service.
  - REST Enabled SQL Query Denotes a REST Source on top of a SQL Query executed on a REST Enabled SQL Reference. Oracle APEX supports filtering and pagination, but no DML on these endpoints.
  - Oracle Cloud Applications (SaaS) REST Service Denotes RESTful web services provided by Oracle Cloud SaaS Applications. Use this web service type to integrate Oracle SaaS REST Services into your Oracle APEX application. Oracle Oracle APEX pagination for these services.
  - Oracle Cloud Infrastructure (OCI) REST Service Denotes RESTful web services provided by Oracle Cloud Infrastructure. Use this web service type to integrate OCI REST Services (for example, accessing the Object Store) into your Oracle APEX application. Oracle APEX supports pagination for these Services.

The **REST Data Source Type** determines what appears next. In the example, REST Data Source Type is set to **Simple HTTP**.

**b.** Name - Enter a descriptive name for this REST Data Source.



c. URL Endpoint - Enter the Endpoint URL (starting with http://or https://) for this REST Data Source.



#### Tip:

Do not add query string parameters by appending ? namel=value&name2=value. These are configured on the Advanced wizard page after you configure Authentication.

- d. HTTPS Host Name The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request. It can also be a domain name like \*.example.com. If NULL, the host name in the given URL is used.
- e. Click Next.
- 5. Remote Server:
  - a. Remote Server Choose an existing Remote Server object. The HTTP Endpoint URL of a REST Data Source consists of the remote server (Base URL) and the service specific part. Remote Servers are stored as separate Entities. When multiple REST Data Sources share the same remote server, they can easily be redirected to another physical location (for example, from test to production) by just changing the base URL within the Remote Server definition..
  - b. Base URL This is the Base URL of the chosen Remote Server object. The HTTP Endpoint URL of this REST Data Source is made up from the Base URL and the service-specific path suffix below.

#### For example:

- http://api.example.com:8080/myservices/test/
- https://api.example.com/ords/scott/
- c. Service URL Path Enter the service-specific URL Path for this REST Data Source. The HTTP Endpoint URL is built by appending this to the Base URL specified in the Remote Server object.

#### For example:

- /services/customers/
- /products/4711/details
- d. Click Next.
- 6. If REST Data Source Type is Simple HTTP, under Settings, Pagination Type, select one of the following:

 Page Size and Fetch Offset - Flexible pagination where the REST API allows the request a specific set of rows, using page size and offset ("start at row") parameters.

The following shows typical URL. In this example, the URL requests page number 2 with a page size of 100, which leads to rows 101 to 200 being returned.

http://hostname.domain.com/path/to/rest\_api?limit=100&offset=20



In the previous example, note that the parameters named limit and offset can be arbitrary and depend upon the REST API being used.

 Page Size and Page Number - Pagination where the REST API allows the request a set of rows, using page size and page number parameters.

URLs typically look like the following example which requests page number 2 with a page size of 100, which leads to rows 101 to 200 being returned.

- http://hostname.domain.com/path/to/rest api?size=100&page=2
- Page Number Pagination where the REST API allows to request a set of rows, using a page parameter. The Page Size is fixed and determined by the REST API.

URLs typically look like the following example which requests page number 2. If the REST API uses a fixed page size of 20, rows 21 to 40 will be returned.

http://hostname.domain.com/path/to/rest api?page=2

The UI changes based on Pagination Type you select. See field-level Help for more information on specific attributes.

 Authentication Required - Choose whether the new REST Data Source requires Authentication.



#### Tip:

To learn more about authentication, see About Supported Authentication Types in Protecting Web Credentials by Defining Valid URLs

- **8.** To proceed, select one of the following:
  - Create REST Source Manually This option does not include Discovery mode.

    Based on the previously entered information, a REST Data Source is created with a few sample operations and a sample data profile. This option creates an *incomplete* REST Data Source that is unusable with an APEX component. To correctly reflect the external web service, you will need to edit the operations and the data profile.
  - Advanced Presents advanced parameters for the Data Profile. Use Response
     Sample to upload a sample JSON (or XML) response. Once a file is uploaded, APEX performs a Data Profile Discovery on the uploaded file.
  - Discover Starts Discovery mode. APEX executes multiple HTTP requests in order
    to get information about the external Web service. APEX samples the data (JSON or
    XML) returned by the Web service and derives a Data Profile (consisting of metadata
    about the JSON attributes). Discovery results then display and confirms whether to
    create the REST Data Source.
- 9. If you click **Advanced**, the Parameter page appears.
  - Use the Parameters page to configure initial REST Data Source parameters which might be required for discovery. Some REST Data Sources may require you set specific HTTP Headers (for example, User-Agent). After setting advanced parameters, select either Create REST Source Manually or Discover.
- 10. If you select **Discover**, APEX invokes the REST service URL and a Preview appears. From the JSON response, APEX derives attributes and their data types and uses this to create a Data Profile.

The information that displays depends upon the complexity of the target service. For simple HTTP services or ORDS services which do not provide metadata about their



JSON response attributes, APEX investigates the JSON or XML response, samples the data, and creates a proposal for a data profile. The Data tab displays the sample response data, formatted as a report.

The columns tab shows information about the data profile columns APEX has found during discovery. Use this tab to verify whether the column data types are correct.

Click **Server Response** to view additional detailed information about the REST Data Source response, such as the response body, response headers and the REST Data Source operations.

11. Click Create REST Data Source.

The REST Data Source is created.

### 17.4.3 Editing or Deleting a REST Data Source

Edit or delete a REST Data Source from Shared Components.

To edit or delete a REST Data Source:

- 1. Navigate to the REST Data Sources page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select the application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select **REST Data Sources**.
- 2. On the REST Data Sources page, click the **REST Source Name**.

The REST Data Source page appears.

3. To delete the REST Data Sources, click **Delete**.



#### Tip:

A REST Data Source can only be deleted if no Oracle APEX component is referencing it.

- 4. To edit the REST Data Source, edit the attributes.
- 5. Under REST Data Source:
  - Name Defines descriptive name for this REST Data Source.
  - b. REST Data Source Type Determines the REST Data Source type, which is either a built-in type or a type defined by a REST Source Plug-In. The following built-in types are supported:
    - Simple HTTP Select this option for a simple HTTP data feed. Oracle
      APEX assumes that all data is returned with the first request and that the
      server does not support server-side filtering, ordering, or other advanced
      REST service feature. All invocation details and parameters must be
      configured manually.
    - Oracle REST Data Services Denotes Oracle REST Data Services (ORDS). These REST services follow the Oracle REST standard, which means that GET, POST, PUT, or DELETE operations are standardized. Server-



- side filtering and ordering are supported. Oracle APEX can leverage these features by delegating report order-bys and filters to the REST service.
- REST Enabled SQL Query Denotes a REST Source on top of a SQL Query executed on a REST Enabled SQL Reference. Oracle APEX supports filtering and pagination, but no DML on these endpoints.
- Oracle Cloud Applications (SaaS) REST Service Denotes RESTful web services provided by Oracle Cloud SaaS Applications. Use this web service type to integrate Oracle SaaS REST Services into your Oracle APEX application. Oracle Oracle APEX pagination for these services.
- Oracle Cloud Infrastructure (OCI) REST Service Denotes RESTful web services provided by Oracle Cloud Infrastructure. Use this web service type to integrate OCI REST Services (for example, accessing the Object Store) into your Oracle APEX application. Oracle APEX supports pagination for these Services.
- **c.** Remote Server Choose a Remote Server object for this REST Data Source. To learn more, see field-level Help.
- d. Base URL Displays the Base URL.
- e. URL Path Prefix The URL Path Prefix is specific to this REST Data Source. The URL Endpoints of all operations within the REST Data Source share the same URL Path Prefix. To learn more, see field-level Help.
- 6. If **REST Data Source Type** is **Simple HTTP**, under **Settings**, **Pagination Type**, select one of the following:
  - Page Size and Fetch Offset Flexible pagination where the REST API allows the request a specific set of rows, using page size and offset ("start at row") parameters.

The following shows typical URL. In this example, the URL requests page number 2 with a page size of 100, which leads to rows 101 to 200 being returned.

```
http://hostname.domain.com/path/to/rest api?limit=100&offset=20
```

In the previous example, note that the parameters named limit and offset can be arbitray and depend upon the REST API being used.

- Page Size and Page Number Pagination where the REST API allows the request a set of rows, using page size and page number parameters.
  - URLs typically look like the following example which requests page number 2 with a page size of 100, which leads to rows 101 to 200 being returned.
- http://hostname.domain.com/path/to/rest api?size=100&page=2
- Page Number Pagination where the REST API allows to request a set of rows, using a page parameter. The Page Size is fixed and determined by the REST API.

URLs typically look like the following example which requests page number 2. If the REST API uses a fixed page size of 20, rows 21 to 40 will be returned.

```
http://hostname.domain.com/path/to/rest api?page=2
```

The UI changes based on Pagination Type you select. See field-level Help for more information on specific attributes.

- 7. Under Authentication:
  - Credentials Select stored credentials for authentication.
- 8. Under Data Profile:



 a. Click Edit Data Profile to change how REST Data Source responses (in XML or JSON) format are being parsed and converted to rows and columns.

The Data Profile page appears.

b. Under **Data Profile** and **Columns**, edit the attributes.

**Row Selector** stores an XML or JSON path expression pointing to the node containing the collection of rows. **Columns** determine how one row is parsed and converted to multiple columns.

- c. Click **Apply Changes** to save your changes.
- 9. Under Operations Operations contains the actual information about the external web service handler. Operations can be mapped to Database Operations which enables APEX components to pick up the correct operation.
  - a. Click **Add Operation** to add a REST Data Source Operation, or click the **Edit** icon to edit an existing operation.

The REST Source Operation page appears.

- **b.** Under **Operation**:
  - URL Pattern The URL Pattern is the last part of the Web Service endpoint URL. The combination of URL pattern and HTTP Operation (GET, POST, PUT, DELETE) identifies the operation within a REST Data Source.
  - HTTP Method Defines the HTTP Operation or Method (GET, POST, PUT, DELETE, PATCH) to be executed on the REST Web Service.
  - Database Operation Assign a Database Operation to this HTTP operation. The database operation is important for APEX components to work with the REST Data Source.

To learn more about these attributes and see examples, see field-level Help.

- c. Under Caching:
  - Caching Select how the APEX engine can cache REST Source responses on the server side. If caching can be used, the component is rendered based on cached results instead of fetching from the web service again. Only HTTP "GET" requests will be cached, which will cut down expensive HTTP requests. This feature is unrelated to the browser's caching capabilities.
  - Invalidate When If you enable Caching, specify when cached content is to be invalidated. Provide either the amount of minutes or a "DBMS\_SCHEDULER Calendaring String". With the latter, you determine cached content to be invalidated at the top of the hour, at midnight, or another specific recurring point in time.

To learn more about these attributes and see examples, see field-level Help.

**d.** Under **Operation Parameters**, click **Add Perameter** to configure REST Data Source parameters.

Parameters enable support for dynamic URL parts or to pass additional HTTP request headers or a specific request body to the web service. Oracle APEX components assign values to the parameters before invoking the web service. To learn more about these attributes and see examples, see field-level Help.

e. Under Advanced:



- Fixed Page Size Enter the size of the REST service's pagination window. The
  pagination for a resource handler HTTP operation GET method, equates to the
  number of rows to return on each page of a JSON format result set based on a
  database query.
- Allow Fetching All Rows Specify whether APEX components are allowed to fetch all rows and executing multiple HTTP requests from the REST source operation.
- Force Raise HTTP-404 Error If the HTTP request, executed by the Fetch Rows database operation, receives the 404 HTTP status code ("Not Found"), APEX treats this as a No Rows Found situation and does not raise an error. An error is raised only when **Debug** is enabled. Enabling this switch forces APEX to always signal HTTP-404 situations as errors.
- Operation Comment Enter any developer comments

To learn more about these attributes, see field-level Help.

- f. Click Apply Changes.
- 10. Under Parameters Parameters enable support for dynamic URL parts or to pass additional HTTP request headers or a specific request body to the web service. APEX components assign values to the parameters before invoking the web service.
  - a. Click Add Parameter.

The Parameter page appears.

- **b.** On Edit REST Data Source Parameter:
  - Edit the attributes. To learn more about an attribute, see field-level Help.
  - Click Add Parameter or Add and Add Another.
- **c.** On Edit REST Data Source Parameter, edit the attributes and then click Add Parameter. To learn more about an attribute, see field-level Help.
- **11. Subscription** lists REST Data Sources that subscribe to this module and indicates if this REST Data Source is a copy.
- 12. REST Source Catalog Click Save to Catalog to save the REST Data Source to a REST Source Catalog. See Managing REST Source Catalogs.
- 13. Under Advanced:
  - a. Static ID Use the Static ID to reference the REST Data Source in API Calls.
  - **b.** Pass ECID Indicates whether to pass the Execution Context ID (ECID) to the external web services for end-to-end tracing.
  - **c.** HTTP Transfer Timeout Specify the transfer timeout for all future HTTP requests that are attempted while reading the HTTP response from the Web server or proxy server.

This timeout value can be used to avoid the application from being blocked by busy Web servers or heavy network traffic while retrieving responses. See SET\_TRANSFER\_TIMEOUT Procedure in *Oracle Database PL/SQL Packages and Types Reference* 

- d. Comments Enter Comments or notes.
- 14. To save your changes, click Apply Changes.



### 17.4.4 Copying a REST Data Source

Copy a REST Data Source by selecting Copy on the REST Data Sources page.

To copy a REST Data Source:

- 1. Navigate to the REST Data Sources page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select REST Data Sources.
- 2. On the REST Data Sources page, click Copy.
- 3. On Copy REST Data Source:
  - a. Copy REST Data Source Select an existing REST Data Source.
  - b. New REST Data Source Name Enter a new name.
  - c. Click Copy.

# 17.4.5 Managing REST Source Catalogs

Create a catalog of REST Data Source metadata that can be used by all applications in a workspace to create REST Data Sources.

REST Source Catalogs contain metadata about REST Data Sources. Developers can search and browse a catalog and then create REST Data Sources for their applications. You can share REST Source Catalogs by exporting the REST Data Source catalog to a file and then importing it into another workspace or another instance.

- Creating a REST Source Catalog
   Create a REST Source Catalog in Workspace Utilities.
- Editing a REST Source Catalog
   Edit an existing REST Source Catalog in Workspace Utilities.
- Managing Catalog Groups
   Use Catalog Groups to organize catalogs into categories...
- About Exporting and Importing a REST Source Catalog
   Move REST Source Catalog to another instance by exporting it to a file and then
   importing the file into the target instance.

### 17.4.5.1 Creating a REST Source Catalog

Create a REST Source Catalog in Workspace Utilities.

REST Source Catalogs contain metadata about existing REST Data Sources. REST Source Catalogs are organized in Groups. First, create a group and then create catalogs within the group. Once the REST Source Catalog is present, REST Data Sources can be added to it. To create a REST Source Catalog, you create a group, then create the catalog, and finally associate the REST Data Source with the catalog.



## To create a REST Source Catalog:

- 1. Navigate to the REST Source Catalogs page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** On the App Builder, click the **Workspace Utilities** icon.
  - c. On the Workspace Utilities page, click **REST Source Catalogs**.

The REST Source Catalogs page appears. REST Source Catalogs are organized into categories called **groups**. First create a group and then create the catalog.

- 2. Create a group:
  - a. From the Tasks list, Manage Catalog Groups.
  - b. Click Create Group.
  - c. In the Catalog Group Details dialog:
    - Name Specify the name of the catalog group.
    - Description Describe the purpose of the group.
    - Click Create.
- 3. Click the REST Source Catalogs breadcrumb to return to the REST Source Catalogs page.
- 4. Create a catalog:
  - a. Click Create Catalog.
  - b. In the REST Source Catalog Details dialog:
    - Group Select a group used to organize the catalog and assist developers when creating services.
    - Name Specify the name of the catalog. Catalog names must be unique within a workspace.
    - Internal Name Specify an internal name of the catalog. The Internal Name is
      used to identify a catalog across multiple APEX instances. If a catalog is
      imported and a catalog with the same internal name already exists, then the
      existing catalog will be overwritten.
    - Description Describe the REST Source Catalog.
    - Click Create.
- Create the REST Data Sources to be included in the catalog. See Creating a REST Data Source.
- **6.** Asssign the REST Data Source with the REST Source Catalog:
  - a. Edit the REST Data Source. Click the **REST Source Name**.
  - b. Under REST Source Catalog, click Save to Catalog.
  - **c.** In the Save to REST Source Catalog dialog, verify the following:
    - Catalog Group Select a Catalog Group. If the service will not be added to an
      existing catalog, select Add a new Catalog Group and follow in on-screen
      instructions.
    - Catalog Select the Catalog to which the service will be added. Choose Add a new Catalog if the service will not be added to an existing catalog.
    - REST Source Name Displays the current REST Source Name.



## d. Click Save to Catalog.

7. Repeat the previous step for each REST Data Source to be added to the catalog.

## 17.4.5.2 Editing a REST Source Catalog

Edit an existing REST Source Catalog in Workspace Utilities.

To edit a REST Source Catalog:

- 1. Navigate to the REST Source Catalogs page:
  - a. On the Workspace home page, click the **App Builder** icon.

The App Builder home page appears.

- b. Click the Workspace Utilities icon.
- c. On the Workspace Utilities page, click REST Source Catalogs.

The REST Source Catalogs page appears. REST Source Catalogs are organized into categories called **groups**.

- To edit a catalog:
  - a. Click the Catalog name.

The REST Source Catalog Details dialog appears.

- Edit the appropriate attributes. To learn more about an attribute, see field-level Help.
- c. Click Apply Changes.
- To delete a catalog.
  - a. Click the Catalog name.

The REST Source Catalog Details dialog appears.

- b. Click Delete.
- 4. To edit a catalog Group:
  - a. Click the Group name.

The Catalog Group Details dialog appears.

- Edit the appropriate attributes. To learn more about an attribute, see field-level Help.
- c. Click Apply Changes.
- To associate a new REST Data Source with a catalog:
  - a. Navigate to REST Data Source.
  - b. Under REST Source Catalog, click Save to Catalog.
  - In the Save to REST Source Catalog dialog, verify the options and click Save to Catalog.

# 17.4.5.3 Managing Catalog Groups

Use Catalog Groups to organize catalogs into categories..

To manage Catalog Groups:



- 1. Navigate to the REST Source Catalogs page:
  - a. On the Workspace home page, click the App Builder icon.
    - The App Builder home page appears.
  - b. Click the Workspace Utilities icon.
  - **c.** On the Workspace Utilities page, click **REST Source Catalogs**.
    - The REST Source Catalogs page appears.
- 2. From the Tasks menu on the right side of the page, click Manage Catalog Groups.
- 3. To add a Catalog Group:
  - a. Click Create Group.
  - b. In the Catalog Group Details dialog:
    - Name Specify the name of the catalog group.
    - Description Describe the purpose of the group.
    - Click Create.
- 4. To edit a catalog group.
  - a. Click the Catalog Name.
  - b. In the Catalog Group Details dialog:
    - Name Specify the name of the catalog group.
    - Description Describe the purpose of the group.
    - Click Apply Changes.
- To delete a Catalog Group:
  - a. Click the Catalog Name.
  - b. Click Delete.

## 17.4.5.4 About Exporting and Importing a REST Source Catalog

Move REST Source Catalog to another instance by exporting it to a file and then importing the file into the target instance.

Exporting a REST Source Catalog to another instance involves the following steps:

- Create the REST Source Catalog.
- 2. Export the REST Source Catalog. See Exporting a REST Source Catalog.
- 3. Import the exported file into the target Oracle APEX instance. See Importing a REST Source Catalog.
- 4. Install the exported file either directly after importing the file, or later from the Export Repository. See Installing Other Files from the Export Repository.

# 17.4.6 Managing Data Synchronization

Enable Data Synchronization to keep the contents of a local table automatically in sync with the data from a REST service.



### About Data Synchronization

Data Synchronization enables developers to automatically sync the contents of a local table with the data from a REST service.

#### Accessing the Data Synchronization Page

Access the the Data Synchronization page by selecting a REST Data Source and then selecting Manage Synchronization on the right side of the page.

#### Configuring Data Synchronization

Configure Data Synchronization to automatically sync a local table with data from a REST service.

## Clearing Synchronization Settings

Clear synchronization settings.

## Viewing Synchronize Usage

View a report of application components currently using the local synchronization table as their data source.

 Managing the REST Data Source Synchronization Log Learn about the REST Data Source Synchronization log.



Configuring Background Jobs in Oracle APEX Administration Guide

## 17.4.6.1 About Data Synchronization

Data Synchronization enables developers to automatically sync the contents of a local table with the data from a REST service.

You can trigger **Data Synchronization** manually or on a regular schedule, using a scheduler job. Note that the CREATE JOB privilege must be granted to the application's parsing schema in order to execute REST source synchronizations on schedule.

Oracle APEX can create the local table based on the visible columns in the REST Data Source **Data Profile**. Since the table is a visible object in the database schema, developers can add indexes, change physical properties, or even add more columns.

If the table is not in sync with the Data Profile, Data Synchronization continues to work for columns present in both the table and the Data Profile (other columns are ignored). However, APEX generates SQL DDL statements to sync table columns back to the Data Profile. These statements can be added to the application as supporting objects.

## **Data Synchronization Uses Cases**

Common use cases using REST Data Source Data Synchronization include:

## Provide efficient reporting on large data sets coming from a REST service

Some REST Services can return large amounts of result data that includes pagination. If a reporting requirement needs larger data sets, this could result to multiple HTTP requests and poorer response times. Also no indexes or other database features can be used to speed up reporting queries. In this case, Oracle recommends enabling Data Synchronization to sync the remote data to a local tables and have any reports based on local tables.



# Collect data from REST Services for consumption by PL/SQL packages or other logic

Having data from the REST service replicated in a local table enables developers to perform all sorts of processing and create a wider variety of reports on local tables.

## Collect data from a REST API over a longer period of time

Some REST APIs only provide data for a recent time frame. For reporting on a larger time frame, Data Synchronization enables developers to fetch REST data and store it in a local table. Note that this use case also requires a "merge by primary key" capability since two subsequent REST requests will return an overlapping data set.

### Utilize Intelligent caching for APEX components

REST Data Sources already provide a caching mechanism: APEX caches the JSON response (or responses) as CLOBs in a caching table. If an APEX component uses the REST Data Source and the cache is not stale, the HTTP request is saved and the cached JSON is used. However, JSON still needs to be parsed (that is, large data sets lead to a lot of JSON parsing overhead). Also, indexes or other database technology cannot be used to speed up queries. Caching within a named local table creates a better level of caching since JSON is no longer parsed and the table can be optimized to support reporting queries.

## 17.4.6.2 Accessing the Data Synchronization Page

Access the the Data Synchronization page by selecting a REST Data Source and then selecting Manage Synchronization on the right side of the page.

To access the Data Synchronization page:

- 1. Navigate to the REST Data Sources page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select REST Data Sources.
- 2. On the REST Data Sources page, click the **REST Source Name**.
- Click Manage Synchronization on the right side of the REST Data Source page.The Data Synchronization page appears.

## 17.4.6.3 Configuring Data Synchronization

Configure Data Synchronization to automatically sync a local table with data from a REST service.

You can trigger synchronization manually or on a regular schedule using a scheduler job.

To configure Data Synchronization:

- 1. Navigate to the Data Synchronization page.
  - The Data Synchronization page appears.
- 2. Under Details:
  - Local Table Owner Select the schema of the local table to synchronize data to. By default, the application Parsing Schema is used.



 Synchronize to - Select either New Table or Existing Table and click Apply Changes.

If creating a new table, the message Table does not exist appears. Click Create Table.

- **c.** Synchronization Type Select a synchronization type:
  - Append Append rows to the local table. This is typically used when no primary key has been defined in the data profile.
  - Merge Merge rows into the local table. To use this option, the data profile
    must have a Primary Key defined. If a row for the given Primary Key value
    exists, the row is updated.. Otherwise the row is created.
  - Replace Empty the local table before loading new data.
- d. Job Execution Interval Use the Database **Scheduler Calendaring Syntax** to define repeating synchronization schedules, such as "every Tuesday and Friday at 4:00 p.m." or "the second Wednesday of every month.". This calendaring syntax can either be provided manually using simple expressions can be built using the Interval Builder by clicking the Hammer icon adjacent to the input field.



To learn more about **Scheduler Calendaring Syntax**, see DBMS\_SCHEDULER Operational Notes in *Oracle Database PL/SQL Packages and Types Reference* 

3. Under Steps - Use **Steps** to pass parameter values or specific external filters to the REST Service.

If no step is defined, the REST Data Source will be invoked once, with default parameters. If steps are defined, APEX will invoke the REST Data Source once for each step, and pass the configured parameters.

- 4. Under Advanced Settings:
  - a. Commit Interval Specify the commit interval to use during data synchronization. If not specified, the whole synchronization will be one transaction, with a commit after the last row. If an interval is specified, APEX will commit each time after the specified amount of rows have been processed.
  - **b.** HTTP Request Limit If required, provide a maximum number of HTTP requests to make for each synchronization step. If this limit is exceeded, synchronization will stop and logged as Incomplete.
    - Note that due to the actual execution method, synchronization will exceed this limit by one request. So if you provide a limit of 10, synchronization will stop after the 11th request has been made.
  - c. Enable Simple Rate Limiting When enabled, APEX ensures that only a limited amount of HTTP requests is executed within the given time frame. This rate limiting is purely based on the number of HTTP requests being executed within a time frame. It does not look into HTTP response headers returned by the REST service.
- **5.** To save your changes, click **Save**.



6. To execute Data Synchronization, click Save and Run.

# 17.4.6.4 Clearing Synchronization Settings

Clear synchronization settings.

Clearing synchronization settings stops synchronization processing and resets all REST Data Source attributes related to synchronizations. If APEX components are using the local synchronization table, they will be reset to use the REST Service directly.

To clear synchronization settings:

- Navigate to the Data Synchronization page.
   The Data Synchronization page appears.
- 2. Click Clear Settings.

## 17.4.6.5 Viewing Synchronize Usage

View a report of application components currently using the local synchronization table as their data source.

View the Synchronize Usage report:

- Navigate to the Data Synchronization page.
  - The Data Synchronization page appears.
- 2. Under Details, click Synchronize Usage.

A report appears showing application components currently using the local synchronization table as their data source.

# 17.4.6.6 Managing the REST Data Source Synchronization Log

Learn about the REST Data Source Synchronization log.

- About the REST Data Source Synchronization Log
   The REST Data Source Synchronization log records details of previously executed synchronizations.
- Purging the Synchronization Log
   Purge the REST Data Source Synchronization log.



Managing the REST Source Synchronization Log in *Oracle APEX Administration Guide* 

## 17.4.6.6.1 About the REST Data Source Synchronization Log

The REST Data Source Synchronization log records details of previously executed synchronizations.

Once you have successfully executed a synchronization, the REST Data Source Synchronization log displays under **Log** on the Data Synchronization page.

The REST Data Source Synchronization log contains details about previously executed synchronizations such as the status (that is, Success or Failure), the amount of processed rows, and the amount of HTTP requests being made. You can drill down from the Synchronization log to the Web Services log to review each individual HTTP request which was made for this synchronization.

## 17.4.6.6.2 Purging the Synchronization Log

Purge the REST Data Source Synchronization log.

To purge REST Data Source Synchronization log:

1. Navigate to the Data Synchronization page.

The Data Synchronization page appears.

The REST Data Source Synchronization log displays under **Log** at the bottom of the page.

2. Under Log, click Purge Log.

## 17.4.7 Viewing REST Data Source Utilization

View the REST Data Sources Utilization report.

To view REST Data Sources utilization:

- 1. Navigate to the REST Data Sources page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select REST Data Sources.
- 2. On the REST Data Sources page, click **Utilization**.

The Utilization page displays where a REST Data Source is used within the application.

# 17.4.8 Viewing REST Data Sources History

View the REST Data Sources History report.

To view recent modifications to REST Data Sources:

- Navigate to the REST Data Sources page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select **REST Data Sources**.
- 2. On the REST Data Sources page, click **History**.

The History page displays recent modifications made to Web Service Modules in the current workspace.



# 17.5 Managing Remote Servers

Store REST Data Source server information as a Remote Server object.

- Understanding Remote Servers
   Create a Remote Server object to store REST Data Source server information.
- Creating a Remote Server
   Create a Remote Server from Shared Components.
- Editing or Deleting a Remote Server
   Edit or delete a Remote Server from Shared Components.
- Viewing Remote Server Utilization
   View the Remote Server Utilization report.
- Viewing Remote Server History
   View the Remote Server History report.

# 17.5.1 Understanding Remote Servers

Create a Remote Server object to store REST Data Source server information.

- About Remote Servers
   Create a Remote Server object to store REST Data Source server information.
- How APEX Stores REST Data Source Information
   Learn how Oracle APEX stores REST Data Source information.
- Exporting and Importing Remote Server Information
   Learn about exporting and importing Remote Server information.



Managing REST Data Sources

## 17.5.1.1 About Remote Servers

Create a Remote Server object to store REST Data Source server information.

Oracle APEX stores REST Data Source server information (for example, REST APIs) as a Remote Server object. Remote Servers can be shared among multiple REST Data Sources. Changing Remote Server properties affects all REST Sources referencing that object. For example, you can change a Remote Server's Base URL to move all associated REST Sources from a test to a production system. Since Remote Servers are stored at the workspace-level, Remote Servers are visible in all applications in a workspace.

When you create a Remote Server you select one of the following types:

- REST Data Source Remote Server for consuming a remote REST API.
- Authentication Remote Server for authentication.
- Print Server Remote Server for an external print server.



## 17.5.1.2 How APEX Stores REST Data Source Information

Learn how Oracle APEX stores REST Data Source information.

Oracle APEX splits the endpoint URL of a REST Data Source into two parts. The first part is the server-specific part and is stored as a separate entity called the **Remote Server**. You can reuse a Remote Server with multiple REST Data Sources if each one uses the same server, port, and URL Path Prefix (context root). Remote Servers are stored at the workspace-level and therefore visible in all applications.

The second part of the endpoint URL and is specific to the REST Data Source. Multiple REST Data Sources can share one Remote Server, thus sharing information such as the Base URL and Authentication. If you change Remote Server attributes, the change impacts all REST Data Sources using the Remote Server. Remote Servers make it easy to move a collection of REST Data Source. For example, you can move from a test system to a production system by changing the URL within the Remote Server object.

## 17.5.1.3 Exporting and Importing Remote Server Information

Learn about exporting and importing Remote Server information.

When you export an application, referenced Remote Servers are added to the export file. When you import the application into another workspace, APEX checks whether the target workspace already contains Remote Servers with the same **static ID**. If a Remote Server already exists, the application uses it. Otherwise the Remote Servers from the import file are created in the target workspace.

# 17.5.2 Creating a Remote Server

Create a Remote Server from Shared Components.

To create a Remote Server object:

- 1. Navigate to the Remove Server page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click App Builder.
    - b. Click Workspace Utilities.
    - c. Click Remote Servers.
  - From Shared Components:
    - a. On the Workspace home page, click **App Builder**.
    - **b.** Select an application.
    - **c.** On the Application home page, click **Shared Components** in the center of the page.
    - d. Under Workspace Objects, select Remote Servers.
- 2. On the Remote Servers page, click **Create**.
- 3. Name Enter a name for the Remote Server object. Remote Server names must be unique within the application.
- 4. Static Identifier Enter a static ID for the Remote Server.



- 5. Server Type Select one of the following:
  - REST Data Source Select this option if the server consumes a remote REST API.
  - **Authentication** Select this option if you are using the server for authentication.
  - Print Server Select this option if you are using the server for an external print server.
- 6. Endpoint URL Enter the base URL of the Remote Server.
- 7. Prompt on Install Select **On** to have APEX prompt for the Endpoint URL after the application installs into another workspace.
- **8.** Comments Enter any comments or notes here. These comments never display when running the application.
- 9. Click Create.

# 17.5.3 Editing or Deleting a Remote Server

Edit or delete a Remote Server from Shared Components.

To edit a Remote Server:

- Navigate to the Credentials page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click App Builder.
    - b. Click Workspace Utilities.
    - c. Click Remote Servers.
  - From Shared Components:
    - a. On the Workspace home page, click App Builder.
    - b. Select an application.
    - c. On the Application home page, click **Shared Components** in the center of the page.
    - d. Under Workspace Objects, select Remote Servers.
- 2. On the Remote Server page, click the name of the Remote Server.

The Edit Remote Server dialog appears.

To delete the current Remote Server, click **Delete**. Otherwise, edit the appropriate attributes.



#### Tip:

Remote Servers which are referenced within an application cannot be deleted.

- To edit the General attributes:
  - a. Name Enter a descriptive name.
  - **b.** Static Identifier Enter a name for the remote server object here. Remote Server names must be unique within the application.
  - c. Server Type Select either:



- REST Data Source
- Authentication
- Print Server
- d. Endpoint URL Enter the base URL of the remote server.
- e. Prompt on Install If **On**, APEX prompts for the Endpoint URL after the application has been installed into another workspace.
- f. HTTPS Host Name The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request. It can also be a domain name like \*.example.com. If NULL, the host name in the given URL is used.

**HTTPS Host Name** only displays if you are using Oracle Database 12.2 or higher.

- g. Comments Enter any comments or notes. These comments only display within App Builder and never display when running the application.
- h. To save your changes, click Apply Changes.

# 17.5.4 Viewing Remote Server Utilization

View the Remote Server Utilization report.

To view Remote Server utilization:

- 1. Navigate to the Remove Server page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click App Builder.
    - b. Click Workspace Utilities.
    - c. Click Remote Servers.
  - From Shared Components:
    - a. On the Workspace home page, click App Builder.
    - b. Select an application.
    - **c.** On the Application home page, click **Shared Components** in the center of the page.
    - d. Under Workspace Objects, select Remote Servers.
- 2. On the Remote Servers page, click **Utilization**.

The Utilization page displays where Remote Servers are used within the current workspace.

# 17.5.5 Viewing Remote Server History

View the Remote Server History report.

To view recent modifications to Remote Servers:

- Navigate to the Remove Server page:
  - From Workspace Utilities:



- a. On the Workspace home page, click **App Builder**.
- b. Click Workspace Utilities.
- c. Click Remote Servers.
- From Shared Components:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Workspace Objects, select Remote Servers.
- 2. On the Remote Servers page, click **History**.

The History page displays recent modifications made to Remote Servers in the current workspace.

# 17.6 Managing Web Credentials

Store authentication credentials for external REST services or REST Enabled SQL services.

- Understanding Web Credentials
   Use Web credentials to connect to external REST services or REST Enabled SQL services.
- Creating Web Credentials
   Create Web credentials from either Workspace Utilities or Shared Components.
- Editing or Deleting Credentials
   Edit or delete Web credentials from either Workspace Utilities or Shared Components.
- Viewing Credential Utilization
   View the Web credential Utilization report.
- Viewing Credential History
   View the Web Credential History report.

# 17.6.1 Understanding Web Credentials

Use Web credentials to connect to external REST services or REST Enabled SQL services.

Creating Web Credentials securely stores and encrypts authentication credentials for use by Oracle APEX components and APIs. Credentials cannot be retrieved back in clear text. Credentials are stored at the workspace-level and therefore are visible in all applications.

- Protecting Web Credentials by Defining Valid URLs
   Protect Web credentials by adding valid URLs.
- About Supported Authentication Types in Web Credentials
   Learn about supported authentication types in Web credentials.
- Exporting and Importing Web Credentials
   Learn about exporting and importing Web credentials.





Managing REST Enabled SQL References

# 17.6.1.1 Protecting Web Credentials by Defining Valid URLs

Protect Web credentials by adding valid URLs.

You can protect Web credentials by adding valid URLs to the **Valid for URLs** attribute. Adding URLs to the **Valid for URLs** attribute prevents APEX from accidentally sending a sensitive credentials to a different server. Whenever a Web credential is used, APEX checks whether the URL matches what is defined in defined in the **Valid for URLs** attribute.

When adding URLs to this attribute, place each URL into a new line. The URL endpoint being used must start with one of the URLs provided here. See field-level Help for examples.

## 17.6.1.2 About Supported Authentication Types in Web Credentials

Learn about supported authentication types in Web credentials.

Web credentials support the following Authentication Types:

- Basic Authentication Sends username and password in Base64-encoded form as the Authorization request header.
- OAuth2 Client Credentials Flow APEX exchanges the client ID and client secret for an Access Token using a token server URL. The access token is then used to perform the actual request. If the access token is expired, APEX will transparently request a new one.
- HTTP Header The credential is added to the REST Request as a HTTP Header.
  The name of the credential is the HTTP Header name, the Secret of the credential
  is the HTTP Header value. APEX does not add these secrets to the Debug log or
  any other logs.
- URL Query String The credential is added to the URL of the REST Request as
  a Query String Parameter (for example: ?name=value). This option can be useful
  with API keys. APEX does not add these secrets to the Debug log or any other
  logs. However, proxy or other intermediate servers will log these credentials in
  their log files.

# 17.6.1.3 Exporting and Importing Web Credentials

Learn about exporting and importing Web credentials.

When you export an application, used credentials are added to the export file. When you import the application into another workspace, APEX checks whether the target workspace already contains credentials with the same static ID. If a credential already exists, the application uses it. Otherwise the credential from the import file is created in the target workspace.



# 17.6.2 Creating Web Credentials

Create Web credentials from either Workspace Utilities or Shared Components.

To create Web credentials:

- Navigate to the Web Credentials page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click App Builder.
    - b. Click Workspace Utilities.
    - c. Click Web Credentials.
  - From Shared Components:
    - a. On the Workspace home page, click App Builder.
    - b. Select an application.
    - c. On the Application home page, click **Shared Components** in the center of the page.
    - d. Under Workspace Objects, select Credentials.
- 2. On the Web Credentials page, click Create.
- 3. Configure the Attributes on the Web Credentials page.
- 4. Name Enter a descriptive name.
- 5. Static Identifier Use the static identifier to reference the credential in API calls.
- Authentication Type Select one of the following:
  - Basic Authentication
  - OAuth2 Client Credentials Flow
  - Oracle Cloud Infrastructure (OCI)
  - HTTP Header
  - URL Query String

To learn more about this attribute, see field level Help.

The options that display next depend upon the Authentication Type you select.

- For the Authentication Type Basic Authentication:
  - Client ID or Username Enter the Username. APEX does not store this information encrypted.
  - b. Client Secret or Password Enter the password.
  - Verify Client Secret or Password Enter the password again to verify your input.
  - d. Valid for URLs APEX checks whether the URL a Web credentials uses matches the URLs in this attribute. When adding URLs to this attribute:
    - Place each URL on a new line.
    - The URL endpoint being used must start with one of the URLs provided here.

See field-level Help for examples.



- **e. Prompt On Install** Choose whether prompts for this credential display when the application is imported on another APEX instance.
- **f. Comments** Enter any comments or notes here. These comments never display when running the application.
- 8. For the Authentication Type **OAuth2 Client Credentials Flow**:
  - a. OAuth Scope Permissions represented by the Access Token in OAuth 2.0 terms are known as scopes. The scope parameter allows the application to express the desired scope of the access request.

If your authentication server requires a scope to be specified for the access token request, provide it here. The OAuth2 access token will then be requested with the following request body:

```
grant type=client credentials&scope={scope}
```

- **b. Client ID or Username** Enter the Client ID. APEX does not store this information encrypted.
- c. Client Secret or Password Enter the password.
- d. Client Secret or Password Enter the password again to verify your input.
- e. Valid for URLs APEX checks whether the URL a Web Credential uses matches the URLs in this attribute. When adding URLs to this attribute:
  - Place each URL on a new line.
  - The URL endpoint being used must start with one of the URLs provided here.

See field-level Help for examples.

- f. **Prompt On Install** Choose whether prompts for this credential display when the application is imported on another APEX instance.
- g. Comments Enter any comments or notes here. These comments never display when running the application.
- 9. For the Authentication Type Oracle Cloud Infrastructure (OCI):
  - a. OCI User ID Enter the Oracle Cloud Infrastructure User OCID. APEX does not store this information encrypted.
  - b. OCI Private Key Enter the private key in PEM format for OCI authentication. APEX stores this information encrypted and secure, so it cannot be retrieved back in clear text.
  - c. OCI Tenancy ID Enter the Oracle Cloud Infrastructure Tenancy's OCID.
  - OCI Public Key Fingerprint Enter the public RSA key fingerprint for OCI authentication.
  - e. Valid for URLs APEX checks whether the URL a Web Credential uses matches the URLs in this attribute. When adding URLs to this attribute:
    - Place each URL on a new line.
    - The URL endpoint being used must start with one of the URLs provided here.

See field-level Help for examples.



- f. **Prompt On Install** Choose whether prompts for this credential display when the application is imported on another APEX instance.
- g. **Comments** Enter any comments or notes here. These comments never display when running the application.
- **10.** For the Authentication Type **HTTP Header**:
  - a. Credential Name Enter the name of the HTTP Header to use for this credential.
  - b. Credential Secret Enter the value (or secret) of the credential.
  - c. Valid for URLs APEX checks whether the URL a Web Credential uses matches the URLs in this attribute. When adding URLs to this attribute:
    - Place each URL on a new line.
    - The URL endpoint being used must start with one of the URLs provided here.

See field-level Help for examples.

- **d. Prompt On Install** Choose whether prompts for this credential display when the application is imported on another APEX instance.
- **e. Comments** Enter any comments or notes here. These comments never display when running the application.
- 11. For the Authentication Type URL Query String:
  - a. Credential Name Enter the name of the URL Query String parameter to use for this credential.
  - b. Credential Secret Enter the value (or secret) of the credential.
  - c. Valid for URLs APEX checks whether the URL a Web Credential uses matches the URLs in this attribute. When adding URLs to this attribute:
    - Place each URL on a new line.
    - The URL endpoint being used must start with one of the URLs provided here.

See field-level Help for examples.

- **d. Prompt On Install** Choose whether prompts for this credential display when the application is imported on another APEX instance.
- e. **Comments** Enter any comments or notes here. These comments never display when running the application.
- 12. Click Apply Changes.

# 17.6.3 Editing or Deleting Credentials

Edit or delete Web credentials from either Workspace Utilities or Shared Components.

To Edit or delete Web credentials:

- Navigate to the Web Credentials page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click **App Builder**.
    - b. Click Workspace Utilities.
    - c. Click Web Credentials.
  - From Shared Components:



- a. On the Workspace home page, click **App Builder**.
- b. Select an application.
- **c.** On the Application home page, click **Shared Components** in the center of the page.
- d. Under Workspace Objects, select Credentials.
- 2. On the Web Credentials page, select the credential name.

The Create/Edit page appears.

- 3. To edit a credential:
  - a. Edit the appropriate attributes. To learn more about an attribute, see field level Help.
  - b. To save your changes, click Apply Changes.
- 4. To delete a credential:
  - a. To delete a credential, click **Delete**.
  - b. When prompted, click **OK**.



#### Tip:

A credential cannot be deleted when it is being referenced somewhere in the workspace.

# 17.6.4 Viewing Credential Utilization

View the Web credential Utilization report.

To view Web Credential Utilization report:

- 1. Navigate to the Web Credentials page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click **App Builder**.
    - b. Click Workspace Utilities.
    - c. Click Web Credentials.
  - From Shared Components:
    - a. On the Workspace home page, click App Builder.
    - **b.** Select an application.
    - **c.** On the Application home page, click **Shared Components** in the center of the page.
    - d. Under Workspace Objects, select Credentials.
- 2. On the Web Credentials page, click **Utilization**.

The top of the Utilization page displays used credentials, the associated component type, the application id, and the component name. Unused credentials display at the bottom of the page.

3. To delete unused credentials, click **Delete Unused**.

# 17.6.5 Viewing Credential History

View the Web Credential History report.

To view Web Credential History report:

- Navigate to the Web Credentials page:
  - From Workspace Utilities:
    - a. On the Workspace home page, click **App Builder**.
    - b. Click Workspace Utilities.
    - c. Click Web Credentials.
  - From Shared Components:
    - a. On the Workspace home page, click **App Builder**.
    - b. Select an application.
    - c. On the Application home page, click **Shared Components** in the center of the page.
    - d. Under Workspace Objects, select Credentials.
- 2. On the Web Credentials page, click **History**.

The History page displays recent modifications made to Credentials in the current workspace.

# 17.7 Accessing Data with Database Links

Access data remotely by creating a database link.

About Database Links

A database link is a schema object in one database that enables you to access objects on another database.

- · Creating a Database Link
  - Create a database link in Object Browser.
- Viewing an Existing Database Link
   View existing database links in Object Browser.



- Managing Database Objects with Object Browser in Oracle APEX SQL Workshop Guide
- Database Links in Oracle Database Administrator's Guide

# 17.7.1 About Database Links

A database link is a schema object in one database that enables you to access objects on another database.



## Note:

By default, the CREATE DATABASE LINK system privilege is not granted to a provisioned workspace or database user. To use this feature, a DBA or administrator must grant this specific privilege to the database user in the user's workspace. See Creating Database Links in *Oracle Database Administrator's Guide*.

Because Oracle APEX runs in the Oracle database, you have access to all distributed Oracle database capabilities. Typically, you perform distributed database operations using database links.

Once you create a database link you can access the remote objects by appending <code>@dblink</code> to the table or view name where <code>dblink</code> is the Database Link Name you specify in the Create Database Object Wizard.

# 17.7.2 Creating a Database Link

Create a database link in Object Browser.

To create a database link:

- On the Workspace home page, click SQL Workshop and then Object Browser.
   Object Browser home page appears.
- 2. Click Create.
- 3. Select Database Link and click Next.
- 4. Follow the on-screen instructions.

Note that Database Link names must conform to Oracle naming conventions and cannot contain spaces, or start with a number or underscore.

# 17.7.3 Viewing an Existing Database Link

View existing database links in Object Browser.

To view an existing a database link:

- On the Workspace home page, click SQL Workshop and then Object Browser.
   Object Browser appears.
- 2. Select the object type **Database Links** at the top of the page.



18

# **Upgrading Oracle APEX Applications**

Installing a new release of APEX updates existing applications to the latest release, but does not alter application user interface or application components.

Once you upgrade an APEX instance from a previous release, existing applications will work without modification. However, to keep applications maintainable, up-to-date, and to leverage new functionality, perform the following steps after an upgrade or after an application has been imported which was exported from a previous release.



## Tip:

At the completion of each task described in this section, Oracle recommends running and thoroughly testing your application.

#### Reviewing Release Notes

After you upgrade from a previous APEX release, review the *Oracle APEX Release Notes*.

## Refreshing the Universal Theme

Update an application to use the latest Universal Theme to take advantage of new features, enhancements, and bug fixes as well as styling for new APEX components.

## Updating App Compatibility Mode

The Compatibility Mode attribute controls the backward compatibility of the APEX runtime engine when executing an application.

### Running Application Upgrade

After upgrading to a new release, the Application Upgrade wizard can help you to bulk update your application to leverage new features instead of deprecated ones or to automatically enable new functionality for existing components.

### Reviewing Old JavaScript

For applications using jQuery Migrate or legacy JavaScript, review the User Interface, JavaScript settings.



### See Also:

Upgrading from a Previous Oracle APEX Release in *Oracle APEX Installation Guide* 

# 18.1 Reviewing Release Notes

After you upgrade from a previous APEX release, review the *Oracle APEX Release Notes*.

Oracle APEX Release Notes contain important information not included in the APEX documentation. Key sections to review include:

- Changed Behavior Describes changes in application and component behavior compared to previous releases.
- Deprecated Features Lists features which Oracle plans to desupport or remove in a future APEX release. If a feature is related to application metadata or an API, existing applications can still use the feature, but Oracle strongly recommends that developers start to modify their applications as described in this section. Use APEX Advisor to scan existing applications for deprecated attributes.
- Deprecated in Previous Releases Lists features which were deprecated in a
  previous release but have not been fully removed or desupported from APEX.
   Oracle strongly recommends that developers start to modify their applications as
  described in this section. Run APEX Advisor to scan existing applications for
  deprecated attributes.
- Desupported Features Lists features that are no longer available. If a
  desupported feature is related to application metadata or APIs, then existing
  applications may not work as they did previously. Oracle recommends modifying
  the application to replace the feature.



Running Advisor to Check Application Integrity

# 18.2 Refreshing the Universal Theme

Update an application to use the latest Universal Theme to take advantage of new features, enhancements, and bug fixes as well as styling for new APEX components.



## Tip:

Before starting this procedure, Oracle recommends backing up your application by either exporting it or creating a copy. See Exporting an Application and Copying an Application.

To update an application to use the latest Universal Theme

- 1. Navigate to the Themes page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.

If the Universal Theme is not up-to-date, the Shared Components page displays a banner at the top of the page.

- 2. Click Refresh Theme.
- 3. Run and test your application.



See Also:

Updating Universal Theme page in the Universal Theme application

# 18.3 Updating App Compatibility Mode

The Compatibility Mode attribute controls the backward compatibility of the APEX runtime engine when executing an application.

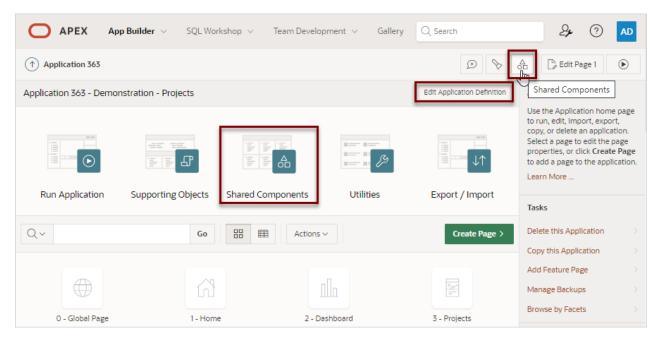
Certain runtime behaviors change from release to release. To not break or change the behavior of existing applications, this attribute is automatically set during upgrade if necessary.

To keep applications maintainable, set **Compatibility Mode** to the latest release after reviewing the changed behavior in the Release Notes and making the necessary changes.

To update the Compatibility Mode within an application:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.

The Application home page appears.



- From Application home page, you can access the Edit Application Definition page in two ways:
  - Click the Edit Application Definition button.
  - From Shared Components:
    - Click Shared Components.
    - Under Application Logic, click Application Definition.

The Edit Application Definition page appears.



- Click the **Definition** tab.
- **5. Properties**, **Compatibility Mode** To use standard behavior in an application, set the compatibility mode of the application to the current version.
- **6.** Click **Apply Changes** to save your changes.
- 7. Run and test your application.

See Also:

Changed Behavior, Compatibility Mode in Oracle APEX Release Notes

# 18.4 Running Application Upgrade

After upgrading to a new release, the Application Upgrade wizard can help you to bulk update your application to leverage new features instead of deprecated ones or to automatically enable new functionality for existing components.

The Upgrade Application page displays the available upgrade types and the number of objects that can be upgraded. Click on the number under **Candidate Object** to review the candidates and upgrade.

To upgrade an application to use new components:

- 1. Navigate to the Workspace home page.
- Click the App Builder icon.
- Select an application.

The Application home page appears.

- 4. Click Utilities.
- 5. Click Upgrade Application.

The Upgrade Application page appears displaying the available upgrade types and the number of objects that can be upgraded.

- To review the candidate objects, click the number link under the Candidate Objects column.
- 7. On the Upgrade page, select the objects to upgrade and click **Upgrade**.
- 8. Run and test your application.

# 18.5 Reviewing Old JavaScript

For applications using jQuery Migrate or legacy JavaScript, review the User Interface, JavaScript settings.

If your application uses jQuery Migrate or legacy JavaScript, review this logic to determine if it is still necessary. Removing this dependency benefits the application by not only ensuring you are only reliant on current, supported technology, but also a performance benefit because APEX will not need to load the corresponding library code.



jQuery 3.x breaks compatibility with earlier 2.x versions. For applications that still rely on removed 2.x functionality, you can use the jQuery Migrate plug-in (to include this plug-in, set the Desktop User Interface Details attribute **Include jQuery Migrate** to **Yes**).

If your application relies on removed 1.x jQuery APIs, that functionality no longer works as of Oracle Application Express release 18.1. You must update the JavaScript to only use jQuery 3.5 or later APIs. To learn more, see Known Issues for jQuery UI and jQuery Upgrade in *Oracle APEX Release Notes*.

To review the User Interface, JavaScript settings:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- 3. From Application home page, you can access the Edit Application Definition page in two ways:
  - Click the Edit Application Definition button.
  - From Shared Components:
    - Click Shared Components.
    - Under Application Logic, click Application Definition.

The Edit Application Definition page appears.

- 4. Click the **User Interface** tab.
- **5.** Edit the following settings:
  - a. JavaScript, Include Deprecated or Desupported Javascript Functions Specifies if deprecated or desupported JavaScript functions are included on every page in the application by selecting the appropriate releases. See Oracle APEX Release Notes for a list of deprecated and desupported functions.



## Tip:

If you are confident your application does not contain any references to deprecated or desupported functions, do not select any checkboxes to reduce the overall size of the JavaScript files loaded

**b. JavaScript**, **Include jQuery Migrate** - Specifies if the **jQuery Migrate** plug-in should be included on every page in the application.

The plug-in restores deprecated features and behaviors of jQuery so that old JavaScript code and jQuery plug-ins will still run properly with the jQuery version loaded by APEX.



### Tip:

If you are confident your application does not use a jQuery plug-in and does not contain any references to deprecated jQuery features, disable **Include jQuery Migrate** to reduce the overall size of the JavaScript files loaded.

- **6.** Click **Apply Changes** to save your changes.
- **7.** Run and test your application.



# **Extending Application Capabilities**

Learn about how to extend application capabilities including managing email, running background PL/SQL, utilizing plug-ins, and understanding jQuery support.

## Sending Email from an Application

To configure and manage email in Oracle APEX, an Instance administrator must sign in to APEX Administration Services.

## Implementing Plug-ins

Create plug-ins to declaratively extend, share, and reuse the built-in types available in APEX.

## · Understanding jQuery Support

Learn about jQuery support inOracle APEX.

## Manually Refreshing Oracle APEX Components

Use the <code>apex.region().refresh()</code> method to refresh the content of a region that supports being refreshed.

### Managing Automations

Automations initiate a sequential set of actions based on a schedule.

### Managing Approvals

Manage approvals by configuring task definitions, task details, and unified task lists. Use page processes to create approval tasks.

## See Also:

- Oracle APEX API Reference
- Deploying an Application

# 19.1 Sending Email from an Application

To configure and manage email in Oracle APEX, an Instance administrator must sign in to APEX Administration Services.

#### About Configuring Email

To enable APEX to send email, an Instance administrator must configure email settings.

## About Email Provisioning

Learn about email provisioning.

## About the Mail Queue

Learn about the mail queue.

## About the APEX MAIL Package

Learn about the APEX MAIL package.

# 19.1.1 About Configuring Email

To enable APEX to send email, an Instance administrator must configure email settings.

- About Enabling Network Services
   Learn about enabling network services.
- About Configuring Email in a Full Development Environment
   Learn about about configuring email in a full development environment.



Configuring Email in Oracle APEX Administration Guide

## 19.1.1.1 About Enabling Network Services

Learn about enabling network services.

Enabling network services enables support for sending outbound mail in Oracle APEX, use of Web services in Oracle APEX, and PDF report printing.

By default, the ability to interact with network services is disabled in Oracle Database 11*g* Release 2 or later. Therefore, if you are running Oracle APEX with Oracle Database 11*g* Release 2 or later, you must use the new DBMS\_NETWORK\_ACL\_ADMIN package to grant connect privileges to any host for the APEX\_220200 database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle APEX.
   Users can call methods from the APEX\_MAIL package, but issues arise when sending outbound email.
- Using Web services in Oracle APEX.
- PDF/report printing.

## See Also:

- Enabling Network Services in Oracle Database in Oracle APEX Installation Guide
- Configuring Email in Oracle APEX Administration Guide

# 19.1.1.2 About Configuring Email in a Full Development Environment

Learn about about configuring email in a full development environment.



To configure APEX to send mail in a full development environment your Instance administrator must sign in to APEX Administration Services, navigate to the Instance Settings page, and configure Email attributes.



Configuring Email in Oracle APEX Administration Guide

# 19.1.2 About Email Provisioning

Learn about email provisioning.

To configure APEX to automatically email users their login credentials when a new workspace request has been approved. To accomplish this, you must complete the email configuration process and select the provisioning status, Request with Email Verification.



- Configuring Email in Oracle APEX Administration Guide
- About Specifying How Workspaces Are Created in Oracle APEX Administration Guide
- Selecting a Provisioning Mode in Oracle APEX Administration Guide

# 19.1.3 About the Mail Queue

Learn about the mail queue.

Instance administrators can manage email sent from applications by monitoring email messages in the mail queue and mail log.



Managing the Mail Queue in Oracle APEX Administration Guide

# 19.1.4 About the APEX\_MAIL Package

Learn about the APEX MAIL package.

You can send email from an APEX application using the APEX MAIL package.

The APEX\_MAIL package is built on top of the Oracle supplied UTL\_SMTP package. Because of this dependence, the UTL\_SMTP package must be installed and functioning to use APEX\_MAIL.



## See Also:

- APEX\_MAIL in Oracle APEX API Reference
- · Configuring Email in Oracle APEX Administration Guide

# 19.2 Implementing Plug-ins

Create plug-ins to declaratively extend, share, and reuse the built-in types available in APEX.

## About Plug-ins

A plug-in is an extension to the built-in types available APEX. Create plug-ins for declarative use of new item, region, process and dynamic action types in your application.

#### Example Plug-ins

View plug-in examples on apex.world and the Oracle APEX GitHub repository.

### Creating a Plug-in

Create a plug-in by navigating to Shared Components and running the Create Plug-in wizard.

## Editing a Plug-in

Edit a plug-in by navigating to Shared Components and selecting it on the Plug-ins page.

## Adding Custom Attributes to a Plug-in

Add Custom Attributes by editing the plug-in.

## • Creating a File to Associate with a Plug-in

Create a file to associate with a plug-in.

#### Automatically Loading CSS and JavaScript Files

Automatically load CSS and JavaScript files when a plug-in is used on a page.

## · Adding Events to a Plug-in

Add events to an item, region, or dynamic action type plug-in, to enable them to be exposed to dynamic actions.

#### Deleting a Plug-in

Delete plug-ins on the Edit page.

## Viewing the Plug-in Repository

The Plug-in Repository provides a central location where developers can share and download plug-ins.

## · Exporting a Plug-in from the Plug-in Page

Export a plug-in definition to a file.

## Importing a Plug-in from the Plug-in Page

Import a plug-in definition to a file.

### Resetting the Plug-in Interactive Report

Reset the plug-in interactive report to clear all current filters applied to the report.

## Viewing Plug-in Utilization Page

The Plug-in Utilization page displays which pages, components, and regions use each plug-in.



## Viewing Plug-in History

The Plug-in History page shows the actions taken on each plug-in, the developer that performed the action and the date of each action.

# 19.2.1 About Plug-ins

A plug-in is an extension to the built-in types available APEX. Create plug-ins for declarative use of new item, region, process and dynamic action types in your application.

APEX supports a set group of authentication scheme, authorization scheme, item, region, dynamic action, and process types. Plug-ins offer a means of augmenting these built-in types by declaratively creating and using new types in your application. Because plug-ins are designed for reuse, developers can export and import them to other workspaces and also share them with the Oracle APEX Plug-in community by using the Plug-in Repository.

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

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

# 19.2.2 Example Plug-ins

View plug-in examples on apex.world and the Oracle APEX GitHub repository.

You can view plug-in implementation examples in the following locations:

- Explore APEX World Plug-ins.
- View Sample Plug-in in the Oracle APEX GitHub repository:
  - Go to https://github.com/oracle/apex.
  - Under Branches, select a release, and then Plug-ins.

# 19.2.3 Creating a Plug-in

Create a plug-in by navigating to Shared Components and running the Create Plug-in wizard.

To create a plug-in:



#### Tip:

To learn more about an attributes described in this section see field-level Help.

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.



- 2. Under Other Components, click Plug-ins.
- 3. Click Create.

The Create Plug-in wizard appears.

- 4. For Create Plug-in, select the method by which you would like to create a plug-in and click **Next**.
- 5. Under Name:
  - a. Name Enter name of the plug-in.
  - **b.** Internal Name Enter the internal name of the plug-in. This name must be unique within the current application.

## Note:

To insure the internal name is a globally unique name worldwide, Oracle recommends that your organization domain name be used as a prefix to internal plug-in names. For example, a domain name of example.com.com prefixed to a plug-in named Slider, would result in an internal name of COM.EXAMPLE.SLIDER.

- c. Type Select the type of component that can use this plug-in. Depending upon the plug-in type you select, the options under Callbacks and Standard Attributes differ. To learn more, see field-level Help.
- **d.** Category Only displays if the selected type is Dynamic Action. Select the category the plug-in is displayed under on the user interface.
- **6.** Under Subscription:
  - Reference Master Plug-in From Use this option to base this plug-in on an
    existing plug-in in this application or another application in your workspace..
    Otherwise, leave the field blank to make this the master copy of this plug-in.
  - b. Subscribe Component Settings -Specifies if the component settings of the plug-in should be refreshed with the component settings of the subscribed plug-in in the master application if the plug-in is getting refreshed.

#### 7. Under Source:

- a. PL/SQL Code Enter a PL/SQL anonymous block of code that contains the procedures for rendering, validating, executing, and performing Ajax callbacks for this plug-in. For performance reasons you can also store this code in a PL/SQL package in the database.
- **b.** Do not validate PL/SQL code (parse PL/SQL code at runtime only) Select this option to parse the PL/SQL code at runtime only. Otherwise, the code is parsed when the plug-in is created.
- 8. Callbacks Configure that appropriate attributes. The attributes that display depend upon the plug-in type. To learn more about an attribute and view examples, see field-level Help.





## Tip:

All Callback function names can reference a function of the anonymous PL/SQL code block, a function within a package or a standalone function in the database.

- 9. User Interfaces Select the display devices the App Builder must support for this plug-in. Options include:
  - Desktop
  - Mobile
- **10.** Standard Attributes Select the attributes that apply to this plug-in. Standard Attributes do not display for some plug-ins. To learn more, see field-level Help.
- **11.** Information:
  - a. Version Enter a string to identify the plug-in version.
  - **b.** About URL Enter a URL to the plug-in authors home page or to additional information about the plug-in.
- 12. For Help Text, enter help text used by the user to understand how the plug-in works.
- **13.** For Comments, enter comments and notes that never display when the application is running.

To learn more about each option, see field-level Help.

14. Click Create Plug-in.

Now that the plug-in is created, you can specify additional custom attributes, upload files such as image, CSS and JavaScript files to associate with your plug-in and add events.

# 19.2.4 Editing a Plug-in

Edit a plug-in by navigating to Shared Components and selecting it on the Plug-ins page.

To edit a plug-in:

- **1.** Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. Click the plug-in you want to edit.

The Edit page appears.

4. Make modifications.

To learn more about each option, see field-level Help.

Click Apply Changes.



# 19.2.5 Adding Custom Attributes to a Plug-in

Add Custom Attributes by editing the plug-in.

Custom Attributes specified by the developer might contain items referenced with substitution syntax.

To add custom attributes to the plug-in:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. Click the plug-in you want to modify.

The Edit page appears.

4. Custom Attributes - Enable or disable the substitution of attribute values.

Enable or Disable **Substitute Attribute Values**. Custom Attribute Values specified by the developer may contain items referenced with substitution syntax, for example &P1 DNAME. Options include:

- **On** APEX automatically replaces substitution syntax with their actual values.
- Off Substitution syntax is written unchanged into the attribute\_01 through attribute\_15 record type attributes of p\_plugin, p\_item, p\_region, and so on. The plug-in developer is responsible for replacing those substitution syntax references with a call to apex\_plugin\_util.replace\_substitutions or perform similar replacements.

To learn more and view examples, see field-level Help.

5. To add an attribute click Add Attribute.

The Edit Attribute page appears. Edit the appropriate attributes.

To learn more about a specific attribute, see field-level Help.

Click Create to create the attribute and go back to the Edit page, or click Create and Create Another to create the attribute and then create another one.



If you click **Create** or **Create and Create Another** and the **Return To Page** checkbox on the right panel under Plug-ins is checked, this same Edit Attribute page displays.



# 19.2.6 Creating a File to Associate with a Plug-in

Create a file to associate with a plug-in.

To create a file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. Select the plug-in.

The Edit page appears.

4. Locate the Files section.

File Prefix determines the virtual path the Web server uses to point to the files of the plug-in. Do not specify anything to reference files which are stored with your plug-in definition in the database. For performance reasons you can also store your plug-in files on your Web Server. Use #APEX FILES# or any valid URL to reference them.

- 5. To upload a file, click **Create File**.
- **6.** On the Create page:
  - a. Directory Enter the name of the directory where the file should be stored. For example, css or css/images.

If no directory is specified, the file is stored in the root directory.

- **b.** File Name If creating a blank file (for example, script.js), enter the name of the file.
- c. Content If uploading a file, do one of the following:
  - Drag and drop the file to the Content region.
  - Click the Content region and select the file.
- d. Click Create or Create and Create Another.

# 19.2.7 Automatically Loading CSS and JavaScript Files

Automatically load CSS and JavaScript files when a plug-in is used on a page.

You can have APEX automatically load CSS and JavaScript files when a plug-in is used on a page by configuring the File URLs to Load attributes. To specify which of the uploaded files should be loaded and in what order.

To automatically load a CSS or JavaScript file:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.



c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click **Plug-ins**.
- **3.** Select the plug-in.

The Edit page appears.

#### 4. Locate File URLs to Load:

a. Cascading Style Sheet - Enter Cascading Style Sheet file URLs to be loaded with this plug-in. Each URL has to be written on a new line.

If you provide a minified version of your file you can use the substitution string #MIN# to include .min, or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view, and an empty string if the page is viewed in debug mode. You also have access to the substitution string #PLUGIN\_FILES# to substitute with the value of the plug-in's file prefix.

File URLs you enter here will be emitted within the #APEX\_CSS# substitution string in the page template.

You do not need to include opening or closing link tags, just the file URL.

b. JavaScript - Enter JavaScript file URLs for code to be loaded with this plug-in.

Enter JavaScript file URLs for code to be loaded with this plug-in. Each URL has to be written on a new line. If you provide a minified version of your file you can use the substitution string #MIN# to include .min, or #MIN\_DIRECTORY# to include minified/ in your file URL for a regular page view, and an empty string if the page is viewed in debug mode. You also have access to the substitution string #PLUGIN\_FILES# to substitute the value of the plug-in's file prefix.

JavaScript file URLs you enter here will be emitted within the #GENERATED\_JAVASCRIPT# substitution string in the page template.

You do not need to include opening or closing script tags, just the file URL.

To view examples, see field-level Help.

5. Click Apply Changes.

# 19.2.8 Adding Events to a Plug-in

Add events to an item, region, or dynamic action type plug-in, to enable them to be exposed to dynamic actions.

For example, suppose you have a Slider plug-in that exposes events such as Start Slide, Sliding, and Stop Slide, and allows the creation of dynamic actions that can react when these events occur.

To add events to a plug-in:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.



- 2. Under Other Components, click Plug-ins.
- 3. Click the plug-in you want to edit.

The Edit page appears.

4. Locate Events and Click Add Event.

A new row displays under Events.

- 5. Under Events:
  - a. Name The display name under which the plug-in event appears in the dynamic action, for example: Start Slide.
  - **b.** Internal Name The name of the assigned JavaScript event that triggers the dynamic action, for example: slidestart.
- 6. Click Add Event.
- 7. Repeat steps 3 through 4 to add another event.
- 8. Click Apply Changes.

# 19.2.9 Deleting a Plug-in

Delete plug-ins on the Edit page.

You can delete a plug-in if it is not in use. If a plug-in is in use, the Delete button does not display.

To delete a plug-in:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. Click the plug-in you want to delete.

The Edit page appears.

- 4. Click Delete.
- 5. To confirm, click **OK**.

# 19.2.10 Viewing the Plug-in Repository

The Plug-in Repository provides a central location where developers can share and download plug-ins.

The Plug-in Repository is located on the Oracle Technology Network.

To view the Plug-in repository:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.



- b. Select an application.
- c. On the Application home page, click Shared Components.
   The Shared Components page appears.
- 2. Under Other Components, click Plug-ins.
- 3. Click View Plug-in Repository.

The APEX Plug-in Repository displays.

# 19.2.11 Exporting a Plug-in from the Plug-in Page

Export a plug-in definition to a file.

Plug-in export files can be imported into any Oracle APEX application. You can access the Export page from the Shared Components, Plug-ins page, as described here, or from the Export page.

To export a plug-in from the Plug-in page:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- Under Tasks, click Export Plug-in.

The Export Plug-in page appears.

- 4. On the **Export Plug-in** page:
  - a. Choose Application Select an application
  - **b.** Plug-in Select the plug-in to export.
  - c. Click Export.
- 5. Click Export.

A downloads complete message appears.

### See Also:

- Importing a Plug-in from the Plug-in Page
- Exporting Plug-ins

# 19.2.12 Importing a Plug-in from the Plug-in Page

Import a plug-in definition to a file.

Import a plug-in from the Shared Components, Plug-ins page, as described here, or from the Import home page.



To import a plug-in from the Plug-in page:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- Under Other Components, click Plug-ins.
- 3. Click Import.

The import Plug-in page appears.

- 4. On Import:
  - a. Drag and drop, or navigate to the file.
  - b. File Type Select Plug-in.
  - c. File Character Set Verify that File Character Set is correct.
  - d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

- 5. To install an imported file, click Next.
- 6. On Install Plug-in:
  - a. Install Into Application Select the target application. You can install the plug-in into the same application or into a different application.



### Tip:

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

b. Click Install Plug-in.



See Also:

Importing Plug-ins

# 19.2.13 Resetting the Plug-in Interactive Report

Reset the plug-in interactive report to clear all current filters applied to the report.

To reset the interactive report:

1. Navigate to the Shared Components page:



- a. On the Workspace home page, click App Builder.
- b. Select an application.
- c. On the Application home page, click Shared Components.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. On the Plug-ins page, click **Reset**.

# 19.2.14 Viewing Plug-in Utilization Page

The Plug-in Utilization page displays which pages, components, and regions use each plug-in.

To view the Plug-in Utilization page:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. Click Utilization.

The Plug-in Utilization page appears.

# 19.2.15 Viewing Plug-in History

The Plug-in History page shows the actions taken on each plug-in, the developer that performed the action and the date of each action.

To view the Plug-in History page:

- Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 2. Under Other Components, click Plug-ins.
- 3. Click History.

The Plug-in History page appears.

# 19.3 Understanding jQuery Support

Learn about jQuery support inOracle APEX.

 About Upgrading to jQuery 3.6.0 Learn about upgrading to jQuery 3.6.0.



# 19.3.1 About Upgrading to jQuery 3.6.0

Learn about upgrading to jQuery 3.6.0.

jQuery 3.x breaks compatibility with earlier 2.x versions. If you application relies on removed jQuery 2.x functionality, you can use the jQuery Migrate plug-in. To include the jQuery Migrate plug-in, go to the User Interface page and set **Include jQuery Migrate** to **On**.

If your application relies on removed 1.x jQuery APIs, be aware that this functionality no longer works as of Oracle APEX release 18.1. You must update the JavaScript to only use jQuery 3.5+ APIs. See the jQuery migration guides to learn more:

- To migrate from 1.x to 2.x, see http://jquery.com/upgrade-guide/1.9/
- To migrate from 2.x to 3.5.x, see https://jguery.com/upgrade-guide/3.5/



Accessing the User Interface Page

# 19.4 Manually Refreshing Oracle APEX Components

Use the <code>apex.region().refresh()</code> method to refresh the content of a region that supports being refreshed.

Although the Dynamic Action framework provides refresh capability for supported APEX components, there may be cases where you wish to manually invoke a refresh from JavaScript code. To do this, use the <code>apex.region().refresh()</code> method as follows:

apex.region("myRegionStatidID").refresh();

# 19.5 Managing Automations

Automations initiate a sequential set of actions based on a schedule.

- About Automations
  - Automations are a sequential set of actions, triggered by query results that monitor data and then perform the appropriate action.
- About Importing and Exporting Automations
   After importing an application, automations are disabled. Learn how to enable automations after importing.
- Creating an Automation
  - Create an automation as a Shared Component on the Automations page.
- Editing an Existing Automation
   Edit an existing automation on the Automation page.
- Managing the Automation Execution Log
   View and clear the Automation Execution Log records on the Automations, Execution Log page.



Viewing the Automation History Report
 View recent automation modifications on the Automations History report.

### 19.5.1 About Automations

Automations are a sequential set of actions, triggered by query results that monitor data and then perform the appropriate action.

Create automations to monitor data and then perform the appropriate action. Common automation use cases include approving specific requests and sending email alerts. An automation executes as a query or a PL/SQL function based on a defined schedule. Automations support Data Sources so the query can execute on a local database, a REST Enabled SQL service, or a REST Data Source.

Key features of automations include:

- Define Automation Actions Define multiple actions and have them execute for each automation query row in sequential order. The typical automation action is PL/SQL code. Automation actions can be executed for each row of the query results when the query returns no result, or when the PL/SQL function returns TRUE. Conditions control whether or not an automation executes. Column values from the query result rows are available as bind variables. Alternatively, you can also use Process Type plug-ins as an automation action.
- Specify Error Handling Define automation behavior for cases when an error occurs. Errors can be ignored, the automation can stopped, or set to "disabled" mode.
- Trigger Automations Programmatically The APEX\_AUTOMATION package provides a PL/SQL interface for triggering an automation programmatically.
- Review Automation Logs View the Automation Execution Log and Log Messages view details about previous automation executions. The Automations History report lists a history of recent automation modifications.

A coordinator job runs automation executions in regular intervals. Each automation actually executes up to a few minutes after the Next Execution Due time. Thus, while the automation edit page shows when the next execution is due, the actual execution will happen a few minutes after the time shown.

### Note:

The CREATE JOB privilege must be granted to the application's parsing schema in order to execute scheduled automations.

### See Also:

- APEX\_AUTOMATION package in Oracle APEX API Reference
- Configuring Background Jobs in Oracle APEX Administration Guide



# 19.5.2 About Importing and Exporting Automations

After importing an application, automations are disabled. Learn how to enable automations after importing.

Developers often import applications into a workspace multiple times, for versioning or other purposes. If automations were enabled during these imports, this would lead to multiple instances of the automation running simultaneously which is not the desired result. Therefore, Oracle APEX disables automations after you import an application.

You can activate automations directly in Shared Components, Automations, or in Runtime Only environment by using the following PL/SQL block as shown in the following examples:

### Example 1: Enable automation and start execution schedule immediately.

#### Example 2: Enable automation and set next execution timestamp explicitly

See Also:

**Editing an Existing Automation** 



# 19.5.3 Creating an Automation

Create an automation as a Shared Component on the Automations page.

The following example demonstrates how to create an automation that runs every two hours. This automation increases the salary (SAL) of salesmen. For each salesman (SALESMAN) with a commission (COMM) greater than 500, the salary (SAL) increases by 1.5%. For all other salesman, the salary (SAL) increases by 1%.



### Tip:

The examples in this section are built on the EMP table available in the sample dataset, EMP / DEPT. To install a sample dataset, see Using Sample Datasets in  $Oracle\ APEX\ SQL\ Workshop\ Guide$ .

#### To create an automation:

- Create a new application.
- Navigate to the Automations page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select the new application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
  - d. Under Workflows and Automations, select **Automations**.

The Automations page appears.

To create an automation, click Create.

The Create Automations Wizard appears.

- 4. Specify the automation name and define the execution schedule:
  - a. Name Enter a name for the new Automation. For example, Increase SAL.
  - b. Type Select an automation type. Select **Scheduled**.

Scheduled executes automatically based on the selected frequency. On Demand executes when called explicitly using the APEX\_AUTOMATION package.

c. Actions initiated on - Select Query.

This option determines whether the execution of Automation Actions should be initiated based on a **Query** (that is, the rows returned can then be used by the actions), or if the actions should **Always** be executed.

Execution Schedule - Select an execution schedule for the new automation.
 Select Custom.

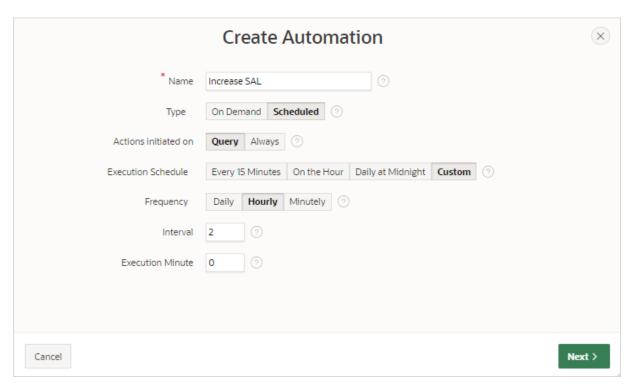
The **Frequency**, **Interval**, **Execution Minute** attributes only display if Execution Schedule is set to **Custom**.

 Frequency - Specify whether the execution schedule should be based on a daily, hourly or minutely basis. Select Hourly.



- f. Interval Enter 2 so that automation executes every 2 hours.
- g. Execution Minute Specify the execution minute, from 0 to 59. Leave this to the default, 0.

The Create Automation Wizard should resemble the following illustration.



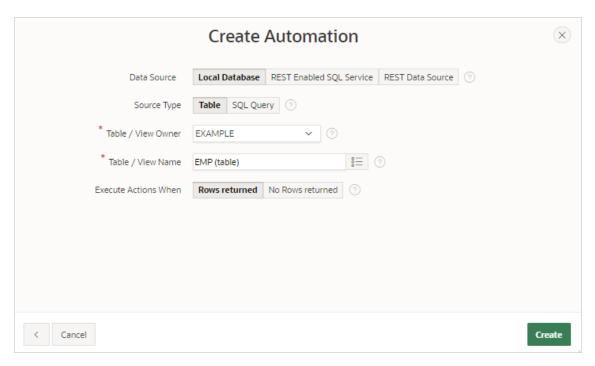
- h. Click Next.
- **5.** Define the source:

This example is based on the local table, EMP.

- a. Data Source Select the data source for this automation. Select Local Database.
- b. Source Type Select Table.
- c. Table/View Owner Select the owner of the table on which you are basing this automation.
- d. Table/View Name Select the table or view on which the automation will be based. For this example, select EMP (table).
- Execute Actions When This option determines if Automation Actions should execute when the query returns rows, or when the query does not return rows. Select Rows returned.

The Create Automation Wizard should resemble the following illustration.





Click Create.

The automation edit page appears. The following message displays at the top of the page:

Automation has been created and is in "Disabled" state. Now create  ${\it Actions}$  to execute when the automation runs.

- **6.** Edit the action for the first salary increase:
  - a. Scroll down to Actions.

Note that the wizard created an action, named **New Action**.

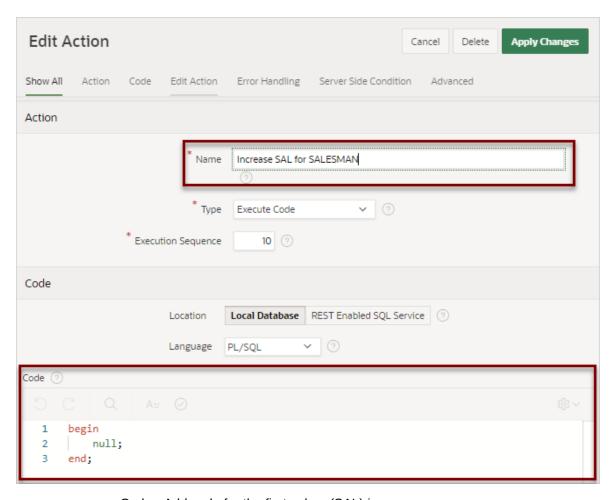
- b. Edit the new action, New Action:
  - Click the Edit icon adjacent to New Action.

The Edit Action page appears.

• Name - Enter a meaningful name such as Increase SAL for SALESMAN.

The Edit Action page should resemble the following illustration.





Code - Add code for the first salary (SAL) increase.

```
begin
update emp set sal = round(sal * 1.015, 1) where empno = :EMPNO;
apex_automation.log_info('SAL for ' || :ENAME || ' increased.');
end;
```

Note that the code will run on each row. In this example, each  ${\tt SQL}$  update statement works on a single row based on the EMPNO primary key column. Also note the use of the  ${\tt APEX\_AUTOMATION.LOG\_INFO}$  procedure . The  ${\tt LOG\_INFO}$  procedure writes a message with the "Information" level to the Execution Log for the automation. Available message levels as "Information" are "Warning" and "Error".

- c. Server Side Condition Create a server side condition for the salary increase.
  - Server Side Condition, Condition Type Select Expression.
  - Language Select PL/SQL.
  - Expression 1- Enter an expression to only execute the action when the salesman (SALESMAN) has a commission (COMM) of more than 500. Enter:

```
:JOB = 'SALESMAN' and :COM > 500
```



- Execute for Each Row Enable this option to specify the condition execute for each row.
- d. Click Apply Changes.
- 7. Create another action for the second salary increase:
  - a. Scroll down to Actions again and click Add Action.

The Edit Action page appears.

- **b.** Edit the new action:
  - Name Enter a meaningful name such as Increase SAL for all others.
  - Code Update the code to increase the salary (SAL) for all other salesman.

```
begin
update emp set sal = round(sal * 1.01, 1) where empno
= :EMPNO;
apex_automation.log_info('SAL for ' || :ENAME || ' increased
by 1%.');
end;
```

- **c.** Server Side Condition Create a server side condition for the salary increase.
  - Condition Type Select Expression.
  - Language Select PL/SQL.
  - Expression Enter an expression to only execute this action when the salesman (SALESMAN) has a commission (COMM) is less than or equal to 500 or null.

```
:JOB != 'SALESMAN' and :COM <= 500 or :COMM is null
```

- Execute for Each Row Enable this option to specify the condition execute for each row.
- d. Click Create.
- 8. Run the automation. On the Automation Edit page, click **Save and Run**.

When you click **Save and Run**. the automations execute in the background. Note that the browser displays again immediately even if the actions are still running.

The following message appears:

```
Changes applied. Automation Execution initiated.
```

- 9. Review the Automation Execution Log:
  - **a.** Return to the Automations page by clicking the **Automations** breadcrumb.
  - b. Click the **Execution Log** tab and verify the automation executed.
  - Click the link under Messages to view individual messages for processed rows.





### Tip:

You can also view the target table in SQL Workshop, Object Browser to validate that the automation is actually changing the data. See Browsing a Table in *Oracle APEX SQL Workshop Guide*.

- d. If viewing messages, click the Execution Log tab to return to the previous page.
- 10. Clear the Automation Execution Log:
  - a. On the Execution Log page, click Purge Log.

The Clear Automation Log dialog appears.

- b. In the Clear Automation Log dialog:
  - From the Automation list, select the Automation (for example, Increase Sal).
  - Click Clear Log.
- 11. Update the automation Settings to enable the schedule:
  - a. Return to the Automations page by clicking **Automations** breadcrumb.
  - b. Select the name of the automation to be edited. For example, select Increase SAL.
  - **c. Settings**, **Schedule Expression** Click **Schedule Builder** to right of the Schedule Expression field and update the following:
    - Frequency Select Weekly.
    - Interval Accept the default, 1.
    - Execution Day Select Mon, Tue, Wed, Thu, and Fri.
    - Execution Hour Enter 14.
    - Execution Minutes Enter 30.
    - Click Set Execution Interval.

In the previous example, the automation execution would be due every working day at 2:30pm. The automation scheduler runs in the time zone of the database server.

- d. Schedule Status Select Active.
- e. To save your edits, click **Save Changes**.

### See Also:

- Configuring Background Jobs in Oracle APEX Administration Guide
- APEX\_AUTOMATION package in Oracle APEX API Reference

# 19.5.4 Editing an Existing Automation

Edit an existing automation on the Automation page.

To edit an automation:



- 1. Navigate to the Automations page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select the application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
  - d. Under Workflows and Automations, select **Automations**.
- 2. On the Automations page, click the automation Name.

The Automation: *Name* edit page appears. Edit the appropriate attributes.

- 3. Name:
  - a. Name Defines the name of the automation.
  - b. Static ID Defines the Static ID for this automation. Use the Static ID when manually executing the automation with the APEX\_AUTOMATION package (for example, APEX\_AUTOMATION.EXECUTE).

#### 4. Settings:

- Type Scheduled executes automatically based on the selected frequency.
   On Demand executes when called explicitly using the APEX\_AUTOMATION package.
- b. Schedule Expression Use **Database Scheduler calendaring syntax** to define repeating execution schedules, such as "every Tuesday and Friday at 4:00 p.m." or "the second Wednesday of every month".
  - The calendaring syntax can either be entered manually, or declaratively to build simple expressions by using the **Interval Builder**. Access Interval Builder by clicking the **Schedule Builder** icon to the right of the text area.
  - BACKGROUND\_MIN\_EXECUTION\_CADENCE controls the minimum amount of minutes which must be between two subsequent automation executions. Note that the automation scheduler works in the time zone of the database server.
- **c.** Schedule Status Indicates the state of the Automation Schedule. Options include:
  - Active Schedule is active and the automation will be executed based on the Schedule Expression.
  - **Disabled** Schedule will not be executed. However, the automation can still be executed by calling the APEX\_AUTOMATION package.
  - **Error** Schedule is disabled because an error occurred during the last execution. However, the automation can still be executed by calling the APEX AUTOMATION package.
- d. Actions Initiated On Specify the data source type for this automation. Options include:
  - Query A SQL Query will be executed. Automation actions can be executed when data is found (for each row), or when no data is found (once).
  - Function Body Returning Boolean A PL/SQL function body is executed. If it returns TRUE, then the automation actions are executed once.



 Always - Automation actions are always executed. This option is suitable to be used with the Schedule type to execute the actions based on a schedule regardless of the presence of certain data.

#### 5. Source:

- Data Source Defines the Data Source for this automation. Options include:
  - Local Database Data is sourced from the local database.
  - REST Enabled SQL Service Data is sourced from a remote database, where
    the connection is defined using REST Enabled SQL. To create or maintain REST
    Enabled SQL references, navigate to Shared Components, REST Enabled SQL.
  - REST Data Source Data is sourced from a RESTful web service defined using REST Data Sources. To create or maintain REST Data Sources, navigate to Shared Components, REST Data Sources.

The option you select determines the subsequent UI options. To learn more about an attribute, see item Help.

#### 6. Actions:

a. Add an Action - Click Add Action.

The Edit Action page appears. Edit the attributes and click **Create**.

b. Edit an action - Click the **Edit** icon adjacent to the action Name.

The Edit Action page appears. Edit the attributes and click **Apply Changes**.

To learn more about an attribute on the Edit Action page, see item Help.

#### **7.** Action Execution:

- **a.** Execute Actions When Specify whether the automation actions should execute when the query returns rows or when the query does not return rows.
- **b.** Primary Key Column Optionally, specify the primary key column within the query result. The value of this column will be added to the log messages, in order to allow correlating log messages to source rows.
- c. Commit Specify whether to commit after the actions for each row have been executed or to commit just once after all rows have been processed.
- d. Maximum Rows to Process If defined, the automation execution stops when that maximum is reached and the automation is logged as Incomplete.
- e. Action Error Handling Select what should happen when the automation encounters and error:
  - Ignore Ignore error and continue processing automation
  - Abort Automation Abort automation but leave it enabled
  - Disable Automation Abort automation and disable it

### 8. Additional Code Execution:

- a. Executable PL/SQL Code Enter a PL/SQL anonymous block of code that contains procedures to be called for the initialization or cleanup of the automation, or before action processing for each row. For performance reasons, you can also store this code in a PL/SQL package in the database.
- b. Initialization Procedure Name Provide the name of an Initialization Procedure to execute at the very beginning of an automation execution. Define the procedure as a PL/SQL object in the database schema, or above in **Executable PL/SQL Code**.



- c. Before Row Processing Procedure Name Provide the name of a Before Row Processing Procedure to execute for each row, before executing the defined actions. Define the procedure as a PL/SQL object in the database schema, or above in Executable PL/SQL Code.
- d. Cleanup Procedure Name Provide the name of a Cleanup Procedure to execute at the very end of the automation execution. Define the procedure as a PL/SQL object in the database schema, or above in Executable PL/SQL Code.

#### 9. Server-Side Condition:

- Condition Type Select a condition type from the list that must be met in order for this automation to be executed.
  - The UI changes depending on the Condition Type you select. If you select **Expression**, the Language and Expression 1 attributes display.
- **b.** Language Select a language that is used to evaluate the entered programming code.
- c. Expression 1 Enter an expression to conditionally control the circumstances under which this automation will be executed. Enter values in this attribute based on the specific condition type selected. The automation will execute only if the specified condition is met.

#### 10. Advanced:

- a. Build Option Select a build option for this automation. Build options are predefined settings that determine whether or not components within an application are enabled.
- Comments Enter any developer comments or notes here. These comments only display within App Builder and never display when running the application.
- 11. To save your edits, click Save Changes.
- 12. To execute the automation, click **Save and Run**.
- **13.** To delete the automation, click **Delete**.

#### See Also:

- APEX AUTOMATION package in Oracle APEX API Reference
- Configuring Background Jobs in Oracle APEX Administration Guide
- DBMS\_SCHEDULER Operational Notes in Oracle Database PL/SQL Packages and Types Reference

## 19.5.5 Managing the Automation Execution Log

View and clear the Automation Execution Log records on the Automations, Execution Log page.

Oracle APEX purges log information by default every 14 days. Other retention periods can be configured in Administration Services.



### Viewing the Automation Execution Log

View the Automation Execution Log for details about previous automation executions, such as start and end timestamps and details about processed rows (both successful and with errors).

Purging the Automation Execution Log

Purge the Automation Execution Log records by clicking Purge Log on Execution Log page.

See Also:

Configuring or Deleting the Automation Log in Oracle APEX Administration Guide

### 19.5.5.1 Viewing the Automation Execution Log

View the Automation Execution Log for details about previous automation executions, such as start and end timestamps and details about processed rows (both successful and with errors).

The Automation Execution Log contains start and end timestamps as well as details about processed rows (successful and with errors). Drill down into **Messages** to see individual messages for processed rows.

To access the Execution Log:

- 1. Navigate to the Automations page:
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select the new application.
  - c. On the Application home page, click **Shared Components**.

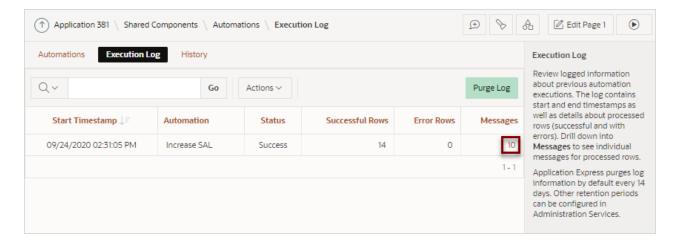
The Shared Components page appears.

d. Under Workflows and Automations, select **Automations**.

The Automations page appears.

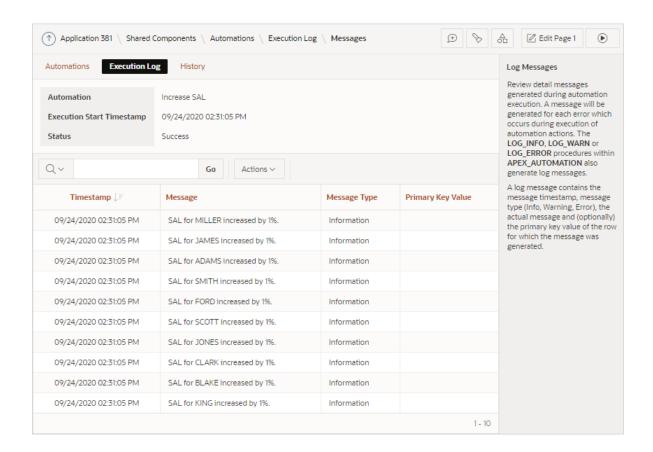
2. Click the Execution Log tab.

The Execution Log appears displaying the following: Start Timestamp, Automation name, Status, Successful Rows, Error Rows, and Messages.





Click the link under Messages to view individual messages for processed rows.The Log Messages appear.



Each log message displays the following: Timestamp, the Message text, the Message Type (Information, Warning, or Error), and (optionally) the primary key value of the row for which the message was generated.



#### Tip:

You can view the target table in SQL Workshop, Object Browser to validate that the automation is actually changing the data. See Browsing a Table in *Oracle APEX SQL Workshop Guide*.

### 19.5.5.2 Purging the Automation Execution Log

Purge the Automation Execution Log records by clicking Purge Log on Execution Log page.

To purge the Automations Execution Log:

- 1. Navigate to the Automations page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select the new application.

c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

d. Under Workflows and Automations, select **Automations**.

The Automations page appears.

2. Click the Execution Log tab.

The Execution Log page appears.

- 3. Click Purge Log.
- 4. In the Clear Automation Log dialog:
  - a. From the Automation list, select the log to purge.
  - b. Click Clear Log

## 19.5.6 Viewing the Automation History Report

View recent automation modifications on the Automations History report.

To view the Automations History report:

- 1. Navigate to the Automations page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select the new application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

d. Under Workflows and Automations, select **Automations**.

The Automations page appears.

Click the History tab.

The History report appears displaying the following: Audit Date, Action, Developer, Object Type, and Component Name.

# 19.6 Managing Approvals

Manage approvals by configuring task definitions, task details, and unified task lists. Use page processes to create approval tasks.

About Approvals

The approvals component allows Oracle APEX to create tasks for user approval.

Example Approvals

View the approvals component functionality in the Sample Approvals app.

Managing Task Definitions

Task Definitions set up the structure for a particular set of tasks, including participants, parameters, and actions.

Managing Task Details

Task Details are displayed when you open the task instance.

Managing Unified Task Lists

The Unified Task List allows workspace users to view and manage their tasks.



- Creating Tasks from Task Definitions
   Create tasks in an Oracle APEX application from existing task definitions.
- Example: Creating Approval Tasks from Form Submission
   Configure approval tasks to run after a user submits a job change request.
- About Task States and Transitions
   Learn about the task lifecycle in the Oracle APEX approval component.
- About Task Retention and Task Purging
   Learn about task retention, task purging, and the Archive of Purged Task Files
   Report.
- About Creating Human Tasks Programmatically Learn about creating human tasks programmatically.
- About Creating Approval Process Plug-ins Learn about creating approval process plug-ins.
- Runtime Views for Approvals
  Learn about the APEX\_TASKS, APEX\_TASK\_COMMENTS, APEX\_TASK\_HISTORY,
  APEX\_TASK\_PARAMETERS, and APEX\_TASK\_PARTICIPANTS views.
- Substitution Strings and Bind Variables for Tasks
   Substitution Strings are used to pass information about a task to an Oracle APEX page.

### 19.6.1 About Approvals

The approvals component allows Oracle APEX to create tasks for user approval.

The APEX Approvals Component is a toolkit for implementing human approvals into your application. It contains infrastructure that streamlines setting up human approvals. Because the approvals component contains a data model, when you configure human approvals, you focus on the details and customization for a specific type of approval.

You can set up task approvers and administrators at design time or determine them dynamically at runtime based on data related to the task.

APEX provides building blocks for approvals:

- Task Definition A shared component used to configure task parameters, participants, actions, and due dates.
- **Unified Task List** A page type in the Create Page Wizard, used to create a summary of tasks that functions like an inbox.
- Task Details Page A page that shows details for a specific task, which can include metadata, history, comments, and actions.
- Human Task Create and Human Task Manage Page processes that create and act on task instances in your pages.
- APEX\_APPROVAL A package API for creating, retrieving, and managing tasks programmatically.

By customizing these building blocks, you can create an approval process specific to your application, or shared across many applications. Once you create the task definition, unified task list, and task details page, you add the task definition to a page as a **Human Task - Create** page process. When the process activates, the approvals engine creates the task from the task definition.



Users can view and take action on their tasks in the unified task list. Based on the user action, the **Task State** changes. For more on task states, see About Task States and Transitions.



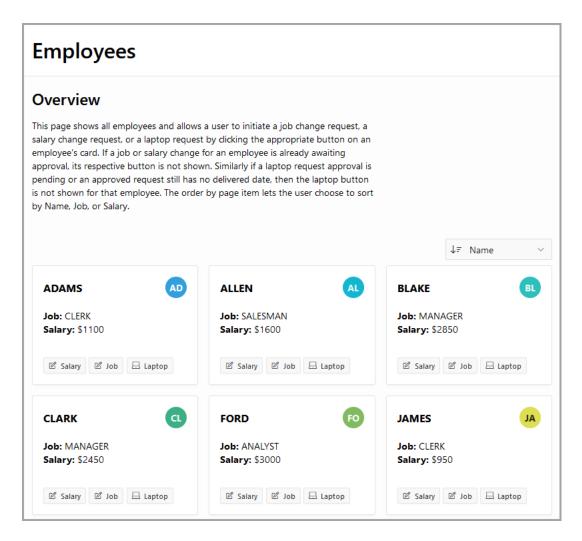
### Tip:

If a user initiates a task, they cannot approve that same task. The initiator of the task and the owner of the task must be different.

# 19.6.2 Example Approvals

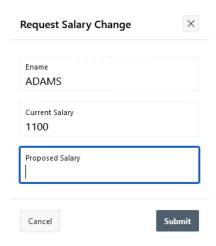
View the approvals component functionality in the Sample Approvals app.

Sample apps are designed to highlight specific functionality and are intended to serve as a developer guide on how to make use of a particular feature. The images included are from the **Sample Approvals** app, which can be installed from the Gallery.

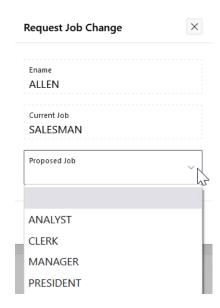


The **Employees** screen is the main screen of the Sample Approvals app. Users can request a change to an employee's salary by clicking **Salary**, or a change to an employee's job by clicking **Job**.



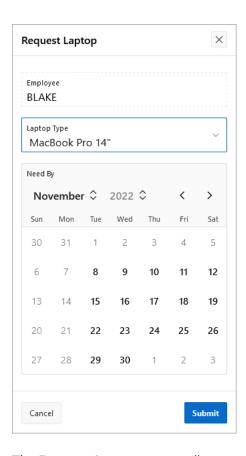


The **Request Salary Change** screen allows users to view the current salary for an employee and enter a proposed salary. Once a user requests a salary change, the **Salary** button on the Employees screen is no longer visible.



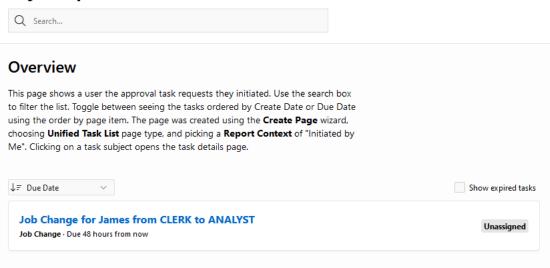
The **Request Job Change** screen allows users to view the current job for an employee and select a proposed job. Once a user requests a job change, the **Job** button on the Employees screen is no longer visible.





The **Request Laptop** screen allows users to select the type of laptop for an employee and the Need By date for the laptop. Once a user requests a laptop, the **Laptop** button on the Employee screen is no longer visible.

## My Requests



There are three unified task lists included as part of the sample app:

1. My Approvals, based on the My Tasks context

- 2. My Requests, based on the Initiated by Me context
- 3. Approvals Administration, based on the **Admin Tasks** context

Each unified task list shows tasks relevant to the user currently logged in, allowing them to manage, track, or administer approvals. Users cannot approve tasks that they have initiated, even if they are one of the potential owners for that task.



#### Tip:

To view this example, install the sample app, *Sample Approvals*. To learn more, see Installing Apps from the Gallery.

# 19.6.3 Managing Task Definitions

Task Definitions set up the structure for a particular set of tasks, including participants, parameters, and actions.

- About Task Definitions
   The approvals component allows Oracle APEX to create tasks for user approval.
- Creating a Task Definition
   Create a Task Definition from the Shared Components page, under the Workflows and Automations heading.
- Copying a Task Definition
   Copy an existing Task Definition from the Shared Components page, under the Workflows and Automations heading.
- Editing a Task Definition
   Edit Task Definition details from the Shared Components page, under the Workflows and Automations heading.
- Viewing the Task Definition Utilization Report
   The Task Definition Utilization Report shows all pages and page components
   where Task Definitions are used in a specific application.
- Viewing the Task Definition History Report
   The Task Definition History Report shows recent modifications made to Task Definitions.

### 19.6.3.1 About Task Definitions

The approvals component allows Oracle APEX to create tasks for user approval.

**Task Definitions** contain information about tasks, including deadlines, expiry settings, and notification settings. Task definitions exist on the application level in the Shared Components section, and are made up of task settings, participants, parameters, and actions:

- **Settings** The general configuration options for the task, including the default priority for tasks, the task detail page URL, and the task deadline settings.
- Task Definition Participants Users that have permission to act on individual tasks. Participants can be:
  - Task Initiators, who can start new tasks or provide more information about existing tasks.



- Potential Owners, who can claim unassigned tasks. Tasks can have multiple potential owners.
- Actual Owners, who can make changes to their assigned tasks, including requesting more information about the task and approving or rejecting the task.
- Business Administrators, who have administrative rights to renew expired tasks, reassign tasks to new owners, or update the priority on tasks.
- **Task Definition Parameters** Attributes for a task that contain information about the task. These parameters can be visible on the task details page.
- Task Definition Actions Possible events that can happen when specific criteria are met. Available actions are:
  - Claim
  - Complete
  - Delegate
  - Update Comment
  - Update Priority
  - Release
  - Cancel
  - Create
  - Request Information
  - Submit Information
  - Before Expire
  - Expire

You can update a Task Definition any time. Updates do not change existing tasks, but are applicable to new tasks.

### 19.6.3.2 Creating a Task Definition

Create a Task Definition from the Shared Components page, under the Workflows and Automations heading.

To create a task definition:

- 1. Select an application.
- 2. Navigate to the Task Definitions page:
  - a. On the application home page, select **Shared Components**.
  - b. Under Workflows and Automations, select **Task Definitions**.
- 3. Click Create.

The Create Task Definition wizard appears.

- **4.** Specify the task definition name and define the metadata.
  - a. Name Enter a name for the new Task Definition.
  - **b.** Subject Provide a subject for the task definition.



For example, Purchase Requisition for Order &ORDER\_ID., where ORDER\_ID is a defined parameter of the task definition.  $ORDER_ID$  is substituted with the parameter value on task creation.

For more on substitution strings, see Substitution Strings and Bind Variables for Tasks.

- c. Static ID Provide a static ID for this task definition. The static ID is used when creating the task with the APEX\_APPROVAL package (APEX\_APPROVAL.CREATE\_TASK).
- d. Priority Set the priority for the task. Choose a number between 1 and 5, where 1 is Urgent and 5 is Lowest. The default priority is 3 Medium.
- e. Potential Owner The user who can approve or reject the task.
  - To determine potential owners dynamically, edit the participants in the Task Definition Details. The user who initiates a task cannot approve their own task, even if they are listed as a Potential Owner.
- **f.** Business Admin The user who has administrative rights on all tasks for this task definition.

To determine business administrators dynamically, edit the participants in the Task Definition Details.

#### Click Create.

The Task Definition details page opens.

6. Set the Task Details Page Number. If a Task Details Page already exists for this application, enter the page number here. Otherwise, select Create Task Details Page to create a new page.

The Task Details Page allows you to view the details of the task instance when the task is selected on the Unified Task List Report. See Editing the Task Details Page.

Set the Actions Source - Specify the source of the data that is evaluated when the task actions are executed.

These actions are based on tables or SQL queries. An Actions SQL Query can reference the bind variable  $:APEX$TASK_PK$$  to access the value of the primary key in the task detail row.

- 8. Set Due on Type by specifying whether the Due Date is based on an ISO/SQL interval, SQL Query, Function Body, PL/SQL Expression, or Scheduler Expression.
  - For Interval, set **Due on Interval** The ISO or SQL format duration that specifies a task's deadline.
  - For SQL Query, Function Body, or Expression, set **Due On** The SQL Query, Expression, or Function Body that returns a valid due date for the task.
  - For Scheduler Expression, set **Due On Scheduler Expression** Use the Database Scheduler calendaring syntax to schedule a due date. For example, first Friday of the month at 4:00 p.m..

### 9. Set the Expiration Policy:

- **None** After the due date, the task stays in its current state, and owners can still approve or reject the task. This is the default setting.
- Expire After the due date, the task expires. Expired tasks cannot be approved or rejected.



- Renew After the due date, the task expires, and a new task is created from the same task definition. If you select Renew, set the Maximum Renewal Count to specify the maximum number of times a task is automatically renewed. A task can be renewed up to 99 times.
- **10.** Create Participants to assign additional people to the Task Definition.
  - a. Select Add Row.
  - b. Edit the Participant Type to select Potential Owner or Business Administrator.

The user who initiates a task cannot approve their own task, even if they are listed as a Potential Owner.

c. Set the Value Type.

SQL Query, Function Body, and Expression all allow users to be dynamically selected, and can return one or more user names.

d. Set the Value.

#### 11. Set Parameters.

- a. Select Add Row and fill in the parameter fields.
- **b.** Static ID Identifier used to reference the parameter.
- c. Label A user-friendly name for the task parameter.
- d. Data Type Choose String.
- e. Required Specify whether the parameter is mandatory.
- f. Visible Specify whether the parameter is visible in the task details page.
- g. Comment (Optional) Describe the parameter.

Note: Parameters set in the Task Definition also need to be set in the page process. See Creating Tasks from Task Definitions.

- **12.** Select **Apply Changes** to save all existing changes, and then click on the task definition name to continue editing.
- 13. Add Actions.
  - a. Click Add Action.

The Edit Task Definition Action page opens.

- **b.** Name Enter a name for the task definition action.
- c. Type Select Execute Code or Send Email.

For Send Email, you can use predefined email templates with substitution strings. For example, you can configure a notification email to the initiator when a task is approved or rejected. For more information, see Managing Email Templates.

- **d.** Execution Sequence Specify the execution sequence. Actions are executed in numerical order, from low to high.
- e. On Event Select the event that triggers the action.
- f. Success Message Enter a success message that indicates the action is successfully processed. The success message is included in the task history if the Log Messages When attribute in the Error Handling section is set to All or Success.
- **14.** Configure the Action Type.
  - Set attributes for Execute Code:



- Location Specify whether your PL/SQL code is executed in the Local Database or on a REST Enabled SQL Service.
- Language Select the language used to evaluate the code.
- Code Provide the PL/SQL code to be executed.
  - \* Column values from the task definition action query are available as bind variables by column name, such as :EMPNO and :ENAME. For more on bind variables, see Substitution Strings and Bind Variables for Tasks. You can expand the **Examples** section to see code examples.
- Set attributes for Send Email:
  - From The email address that displays as the sender of the email.
  - To The email recipients.
  - Cc The carbon copy email recipients.
  - Bcc The blind carbon copy email recipients.
  - Reply To The email address replies are sent to. If left blank, the From email is used.
  - Email Template Choose an email template, and set the placeholder values. For more information, see Managing Email Templates.
  - Subject The subject of the email.
  - Body Plain Text The text of the email. Plain text is used if the recipient's email client does not support rich text. See the in-app help text for more details.
  - Body HTML The HTML text of the email. See the in-app help text for more details.
  - Attachment SQL Enter a SQL statement that returns one or more BLOBs that are attached to the email as files.

### 15. Set up Error Handling:

- a. Error Message Enter an error message that can be added to the task log if the action errors while executing. The error message is included in the task history if the Log Messages When attribute in the Error Handling section is set to All or Failure. Use #SQLERRM# as a placeholder for the actual ORA error message.
- **b.** Stop Execution on Error Enable if processing for the current task stops after an error. Subsequent actions are not processed, and the task goes into the ERRORED state.
- c. Log Messages When Specify the actions that are logged in the task history. You can choose between None, Success, Failure, and All. When actions are logged in the history, they include the Success Message or Error Message text.
- **16.** Finish configuring the Action.
  - Condition Type Select a condition type that must be met for this action to be executed.
  - **b.** Build Option Select a build option for this action. Build options determine whether or not components in an application are enabled.



- **c.** Comments Enter developer notes here. These comments only display in App Builder and are not visible in the application.
- 17. Click Create to go back to the Task Definition.
- 18. Add any Comments for this task definition.
- 19. Click Apply Changes.

APEX creates the Task Definition.

## 19.6.3.3 Copying a Task Definition

Copy an existing Task Definition from the Shared Components page, under the Workflows and Automations heading.

To copy a task definition:

- 1. Select an application.
- 2. Navigate to the Task Definitions page:
  - a. On the application home page, select **Shared Components**.
  - **b.** Under Workflows and Automations, select **Task Definitions**.
- 3. Click Copy.

The Copy Task Definition wizard appears.

- 4. Specify the task definition you want to copy:
  - a. Copy Source Select This Application or Other Application.
    - Applications Choose the application you want to copy the task definition from.
       This option only appears if you selected Other Application.
    - c. Copy Task Definition Choose the task definition to copy.
    - d. New Name Provide a name for the copied task definition
    - e. New Static ID Provide a static ID
- 5. Click Copy Task Definition.
- APEX copies the task definition:
  - Copy Task Definition copies the settings, deadline, participants, actions, and parameters from the original task. The task details page is not copied.
  - If the task definition uses any shared components (like email templates or Rest Data Sources), those shared components are copied to the target application if they are not already there.
  - Subscriptions are not copied.
- 7. Click on the task definition name to edit it.
- 8. Set the Task Details Page Number. If a Task Details Page already exists for this application, enter the URL here. Otherwise, select **Create Task Details Page** to create a new page.

### 19.6.3.4 Editing a Task Definition

Edit Task Definition details from the Shared Components page, under the Workflows and Automations heading.



- Example: Editing Task Definition Participants
   Edit Task Definition Participants by accessing the Task Definition in the Shared Components page.
- Example: Editing Task Definition Parameters
   Edit Task Definition Parameters by accessing the Task Definition in the Shared Components page.
- Example: Adding and Editing Task Definition Actions
   Add and edit Task Definition Actions by accessing the Task Definition in the Shared Components page.

### 19.6.3.4.1 Example: Editing Task Definition Participants

Edit Task Definition Participants by accessing the Task Definition in the Shared Components page.

This example uses the **Sample Approvals** application, which can be installed from the Gallery. In this example, suppose that Bo, one of the potential owners in the Job Change task definition, has become a business administrator for that definition.

To edit Task Definition Participants:

- 1. Select the Sample Approvals app.
- 2. Navigate to the Task Definitions page:
  - a. On the Application home page, click **Shared Components**.
  - b. Under Workflows and Automations, select **Task Definitions**.
- 3. Click Job Change.
- 4. Under Participants, select the row where Participant Type is Potential Owner and Value is Bo.
- 5. Click Edit.
- 6. Change the Participant Type from Potential Owner to Business Administrator.
- 7. Click Apply Changes.

Bo is now a business administrator on all new Job Change tasks. Job Change tasks that already exist are not changed.

### 19.6.3.4.2 Example: Editing Task Definition Parameters

Edit Task Definition Parameters by accessing the Task Definition in the Shared Components page.

This example uses the **Sample Approvals** application, which can be installed from the Gallery. In this example, suppose that for Job Change requests, you want to display the old job title as well as the new job title on 2 - Task Details.

To edit Task Definition Parameters:

- 1. Select the Sample Approvals app.
- 2. Navigate to the Task Definitions page:
  - a. On the Application home page, click **Shared Components**.
  - b. Under Workflows and Automations, select **Task Definitions**.
- 3. Click Job Change.



- 4. Under Parameters, click Add Row.
  - a. Static Id JOB
  - b. Label Previous Job
  - c. Data Type String
  - d. Required Yes
  - e. Visible Yes
- 5. Click Apply Changes.
- **6.** Go back to the application home page, and open **7 Request Job Change** in Page Designer.
- 7. Open the Processing tab, and expand the Submit Task process.
- 8. Under Parameters, select Previous Job.
- 9. Under Value, set the Type to Item.
- 10. Set the item to P7 JOB.
- 11. Click Save.

Now, when 7 - Request Job Change is saved, the Previous Job value will be stored.

12. Open 2 - Task Details in Page Designer, and confirm that the Details section contains the columns Param Label and Param Value.

All visible parameters, including the new Previous Job parameter, are visible in the Details section of the Task Details page.

To test this change, go to the Employees page, and request a new job change. After submitting the Request Job Change page, access the task details page through My Requests or Approvals Administration. Both the new job and the previous job are visible.

### 19.6.3.4.3 Example: Adding and Editing Task Definition Actions

Add and edit Task Definition Actions by accessing the Task Definition in the Shared Components page.

This example uses the **Sample Approvals** application, which can be installed from the Gallery. In this example, suppose that you want to add an action that logs an event every time a task is complete.

This example requires a metrics table to be added to the Sample Approvals app through the SQL Commands page of the SQL Workshop.

```
CREATE TABLE EBA_DEMO_APPR_METRICS(

ID NUMBER GENERATED BY DEFAULT ON NULL AS IDENTITY PRIMARY KEY,

TASK_DEF_STATIC_ID VARCHAR2(255),

OUTCOME_CODE VARCHAR2(32),

APPROVER VARCHAR2(255),

APPROVAL_DATE DATE,

DAYS_ELAPSED NUMBER
);
```

To add and edit Task Definition Actions:

1. Select the Sample Approvals app.



- 2. Navigate to the Task Definitions page:
  - a. On the Application home page, click **Shared Components**.
  - b. Under Workflows and Automations, select **Task Definitions**.
- 3. Click Salary Change.
- 4. In the Actions section, click Add Action.
  - a. Name Salary Change Metrics
  - b. Type Execute Code
  - c. Execution Sequence Leave the default value.
  - d. On Event Complete
  - e. Outcome Leave blank.
  - f. Success Message Leave blank.
  - g. Location Local Database
  - h. Language PL/SQL
  - i. Code Enter the sample insert statement.

```
insert into
eba_demo_appr_metrics(task_def_static_id,outcome_code,approver,da
ys_elapsed)
select task_def_static_id, outcome_code, actual_owner, sysdate -
cast(created_on as date)
from apex_tasks
where task id = :APEX$TASK ID;
```

- The Error Handling, Server Side Condition, and Advanced sections can be left as-is.
- 6. Click Create.
- 7. Click Apply Changes.

The new action adds a row into <code>EBA\_DEMO\_APPR\_METRICS</code> every time a Salary Change task is completed. You could set up an interactive report based on this table to allow users to view metrics on approval tasks.

### 19.6.3.5 Viewing the Task Definition Utilization Report

The Task Definition Utilization Report shows all pages and page components where Task Definitions are used in a specific application.

To view the Task Definition Utilization Report:

- 1. Select the application.
- 2. Navigate to the Task Definition page:
  - a. On the Application home page, click Shared Components.
  - b. Under Workflows and Automations, select **Task Definitions**.
- 3. Select Utilization.

The Task Definition Utilization Report appears.



### 19.6.3.6 Viewing the Task Definition History Report

The Task Definition History Report shows recent modifications made to Task Definitions.

To view the Task Definition History Report:

- 1. Select the application.
- 2. Navigate to the Task Definition page:
  - a. On the Application home page, click **Shared Components**.
  - b. Under Workflows and Automations, select **Task Definitions**.
- Select History.

The Task Definition History Report appears.

The History Report displays recent modifications made to Task Definitions in the current application.

## 19.6.4 Managing Task Details

Task Details are displayed when you open the task instance.

- About the Task Details Page
   The task details page shows information about a particular task instance.
- Editing the Task Details Page
   Edit the Task Details Page using Page Designer.
- Configuring the Task History
   Configure the Task History from the Task Definition.

## 19.6.4.1 About the Task Details Page

The task details page shows information about a particular task instance.

The **Task Details** page contains information about a specific task instance. Depending on the status of the task, and the role of the person logged in, the task details page may show the following buttons:

- Release Releases the task, setting it from Assigned to Unassigned so that it can be claimed by other potential owners.
- Delegate Assigns a task exclusively to another potential owner, who then becomes the actual owner.
- Change Priority Updates the priority of a task.
- Change Due Date Updates the task's due date.
- Request Information Requests more information from the task initiator.
- Submit Information Sends more information back to the task owner.
- Invite Participant Adds a new potential owner.
- Cancel Task Cancels a task.
- Renew Task Renews an expired task.
- Approve Approves the task, setting the state to Completed.



- Reject Rejects the task, setting the state to Completed.
- Claim Claims a task, setting it from Unassigned to Assigned and changing the current user to the actual owner.
- Add Comment Adds a comment to the task.

The task details page also shows comments users make during the approval process, and a log of changes for the task.

Typically, you set up one task details page for each task definition. This ensures you can customize the task details page to include information relevant for the specific task definition.

### 19.6.4.2 Editing the Task Details Page

Edit the Task Details Page using Page Designer.

The Task Details Page is a generated page that you can customize according to your requirements. It displays when the task is selected on the Unified Task List Report.

To edit a Task Details page:

- 1. Select the application.
- In Page Designer, select the Task Details page:You can also find the Task Details Page URL in the Task Definition.
- 3. Edit the Task Details in Page Designer.



Editing Pages in Page Designer

### 19.6.4.3 Configuring the Task History

Configure the Task History from the Task Definition.

The task history logs events for an individual task. You can view the task history on the task details page.

To configure the task history:

- 1. Select an application.
- Navigate to the Task Definitions page:
  - a. On the application home page, select **Shared Components**.
  - **b.** Under Workflows and Automations, select **Task Definitions**.
- 3. Click on the task definition.
- 4. Navigate to the **Actions** section.
- 5. Click the pencil icon next to an action to edit the action.
- 6. Under Error Handling, navigate to Log Messages When.
- 7. Choose from the available options:



- None (Default) No action is logged in the task history.
- Success Only successful actions are logged in the task history.
- Failure Only failed actions are logged in the task history.
- All All actions are logged in the task history.
- 8. Repeat this step for each action.

# 19.6.5 Managing Unified Task Lists

The Unified Task List allows workspace users to view and manage their tasks.

- About Unified Task Lists
  - Learn about the types of Unified Task Lists available, including My Tasks for potential task owners, Admin Tasks for business administrators, and Initiated by Me for task initiators.
- Creating Unified Task Lists
   Create a Unified Task List using the Create Page Wizard.
- Editing Unified Task Lists
   Edit a Unified Task List using Page Designer.

### 19.6.5.1 About Unified Task Lists

Learn about the types of Unified Task Lists available, including My Tasks for potential task owners, Admin Tasks for business administrators, and Initiated by Me for task initiators.

The Unified Task List allows users to view, action, or edit task instances. When you configure the Unified Task List, you have different **Report Contexts** to choose from:

- My Tasks, for users who are potential or actual owners of tasks.
  - Shows all tasks that are either **Assigned** to the user or **Unassigned** with the user as a potential owner. Tasks that are approved or rejected do not show in the list.
  - Sorts by descending creation date, with newly created tasks at the top of the list.
- Admin Tasks, for users who are business administrators of tasks.
  - Shows all tasks that list the user as a business administrator, including Errored,
     Completed, and Canceled tasks. Expired tasks only show if the user selects Show expired tasks.
- Initiated by Me, for users who have initiated tasks.
  - Shows all tasks that the user has initiated.

The Unified Task List can be in the same application as one of the task definitions or a completely separate application in the same workspace. If the Unified Task List is in a separate application, you must configure session sharing so users can still open the task details.

### 19.6.5.2 Creating Unified Task Lists

Create a Unified Task List using the Create Page Wizard.

To create a Unified Task List:

Open the Create Page Wizard.



- a. On the Workspace home page, click **App Builder**.
- b. Select the application that needs a Unified Task List.
- **c.** On the Application home page, select **Create Page**.

The Create Page Wizard appears.

- 2. Under Components, select Unified Task List.
- 3. For Page Definition, set the following:
  - Page Number An integer value that identifies a page within an application.
  - **b.** Name Specify a text name for this page. The same text is also used for the page title.

After page creation, the title can be modified using Page Designer.

- c. Report Context Select My Tasks. Admin Tasks, or Initiated by Me.
  - **My Tasks** is for the potential and actual task owners. **Admin Tasks** is for the business administrators. **Initiated by Me** is for users who initiate tasks.
- Navigation Expand the region and enable or disable navigation. If either flag is enabled, additional attributes appear. To learn more about an attribute, see fieldlevel Help.
  - a. Use Breadcrumb Enable to create a breadcrumb entry for this page. By default, the page name is used as breadcrumb entry name.
  - **b.** Use Navigation Enable to create a navigation menu entry for this page.By default, the page name is used as navigation menu name.
- Select Create Page.

The Unified Task List opens in Page Designer.

### 19.6.5.3 Editing Unified Task Lists

Edit a Unified Task List using Page Designer.

To edit a Unified Task List:

- 1. Open the Unified Task List in Page Designer.
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select the application that contains the Unified Task List.
  - On the Application home page, select the Unified Task List page you want to edit.
- 2. Edit the Unified Task List.
- 3. Select Save or Save and Run Page to save changes.



**Using Page Designer** 



# 19.6.6 Creating Tasks from Task Definitions

Create tasks in an Oracle APEX application from existing task definitions.

For APEX to create tasks, you must define a **Human Task - Create** page process. When the page process runs, APEX creates a new task based on the task definition. In order to be able to use this process, at least one Task Definition must exist as a shared component in the application.

To add a Human Task - Create page process to a page:

- 1. View the page in Page Designer.
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.
- In either the Rendering or Processing tab, locate the node where the process will occur. Right-click and select Create Process.
- 3. Under Identification:
  - a. Name Specify the name of the process.
  - b. Type Select Human Task Create.
- 4. Under Settings:
  - a. Definition Select the Task Definition.
  - b. Subject If specified here, this will override the subject in the task definition.
  - c. Priority If specified here, this will override the priority in the task definition.
  - d. Initiator Item The page item whose value can be used to specify who initiates the task. By default, the logged-in user running the page will be the initiator. This value can be specified to override the logged-in user, allowing a user to initiate a task on behalf of another user.
  - e. Task ID Item When specified, this saves the internal id of the task created when the page is run.
  - f. Details Primary Key Item When specified, this allows Oracle APEX to uniquely identify a record from the table a task is created from.
    - For example, in the **Sample Approvals** app, entering P4\_EMPNO allows the corresponding record in the EBA\_DEMO\_APPR\_EMP table to be updated when a Job Change Request is approved.
- Configure the rest of the Process.
  - For more information, see Creating Page Processes.
- **6.** Set the Page Process Parameters.
  - If the Task Definition has parameters specified, these appear in the Process Tree on the page. Parameters can be set to static values or page items. If a parameter is not required, it can be left as Null. If a parameter is marked Required in the Task Definition, it must be set in the process or there will be an error when saving the page.
- Click Save.



# 19.6.7 Example: Creating Approval Tasks from Form Submission

Configure approval tasks to run after a user submits a job change request.

This example uses the **Sample Approvals** application, which you can install from the Gallery. In this example, you set up the process that initiates job change approvals when the Request Job Change form is submitted.

To create approval tasks when the Request Job Change form is submitted:

- Open 7 Request Job Change in Page Designer.
- 2. Open the Processing tab.
- Right-click Processing and select Create Process.
- Under Identification:
  - a. Name Submit Task
  - b. Type Human Task Create
- 5. Under Settings:
  - a. Definition Job Change
  - b. Details Primary Key Item P7 EMPNO
- 6. Under Execution Options:
  - a. Sequence 20
  - b. Point Processing
  - c. Run Process Once Per Page Visit (Default)
- 7. Under Server-side Condition:
  - a. When Button Pressed SUBMIT FOR APPROVAL
  - b. Type Leave as Select -
- Set the Page Process Parameters.
  - a. On the Processing tab, under Submit Task, expand Parameters.
  - b. Select New Job.
  - c. Under Value, select Item.
  - d. Set Item to P7 PROPOSED JOB.
- 9. Click Save.

APEX creates an approval task whenever users submit the Request Job Change form.

# 19.6.8 About Task States and Transitions

Learn about the task lifecycle in the Oracle APEX approval component.

The task **lifecycle** is the path a task takes from the time the task is created to the time that the task is complete. There are three lifecycle stages: **Initial**, when a task is created, **Intermediate**, as the task moves through various states, and **Final**, when a task is complete.



A **state** is the current location of the task in the task lifecycle. A **transition** refers to the movement of a task between states. Transitions can occur as part of the normal task lifecycle, or they can occur due to an exception or a user interruption.

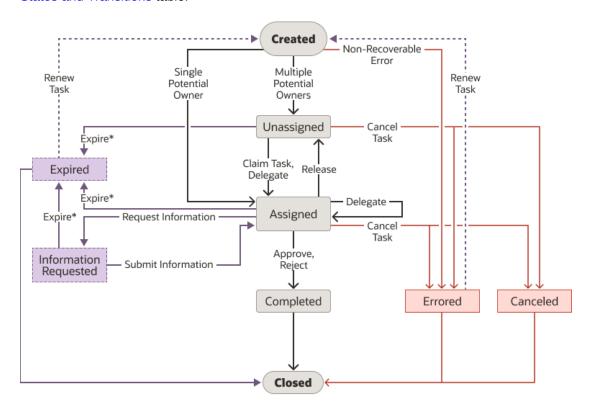
An **errored** state occurs when there is a non-recoverable error during the execution of the task, including:

- an underlying database error
- a code bug
- an invalid Task Definition
- an error during execution of the action specified for the Task Definition

A **canceled** state occurs when the initiator of the task explicitly cancels the task.

An **expired** state occurs when the due date arrives, the task is not complete, and either the task does not have a renewal policy or the maximum number of renewals has already been reached.

Task states and possible transitions are available in the following diagram, or in the Task States and Transitions table.



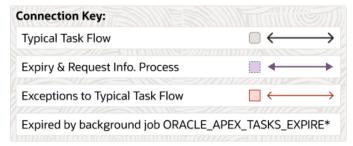




Table 19-1 Task States and Transitions

Task State	Lifecycle Stage	Category	<b>Possible Transitions</b>
Created	Initial	Normal	<ul> <li>Unassigned, when there are multiple potential owners</li> <li>Assigned, when there is one potential owner</li> <li>Errored, when there is a non- recoverable error during execution</li> </ul>
Unassigned	Intermediate	Normal	Assigned, when a user claims the task or delegates the task     Completed, when a potential owner approves or rejects the task from the unified task list     Errored, when there is a non-recoverable error during execution     Canceled, when the initiator cancels the task     Expired, when the task is not completed by the due date the expiration policy for the task definition is either:     Expire     (APEX does not create a new task)     Renew     (APEX does create a new task as long as the maximum number of renewals is not yet reached)



Table 19-1 (Cont.) Task States and Transitions

Assigned Intermediate  Normal  Completed, when the owner approves or rejects the task  Unassigned, when the owner releases the task to Info Requested, when the owner requests information from the initiator  Assigned, when a user delegates the task to another potential owner  Errored, when there is a non-recoverable error during execution  Canceled, when the initiator cancels the task to another potential owner  Errored, when the task is not cancels the task to another potential owner  Errored, when the initiator cancels the task to another potential owner  Errored, when the task is not canceled to task the expiration policy for the task definition is either:  Expired  (APEX does not create a new task)  Renew  (APEX does create a new task as long as the	Task State	Lifecycle Stage	Category	Possible Transitions
maximum number of renewals is not yet reached)				Completed, when the owner approves or rejects the task  Unassigned, when the owner releases the task  Info Requested, when the owner requests information from the initiator  Assigned, when a user delegates the task to another potential owner  Errored, when there is a non-recoverable error during execution  Canceled, when the initiator cancels the task  Expired, when the task is not completed by the due date the expiration policy for the task definition is either:  Expire (APEX does not create a new task)  Renew (APEX does create a new task as long as the maximum number of renewals is not yet



Table 19-1 (Cont.) Task States and Transitions

Task State	Lifecycle Stage	Category	<b>Possible Transitions</b>
Info Requested	Intermediate	Normal	Assigned, when the initiator submits the requested information     Expired, when the task is not completed by the due date the expiration policy for the task definition is either:     Expire (APEX does not create a new task)     Renew (APEX does create a new task as long as the maximum number of renewals is not yet reached)
Completed	Final	Normal	None
Errored	Final	Exception	Renewed, when the Business Administrator manually renews the task. APEX creates a new task based on the underlying task definition.
Canceled	Final	User Interrupted	None



Table 19-1 (Cont.) Task States and Transitions

Task State	Lifecycle Stage	Category	Possible Transitions
Expired	Final	Normal	None  If the task's Expiration Policy is set to Renew and the maximum number of renewals is not yet reached,APEX creates a new task.  If the task's Expiration Policy is set to Expire, or if it is set to Renew but the maximum number of renewals is already reached, APEX does not create a new task. The business administrator can manually renew the task.

# 19.6.9 About Task Retention and Task Purging

Learn about task retention, task purging, and the Archive of Purged Task Files Report.

The Approvals Component can create tasks with complex payloads. This means task data can grow exponentially, causing space and performance overloads. Periodically purging task data prevents overloading the system.

#### **Task Retention Logic**

A DBMS\_SCHEDULER job runs on a daily basis to check all records in the task instance table. When DBMS\_SCHEDULER runs, it:

- Keeps created, unassigned, and assigned tasks.
- Purges completed tasks with a retention period that is less than or equal to the current date.
- Purges errored and canceled tasks. Errored and canceled tasks do not have a retention period.

The Archive of Purged Tasks Report saves a JSON document of tasks that are eligible for purge. After the report is generated, the tasks eligible for purge are cleaned up.

#### **Task Retention Settings**

The task retention policy determines how long to keep completed tasks. The default task retention period is seven days and the maximum task retention period is thirty days. An



instance administrator can configure the task retention period in Instance Settings. For more information, see Configuring Workflow Settings in *Oracle APEX Administration Guide*.

#### Archive of Purged Task Files Report

The report of tasks that have been purged by the Task Purge job is located in Workspace Administration. For more information, see Accessing the Monitor Activity Page in Administration Services in *Oracle APEX Administration Guide*.

Files in the Purged Task Files Report area are cleaned up every 30 days.

# 19.6.10 About Creating Human Tasks Programmatically

Learn about creating human tasks programmatically.

The APEX\_APPROVAL API package allows you to manage approvals and Human Tasks programmatically. The package includes functionality to create new tasks and handle lifecycle management for existing tasks. The package is part of Oracle APEX workflow functionality.



APEX\_APPROVAL package in Oracle APEX API Reference

# 19.6.11 About Creating Approval Process Plug-ins

Learn about creating approval process plug-ins.

You can extend Approvals with Process Plug-ins as part of the plug-in functionality available with Oracle APEX. By setting the plug-in **Type** to Process and **Supported for** to Task Definition Actions, you can use the plug-in for approvals.

For example, if you want to update an external system when the approval task completes, you can use the standard approvals functionality to add custom PL/SQL as a task action to make those updates. However, if this code is repeated across many task definitions in your application, you can use an Approval Process Plug-in to hide the details of the task processing, and instead have a simple declarative definition using the plug-in within each task action.

For more on plug-ins, see Implementing Plug-ins and Example Plug-ins.

# 19.6.12 Runtime Views for Approvals

Learn about the APEX\_TASKS, APEX\_TASK\_COMMENTS, APEX\_TASK\_HISTORY, APEX\_TASK\_PARAMETERS, and APEX\_TASK\_PARTICIPANTS views.

There are five public views available for the Approvals Component:

- 1. APEX TASKS, for the properties of each task instance.
- 2. APEX TASK COMMENTS, for all comments entered on each task instance.



- 3. APEX\_TASK\_HISTORY, for the chronological series of operations performed during the lifecycle of a task instance, including the user associated with the update and the date the operation was performed.
- **4.** APEX\_TASK\_PARAMETERS, for the parameters defined for a task instance along with their computed runtime values in String format.
- 5. APEX\_TASK\_PARTICIPANTS, for the list of participants on each task instance. Note that this list can differ from the list in the task definition due to business administrators inviting new participants.

Table 19-2 APEX\_TASKS

Name	Null?	Туре
TASK ID	NOT NULL	NUMBER
WORKSPACE ID	NOT NULL	NUMBER
WORKSPACE	NOT NULL	VARCHAR2 (255)
WORKSPACE DISPLAY NAME	N/A	VARCHAR2 (4000)
APPLICATION ID	NOT NULL	NUMBER
APPLICATION_NAME	NOT NULL	VARCHAR2 (255)
TASK_DEF_ID	N/A	NUMBER
TASK_DEF_NAME	N/A	VARCHAR2 (255)
TASK_DEF_STATIC_ID	N/A	VARCHAR2 (255)
PREVIOUS_TASK_ID	N/A	NUMBER
SUBJECT	N/A	VARCHAR2 (1000)
DUE_ON	N/A	TIMESTAMP(6) WITH TIME ZONE
PRIORITY	NOT NULL	NUMBER(1)
PRIORITY_LEVEL	N/A	VARCHAR2(6)
DETAIL_PK	N/A	VARCHAR2 (400)
INITIATOR	N/A	VARCHAR2 (255)
ACTUAL_OWNER	N/A	VARCHAR2 (255)
PREVIOUS_OWNER	N/A	VARCHAR2 (255)
STATE_CODE	N/A	VARCHAR2(10)
STATE	N/A	VARCHAR2(10)
RENEWAL_COUNT	N/A	NUMBER
OUTCOME_CODE	N/A	VARCHAR2 (32)
OUTCOME	N/A	VARCHAR2 (32)
CREATED_BY	N/A	VARCHAR2 (255)
CREATED_ON	NOT NULL	TIMESTAMP(6) WITH TIME ZONE
LAST_UPDATED_BY	N/A	VARCHAR2(255)
LAST_UPDATED_ON	N/A	TIMESTAMP(6) WITH TIME ZONE



Table 19-3 APEX\_TASK\_COMMENTS

Name	Null?	Туре
TASK_ID	NOT NULL	NUMBER
WORKSPACE	NOT NULL	VARCHAR2 (255)
WORKSPACE_DISPLAY_NAME	N/A	VARCHAR2 (4000)
APPLICATION_ID	NOT NULL	NUMBER
APPLICATION_NAME	NOT NULL	VARCHAR2 (255)
CREATED_BY	N/A	VARCHAR2 (255)
CREATED_ON	N/A	TIMESTAMP(9) WITH TIME ZONE
TEXT	N/A	VARCHAR2 (4000)

Table 19-4 APEX\_TASK\_HISTORY

Null?	Туре
NOT NULL	NUMBER
NOT NULL	VARCHAR2 (255)
N/A	VARCHAR2 (4000)
N/A	NUMBER
NOT NULL	VARCHAR2 (255)
N/A	VARCHAR2 (20)
N/A	VARCHAR2 (15)
N/A	VARCHAR2 (255)
N/A	TIMESTAMP(9) WITH TIME ZONE
N/A	VARCHAR2(32)
N/A	VARCHAR2(10)
N/A	VARCHAR2 (32)
N/A	VARCHAR2 (10)
N/A	VARCHAR2 (255)
N/A	VARCHAR2 (255)
N/A	NUMBER
N/A	NUMBER
N/A	VARCHAR2 (4000)
N/A	VARCHAR2 (4000)
N/A	VARCHAR2 (32)
N/A	VARCHAR2 (255)
N/A	VARCHAR2(7)
N/A	TIMESTAMP WITH TIME ZONE
N/A	VARCHAR2 (4000)
N/A	VARCHAR2(4000)
	NOT NULL  N/A  N/A  NOT NULL  N/A  N/A  N/A  N/A  N/A  N/A  N/A  N



Table 19-4 (Cont.) APEX\_TASK\_HISTORY

Name	Null?	Туре
OUTCOME	N/A	CHAR(8)
DISPLAY_MSG	N/A	VARCHAR2 (4000)

Table 19-5 APEX\_TASK\_PARAMETERS

Name	Null?	Туре
TASK_ID	NOT NULL	NUMBER
TASK_DEF_PARAM_ID	N/A	NUMBER
WORKSPACE	NOT NULL	VARCHAR2 (255)
WORKSPACE_DISPLAY_NAME	N/A	VARCHAR2 (4000)
APPLICATION_ID	NOT NULL	NUMBER
APPLICATION_NAME	NOT NULL	VARCHAR2 (255)
PARAM_LABEL	N/A	VARCHAR2 (255)
PARAM_STATIC_ID	N/A	VARCHAR2 (255)
IS_REQUIRED	N/A	VARCHAR2(1)
IS_VISIBLE	N/A	VARCHAR2(1)
PARAM_VALUE	N/A	VARCHAR2 (255)

Table 19-6 APEX\_TASK\_PARTICIPANTS

Name	Null?	Туре
TASK_ID	NOT NULL	NUMBER
WORKSPACE	NOT NULL	VARCHAR2 (255)
WORKSPACE_DISPLAY_NAME	N/A	VARCHAR2 (4000)
APPLICATION_ID	NOT NULL	NUMBER
APPLICATION_NAME	NOT NULL	VARCHAR2 (255)
PARTICIPANT	N/A	VARCHAR2 (4000)
PARTICIPANT_TYPE	N/A	VARCHAR2 (15)
IDENTITY_TYPE	N/A	VARCHAR2(32)

# 19.6.13 Substitution Strings and Bind Variables for Tasks

Substitution Strings are used to pass information about a task to an Oracle APEX page.

You can use Task Substitution Strings to pass information about a task instance to an APEX page. For example, you might want to show different regions in the Task Details page depending on the task's priority or the date a task was created.

Substitution Strings are configured in the Task Definition.



Table 19-7 Substitution Strings for Task Definition Actions

Substitution String Syntax	Description
APEX\$TASK_PK	The primary key value  APEX\$TASK_PK can also be used as a bind variable in any PL/SQL query used by Task Definition Actions and Task Definition Participants. When used as a bind variable, the syntax is :APEX\$TASK_PK
APEX\$TASK_ID	The task id
APEX\$TASK_SUBJECT	The task subject
APEX\$TASK_STATE	The task's current state
APEX\$TASK_OUTCOME	The task outcome    Only populated for tasks in the Completed state
APEX\$TASK_CREATED_ON	The timestamp for task creation in YYYY-MM-DD"T"HH24:MI:SS.FF3TZH:TZM format.
APEX\$TASK_INITIATOR	The user who initiated the task  Defaults to the logged in user unless a different value is explicitly specified in the Human Task - Create Page Process
APEX\$TASK_DUE_ON	The timestamp for the task due date, in YYYY-MM-DD"T"HH24:MI:SS.FF3TZH:TZM format
APEX\$TASK_OWNER	The user who currently owns the task
APEX\$TASK_RENEWAL_COUNT	The number of times a task has been renewed
APEX\$TASK_MAX_RENEWAL_COUNT	The maximum number of times a task can be renewed according to the expiration policy in the task definition
APEX\$TASK_PREVIOUS_ID	<ul> <li>The previous id for a task</li> <li>Links an expired task to the renewed task</li> <li>If task T1 is expired and T2 is the renewed task, then  APEX\$TASK_PREVIOUS_ID of T2 is the ID of task T1 (T1.id)</li> </ul>



20

# Managing Application Security

Administrators are primarily responsible for ensuring the security of the Oracle APEX installation and developers are responsible for building secure applications. Learn about how to implement best practices for APEX application security.



To ensure the security and performance of your development environment, some administration functionality is not available in Oracle APEX instances running in Oracle Cloud.

- Understanding Administrator Security Best Practices
   Learn about security best practices for Oracle APEX administrators.
- Understanding Developer Security Best Practices
   Learn about security best practices for Oracle APEX developers.
- Controlling Access to Applications, Pages, and Page Components
   Control access to an application, individual pages, or page components by creating an access control list.
- Establishing User Identity Through Authentication
   Use authentication to establish a user's identity to control access to an application.

   Authentication may require a user identify a user name and password or could involve the use of digital certificates or a secure key.
- Providing Security Through Authorization
   Extend the security of your application by creating an authorization scheme.



Running Advisor to Check Application Integrity

# 20.1 Understanding Administrator Security Best Practices

Learn about security best practices for Oracle APEX administrators.



To ensure the security and performance of your development environment, some administration functionality is not available in Oracle APEX instances running in Oracle Cloud.

This section references many settings in the APEX Administration Services application.

#### About Oracle APEX Administrator Roles

Oracle APEX includes two different types of administrators: Workspace administrators and Instance administrators.

### • Web Server Security Considerations

Review Oracle REST Data Services security considerations.

### Managing Instance Security

Learn about security best practices when managing an Oracle APEX instance.

#### Configuring Instance Settings

Security best practices when configuring an Oracle APEX instance include determining whether to automate the creation workspaces., enabling and configuring email, configuring storage options, and creating wallets.

#### About Configuring Workspace Purge Settings

Save storage space and improve system performance by purging inactive workspaces.

#### Understanding Workspace Management

Instance administrators can define associations between workspaces and schemas. Administrators can manage developers and users at the workspace or instance-level and control user access to key components such App Builder, Team Development, and SQL Workshop, and PL/SQL editing.

#### About Integrating with Oracle BI Publisher

Oracle recommends that you employ Secure Sockets Layer (SSL) when integrating Oracle APEX with Oracle BI Publisher. Once SSL (HTTPS protocol) is configured for your Oracle BI Publisher server, you must create a wallet and specify the HTTPS protocol for the Report Server in the internal administration Environment Settings.

#### About the Advantages of the Oracle APEX Runtime Environment

An Oracle APEX runtime environment enables you to run production applications, but does not provide a web interface for administration or direct development of these applications.

#### Enabling Network Services in Oracle Database

You must enable network services in Oracle Database to send outbound mail, use Web services, or use template-based PDF report printing with BI Publisher in Oracle APEX.



See Also:

**Understanding Developer Security Best Practices** 

## 20.1.1 About Oracle APEX Administrator Roles

Oracle APEX includes two different types of administrators: Workspace administrators and Instance administrators.

To access the APEX development environment, users sign in to a shared work area called a workspace. **Workspace administrators** are users who perform administrator



tasks specific to a workspace such as managing user accounts, monitoring workspace activity, and viewing log files. **Instance administrators** are superusers that manage an entire hosted instance using the APEX Administration Services application.



#### Tip:

The role of Instance administrator is not available in Oracle Database Cloud Service (Database Schema).



#### See Also:

Workspace and Application Administration and Oracle APEX Administration Services in *Oracle APEX Administration Guide* 

# 20.1.2 Web Server Security Considerations

Review Oracle REST Data Services security considerations.

About Configuring Oracle REST Data Services with Oracle APEX
 Oracle APEX requires access to the web server, Oracle REST Data Services

## 20.1.2.1 About Configuring Oracle REST Data Services with Oracle APEX

Oracle APEX requires access to the web server, Oracle REST Data Services

Oracle REST Data Services (formerly known as Oracle APEX Listener) is a J2EE application which communicates with the Oracle Database by mapping browser requests to the APEX engine database over a SQL\*Net connection. In a production environment, you deploy Oracle REST Data Services web archive files to a supported Java EE application server, like Oracle Web Logic Server. Each deployment can be configured individually and serves the same purpose as a  $mod_plsql$  Database Access Descriptor, which is to communicate with an Oracle database.

An Oracle REST Data Services deployment configuration contains several security related parameters. In a configuration for APEX, Oracle recommends to set the parameter security.requestValidationFunction to wwv\_flow\_epg\_include\_modules.authorize. This activates the white list of callable procedures which ships with APEX and prohibits calls to other procedures. This can be extended using the validation functions shipped with APEX.

# 20.1.3 Managing Instance Security

Learn about security best practices when managing an Oracle APEX instance.



To ensure the security and performance of your development environment, this functionality is not available in Oracle APEX instances running in Oracle Cloud.

#### About Creating Login Controls

Administrators can configure login controls for an entire instance or for individual workspaces.

#### About Enabling Public File Upload

Administrators can use the Allow Public File Upload attribute to control whether unauthenticated users can upload files in applications that provide file upload capability

#### About Restricting User Access by IP Address

Administrators can restrict user access to an APEX instance by entering a commadelimited list of allowable IP addresses in the Restrict Access by IP Address attribute on the Manage Instance, Security page.

#### About Specifying an Instance Proxy

Administrators can use the Instance Proxy attribute to configure an entire APEX instance to use a proxy for all outbound HTTP traffic.

#### About Utilizing Secure Sockets Layer

Secure Sockets Layer (SSL) is a protocol for managing the security of data transmitted on the Internet. For web applications, SSL is implemented by using the HTTPS protocol. Oracle recommends that you run APEX applications using SSL (HTTPS protocol) to prevent any sensitive data from being sent over an unencrypted (cleartext) communication channel.

#### About Enabling RESTful Access

Administrators can use the Allow RESTful Access attribute to control whether developers can expose report regions as RESTful services.

#### About Rejoin Sessions

Use the Rejoin Sessions attribute to control if APEX supports application URLs that do not contain session IDs.

#### About Isolating Workspaces

Isolating workspaces is an effective approach to preventing browser attacks.

#### About Utilizing Session Timeout

Configure Session Timeout attributes to reduce your application's exposure.

#### Restricting Password Reuse

Site administrators can restrict password reuse for all administrator, developer, and end-user accounts based on a history of passwords previously used for the accounts.

#### About Enabling RESTful Services

Administrators can control the ability to create and access RESTful Services at either the workspace or instance-level.



Configuring Security in Oracle APEX Administration Guide

# 20.1.3.1 About Creating Login Controls

Administrators can configure login controls for an entire instance or for individual workspaces.



Workspace administrators and developers can create user accounts for the purpose of logging in to the APEX development environment and for end-user authentication to applications developed within their workspaces.

Administrators can configure login controls at the instance or workspace level. For example, if an Instance administrator configures account login controls in APEX Administration Services, that configuration applies to all APEX accounts in all workspaces across an entire development instance.

If the Instance administrator does *not* enable login controls across an entire instance, then each Workspace administrator can enable the following controls on a workspace-byworkspace basis:

- End-user account expiration and locking.
- A maximum number of failed login attempts for end-user accounts.
- The password lifetime (or number of days an end-user account password can be used before it expires for end-user accounts).



Managing Workspace Account Login Controls and in Configuring Authentication Controls for an Instance in *Oracle APEX Administration Guide* 

# 20.1.3.2 About Enabling Public File Upload

Administrators can use the Allow Public File Upload attribute to control whether unauthenticated users can upload files in applications that provide file upload capability

See Also:

Controlling Public File Upload in Oracle APEX Administration Guide

# 20.1.3.3 About Restricting User Access by IP Address

Administrators can restrict user access to an APEX instance by entering a comma-delimited list of allowable IP addresses in the Restrict Access by IP Address attribute on the Manage Instance, Security page.



Restricting User Access by IP Address in Oracle APEX Administration Guide



## 20.1.3.4 About Specifying an Instance Proxy

Administrators can use the Instance Proxy attribute to configure an entire APEX instance to use a proxy for all outbound HTTP traffic.

Setting a proxy at the instance-level supersedes any proxies defined at the application-level or in web service references. If a proxy is specified, regions of type URL, Web services, and report printing will use the proxy.



Configuring a Proxy Server for an Instance in *Oracle APEX Administration Guide* 

# 20.1.3.5 About Utilizing Secure Sockets Layer

Secure Sockets Layer (SSL) is a protocol for managing the security of data transmitted on the Internet. For web applications, SSL is implemented by using the HTTPS protocol. Oracle recommends that you run APEX applications using SSL (HTTPS protocol) to prevent any sensitive data from being sent over an unencrypted (cleartext) communication channel.

Instance administrators can configure both their APEX instance and all related applications to require HTTPS by configuring the **Require HTTPS** and **Require Outbound HTTPS** attributes. Configuring these attributes forces authenticated pages within the App Builder to require HTTPS which encrypts network communications. Changing the Require HTTPS option does not affect the web server in any way. You will still need to enable the web server for HTTPS for these options to have any meaning. To learn more about enabling HTTPS, see the documentation for your specific web server.

#### Require HTTPS options include:

- Always Enforces HTTPS for all applications (including the APEX development and administration applications) to require HTTPS.
- Development and Administration Forces all internal applications within APEX (that is, App Builder, SQL Workshop, Instance Administration and so on) to require HTTPS.
- Application specific Makes HTTPS dependent on application-level settings.

See Also:

Configuring HTTP Protocol Attributes in Oracle APEX Administration Guide



# 20.1.3.6 About Enabling RESTful Access

Administrators can use the Allow RESTful Access attribute to control whether developers can expose report regions as RESTful services.



#### See Also:

Enabling RESTful Services for an Instance in Oracle APEX Administration Guide

## 20.1.3.7 About Rejoin Sessions

Use the Rejoin Sessions attribute to control if APEX supports application URLs that do not contain session IDs.



#### Tip:

For security reasons, Oracles recommends that administrators disable Rejoin Sessions unless they implement workspace isolation by configuring the Allow Hostname attribute at the workspace or instance-level. See About Isolating Workspaces.

When rejoin sessions is enabled, APEX attempts to use the session cookie to join an existing session, when a URL does not contain a session ID. To use Rejoin Sessions, administrators must enable Rejoin Sessions at the application or page-level. Note that a more restrictive value of Rejoin Sessions at the instance-level overrides application and page settings.

While supporting session joins is convenient, it does present some serious security risks:

Triggering malicious session state changes or other modifications.

If an attacker tricks the user into clicking an application link, this can trigger malicious session state changes or other modifications. Because of this risk, APEX requires a checksum that the attacker will not be able to guess when processing requests that alters data

Triggering unintended changes between applications.

If a user has two applications open in separate tabs on the same APEX instance, one application could trigger unintended changes in the other one. The attacking application could be written by a hacker or it could have an XSS vulnerability that enables an attacker to inject code. This application could use Ajax calls that simulate user interactions with the other application.



### See Also:

- About Enabling Support for Bookmarks
- Session Management
- Configuring Rejoin Sessions for a Page
- Configuring Rejoin Sessions for an Instance in Oracle APEX Administration Guide

# 20.1.3.8 About Isolating Workspaces

Isolating workspaces is an effective approach to preventing browser attacks.

The only way to truly isolate a workspace is to enforce different domains in the URL by configuring the Allow Hostnames attribute in APEX Administration Services. When the URLs of the attacker and the victim have different domains and hostnames, the browser's same-origin policy prevents attacks.

Workspace isolation by configuring Allow Hostnames is a counter measure against client side attacks that attempt to cross workspace boundaries. This security measure is not necessary if you trust all applications that are accessible using the instance's host which includes applications that are written in other frameworks and languages such as Oracle Application Development Framework (ADF) and Java.

## See Also:

- Isolating All Workspaces in an Instance in Oracle APEX Administration Guide
- Isolating a Workspace to Prevent Browser Attacks in Oracle APEX Administration Guide

# 20.1.3.9 About Utilizing Session Timeout

Configure Session Timeout attributes to reduce your application's exposure.

Users often leave their computers unattended for extended periods and do not close applications before departing. Therefore, an unauthorized person can easily assume the user's identity within the application. 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
- Maximum Session Idle Time in Seconds
- Session Timeout Warning in Seconds
- Session Timeout URL (application-level setting)
- Idle Timeout URL (application-level setting)



Developers can configure session timeout for a specific application, or administrators can configure sessions timeout for a workspace or an entire instance.



- Session Management to learn how to configure these attributes at an application-level.
- Configuring Session Timeout for a Workspace and Configuring Session
   Timeout for an Instance in Oracle APEX Administration Guide

# 20.1.3.10 Restricting Password Reuse

Site administrators can restrict password reuse for all administrator, developer, and end-user accounts based on a history of passwords previously used for the accounts.

To restrict password reuse:

- 1. Start SQL\*Plus and connect to the database where APEX is installed having the apex\_administrator\_role role or as SYS specifying the SYSDBA role. For example:
  - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS password
```

On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT SYS as SYSDBA
Enter password: SYS password
```



#### Tip:

The APEX\_ADMINISTRATOR\_ROLE must be granted directly to a user and not through another database role.

**2.** Execute the following statement:

```
ALTER SESSION SET CURRENT SCHEMA = APEX 220200;
```

**3.** Execute the following statement:

```
BEGIN
APEX_INSTANCE_ADMIN.SET_PARAMETER('PASSWORD_HISTORY_DAYS',365);
COMMIT;
END;
/
```

This restricts new or updated passwords to those that have not been used for the account for the previous 365 days. Recording of previously used passwords (actually, hashed representations of passwords) begins upon installation of Oracle APEX.

**4.** To disable this feature, run the block above, providing 0 for the parameter value. For example:

```
BEGIN
APEX_INSTANCE_ADMIN.SET_PARAMETER('PASSWORD_HISTORY_DAYS',0);
COMMIT;
END;
//
```

### See Also:

- STRONG\_PASSWORD\_CHECK Procedure in Oracle APEX API Reference
- STRONG\_PASSWORD\_VALIDATION Function in Oracle APEX API Reference

## 20.1.3.11 About Enabling RESTful Services

Administrators can control the ability to create and access RESTful Services at either the workspace or instance-level.

Disabling the **Enable RESTful Services** attribute prevents developers from creating and editing RESTful Web Services mapped to SQL and PL/SQL in conjunction with Oracle REST Data Services 2.0 or later.

To configure Enable RESTful Services:

- In Workspace Administration Sign in to APEX and click the Administration menu. Select Manage Service, Set Workspace Preferences, SQL Workshop and find the Enable RESTful Services attribute.
- In Instance Administration Sign in to APEX Administration Services. Under Instance Settings, click Feature Configuration and click Feature Configuration. Find the REST tab and then Enable RESTful Services attribute.

### See Also:

Enabling RESTful Services and Defining a Path Prefix for a Workspace and Enabling RESTful Services for an Instance in *Oracle APEX Administration Guide* 

# 20.1.4 Configuring Instance Settings

Security best practices when configuring an Oracle APEX instance include determining whether to automate the creation workspaces., enabling and configuring email, configuring storage options, and creating wallets.



#### Note:

To ensure the security and performance of your development environment, some administration functionality is not available in Oracle APEX instances running in Oracle Cloud.

- About Enabling Automation When Creating Workspaces
   Learn about enabling automation when creating workspaces.
- About Enabling and Configuring Email Learn about enabling and configuring email.
- About Configuring Storage Options
   Learn about configuring storage options.
- About Creating Wallets
   Learn about creating wallets.

### See Also:

Configuring Instance Settings in Oracle APEX Administration Guide

# 20.1.4.1 About Enabling Automation When Creating Workspaces

Learn about enabling automation when creating workspaces.

Administrators determine the amount of automation when provisioning (or creating) new workspaces.

To determine how provisioning works, an Instance Administrator selects one of the following options on the Instance Settings page:

- Manual An Instance administrator creates new workspaces and notifies the Workspace administrator regarding the Sign In credentials.
- Request Users request a workspace. Once an administrator approves the request, the
  user receives an email containing an email verification link. After the user clicks the email
  verification link, the workspace is created.
- Automatic Works similar to Request except requests are automatically approved with no administrator review required.

## Note:

To enable users to request a workspace using a link on the Sign In page, the Instance administrator must choose either the **Request** or **Automatic** Provisioning Method and configure email. If the Provisioning Method is set to **Manual**, no link appears on the Sign In page.





About the Workspace Request Approval Process and Selecting a Provisioning Mode in *Oracle APEX Administration Guide* 

# 20.1.4.2 About Enabling and Configuring Email

Learn about enabling and configuring email.

In order to send email from an APEX application, an Instance administrator must define the email SMTP settings and set the Use SSL/TLS attribute to use a secure connection for Oracle Database 11g R2 or later.



- Configuring Email in Oracle APEX Administration Guide
- When and Why Network Services Must be Enabled

# 20.1.4.3 About Configuring Storage Options

Learn about configuring storage options.

Administrators can configure the following storage options: require a new schema when requesting a workspace, auto extend tablespaces, or delete uploaded files after a specified number of days.



Configuring Storage in Oracle APEX Administration Guide

# 20.1.4.4 About Creating Wallets

Learn about creating wallets.

A wallet is a password-protected container that stores authentication and signing credentials (including private keys, certificates, and trusted certificates) needed by SSL. You must create a wallet if you:

- Call a SSL-enabled URL (for example, by invoking a Web service).
- Create a region of type URL that is SSL-enabled.
- Configure secure SMTP by setting the Use SSL/TLS attribute to Yes.
- Have applications with LDAP authentication schemes that are configured to use SSL with Authentication.





Configuring Wallet Information in Oracle APEX Administration Guide

# 20.1.5 About Configuring Workspace Purge Settings

Save storage space and improve system performance by purging inactive workspaces.

Inactive workspaces consume valuable storage space and degrade system performance. By enabling Workspace Purge Settings, administrators can configure Oracle APEX to purge inactive workspaces.



Purging Inactive Workspaces in Oracle APEX Administration Guide

# 20.1.6 Understanding Workspace Management

Instance administrators can define associations between workspaces and schemas. Administrators can manage developers and users at the workspace or instance-level and control user access to key components such App Builder, Team Development, and SQL Workshop, and PL/SQL editing.

- About Managing Workspace to Schema Assignments
   Learn about managing workspace to schema assignments.
- About Managing Developers and Users Learn about managing developers and users.
- About Managing Component Availability
   Learn how workspace administrators can control user access to key components.



Managing Existing Workspaces in Oracle APEX Administration Guide

# 20.1.6.1 About Managing Workspace to Schema Assignments

Learn about managing workspace to schema assignments.

When users sign in to Oracle APEX, they sign in to a shared work area called a workspace. Each workspace can have multiple associated (or mapped) schemas. Instance administrators can define associations between workspaces and schemas as appropriate. By associating a workspace with a schema, developers in that workspace can create new database objects in that schema and build applications that interact with the database objects in that schema.





Managing Workspace to Schema Assignments in *Oracle APEX Administration Guide* 

# 20.1.6.2 About Managing Developers and Users

Learn about managing developers and users.

Administrators can define what schemas specific users have access to and also their user role, that is if they are a workspace administrator, a developer, or an end user. Administrators can also limit developer access to specific APEX components and lock accounts. APEX includes two separate interfaces for managing developers and users. Workspace administrators manage user accounts within their workspace and Instance administrators manage all user accounts across an APEX development instance.

## See Also:

Managing Users in a Workspace and Managing Users Across an APEX Instance in *Oracle APEX Administration Guide* 

# 20.1.6.3 About Managing Component Availability

Learn how workspace administrators can control user access to key components.

Workspace administrators can control user access to key components such as App Builder, Team Development, SQL Workshop, and PL/SQL editing, which determines whether developers have the ability to edit and compile PL/SQL program units from Object Browser. For example, suppose an administrator wants users to be able to build database components, run SQL statements, but not create applications, he or she could define a workspace with rights to a specific schema and then configure the users as developers using the options on the Set Workspace Preferences page.



Configuring Workspace Preferences in Oracle APEX Administration Guide

# 20.1.7 About Integrating with Oracle BI Publisher

Oracle recommends that you employ Secure Sockets Layer (SSL) when integrating Oracle APEX with Oracle BI Publisher. Once SSL (HTTPS protocol) is configured for your Oracle BI Publisher server, you must create a wallet and specify the HTTPS protocol for the Report Server in the internal administration Environment Settings.





Configuring Wallet Information and Configuring Report Printing for an Instance in Oracle APEX Administration Guide

# 20.1.8 About the Advantages of the Oracle APEX Runtime Environment

An Oracle APEX runtime environment enables you to run production applications, but does not provide a web interface for administration or direct development of these applications.



To ensure the security and performance of your development environment, this functionality is not available in Oracle APEX instances running in Oracle Cloud.

Oracle recommends that you run any sensitive production APEX applications with a runtime installation of APEX. A runtime installation does not expose the web-based application development environment, thus preventing the use of App Builder, SQL Workshop, and related utilities on a production installation. Additionally, a runtime environment only includes the APEX database objects and privileges necessary to run applications, making it a more hardened environment.



Installing Exported Applications in a Runtime Environment in *Oracle APEX Administration Guide* 

# 20.1.9 Enabling Network Services in Oracle Database

You must enable network services in Oracle Database to send outbound mail, use Web services, or use template-based PDF report printing with BI Publisher in Oracle APEX.

- When and Why Network Services Must be Enabled
   Enabling network services enables support for sending outbound mail in Oracle APEX, use of Web services in APEX, and PDF report printing with BI Publisher.
- Granting Connect Privileges in Oracle Database 12c or Later
   Procedures CREATE\_ACL, ASSIGN\_ACL, ADD\_PRIVILEGE and CHECK\_PRIVILEGE in
   DBMS\_NETWORK\_ACL\_ADMIN are deprecated in Oracle Database 12c. Oracle recommends
   to use APPEND HOST ACE.
- Troubleshooting an Invalid ACL Error
  Learn how to identify any invalid ACL error by running the query.



## 20.1.9.1 When and Why Network Services Must be Enabled

Enabling network services enables support for sending outbound mail in Oracle APEX, use of Web services in APEX, and PDF report printing with BI Publisher.

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 2 or later. Therefore, if you are running Oracle APEX with Oracle Database 11g Release 2 or later, you must use the new <code>DBMS\_NETWORK\_ACL\_ADMIN</code> package to grant connect privileges to any host for the <code>APEX\_220200</code> database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle APEX.
  - Users can call methods from the  ${\tt APEX\_MAIL}$  package, but issues arise when sending outbound email.
- Consuming web services from APEX.
- Making outbound LDAP calls from APEX.
- · PDF report printing with BI Publisher.

### Note:

When upgrading APEX on a database 12c or newer, based on the configuration of the old APEX version the upgrade automatically configures Network Services.



#### Tip:

To run the examples described in this section, the compatible initialization parameter of the database must be set to at least 11.1.0.0.0. By default an 11g or 12c database will already have the parameter set properly, but a database upgraded to 11g or 12c from a prior version may not. For information about changing database initialization parameters, see Specifying the Database Compatibility Level in *Oracle Multitenant Administrator's Guide*.



About Report Printing in *Oracle APEX App Builder User's Guide*.



# 20.1.9.2 Granting Connect Privileges in Oracle Database 12c or Later

Procedures CREATE\_ACL, ASSIGN\_ACL, ADD\_PRIVILEGE and CHECK\_PRIVILEGE in DBMS\_NETWORK\_ACL\_ADMIN are deprecated in Oracle Database 12c. Oracle recommends to use APPEND HOST ACE.

The following example demonstrates how to grant connect privileges to any host for the APEX\_220200 database user. This example assumes you connected to the database where Oracle APEX is installed as SYS specifying the SYSDBA role.

The following example demonstrates how to provide less privileged access to local network resources. This example enables access to servers on the local host only, such as email and report servers.

# 20.1.9.3 Troubleshooting an Invalid ACL Error

Learn how to identify any invalid ACL error by running the query.

If you receive an ORA-44416: Invalid ACL error after running the previous script, use the following query to identify the invalid ACL:

```
REM Show the dangling references to dropped users in the ACL that is assigned REM to '*'.

SELECT ACL, PRINCIPAL

FROM DBA_NETWORK_ACLS NACL, XDS_ACE ACE

WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL AND NACL.ACLID = ACE.ACLID AND

NOT EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);
```

Next, run the following code to fix the ACL:

```
DECLARE

ACL ID RAW(16);
```



```
CNT
         NUMBER;
BEGIN
  -- Look for the object ID of the ACL currently assigned to '*'
  SELECT ACLID INTO ACL ID FROM DBA NETWORK ACLS
  WHERE HOST = '*' AND LOWER PORT IS NULL AND UPPER PORT IS NULL;
  -- If just some users referenced in the ACL are invalid, remove just
those
  -- users in the ACL. Otherwise, drop the ACL completely.
  SELECT COUNT (PRINCIPAL) INTO CNT FROM XDS ACE
  WHERE ACLID = ACL ID AND
        EXISTS (SELECT NULL FROM ALL USERS WHERE USERNAME =
PRINCIPAL);
  IF (CNT > 0) THEN
    FOR R IN (SELECT PRINCIPAL FROM XDS ACE
               WHERE ACLID = ACL ID AND
                  NOT EXISTS (SELECT NULL FROM ALL USERS
                                 WHERE USERNAME = PRINCIPAL)) LOOP
      UPDATE XDB.XDB$ACL
         SET OBJECT VALUE =
               DELETEXML (OBJECT VALUE,
                         '/ACL/ACE[PRINCIPAL="'||R.PRINCIPAL||'"]')
       WHERE OBJECT ID = ACL ID;
    END LOOP;
  ELSE
    DELETE FROM XDB.XDB$ACL WHERE OBJECT ID = ACL ID;
  END IF;
END;
REM commit the changes.
COMMIT;
```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the APEX 220200 user.

# 20.2 Understanding Developer Security Best Practices

Learn about security best practices for Oracle APEX developers.

About Items of Type Password

Password items do not emit the text entered to the web browser screen. When creating password items, Oracle recommends using password attributes that do not save session state to prevent the password from being saved in the database in the session state tables.

 Identifying At Risk Password Items
 Identify at risk password items by viewing the Security Profiles report and Password Items report.

- Understanding Cross-Site Scripting Protection
   Protect your application from a cross site-scripting security breach.
- About Session State and Security
   Learn about managing session state and security.
- Preventing URL Tampering
   Session State Protection is a built-in functionality that prevents hackers from tampering with the URLs within your application. URL tampering can adversely affect program logic, session state contents, and information privacy.
- About Securing File Uploads
   Learn about developer best practices for securing file uploads.

### See Also:

- Understanding Administrator Security Best Practices
- About Oracle APEX Administrator Roles

# 20.2.1 About Items of Type Password

Password items do not emit the text entered to the web browser screen. When creating password items, Oracle recommends using password attributes that do not save session state to prevent the password from being saved in the database in the session state tables.

Configurable password item type attributes include:

- Validation, Value Required If set to On and the page item is visible, Oracle APEX
  automatically performs a NOT NULL validation when the page is submitted. If set to No,
  no validation a NULL value is accepted.
- **Settings**, **Submit when Enter pressed** If set to **On**, when the user presses the ENTER key in the field the page is submitted.
- Source, Maintain Session State If set to Per Request (Memory Only), the value will
  not be written to the database and will only be available for the current request. For highly
  sensitive values, this is the preferred setting. However, if the value of Maintain Session
  State is set to Per Session (Disk), be sure to set Store value encrypted in session
  state to Yes.
- Security, Authorization Scheme Optionally select an authorization scheme which
  must evaluate to TRUE in order for this component to be rendered or otherwise
  processed.
- **Security**, **Session State Protection** You can select the level of session state protection by setting this attribute to Unrestricted or Restricted.
  - Unrestricted means the item may be set by passing the item in a URL or in a form.
     No checksum is required in the URL.
  - Restricted means the item may not be set from a browser. Use this when you want to
    restrict the way that the item value can be set to internal processes, computations,
    and so on. This attribute is applicable only to items that cannot be used as data entry
    items and is always observed, even if Session State Protection is disabled.
- Security, Store value encrypted in session state You can encypt sensitive content stored in APEX session state management tables. To encrypt an item when stored in



session state, set this attribute to **On**. To learn more, see About Session State and Security.

### See Also:

- About Item Types
- Editing Page Items

# 20.2.2 Identifying At Risk Password Items

Identify at risk password items by viewing the Security Profiles report and Password Items report.

At risk password items are those that either do not use a password item type that does not save session state, or store an unencrypted value in session state.

- Viewing the Security Profiles Report
   View the Security Profiles Report by navigating to Workspace Utilities and selecting it from Cross Application Reports.
- Viewing the Password Items Report
   View the Password Items Report by navigating to Workspace Utilities and selecting it from Cross Application Reports.

## 20.2.2.1 Viewing the Security Profiles Report

View the Security Profiles Report by navigating to Workspace Utilities and selecting it from Cross Application Reports.

To view the Security Profiles Report:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.

The App Builder home page appears.

- 3. Click the Workspace Utilities icon.
- 4. Locate Cross Application Reports on the right side of the window.
- 5. Under Cross Application Reports, click **Security Profiles** report.

This report list the following information about all applications in the current workspace:

- Application
- Name
- Parsing Schema
- Application Level Authorization Scheme
- Authentication
- Authorization Schemes
- Authorization Schemes



- Pages
- Encrypted Items
- At Risk Password Items

# 20.2.2.2 Viewing the Password Items Report

View the Password Items Report by navigating to Workspace Utilities and selecting it from Cross Application Reports.

To identify at risk password items:

- 1. Navigate to the Workspace home page.
- Click the App Builder icon.

The App Builder home page appears.

- 3. Click the Workspace Utilities icon.
- 4. Locate **Cross Application Reports** on the right side of the window.
- 5. Under Cross Application Reports, click Password Items.

The Password Items report shows all of the password items within the application and indicates if they use encryption and whether they save state. Password items that do neither are highlighted as At Risk.



#### Tip:

For pages that contain password items, set the page attribute **Form Auto Complete** to **Off**. Setting that attribute to **Off** prevents the web browser from attempting to auto complete items on the page.

# 20.2.3 Understanding Cross-Site Scripting Protection

Protect your application from a cross site-scripting security breach.

- About Cross Site-scripting Security Breaches
   Learn about cross site-scripting security breaches.
- Protecting HTML Regions and Other Static Areas
   Learn how to protect HTML regions and other static display areas.
- About Protecting Dynamic Output Learn about protecting dynamic output.
- About Protecting Report Regions
   Learn about protecting report regions.
- About Protecting Form Items
   Learn about protecting form items.
- About Restricting Characters Entered on an Item Learn about restricting characters entered on an item.



## 20.2.3.1 About Cross Site-scripting Security Breaches

Learn about cross site-scripting security breaches.

Cross-site scripting (also referred to as XSS) is a security breach that takes advantage of dynamically generated web pages. In an XSS attack, a web application is sent a script that activates when it is read by a user's browser. Once activated, these scripts can steal data, even session credentials, and return the information to the attacker.

If malicious code were introduced into an Oracle APEX application, it could be rendered into HTML regions and other places within the application during normal page rendering. To prevent the introduction of malicious code into session state, the APEX engine escapes characters in certain cases.

# 20.2.3.2 Protecting HTML Regions and Other Static Areas

Learn how to protect HTML regions and other static display areas.

- About Protecting HTML Regions and Other Static Areas
   Learn how to protect HTML regions and other static display areas.
- About Safe Item Display Types
   Learn about safe item display types.
- About the Rules Used to Determine Whether to Escape Values Review rules used to determine whether to escape values.
- About Using Safe Item Types to Hold and Emit HTML Markup Learn about using safe item types to hold and emit HTML markup.

## 20.2.3.2.1 About Protecting HTML Regions and Other Static Areas

Learn how to protect HTML regions and other static display areas.

In HTML regions and other static display areas, you can reference session state using the substitution strings. Special substitution strings available within a template are denoted by the number symbol (#), for example, #ABC#. To reference page or application items use the &ITEM. notation.

Examples of static display areas include HTML regions, page headers and footers, region headers and footers, region titles, button labels, help text, form item labels and post-element text, templates, radiogroup (before and after field text), event success messages, event error messages, navigation bar attributes, application static substitution string values, chart labels and legends, breadcrumbs and list framing text, and calendar text, labels, or legends.

Developers can also append an exclamation mark (!) followed by a predefined filter name to a page or application item name or to a report column reference to escape special characters in the substitution value.



### See Also:

- About Using Substitution Strings
  - Controlling Output Escaping in Substitution Strings

### 20.2.3.2.2 About Safe Item Display Types

Learn about safe item display types.

When session state is referenced in this way, the value emitted to the page will not have special characters (<, >, &, ") escaped if the referenced item is **Display Only** with the attribute **Save Session State** set to **No** and **Escape Special** set to **No**.

If the referenced item has a display type other than **Display Only** with the attribute **Save Session State** set to **No**, the value emitted to the page will have special characters escaped. Although application-level items are also considered to have a safe display type, they do not actually have display properties like form items do.



**Understanding Page Items** 

## 20.2.3.2.3 About the Rules Used to Determine Whether to Escape Values

Review rules used to determine whether to escape values.

The APEX engine uses predefined smart escaping rules to determine if and when to escape values fetched from session state.

The reason for these rules is that items that use the display types listed previously are often for text containing HTML that is intended to be emitted to the browser without being filtered (that is, escaped). The only way this can be made safe is by the enforcement of the rule that these types of items are always escaped on input to the application. For example, if a user passes some text into a safe item using an APEX f?p URL syntax, the APEX engine escapes special characters when saving the value into session state. This has two intended results:

- 1. If the value contains no special characters, the value passed in is saved into session state exactly as it was provided.
- If the value contains special characters, those characters are escaped when the value is saved into session state.

In either situation, the item can now safely be referenced using an &ITEM. notation in any HTML region or other static area mentioned previously.

## 20.2.3.2.4 About Using Safe Item Types to Hold and Emit HTML Markup

Learn about using safe item types to hold and emit HTML markup.

You can use the safe item types listed previously to hold and emit HTML markup to the browser. For example, suppose you have a requirement to render some text in bold face by

referencing a safe page item named  $P1\_XXX$  (using  $\&P1\_XXX$ .) The item  $P1\_XXX$  is presumed to contain the following HTML:

```
<b>ABABABAB</b>
```

You can achieve this by using application controls (computations, processes, item source expressions, item default values, and so on) to store values into these safe items. When values are introduced in this way, you ensure the safety of the content. When you use these methods, the APEX engine does not escape any special characters when saving the values into session state.

Finally, the safety of safe items is ensured by a rule that prevents those items from being posted on a page and submitted to the APEX engine as part of a page submission.

# 20.2.3.3 About Protecting Dynamic Output

Learn about protecting dynamic output.

Items fetched from session state and rendered using htp.p or other methods should be explicitly escaped by the code where it is appropriate to do so. For example, suppose a PL/SQL dynamic content region on a page uses the following:

```
htp.p(v('SOME_ITEM'));
```

If the value of the item fetched from session state could contain unintended tags or scripts, you might want to use the following in the region:

```
htp.p(apex escape.html(:SOME ITEM));
```

However, if you are confident that the fetched value is safe for rendering, you do not need to escape the value. As a developer, you must determine when it is appropriate to not escape output.

As a best practice, follow this rule:

 Never emit an item fetched from session state without escaping it unless the item is a safe type.

The reason for this is that as a developer, there is no way you can prevent a hacker from posting a malicious value into a non-safe item. Even if your application does not present these items visibly to ordinary users, be aware that a hacker can mount a XSS attack using your application if you do not follow this rule.



About Safe Item Display Types

# 20.2.3.4 About Protecting Report Regions

Learn about protecting report regions.

The APEX engine escapes data rendered in the body of a report. References to session state in report headings and messages are fetched from session state using



the smart escaping rules so that the values of safe item types are not escaped and the values of other item types are escaped.

APEX automatically escapes HTML special characters of a report column when the column's **Escape special characters** attribute is set to **On**. If you need to render HTML fragments instead of plain column values (for example, for highlighting), instead of concatenating the HTML fragment in the query itself (which prevents you from using Escape special characters), you should use the report column's **HTML Expression** attribute. In the **HTML Expression** attribute, you can enter static HTML and embed escaped column values with the #COLUMN# notation. The extended column notation gives you control regarding how APEX should escape a column value:

- #COLUMN! HTML# Escapes reserved HTML characters.
- #COLUMN!ATTR# Escapes reserved characters in a HTML attribute context.
- #COLUMN!JS# Escapes reserved characters in a JavaScript context.
- #COLUMN!RAW# Preserves the original item value and does not escape characters.
- #COLUMN!STRIPHTML# Removes HTML tags from the output and escapes reserved HTML characters.

For example, suppose you have a report based on this query:

```
SELECT
empno,
ename,
NULL DELETE_LINK
FROM emp
```

In this example, all columns are escaped. You could define a HTML Expression on  $\tt DELETE\ LINK$  as follows:

```
<a href="javascript:if (confirm('Do you really want to delete #ENAME!JS#?'))
doSubmit('DELETE-#EMPNO#');">Delete</a>
```

This example renders a link that asks if you would like to delete an employee and submits a request to delete the row if the user is confirmed. If you had not used #ENAME!JS# but #ENAME#, a name like O'Neill would cause a syntax error and an attacker could exploit the improper escaping for cross-site scripting.



- Controlling Output Escaping in Substitution Strings
- Editing Interactive Report Column Attributes

# 20.2.3.5 About Protecting Form Items

Learn about protecting form items.

When form items, including hidden items, obtain their values during the generation of the form page to be sent to the browser, the resulting text is escaped before rendering. Some of the safe item types are exceptions to this rule to support the intended behavior of each display type.



Some item types have the Security attribute **Escape special characters**. Use the **Escape special characters** attribute to specify whether or not the value should be escaped. To prevent Cross-Site Scripting (XSS) attacks, always set this attribute to **On**. If you need to render HTML tags stored in the page item or in the entries of a list of values, you can set this flag to **Off**. In such cases, you should take additional precautions to ensure any user input to such fields are properly escaped when entered and before saving.

Developers can also append an exclamation mark (!) followed by a predefined filter name to a page or application item name or to a report column reference, to escape special characters in the substitution value.



Controlling Output Escaping in Substitution Strings

## 20.2.3.6 About Restricting Characters Entered on an Item

Learn about restricting characters entered on an item.

Limit cross-site scripting (XSS) and other injection attacks by restricting the characters users can save in session state. To accomplish this, edit the page item and configure the **Security**, **Restricted Characters** attribute. Restricted Characters can be saved in session state. Available options include:

All Characters Allowed

No restriction applies.

Allowlist for a-Z, 0-9 and space

Only allow characters a-z, A-Z, 0-9, and space.

Blocklist HTML command characters (<>").

Reserved HTML characters can NOT be saved.

Blocklist &<>"/;,\*|=% and --

The following characters: &, <, >, ", /, ;, ",", \*, |, =, % and "--" (PL/SQL comment) can NOT be saved.

Blocklist &<>"/;,\*|=% or -- and new line

The following characters: &, <, >, ", /, ;, ",", \*, |, =, %, "--", and new line characters can NOT be saved.

If you select a restriction, APEX displays an error message if a user tries to save data which does not conform to the selected character restriction.



Configuring Page Item Security



## 20.2.4 About Session State and Security

Learn about managing session state and security.

Oracle APEX persists session state in database tables. Session state is preserved in database tables because it is more secure to store the session state on the server side than on the client. Because APEX applications use the stateless HTTP protocol, an application's session state across multiple page views is preserved in database tables. Not maintaining a synchronous database connection for each APEX application user significantly lessens memory and database resource requirements.

Developers can query the session state stored by APEX applications using the App Builder and built-in monitoring pages. Developers and administrators can access session state for any application in the workspace to which they are authenticated.

Developer best practices for managing session state include:

- As a standard part of implementing program control flow, clear the session state of unneeded values using clear-cache page processes or clear-cache directives in URLs used to navigate to pages.
- Use password page item types that do not save state. This prevents the entered passwords from being saved in session state tables in the database.
- When sensitive data must persist in a session, it should be saved in APEX session state tables in encrypted form. To use this feature, set the page item's **Store value encrypted in session state** attribute to **On**. Encrypted stored values are automatically decrypted when read.



The objective of encrypted session state is to persist session state such that the unencrypted values cannot be read by other APEX developers or database administrators who might have access to the APEX session state tables, debug output, or database data files. Oracle recommends that database backups be performed using facilities that encrypt data in the backup files.



### Tip:

You can encrypt item values up to 4000 bytes in length. Attempts to encrypt values longer than 4000 bytes produces an error message.

## 20.2.5 Preventing URL Tampering

Session State Protection is a built-in functionality that prevents hackers from tampering with the URLs within your application. URL tampering can adversely affect program logic, session state contents, and information privacy.

 How Session State Protection Works Learn session state protection works.



- Enabling Session State Protection
   Enable Session State Protection in Shared Components.
- Configuring Session State Protection
   Learn how to configure Session State Protection.

## 20.2.5.1 How Session State Protection Works

Learn session state protection works.

Enabling Session State Protection is a two-step process. First, you enable the Session State Protection feature in Shared Components. Second, you set page and item security attributes. You can perform these steps using a wizard, or you can set security attributes for pages and items manually on the Session State Protection page.

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

## 20.2.5.2 Enabling Session State Protection

Enable Session State Protection in Shared Components.



### Tip:

To disable Session State Protection, perform the steps described in this topic, but select **Disable** instead of **Enable**. Disabling Session State Protection does not change existing security attribute settings, but those attributes are ignored at runtime.

To enable Session State Protection:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Security, select **Session State Protection**.

The Session State Protection page appears. Note that the page displays the application name and current Session State Protection status (that is, **Enabled** or **Disabled**).

2. Click Set Protection.

The Session State Protection page appears.

- 3. In the Session State Protection wizard:
  - a. Select Action Select Enable.

When enabled, Session State Protection, uses the Page Access Protection page attributes and the Session State Protection item attributes in conjunction



with checksums positioned in f?p= URLs to prevent URL tampering and unauthorized access to and alteration of session state.



### Tip:

You can also adjust page and item security attributes manually. Select **Enable**, return to the Session State Protection page, and click the appropriate icon.

- b. Click Next.
- c. Click Enable.

Next, determine whether to set security attributes for pages and items.

## 20.2.5.3 Configuring Session State Protection

Learn how to configure Session State Protection.



### Tip:

Before you can configure security attributes, you must first enable Session State Protection. See Enabling Session State Protection.

- About Configuring Session State Protection
   Learn about configuring Session State Protection.
- Reviewing Existing Session State Protection Settings
  Review a summary of Session State Protection settings for pages, items, and application items on the first page of the Session State Protection wizard.
- Configuring Session State Protection Using a Wizard Configure Session State Protection using a wizard.
- Configuring Session State Protection for a Page Configure Session State Protection for a page in Page Designer.
- Configuring Session State Protection for Page Items
   Configuring Session State Protection for page items in Page Designer.
- Configuring Session State Protection for Application Items
   Configuring Session State Protection for application items in Shared Components.

## 20.2.5.3.1 About Configuring Session State Protection

Learn about configuring Session State Protection.

Once you have enabled Session State Protection, the next step is to configure security attributes. You can configure security attributes in two ways:

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



## 20.2.5.3.2 Reviewing Existing Session State Protection Settings

Review a summary of Session State Protection settings for pages, items, and application items on the first page of the Session State Protection wizard.

To view summaries of existing Session State Protection settings:

- Navigate to the Session State Protection page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - **d.** Under Security, select **Session State Protection**.

The Session State Protection page appears.

- 2. Click Set Protection.
- **3.** Expand and review the following regions at the bottom of the page:
  - Page Level Session State Protection Summary
  - Page Item Session State Protection Summary
  - Application Item Session State Protection

## 20.2.5.3.3 Configuring Session State Protection Using a Wizard

Configure Session State Protection using a wizard.

When you configure Session State Protection using a wizard, you set a value for specific attribute categories. Those selections are then applied to all pages and items within the application.

To configure Session State Protection using a wizard:

- 1. Navigate to the Session State Protection page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Security, select **Session State Protection**.

The Session State Protection page appears.

Click Set Protection.

The Session State Protection wizard appears.

3. Select Action - Select Configure and click Next.

Select security attributes for pages and items. You may accept the default settings displayed here, or make new selections. Note that the value you choose for an attribute category will be applied to all pages and items throughout the application.

- 4. Page Access Protection:
  - **Unrestricted** The page may be requested using a URL with or without session state arguments (Request, Clear Cache, Name/Values).
  - **Arguments Must Have Checksum** If Request, Clear Cache, or Name/Value arguments appear in the URL, a checksum must also be provided. The



- checksum type must be compatible with the most stringent Session State Protection attribute of all the items passed as arguments.
- **No Arguments Allowed** A URL may be used to request the page but no Request, Clear Cache, or Name/Value arguments are allowed.
- No URL Access The page may not be accessed using a URL; however, the page may be the target of a Branch to Page branch type, which does not do a URL redirect.

### 5. Page Data Entry Item Protection:

- **Unrestricted** The item's session state may be set by passing the item name/value in a URL or in a form. No checksum is required in the URL.
- Checksum Required: Application Level The item's session state may be set by passing the item name/value in a URL if a checksum is also provided that is specific to the workspace and application. A user-level checksum or a session-level checksum will also suffice (see the next option). Use this option when you want to allow the item to be set only by URLs having checksums that were generated by any user running the same application in the current workspace but in a different session.
- Checksum Required: User Level The item's session state may be set by passing
  the item name/value in a URL if a checksum is also provided that is specific to the
  workspace, application, and user. A session-level checksum will also suffice (see the
  next option). Use this option when you want to allow the item to be set only by URLs
  having checksums that were generated by the same named user, running the same
  application in the current workspace but in a different session.
- Checksum Required: Session Level The item's session state may be set by
  passing the item name/value in a URL if a checksum is also provided that is specific
  to the current session. Use this option when you want to allow this item to be set only
  by URLs having checksums that were generated in the current session.
- 6. Page Display-Only Item Protection:
  - **Unrestricted** The item may be set by passing the item name/value in a URL or in a form. No checksum is required in the URL.
  - Restricted: May not be set from browser The item may not be altered via the URL or POSTDATA. Use this when you want to restrict the way that the item value can be set to internal processes, computations, and so on. This attribute is always observed, even if Session State Protection is disabled. This attribute may be used with any of these **Display As** types:
    - Display Only (Save State=No)
    - Display as Text (does not save state)
    - Display as Text (based on LOV, does not save state)
    - Display as Text (based on PLSQL, does not save state)
    - Text Field (Disabled, does not save state)
    - Stop and Start Grid Layout (Displays label only)
  - Checksum Required: Application Level The item's session state may be set by
    passing the item name/value in a URL if a checksum is also provided that is specific
    to the workspace and application. A user-level checksum or a session-level
    checksum will also suffice (see next bullets). Use this option when you want to allow
    the item to be set only by URLs having checksums that were generated by any user
    running the same application in the current workspace but in a different session.



Checksum Required: User Level - The item's session state may be set by
passing the item name/value in a URL if a checksum is also provided that is
specific to the workspace, application, and user. A session-level checksum will
also suffice (see next bullet). Use this option when you want to allow the item
to be set only by URLs having checksums that were generated by the same
named user, running the same application in the current workspace but in a
different session.

### 7. Application Item Protection:

- Restricted May not be set from browser The item may not be altered using the URL or POSTDATA. Use this option when you want to restrict the way that the item value can be set to internal processes, computations, and so on. This attribute is only applicable only to items that cannot be used as data entry items and is always observed even if Session State Protection is disabled. This attribute may be used for application items or for page items with any of these Display As types:
  - Display Only (Save State=No)
  - Text Field (Disabled, does not save state)
  - Stop and Start Grid Layout (Displays label only)
- Checksum Required: Application Level The item may be set by passing the item name/value in a URL if a checksum is also provided that is specific to the workspace and application. A user-level checksum or a session-level checksum will also suffice (see next bullets). Use this option when you want to allow the item to be set only by URLs having checksums that were generated by any user running the same application in the current workspace but in a different session.
- Checksum Required: User Level The item may be set by passing the item name/value in a URL if a checksum is also provided that is specific to the workspace, application, and user. A session-level checksum will also suffice (see next bullet). Use this option when you want to allow the item to be set only by URLs having checksums that were generated by the same named user, running the same application in the current workspace but in a different session.
- 8. Click Next.
- 9. Click Finish.

## 20.2.5.3.4 Configuring Session State Protection for a Page

Configure Session State Protection for a page in Page Designer.

To configure Session State Protection for a page:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In either the Rendering tab, select the page name.

The Property Editor displays the page attributes in the right pane. Attributes are organized in groups.



- 3. Find the Security group and edit the Page Access Protection attribute. Options include:
  - **Unrestricted** The page may be requested using a URL, with or without session state arguments, and without having to have a checksum.
  - Arguments Must Have Checksum If Request, Clear Cache, or Name/Value arguments appear in the URL, a checksum must also be provided. The checksum type must be compatible with the most stringent **Session State Protection** attribute of all the items passed as arguments.
  - **No Arguments Allowed** A URL may be used to request the page, but the URL can not contain Request, Clear Cache, or Name/Value Pair arguments.
  - No URL Access The page may not be accessed using a URL. However, the page may be the target of a Branch to Page branch type, as this does not perform a URL redirect.
- **4.** To save your changes, click **Save**.

## 20.2.5.3.5 Configuring Session State Protection for Page Items

Configuring Session State Protection for page items in Page Designer.

To configure Session State Protection for items:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In either the Rendering tab or the Layout tab, select the page item.
  - The Property Editor displays the page attributes in the right pane. Attributes are organized in groups.
- 3. In either the Rendering tab, select the page item.
- 4. Find the **Security** group .
- 5. Under **Security**, edit the **Session State Protection** attribute. Options include:
  - Unrestricted The item can be set by passing the item in a URL or in a form. No checksum is required in the URL.
  - Checksum Required Application Level The item can be set by passing the item in a URL that includes a checksum specific to the the workspace and application.
  - Checksum Required User Level The item can be set by passing the item in a
    URL that includes a checksum specific to the the workspace, application and user.
  - Checksum Required Session Level The item can be set by passing the item in a URL that includes a checksum specific to the the session.
  - Restricted May not be set from browser The item can not be altered using the
    URL or POSTDATA. Select this option to restrict what can set the item value to
    internal processes, computations, and so on. This attribute only applies to items that
    are not used as data entry items and is always observed, even if Session State
    Protection is disabled. Use this attribute for page or application items that have the
    following Display As types:
    - Display Only (Save State=No)



- Text Field (Disabled, does not save state)
- **6.** To save your changes, click **Save**.

## 20.2.5.3.6 Configuring Session State Protection for Application Items

Configuring Session State Protection for application items in Shared Components.

To configure Session State Protection for an application item:

- 1. Navigate to the Session State Protection page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Application Logic, select Application Items.
     The Application Items page appears.
- 2. Click the name of an Application Item.
- 3. Security, Session State Protection Select Session State Protection for this item. Options include:
  - Unrestricted The item's session state may be set by passing the item name/ value in a URL or in a form. No checksum is required in the URL.
  - Restricted May not be set from browser The item may not be altered using the URL or POSTDATA. Use this option when you want to restrict the way that the item value can be set to internal processes, computations, and so on. This attribute is only applicable only to items that cannot be used as data entry items and is always observed even if Session State Protection is disabled. This attribute may be used for application items or for page items with any of these **Display As** types:
    - Display Only (Save State=No)
    - Text Field (Disabled, does not save state)
    - Stop and Start Grid Layout (Displays label only)
  - Checksum Required: Application Level The item may be set by passing
    the item name/value in a URL if a checksum is also provided that is specific to
    the workspace and application. Use this option when you want to allow the
    item to be set only by URLs having checksums that were generated by any
    user running the same application in the current workspace but in a different
    session.
  - Checksum Required: User Level The item may be set by passing the item name/value in a URL if a checksum is also provided that is specific to the workspace, application, and user. Use this option when you want to allow the item to be set only by URLs having checksums that were generated by the same named user, running the same application in the current workspace but in a different session.
  - Checksum Required: Session Level The item may be set by passing the item name/value in a URL if a checksum is also provided that is specific to the current session. Use this option when you want to allow this item to be set only by URLs having checksums that were generated in the current session.
- 4. Click Apply Changes.



## 20.2.6 About Securing File Uploads

Learn about developer best practices for securing file uploads.

Oracle APEX enables you to easily build an application that can be used to upload files and to access uploaded files. These files are uploaded into a common file storage table. Although the database view <code>APEX\_APPLICATION\_FILES</code> shows those files associated with your database account (or workspace), programmatic access to the common file storage table does not always require authentication, enabling other users to see your uploaded files. For this reason, Oracle recommends that developers use the methods described in <code>Understanding BLOB Support</code> in Forms and Reports, with the files being uploaded directly to a table in your workspace schema, or if you need programmatic access, uploaded to <code>APEX\_APPLICATION\_TEMP\_FILES</code>. When you use the built-in methods of files access, the authorization checks on the page also apply to file access.



- · About the Differences Between Page Items and Application Items
- About Item Types to learn more about creating a File Browse page item

# 20.3 Controlling Access to Applications, Pages, and Page Components

Control access to an application, individual pages, or page components by creating an access control list.



### Tip:

To create an access control page, the application schema must have CREATE TABLE, CREATE TRIGGER, and CREATE SEQUENCE privileges.

- Understanding Access Control
  - Adding the Access Control feature to an application, creates multiple pages and the following components: an Access Control region, access roles, authorization schemes, a build option, and an Application Setting.
- Creating an Access Control Using the Create Page Wizard
   Create an access control list to associate application roles with application users.
- Managing User Access
   Manage user access on the Administration page.
- Configuring Access Control
   Configure user access on the Administration page.



- About Controlling Access for Pages and Page Components
   Control access to a specific page or page component by editing the page or component and selecting an authorization schemes.
- About Removing an Access Control Created with a Wizard Remove an access control created with a wizard using build options.
- Managing Roles and User Assignments
   Manage application access control roles and user role assignments on the Application Access Control page..



Managing Roles and User Assignments

## 20.3.1 Understanding Access Control

Adding the Access Control feature to an application, creates multiple pages and the following components: an Access Control region, access roles, authorization schemes, a build option, and an Application Setting.

- About Adding Access Control Learn about adding Access Control.
- About Access Control Authorization Schemes
   Learn about Access Control authorization schemes.
- About Configuring Access Control
   Configure Access Control by running the application and accessing the Access
   Control region on the Administration page.
- About Exporting an Application with Access Control Learn about exporting an application with Access Control.

## 20.3.1.1 About Adding Access Control

Learn about adding Access Control.

Running the Access Control Wizard creates multiple pages and the following components:

- Adds an Access Control region to the Administration page you specify.
- Creates the access roles: Administrator, Contributor, and Reader.
- Creates the authorization schemes: Administration Rights, Contribution Rights, and Reader Rights.



## Note:

When you add a new Access Control to an existing application, these authorization schemes are only be created if the names do not exist. For example, if Administration Rights already exists (case sensitive comparison), the wizard will not recreate. Instead, the Access Control page will re-use the existing authorization scheme.

- Creates the build option, Feature: Access Control.
- Creates the Application Setting, ACCESS CONTROL SCOPE.

Developers use the access control list to associate the privileges, view, edit, and administration, with application users. Within the final Access Control UI, each privileges correlates to an access role:

- View correlates to the Reader role.
- Edit correlates to the Contributor role.
- Administration correlates to the Administrator role.

## See Also:

- Attaching an Authorization Scheme to an Application, Page, or Components
- Managing Roles and User Assignments

## 20.3.1.2 About Access Control Authorization Schemes

Learn about Access Control authorization schemes.

When you add the Access Control feature to an application, the PL/SQL Body Wizard creates the following authorization schemes:

 Administration Rights – This authorization scheme checks if the current user in the application is assigned ADMINISTRATOR role.

```
return APEX_ACL.HAS_USER_ROLE (
    p_application_id=>:APP_ID,
    p_user_name => :APP_USER,
    p_role_static_id => 'ADMINISTRATOR');
```

• Contribution Rights — This authorization scheme checks if the current user in the application is assigned the ADMINISTRATOR role or the CONTRIBUTOR role.

```
if apex_acl.has_user_role (
   p_application_id=>:APP_ID,
   p_user_name => :APP_USER,
   p_role_static_id => 'ADMINISTRATOR') or
   apex_acl.has_user_role (
     p_application_id=>:APP_ID,
```



```
p_user_name=> :APP_USER,
    p_role_static_id=> 'CONTRIBUTOR') then
    return true;
else
    return false;
end if;
```

 Reader Rights – This authorization scheme returns TRUE if the access control is configured to allow any authenticated user access the application. If this behavior is not allowed, it checks if the current user in the application is assigned to any application role.

```
if nvl(apex_app_setting.get_value(
    p_name => 'ACCESS_CONTROL_SCOPE'),'x') = 'ALL_USERS' then
    -- allow user not in the ACL to access the application
    return true;
else
    -- require user to have at least one role
    return apex_acl.has_user_any_roles (
        p_application_id => :APP_ID,
        p_user_name => :APP_USER);
end if;
```

## See Also:

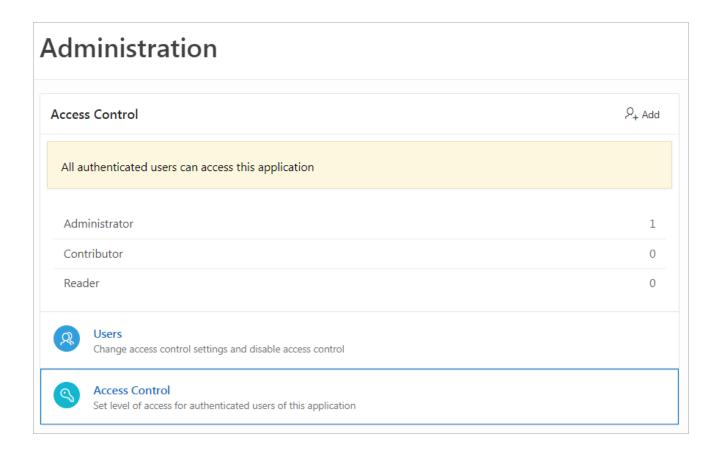
Attaching an Authorization Scheme to an Application, Page, or Components

## 20.3.1.3 About Configuring Access Control

Configure Access Control by running the application and accessing the Access Control region on the Administration page.

Once you add the Access Control feature, you configure it by running the application and accessing the Access Control region on the Administration page.





The Access Control region lists currently defined access roles and contains two sections: **Users** and **Access Control**.

### Users

Click **Users** to add new users, change a user's role, or disable access control by locking an account.



## Tip:

You add additional roles and configure role assignments on the Shared Components, Application Access Control page. See Managing Roles and User Assignments.

### **Access Control**

Click **Access Control** to specify the behavior when authenticated users access the application.

For Any authenticated user may access this application, select one of the following:

- Off Choose Off if all defined users are included in the access control list.
- On Choose On if authenticated users not in the access control list may also use this
  application.



## See Also:

- Managing User Access
- Configuring Access Control

## 20.3.1.4 About Exporting an Application with Access Control

Learn about exporting an application with Access Control.

When your export an application with the Access Control feature, the application roles, Administrator, Contributor, and Reader, are exported. However, the users assigned to these roles are not exported. If you deploy a exported application with the Access Control feature, navigation menu entry for Administration page will not display. When you deploy an application with Access Control feature, your can add user roles as needed by going to Shared Components, Application Access Control. If the application is being deployed in a runtime environment, you can add user roles using APEX\_ACL API. For example, the following example adds the user name 'SCOTT' as Administrator in application 255:

```
begin
   APEX_ACL.ADD_USER_ROLE (
        p_application_id => 255,
        p_user_name => 'SCOTT',
        p_role_static_id => 'ADMINISTRATOR' );
end;
```

You can also execute the  $APEX\_ACL$  API from the command line or create an install script in application supporting objects.

## See Also:

- Attaching an Authorization Scheme to an Application, Page, or Components
- Managing Roles and User Assignments
- APEX\_ACL in Oracle APEX API Reference

## 20.3.2 Creating an Access Control Using the Create Page Wizard

Create an access control list to associate application roles with application users.

Create an access control list by running the Create Page Wizard and selecting Features and then Access Control. The wizard also adds a reader, contributor and administrator role and corresponding authorization scheme to your application. Apply these authorization schemes to pages and page components to manage access by user and role.





### Tip:

This section describes how to create an access control list by running the Create Page Wizard from the Application home page. You can also run this wizard in Page Designer by clicking the **Create** menu and selecting **Page**.

To create an access control list using the Create Page Wizard:

- On the Workspace home page, click App Builder.
- Select an application.
- 3. Click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Click Feature and select Access Control.
- 5. For Page Type, select **Feature** and then **Access Control**.
- 6. On the Create Access Control Pages:
  - a. Starting Page Number Enter an unused starting page number. This feature creates multiple pages starting with the number specified. The default is calculated as the first available page number that is divisible by 10, which is greater than the maximum page number within this application..
  - b. Page Group Identify the name of the page group you to associate with this page. Page groups help developers manage the pages within an application. To create a page group, enter the name. To use an existing page group, select the name from the list.
  - c. Build Option The wizard creates the displayed build option to support this feature. You can use the build option to control whether the feature appears or to remove it later on.
  - **d.** Administration Page Preference Specify the administration page to which this access control list will be added. Options include:
    - Create a new page
    - Identify an existing page

What appears next depends upon your selection. Follow the on-screen instructions.

- Existing Administration Page Select an existing page used as the administration page in this application.
- f. Click Next.

A Confirmation page appears.

7. Click Create.

## 20.3.3 Managing User Access

Manage user access on the Administration page.

Use Manage User Access page to add new users, change a user's role, or disable access control by locking an account.





### Tip:

You can also add users by clicking the **Add** button adjacent to the Access Control region heading.

### To manage user access:

1. Run the application and navigate to Access Control.

By default, navigate to the **Administration** page and locate **Access Control** region.

Under Access Control, click Users.

The Manage User Access appears.

- 3. To add a user:
  - a. Click the Add User.
  - b. On Manage User Access, edit the attributes:
    - Username
    - Email
    - Role Select role (for example, Administrator, Contributor, or Reader).
  - c. Click Add User.
- 4. To edit an existing user:
  - a. Click the **Edit** icon adjacent to the Username.
  - **b.** On Manage User Access, edit the following:
    - Username
    - Email
    - Role Select role (for example, Administrator, Contributor, or Reader).
    - Account Locked Select Yes or No.
  - c. Click Apply Changes.
- **5.** To add multiple users:
  - a. Role Select a role (such as **Administrator**, **Contributor**, or **Reader**).
  - **b.** Username Enter usernames separated by commas, semicolons, or white space. Existing or duplicate usernames are automatically be ignored.
  - c. Confirm the additions and click **Apply Changes**.
- 6. To delete a user:
  - a. Click the **Edit** icon adjacent to the Username.
  - b. Click Delete
- 7. To revert you changes, click **Reset**.



## 20.3.4 Configuring Access Control

Configure user access on the Administration page.

Use Configure Access Control to specify the behavior when authenticated users access the application, determine the default role for users not in the access control list, and determine the userame format (email or string).

To configure access control:

- Run the application and navigate to Access Control.
   By default, navigate to the Administration page and locate Access Control section.
- 2. Under Access Control, click Access Control.
- 3. In the Configure Access Control dialog, edit Any authenticated user may access this application:
  - Off Choose Off if all defined users are included in the access control list.
  - On Choose On if authenticated users not in the access control list may also use this application.
- To save your changes, click Apply Changes.

## 20.3.5 About Controlling Access for Pages and Page Components

Control access to a specific page or page component by editing the page or component and selecting an authorization schemes.

The Access Control Wizard creates authorization schemes that correspond to the application mode list options and the privileges available in the Access Control List.

You can control access to a specific page or page component by editing the page or component and selecting one of the following authorization schemes:

- Administration Rights Only users with Administrator privileges can view the page or component.
- **Contribution Rights** Users with both Edit and Administrator privileges can view the page or component. Users with View privileges cannot view the page or component.
- Reader Rights Users with Administrator, Edit, or View privileges can view the page or component.
- Not Administration Rights Users with Administrator privileges cannot view the page or component.
- **Not Contribution Rights** Users with both Edit and Administrator privileges cannot view the page or component. Users with View privileges can view the page or component.
- Not Reader Rights Users with Administrator, Edit, or View privileges cannot view the page or component.



Attaching an Authorization Scheme to an Application, Page, or Components



## 20.3.6 About Removing an Access Control Created with a Wizard

Remove an access control created with a wizard using build options.

When you add an access control list using a wizard, the wizard creates one or more pages and other components and processes to seamlessly integrate it into your application. Each feature is associated with a build option which contains one or more components. You use the associated build option to enable, disable, or permanently remove features.

### **Using Build Options to Include or Exclude Features**

Build options have two possible values: **Include** and **Exclude**. If you select the build option status of **Include**, then the Oracle APEX engine considers the associated components (in this case features) as part of the application definition at runtime. Conversely, if you specify the build options status as **Exclude**, then the Oracle APEX engine treats it and any associated components as if it did not exist.

### **Removing Features Permanently**

You remove features created with a wizard by first removing the components associated with the build option and then deleting the build option.



- Including or Excluding Build Options
- Deleting Build Options and Associated Components

## 20.3.7 Managing Roles and User Assignments

Manage application access control roles and user role assignments on the Application Access Control page..



### Tip:

You also use the APEX APP ACL API.

- About Application Access Control Learn about managing access control application users and roles.
- Creating Access Control Roles
   Create application access control roles.
- Editing or Deleting Access Control Roles
   Edit or delete application access control roles.
- Adding User Role Assignments
   Define additional user role assignments on the Application Access Control page.



Editing User Role Assignments
 Edit or delete user role assignments.

## See Also:

- Controlling Access to Applications, Pages, and Page Components
- APEX\_ACL in Oracle APEX API Reference

## 20.3.7.1 About Application Access Control

Learn about managing access control application users and roles.

You create an access control list by running the Access Control Wizard from either the Create Application Wizard or Create Page Wizard. The Access Control Wizard creates a page to manage an access control list and creates two tables within the application's default parsing schema to manage the access control list. Use the access control list within the application to associate the privileges (view, edit, and administration, with application users. Each privileges correlates to an access level role:

- View correlates to the READER role.
- Edit correlates to the CONTRIBUTOR role.
- Administration correlates to the ADMINISTRATOR role.

To control access to application pages and components, you need to create an Authorization Scheme and associate it with the application.

## **About Defining Additional Roles**

You can define additional roles on the Application Access Control page. Since roles are applied to users you must create the roles before adding users. Roles and users defined on the Application Access Control page can be reviewed using the following view:

- APEX APPL ACL USERS
- APEX APPL ACL USER ROLES
- APEX APPL ACL ROLES



Attaching an Authorization Scheme to an Application



## 20.3.7.2 Creating Access Control Roles

Create application access control roles.



## Tip:

Since roles are applied to users, you must create the roles before adding users.

To create an application access control role:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

Under Security, select Application Access Control.

The Application Access Control page appears.

3. Under Roles, click Add Role.

The Role dialog appears.

- 4. On Role:
  - a. Name Enter a descriptive name for this role. Name may only contain alphanumeric characters and underscores (\_).
  - **b.** Static Identifier Alternate application identifier for this role.
  - c. Description Enter an optional description of this role.
- Click Create Role.

The new role displays under Roles on the Application Access Control page.

## 20.3.7.3 Editing or Deleting Access Control Roles

Edit or delete application access control roles.

To edit an application access control role:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click App Builder.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Security, select Application Access Control.

The Application Access Control page appears.

3. To edit a role:



a. Under Roles, select the role.

The Role dialog appears.

- **b.** Edit the attributes.
- c. Click Apply Changes.
- To delete a role:
  - a. Under Roles, select the role. The Role dialog appears.
  - b. Click Delete.

## 20.3.7.4 Adding User Role Assignments

Define additional user role assignments on the Application Access Control page.

To add user role assignments:

- **1.** Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Security, select Application Access Control.

The Application Access Control page appears.

3. Under User Role Assignments, click **Add User Role Assignment**.

The User Assignment dialog appears.

- 4. On User Assignment:
  - a. User Name Enter a descriptive name for this role. Name may only contain alphanumeric characters and underscores ( ).
  - b. Application Role Select a role.
- 5. Click Create Assignment.

The new user assignment displays under User Role Assignments.



### Tip:

Application users are not exported as part of your application. When you deploy your application you will need to manually manage your user to role assignments. Roles are exported as part of an application export and imported with application imports.

## 20.3.7.5 Editing User Role Assignments

Edit or delete user role assignments.

To edit user role assignments:



- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Security, select Application Access Control.

The Application Access Control page appears.

- 3. To edit an existing user role assignment:
  - a. Under User Role Assignments, select a user name.

The User Assignment dialog appears.

- **b.** For Application Role, celect a new role.
- c. Click Save.
- 4. To delete a user role assignment:
  - a. Under User Role Assignments, select a user name.

The User Assignment dialog appears.

b. Click Delete.



### Tip:

Application users are not exported as part of your application. When you deploy your application you will need to manually manage your user to role assignments. Roles are exported as part of an application export and imported with application imports.



Exporting Workspaces, Applications, and App Components

## 20.4 Establishing User Identity Through Authentication

Use authentication to establish a user's identity to control access to an application. Authentication may require a user identify a user name and password or could involve the use of digital certificates or a secure key.

- Understanding Authentication Learn about authentication.
- Creating an Authentication Scheme
   To associate an authentication scheme with an application, you create an authentication scheme on the Shared Components page.
- Understanding Preconfigured Authentication Schemes Learn about the preconfigured authentication schemes.



- Configuring an Existing Authentication Scheme
   Configure various settings and program hooks in an existing authentication scheme.
- Viewing the Authentication Scheme Associated with an Application
   View the current authentication scheme associated with an application.
- Changing the Authentication Scheme Associated with an Application Change the authentication scheme associated with an application.
- Creating a Login Page
   Create an application login page.
- Viewing Authentication Scheme Reports View authentication scheme reports.

## 20.4.1 Understanding Authentication

Learn about authentication.

- How Authentication Works
   Lean how authentication works.
- About Support for Deep Linking Learn about support for deep linking.
- About Determining Whether to Include Authentication
   Learn about determining whether to include application authentication.

## 20.4.1.1 How Authentication Works

Lean how authentication works.

You determine how your application interacts with users. If all users have the same rights and privileges, they are referred to as public users. However, if your application must track each user individually, you must specify an authentication method.

Authentication establishes the identity of each user who accesses your application. Many authentication processes require that a user provide some type of credentials such as a user name and password. These credentials are then evaluated and they either pass or fail. If the credentials pass, the user has access to the application. Otherwise, access is denied.

Once a user has been identified, the Oracle APEX engine keeps track of each user by setting the value of the built-in substitution string APP\_USER. As a user navigates from page to page, the APEX engine sets the value of APP\_USER to identify the user. The APEX engine uses APP\_USER as one component of a key for tracking each user's session state.

From a programming perspective, you can access APP USER using the following syntax:

As a bind variable from either PL/SQL or SQL:

```
:APP USER
```

From PL/SQL packages and triggers:

```
V('APP USER')
```

As an attribute of the context APEX\$SESSION:

```
sys_context('APEX$SESSION', 'APP_USER')
```

You can use APP\_USER to perform your own security checks and conditional processing. For example, suppose you created the following table:



```
CREATE TABLE my_security_table (
  user_id VARCHAR2(30),
  privilege VARCHAR2(30));
```

Once created, you could populate this table with user privilege information and then use it to control the display of pages, tabs, navigation bars, buttons, regions, or any other control or component.



- APP USER
- Configuring Security Attributes

## 20.4.1.2 About Support for Deep Linking

Learn about support for deep linking.

APEX applications that use authentication schemes support deep linking. Deep linking refers to the ability to link to an APEX page out of context (for example, from a hyperlink in an email or workflow notification). When you link to a page out of context and the application requires the user be authenticated, the user is taken to the Sign In page. After credentials verification, the APEX engine automatically displays the page that was referenced in the original link. Deep linking is disabled by default. Application developers can enable deep linking at the application-level on the Security Attributes page in Shared Components or for individual pages in Page Designer.

## 20.4.1.3 About Determining Whether to Include Authentication

Learn about determining whether to include application authentication.

As you create your application, you must determine whether to include authentication. Options include:

- Choose to not require authentication. APEX does not check any user credentials. All pages of your application are accessible to all users.
- Select a built-in authentication scheme. Create an authentication method based on available preconfigured authentication schemes. Depending on which scheme you choose, you may also have to configure the corresponding components of Oracle 10giAS, Oracle Internet Directory, or other external services.
- Create custom authentication scheme. Create a custom authentication method
  to have complete control over the authentication interface. To implement this
  approach, you must provide a PL/SQL function the APEX engine executes before
  processing each page request. This function's Boolean return value determines
  whether the APEX engine processes the page normally or displays a failure page.



## See Also:

- Understanding Preconfigured Authentication Schemes
- Changing the Authentication Scheme Associated with an Application
- Creating and Editing an Authorization Scheme

## 20.4.2 Creating an Authentication Scheme

To associate an authentication scheme with an application, you create an authentication scheme on the Shared Components page.

To create an authentication scheme:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

4. Under Security, select Authentication Schemes.

The Authentication Schemes page appears.

- 5. You can customize the appearance the page using the Search bar at the top of the page.
- 6. To create a new authentication scheme, click **Create**.
- Specify how the scheme should be created by selecting one of the following:
  - Based on a pre-configured scheme from the gallery.
  - As a copy of an existing authentication scheme.
- 8. Follow the on-screen instructions.

## See Also:

- Understanding Preconfigured Authentication Schemes
- Custom Authentication

## 20.4.3 Understanding Preconfigured Authentication Schemes

Learn about the preconfigured authentication schemes.

When you create an authentication scheme from the gallery, you can select a preconfigured authentication scheme which follows a standard behavior for authentication and session management. To associate an authentication scheme with an application, you select the application and create a new authentication scheme. The new authentication scheme automatically becomes the **Current** authentication scheme for the selected application. This section describes all preconfigured authentication schemes that ship with Oracle APEX.





### Tip:

Authentication schemes support plug-ins. To learn more, see Implementing Plug-ins.

### Oracle APEX Accounts

Oracle APEX Accounts are user accounts that are created within and managed in the APEX user repository. When you use this method, your application is authenticated against these accounts.

### Custom Authentication

Creating a Custom Authentication scheme from scratch to have complete control over your authentication interface.

### Database Accounts

Database Account Credentials authentication utilizes database schema accounts to authenticate users.

### HTTP Header Variable

Authenticate users externally by storing the username in a HTTP Header variable set by the web server.

### Open Door Credentials

Enable anyone to access your application using a built-in login page that captures a user name.

### No Authentication (using DAD)

Adopts the current database user. This approach can be used in combination with a mod\_plsql Database Access Descriptor (DAD) configuration that uses basic authentication to set the database session user.

### LDAP Directory

Authenticate a user and password with an authentication request to a LDAP server.

### Oracle Application Server Single Sign-On Server

Delegates authentication to the Oracle AS Single Sign-On (SSO) Server. To use this authentication scheme, your site must have been registered as a partner application with the SSO server.

### SAML Sign-In

Delegates authentication to the Security Assertion Markup Language (SAML) Sign In authentication scheme.

### Social Sign-In

Social Sign-In supports authentication with Google, Facebook, and other social network that supports <code>OpenID Connect or OAuth2 standards</code>.



### See Also:

Configuring Authentication Schemes for an Instance in *Oracle APEX Administration Guide* 



## 20.4.3.5 Open Door Credentials

Enable anyone to access your application using a built-in login page that captures a user name.

Open Door Credentials enables anyone to access your application using a login page that captures a user name. This authentication scheme is useful during application development.

Setting Up Open Door Credentials
 Learn how to set up Open Door Credentials authentication.

## 20.4.3.5.1 Setting Up Open Door Credentials

Learn how to set up Open Door Credentials authentication.

To set up Open Door Credentials authentication:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- On the Application home page, click Shared Components.The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click Create.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- Under Name:
  - Name Enter the name used to reference the authentication scheme by other application developers.
  - **b.** Scheme Type Select **Open Door Credentials**.
- 8. Click Create Authentication Scheme.

## 20.4.3.1 Oracle APEX Accounts

Oracle APEX Accounts are user accounts that are created within and managed in the APEX user repository. When you use this method, your application is authenticated against these accounts.

- About Oracle APEX Accounts Learn about Oracle APEX accounts.
- Setting Up Oracle APEX Accounts Authentication Learn how to set up Oracle APEX accounts authentication.

## 20.4.3.1.1 About Oracle APEX Accounts

Learn about Oracle APEX accounts.

Oracle APEX Accounts authentication requires that a database user (schema) exists in the local database. When using this method, the user name and password of the database account is used to authenticate the user.

Oracle APEX Accounts is a good solution when:



- You want control of the user account repository.
- User name and password-based approach to security is sufficient.
- You do not need to integrate into a single sign-on framework.

Oracle APEX Accounts is an especially good approach when you must get a group of users up and running on a new application quickly.



### Tip:

Oracle does not recommend Oracle APEX Accounts authentication in production environments. The credentials used to log in to an application may be the same as the credentials used to log in to a workspace. In production environments, Oracle recommends using another identity provider such as Oracle Access Manager (OAM), Oracle Identity Cloud Service (IDCS), Okta, or Microsoft Azure authentication.



Managing APEX Users in Oracle APEX Administration Guide

## 20.4.3.1.2 Setting Up Oracle APEX Accounts Authentication

Learn how to set up Oracle APEX accounts authentication.

To set up Oracle APEX Accounts:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**. The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - b. Scheme Type Select Oracle APEX Accounts.
  - c. Click Create Authentication Scheme.

## 20.4.3.2 Custom Authentication

Creating a Custom Authentication scheme from scratch to have complete control over your authentication interface.

- About Custom Authentication
   Learn about Custom authentication.
- Setting Up Custom Authentication Learn how to set up Custom authentication.
- About Session Management Security
   Learn about session management security.

### 20.4.3.2.1 About Custom Authentication

Learn about Custom authentication.

Custom authentication is the best approach for applications when any of the following is true:

- Database authentication or other methods are not adequate.
- You want to develop your own login form and associated methods.
- You want to control security aspects of session management.
- You want to record or audit activity at the user or session level.
- You want to enforce session activity or expiry limits.
- You want to program conditional one-way redirection logic before Oracle APEX page processing.
- You want to integrate your application with non-APEX applications using a common session management framework.
- Your application consists of multiple applications that operate seamlessly (for example, more than one application ID).



## Tip:

If you are planning on using the same authentication scheme for multiple applications, consider writing a custom authentication plug-in. See Implementing Plug-ins.

## 20.4.3.2.2 Setting Up Custom Authentication

Learn how to set up Custom authentication.

To create a custom authentication scheme:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- On the Application home page, click Shared Components.
   The Shared Components page appears.
- Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:



- a. Name Enter the name used to reference the authentication scheme by other application developers.
- b. Scheme Type Select Custom.
- 8. Fill in the appropriate fields.

To learn more about a specific field, see field-level Help.

9. Click Create Authentication Scheme.

See Also:

Viewing Field-level and Page Designer Help

## 20.4.3.2.3 About Session Management Security

Learn about session management security.

When running custom authentication, APEX attempts to prevent two improper situations:

- Intentional attempts by a user to access session state belonging to someone else. However, users can still type in an arbitrary application session ID into the URL.
- Inadvertent access to a stale session state (probably belonging to the same user from an earlier time). This would commonly result from using bookmarks to application pages.

APEX checks that the user identity token set by the custom authentication function matches the user identity recorded when the application session was first created. If the user has not yet been authenticated and the user identity is not yet known, the session state being accessed does not belong to someone else. These checks determine whether the session ID in the request can be used. If not, the APEX engine redirects back the same page using an appropriate session ID.

## 20.4.3.3 Database Accounts

Database Account Credentials authentication utilizes database schema accounts to authenticate users.

- About Database Account Credentials
   Learn about Database Account Credentials.
- Setting Up Database Account Credentials
   Learn how to set up Database Account Credentials.

### 20.4.3.3.1 About Database Account Credentials

Learn about Database Account Credentials.

Database Account Credentials requires that a database user (schema) exist in the local database. This authentication method uses the database account user name and password to authenticate the user. Choose Database Account Credentials if having one database account for each named user of your application is feasible and account maintenance using database tools meets your needs.



## 20.4.3.3.2 Setting Up Database Account Credentials

Learn how to set up Database Account Credentials.

To set up Database Account Credentials:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- On the Application home page, click Shared Components.
   The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - b. Scheme Type Select Database Accounts.
  - c. Click Create Authentication Scheme.

## 20.4.3.4 HTTP Header Variable

Authenticate users externally by storing the username in a HTTP Header variable set by the web server.



To ensure the security and performance of your development environment, this functionality is not available in Oracle APEX instances running in Oracle Cloud.

- About HTTP Header Variable Learn about HTTP Header Variable authentication.
- Setting Up HTTP Header Variable
  Learn how to set up HTTP Header Variable authentication.

## 20.4.3.4.1 About HTTP Header Variable

Learn about HTTP Header Variable authentication.

HTTP Header Variable supports the use of header variables to identify a user and to create an Oracle APEX user session. Use HTTP Header Variable authentication scheme if your company employs a centralized web authentication solution like Oracle Access Manager which provides single sign-on across applications and technologies. User credential verification is performed by these systems and they pass the user's name to APEX using a HTTP header variable such as "REMOTE\_USER" (which is the default).

## 20.4.3.4.2 Setting Up HTTP Header Variable

Learn how to set up HTTP Header Variable authentication.



To set up HTTP Header Variable authentication:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. On the Application home page, click **Shared Components**.
  - The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - b. Scheme Type Select HTTP Header Variable.
- 8. Under Settings:

To learn more about a specific field, see field-level Help.

- a. HTTP Header Variable Name Specifies the name of the HTTP header variable which contains the username. If not specified, REMOTE\_USER will be used. The HTTP header variable is a variable set by the web server.
- **b.** Action if Username is Empty Specifies the action which should be performed if the username stored in the HTTP header variable is empty. Options include:
  - Redirect to Built-In URL Initiates a login by the web server. This Built-In URL has to be setup to be protected by the web server, in order to force a login when called. After login, the web server must store the validated username in the HTTP header variable, so it is available to the authentication scheme. The Built-In URL is:

```
/apex/apex authentication.callback
```

Where The prefix /apex/ depends on your server configuration.

- Redirect to URL Initiates a login on an external server which then sets
  the validated username in the HTTP header variable. The external server
  should redirect back to the application using the URL generated by the
  #CALLBACK# placeholder to complete authentication in the application.
- Display Error Displays the specified error message and no login will be performed in the application.
- **c.** Verify Username Specifies how often the username stored in the HTTP header variable is verified. Options include:
  - Each Request Will expect that the CGI variable is always set as soon as
    the login has been performed by the web server. If the username is not
    identical to the one stored in the current APEX session, the session will be
    invalidated and a new login will be initiated. This is the most secure option
    because it detects logouts or username changes.
  - After Login Will only verify and store the username in the APEX session after the web server has performed the login and calls the callback to complete authentication in the application. For callback see "Action if Username is Empty" configuration.



d. Logout URL of SSO Server - If the authentication scheme is based on Oracle Access Manager or similar servers, you can use this attribute to specify a URL to log out of the central single sign-on server. The substitution parameter %POST\_LOGOUT\_URL% will be replaced by an encoded URL to the login page of your application.

Oracle Access Manager based SSO example:

/oamsso/logout.html?end url=%POST LOGOUT URL%

9. Click Create Authentication Scheme.

## 20.4.3.6 No Authentication (using DAD)

Adopts the current database user. This approach can be used in combination with a mod\_plsql Database Access Descriptor (DAD) configuration that uses basic authentication to set the database session user.

- About DAD Credentials Verification Learn about DAD Credentials Verification.
- Setting Up DAD Credentials Verification
   Learn how to set up DAD Credentials Verification.

## 20.4.3.6.1 About DAD Credentials Verification

Learn about DAD Credentials Verification.

DAD credentials verification uses the Oracle database native authentication and user mechanisms to authenticate users using a basic authentication scheme. This authentication scheme gets the user name from the DAD either as the value stored in the DAD configuration or, if the account information is not stored in the DAD configuration, as the user name captured using the basic authentication challenge.

To use DAD credentials verification:

- Each application user must have a user account in the Oracle database.
- You must configure a PL/SQL DAD for basic authentication (without account information).
   This results in one user name/password challenge for browser session for your application users. The user identity token is then made available in the APP USER item.

DAD database authentication is useful when you must implement an authentication method that requires minimal setup for a manageable number of users. Ideally these users would have self-managed accounts in the database and your use of this authentication method would be short lived (for example, during the demonstration or prototyping stages of development).

The main drawback of this approach is burdensome account maintenance, especially if users do not administer their own passwords, or if their database accounts exist only to facilitate authentication to your application.

## 20.4.3.6.2 Setting Up DAD Credentials Verification

Learn how to set up DAD Credentials Verification.

To set up DAD Credentials Verification authentication:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.



3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - **b.** Scheme Type Select **No Authentication**.
- 8. Settings, Username Enter the username for the APEX session. If empty, APEX uses the database session user (typically APEX PUBLIC USER).
- 9. Click Create Authentication Scheme.

## 20.4.3.7 LDAP Directory

Authenticate a user and password with an authentication request to a LDAP server.



To ensure the security and performance of your development environment, this functionality is not available in Oracle APEX instances running in Oracle Cloud.

- About LDAP Directory Verification Learn about LDAP Directory Verification.
- Setting Up LDAP Directory Verification
   Learn how to set up LDAP Directory Verification.

## 20.4.3.7.1 About LDAP Directory Verification

Learn about LDAP Directory Verification.

You can configure any authentication scheme that uses a login page to use Lightweight Directory Access Protocol (LDAP) to verify the user name and password submitted on the login page.

App Builder includes wizards and edit pages that explain how to configure this option. These wizards assume that an LDAP directory accessible to your application for this purpose already exists and that it can respond to a <code>SIMPLE\_BIND\_S</code> call for credentials verification. When you create an LDAP Credentials authentication scheme, the wizard requests and saves the LDAP host name, LDAP port, DN string, and determines whether to use SSL, exact DN, and optionally a search filter if not using exact DN. An optional preprocessing function can be specified to adjust formatting of the user name passed to the API.

## 20.4.3.7.2 Setting Up LDAP Directory Verification

Learn how to set up LDAP Directory Verification.



### To set up LDAP Directory:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. On the Application home page, click **Shared Components**.
  - The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - b. Scheme Type Select LDAP Directory.
- 8. Under Settings:
  - a. Host Enter the hostname of your LDAP directory server.
  - b. Port Enter the port number of your LDAP directory host. The default is 389.
  - **c.** Use SSL Choose whether to use SSL to bind to the LDAP directory. If SSL with Authentication is chosen, a wallet must be configured for the Oracle APEX instance.
  - d. Distinguished Name (DN) String Enter the pattern used to construct the fully qualified distinguished name (DN) string to DBMS\_LDAP.SIMPLE\_BIND\_S if using exact DN or the search base if using non-exact DN. Use %LDAP\_USER% as a placeholder for the username. For example:

### **Exact DN:**

cn=%LDAP USER%,l=amer,dc=yourdomain,dc=com

### Non-Exact DN (Search Base):

```
Non-Exact DN (Search Base)
```

- e. Use Distinguished Name (DN) Choose whether the LDAP Distinguished Name (DN) String is exact or non-exact. If non-exact, LDAP Distinguished Name (DN) is the search base and you must supply a Search Filter.
- f. LDAP Username Edit Function You may provide additional code to be executed to transform the username into a format perfectly suited to the LDAP directory entry or LDAP username. The bind variable : USERNAME contains the name the end user specified. For example, the following code calls a function which replaces all periods (.) with underscores (\_) in the DN string:

```
return apex_custom_auth.ldap_dnprep(p_username => :USERNAME);
```

g. Username Escaping - Choose how Oracle APEX escapes special characters in %LDAP\_USER%. The correct value for this attribute depends on the used LDAP server and whether a LDAP Username Edit Function already escapes special characters.

To learn more about a specific field, see field-level Help.

9. Click Create Authentication Scheme.



#### Note:

If you choose SSL with Authentication as the SSL mode, a wallet must be set up using the Oracle APEX instance settings. Additionally, the root certification of the LDAP server must be imported into that wallet as a trusted certificate.

#### See Also:

- Configuring Authentication Schemes for an Instance
- Configuring Wallet Information in Oracle APEX Administration Guide
- Using Oracle Wallet Manager in Oracle Database Enterprise User Security Administrator's Guide

# 20.4.3.8 Oracle Application Server Single Sign-On Server

Delegates authentication to the Oracle AS Single Sign-On (SSO) Server. To use this authentication scheme, your site must have been registered as a partner application with the SSO server.

#### Note:

To ensure the security and performance of your development environment, this functionality is not available in Oracle APEX instances running in Oracle Cloud

- About Application Server Single Sign-On Server
   Learn about Application Server Single Sign-On Server authentication.
- Setting Up Oracle Application Server Single Sign-On Learn how to set up Single Sign-On authentication.

#### 20.4.3.8.1 About Application Server Single Sign-On Server

Learn about Application Server Single Sign-On Server authentication.

Oracle APEX applications can operate as partner applications with Oracle Application Server's Single Sign-On (SSO) infrastructure. You must register your application (or register the APEX engine) as the partner application by following the Oracle Application Server instructions for registering partner applications and install the Oracle 9iAS SSO Software Developer Kit (SDK).

If you choose this approach, your application will not use an integrated login page. Instead, when a user accesses your application in a new browser session, the APEX engine redirects to the Single Sign-On login page. After the user is authenticated by SSO, the SSO components redirect back to your application, passing the user identity and other information to the APEX engine. The user can then continue to use the



application until they log off, terminate their browser session, or until some other session-terminating event occurs.

#### 20.4.3.8.2 Setting Up Oracle Application Server Single Sign-On

Learn how to set up Single Sign-On authentication.

To set up Oracle Application Server Single Sign-On:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
  - The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - **b.** Scheme Type Select **Oracle Application Server Single Sign-On**.
- 8. Under Settings:
  - a. Partner Application Name If you authenticate with Oracle Application Server Single Sign-On and your application is a registered partner application with SSO, then enter exactly the same name you used when registering the partner application with SSO.
    - If you are relying on APEX to be the registered partner application, leave this field blank.
  - b. Logout URL of SSO Server Enter the logout path of the Single Sign-On Server (for example https://login.example.com/sso/logout). On logout of your application, APEX will use this value, concatenate '?p\_done\_url=' and the application's login url, and use the resulting URL to log out of Single Sign-On before redirecting back to your application.
- 9. Click Create Authentication Scheme.

## 20.4.3.9 SAML Sign-In

Delegates authentication to the Security Assertion Markup Language (SAML) Sign In authentication scheme.



SAML support requires Oracle Database 19c (Database Release Update 19.9.0.0.0 or newer) or Oracle Database 21c. If your database does not meet these requirements, SAML Sign-In authentication scheme will not be displayed.

 About SAML Sign In Learn about SAML Sign In authentication.



 Setting Up SAML Sign In Learn how to set up SAML Sign In authentication.

#### 20.4.3.9.1 About SAML Sign In

Learn about SAML Sign In authentication.

Oracle APEX supports the use of Security Assertion Markup Language (SAML). SAML is an XML-based protocol for exchanging security information between software entities on the Web. SAML security is based on the interaction of asserting and relying parties. SAML provides single sign-on capabilities; users can authenticate at one location and then access service providers at other locations without having to log in multiple times.



SAML support requires Oracle Database 19c (Database Release Update 19.9.0.0.0 or newer) or Oracle Database 21c. If your database does not meet these requirements, SAML Sign-In authentication scheme will not display.

#### 20.4.3.9.2 Setting Up SAML Sign In

Learn how to set up SAML Sign In authentication.



#### Tip:

To configure SAML Sign In for an Oracle APEX instance, see Editing SAML Sign-In in *Oracle APEX Administration Guide*.

To set up SAML Sign In:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - Name Enter the name used to reference the authentication scheme by other application developers.
  - b. Scheme Type Select SAML Sign In.
- 8. Under Settings:
  - a. Use SAML Attributes of Select Instance.
  - **b.** Convert Username To Upper Case Configure whether the attribute values for the username should be converted to upper case.

#### 9. Click Create Authentication Scheme.

## 20.4.3.10 Social Sign-In

Social Sign-In supports authentication with Google, Facebook, and other social network that supports OpenID Connect or OAuth2 standards.

- About Social Sign-In Learn about Social Sign-In authentication.
- Setting Up Social Sign-In Authentication
   Learn how to set up Social Sign-In authentication.

#### 20.4.3.10.1 About Social Sign-In

Learn about Social Sign-In authentication.

Social Sign-In authentication is primarily useful for the following use cases:

- Your application is internet facing and you expect an unknown number of users from social networks to use your application.
- Your company has standardized on one of these identity providers for authentication: Oracle Identity Cloud Service, an internal OpenID Connect or OAuth2.

Since these identity providers perform user credential verification, be aware that anyone who registers with the provider can use your application, unless you use authorization schemes for protection.

When registering your application with the identity provider, you need to use the full URI for one of the predefinedOracle APEX callback URLs. For example, suppose your application URI is:

```
https://www.example.com/apex/f?p=100
```

Then, you can register one of the following:

```
https://www.example.com/apex/apex authentication.callback
```

or

https://www.example.com/apex/apex authentication.callback2

Social network authentication providers store a multitude of information about users. You can configure the Social Login authentication scheme to request this information, using the Scope attribute (see Item Help). In the authentication scheme's Post-Authentication procedure, you can access this information using APEX\_JSON.GET\_% function calls.

You can use multiple authentication schemes in your application, to support more than one Social Login provider and other schemes.



#### See Also:

Authorization for the authentication scheme attribute Switch in Session for details.

#### 20.4.3.10.2 Setting Up Social Sign-In Authentication

Learn how to set up Social Sign-In authentication.

#### Note:

As a prerequisite for creating the Social Sign-In Authentication , you have to request <code>OAuth2</code> credentials from the authentication provider and configure your account to support redirects to your application. Check your authentication provider's documentation for the details. The steps below assume that this has been done and that you saved the <code>OAuth2</code> credentials in the application's shared components.

To set up Social Sign-In Authentication:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- On the Application home page, click Shared Components.
   The Shared Components page appears.
- 4. Under Security, select Authentication Schemes.
- 5. On the Authentication Schemes page, click **Create**.
- 6. Select Based on a pre-configured scheme from the gallery and click Next.
- 7. Under Name:
  - a. Name Enter the name used to reference the authentication scheme by other application developers.
  - b. Scheme Type Select Social Sign-In.
- 8. Under Settings:
  - a. Credential Store Select the credential store which contains Client ID and Secret for the Authentication Provider.
  - **b.** Authentication Provider Options include:
    - OpenID Connect Provider Use an OpenID Connect based authentication provider. You have to enter the provider's OpenID Discovery URL below.
    - Generic OAuth2 Provider Use an OAuth2 authentication provider. You
      have to enter URLs for the authorization, token and userinfo endpoints
      below.
    - Google Use pre-defined settings for Google Login.
    - Facebook Use pre-defined settings for Facebook Login.



c. Discovery URL - Enter the OpenID Connect provider's discovery URL.

#### Example:

https://accounts.example.com/.well-known/openid-configuration

d. Scope - Enter a comma separated list of permissions to request for the user who is logging in. The acceptable values depend on your authentication provider. For OpenID Connect and Google, APEX automatically adds the "openid" scope. The authentication provider returns user attributes based on these permissions. You can map the attributes to application items, or use a Post Authentication procedure to process them, using the APEX JSON.GET % functions.

OpenID Connect scopes and attributes (also called claims) are listed here: https://openid.net/specs/openid-connect-basic-1 0.html#Scopes%20Examples%20email,profile

**e.** Authentication URI Parameters - Enter optional parameters for the authentication URI. Consult the authentication provider's documentation for supported parameters.

#### Example:

prompt=consent

f. Username - Enter the attribute which contains the username, or free text with one or more attribute substitutions that are enclosed by "#". You can reference the authentication scheme's name with #APEX\_AUTH\_NAME#. For example, #email# (#APEX\_AUTH\_NAME#) will result in a username that consists of the email address, followed by " (", followed by the authentication scheme name, followed by ")", like "jane.doe@example.com (Google)".

Consult the authentication provider's documentation for supported attributes. Note that you need to set the required Scope, otherwise the authentication provider will not send all attributes. OpenID Connect scopes and attributes (also called claims) are listed here:

#### Examples:

```
#sub# (#APEX AUTH NAME#)
```

- **g.** Convert Username To Upper Case Configure whether the attribute values for the username should be converted to upper case.
- Additional User Attributes Enter a comma separated list of additional user data attributes.

Consult the authentication provider's documentation for supported attributes. Note that you need to set the required Scope, otherwise the authentication provider will not send all attributes. OpenID Connect scopes and attributes (also called claims) are listed here:

https://openid.net/specs/openid-connect-basic-1 0.html#Scopes

 Map Additional User Attributes - Provide a comma-separated list of application item names that the Additional User Attributes map to.

For example, if you set the following attributes, then APEX automatically saves the attribute values in session state for the corresponding items.:

- Additional User Attributes email, profile, picture
- Map Additional User Attributes To G EMAIL, G PROFILE, G PICTURE



- j. Verify Attributes If enabled, APEX looks for an attribute "#name#\_verified" (for example, "email\_verified" for Attribute "email"). OpenID defines that the identity provider sends "#name#\_verified": false for unverified "email" and "phone\_number" attributes. APEX ignores such unverified attributes. This will result in a failed authentication if "#name#" is the Username attribute. If the identity provider lets attackers enter unverified data that the application uses for authentication, they could impersonate other users in the application. The Verify Attributes check prevents this.
- 9. Click Create Authentication Scheme.

# 20.4.4 Configuring an Existing Authentication Scheme

Configure various settings and program hooks in an existing authentication scheme.

The authentication scheme designated as **Current** determines how an application identifies and verifies the user. Depending on the selected Authentication Scheme, you can configure various settings and program hooks to fine-tune your application's authentication such as login processing, post-logout URL, and session sharing.

To configure an existing authentication scheme:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- On the Application home page, click Shared Components.
   The Shared Components page appears.
- Under Security, select Authentication Schemes.
   Customize the appearance the page using the Search bar at the top of the page.
- **5.** To configure an authentication scheme, click the authentication scheme name. The Authentication Scheme page appears.
- Edit the appropriate attributes.
   To learn more about a specific attribute, see field-level Help.
- Edit the appropriate attributes and click Apply Changes.



Configuring Authentication Schemes for an Instance in *Oracle APEX Administration Guide* 

# 20.4.5 Viewing the Authentication Scheme Associated with an Application

View the current authentication scheme associated with an application.

To view the current authentication scheme for an application:

1. On the Workspace home page, click the **App Builder** icon.



- 2. Select an application.
- 3. Click Shared Components.
- 4. Under Security, click Security Attributes.
- Locate the Authentication section. The current authentication scheme displays next to Authentication Scheme.
- To edit the Authentication Scheme. Define Authentication Schemes.

# 20.4.6 Changing the Authentication Scheme Associated with an Application

Change the authentication scheme associated with an application.

To change the authentication scheme for an application:

- 1. Navigate to the Authentication Schemes:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
  - d. Under Security, select Authentication Schemes.
- 2. Select the authentication scheme you want to activate.

The Create/Edit page appears.

3. Click Make Current Scheme.

See Also:

**Understanding Preconfigured Authentication Schemes** 

## 20.4.7 Creating a Login Page

Create an application login page.

When you create an application in Oracle APEX, a login page is created. The alias for the page is 'LOGIN'. You can use this page as the "invalid session page" in an authentication scheme. The page is constructed with processes that call the APEX login API to perform credentials verification and session registration.

You can also build your own login pages using the pre-built pages as models and tailoring all of the user interface and processing logic to your requirements.

To create a login page for your application:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. Click Create Page.



- 4. For Create a Page:
  - a. User Interface Select a user interface for the page.
  - b. Select a page type Select Login Page.
  - c. Click Next.
- Select Login Page.
- 6. Specify Login page attributes and click Create.

# 20.4.8 Viewing Authentication Scheme Reports

View authentication scheme reports.

To view authentication scheme reports:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 4. Under Security, select Authentication Schemes.
- **5.** Click the appropriate tab at the top of the page:
  - Subscription Use the Authentication Scheme Subscription report to view subscribed authentication schemes in your application.
  - History Use the Authentication Scheme History report to view recent modifications made to items in this application.

# 20.5 Providing Security Through Authorization

Extend the security of your application by creating an authorization scheme.

Authorization is a broad term for controlling access to resources based on user privileges. While conditions control the rendering and processing of specific page controls or components, authorization schemes control user access to specific controls or components.

- How Authorization Schemes Work
   Learn about how an authorization scheme extends the security of your
   application's authentication scheme.
- Creating and Editing an Authorization Scheme
   Learn how to create and edit an authorization scheme. Before you can attach an
   authorization scheme to an application or an application component or control, you
   must first create it.
- Attaching an Authorization Scheme to an Application, Page, or Components
  Attach an authorization scheme to an entire application, page, control, or
  component.
- Viewing Authorization Reports
   View the Authorization Scheme Subscription and Authorization Scheme Utilization reports to better manage authorization schemes within your application.



#### 20.5.1 How Authorization Schemes Work

Learn about how an authorization scheme extends the security of your application's authentication scheme.

You can specify an authorization scheme for an entire application, page, or specific control such as a region, item, or button. For example, you could use an authorization scheme to selectively determine which tabs, regions, or navigation bars a user sees. An authorization scheme either succeeds or fails. Common authorization scheme types include Exists, Not Exists SQL Queries, and PL/SQL Function Returning Boolean. If a component or control level authorization scheme succeeds, the user can view the component or control. If it fails, the user cannot view the component or control. If an application or page-level authorization scheme fails, then Oracle APEX displays a previously defined message.

When you define an authorization scheme, you give it a unique name. Once defined, you can attach it to any component or control in your application. To attach an authorization scheme to a component or control in your application, simply navigate to the appropriate attributes page and select an authorization scheme from the Authorization Scheme list.

# 20.5.2 Creating and Editing an Authorization Scheme

Learn how to create and edit an authorization scheme. Before you can attach an authorization scheme to an application or an application component or control, you must first create it.

- About Authorization Scheme Types
   Select an authorization scheme type when you create an authorization scheme.
- Creating an Authorization Scheme
   Create an authorization scheme on the Shared Components page.
- Editing Attributes of an Existing Authorization Scheme
   Edit attributes of an existing authorization scheme.
- Changing the Evaluation Point Attribute
   Control when an authorization scheme is validated using the Evaluation Point, Validate authorization scheme attribute.
- About Resetting Authorization Scheme State
   Call an API to reset a session's authorization scheme state.

# 20.5.2.1 About Authorization Scheme Types

Select an authorization scheme type when you create an authorization scheme.

The authorization scheme type determines how an authorization scheme is applied. Developers can create new authorization type plug-ins to extend this list.

Table 20-1 Authorization Scheme Types

Authorization Scheme Types	Description
Exists SQL Query	Enter a query that causes the authorization scheme to pass if it returns at least one row and causes the scheme to fail if it returns no rows
NOT Exists SQL Query	Enter a query that causes the authorization scheme to pass if it returns no rows and causes the scheme to fail if it returns one or more rows



Table 20-1 (Cont.) Authorization Scheme Types

Authorization Scheme Types	Description
PL/SQL Function Returning Boolean	Enter a function body. If the function returns true, the authorization succeeds.
Item in Expression 1 is NULL	Enter an item name. If the item is null, the authorization succeeds.
Item in Expression 1 is NOT NULL	Enter an item name. If the item is not null, the authorization succeeds.
Value of Item in Expression 1 Equals Expression 2	Enter and item name and value. The authorization succeeds if the item's value equals the authorization value.
Value of Item in Expression 1 Does NOT Equal Expression 2	Enter an item name and a value. The authorization succeeds if the item's value is not equal to the authorization value.
Value of Preference in Expression 1 Does NOT Equal Expression 2	Enter an preference name and a value. The authorization succeeds if the preference's value is not equal to the authorization value.
Value of Preference in Expression 1 Equals Expression 2	Enter an preference name and a value. The authorization succeeds if the preference's value equal the authorization value.
Is In Group	Enter a group name. The authorization succeeds if the group is enabled as a dynamic group for the session. See APEX_AUTHORIZATION.ENABLE_DYNAMIC_GROUPS in <i>Oracle APEX API Reference</i> .
	If the application uses APEX Accounts Authentication, this check also includes workspace groups that are granted to the user. If the application uses Database Authentication, this check also includes database roles that are granted to the user.
Is Not In Group	Enter a group name. The authorization succeeds if the group is not enabled as a dynamic group for the session.

# 20.5.2.2 Creating an Authorization Scheme

Create an authorization scheme on the Shared Components page.

To create an authorization scheme:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- **3.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 4. Under Security, select Authorization Schemes.
- 5. Click Create.
- **6.** Specify how to create an authorization scheme by selecting one of the following:
  - From Scratch
  - As a Copy of an Existing Authorization Scheme
- 7. On Create Authorization Scheme Details:
  - a. Name Enter an unique name that identifies this authorization scheme.
  - **b.** Scheme Type Select how this authorization scheme will be applied. See About Authorization Scheme Types.



- c. Identify error message displayed when scheme violated Enter error text that displays if the authorization scheme fails (that is, the current user fails the security check).
- d. Validate Authorization Scheme Authorization schemes are evaluated on first use in a session. Use this option to controls if future uses cause re-evaluations and when a memorized result can be taken instead.

For more details, see field-level Help.

8. Click Create Authorization Scheme.

#### See Also:

- Attaching an Authorization Scheme to an Application, Page, or Components
- Changing the Evaluation Point Attribute
- About Resetting Authorization Scheme State

## 20.5.2.3 Editing Attributes of an Existing Authorization Scheme

Edit attributes of an existing authorization scheme.

To edit attributes of an existing authorization scheme:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

4. Under Security, select Authorization Schemes.

The Authorization Schemes page appears. By default, each scheme displays as an icon. You can customize the appearance the page using the Search bar at the top of the page.

- 5. Select an authorization scheme.
- 6. Edit the appropriate attributes.

To learn more, see field-level Help.

7. To save your changes, click **Apply Changes**.

## 20.5.2.4 Changing the Evaluation Point Attribute

Control when an authorization scheme is validated using the Evaluation Point, Validate authorization scheme attribute.

Authorization schemes are evaluated on first use in a session. The Validate authorization scheme attribute controls if future uses cause re-evaluations and when a memorized result can be taken instead.

To change the authorization scheme evaluation point:

1. On the Workspace home page, click the **App Builder** icon.



- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

4. Under Security, select Authorization Schemes.

The Authorization Schemes page appears.

By default, each scheme displays as an icon. You can customize the appearance the page using the Search bar at the top of the page.

- 5. Select an authorization scheme.
- **6.** Scroll down to Evaluation Point and edit the Validate authorization scheme attribute. Options include:
  - Once per session Evaluate only once and always use the memorized result
    afterwards.
  - Once per page view Evaluate once for each request that is processed. Use
    the memorized result if the authorization scheme is referenced in more than
    one component on the page.
  - Once per component Evaluate once for each component that references
    the authorization scheme, but save the result in the session. Further requests
    to render or process the scheme use the result that was memorized for the
    component.
  - Always (No Caching) The authorization scheme will always be evaluated.

To learn more, see field-level Help.

7. To save your changes, click Apply Changes.



#### Tip:

The default value **Once per session** is the most efficient. You should choose another value if the authorization check depends on changing session state or other factors that are not consistent over an entire session.

## 20.5.2.5 About Resetting Authorization Scheme State

Call an API to reset a session's authorization scheme state.

If an authorization scheme is validated once for each session, Oracle APEX caches the validation results in each user's session cache. You can reset a session's authorization scheme state by calling the APEX AUTHORIZATION.RESET CACHE API.



APEX\_AUTHORIZATION.RESET\_CACHE Procedure in Oracle APEX API
Reference



# 20.5.3 Attaching an Authorization Scheme to an Application, Page, or Components

Attach an authorization scheme to an entire application, page, control, or component.

- Attaching an Authorization Scheme to an Application
   Learn how to attach an authorization scheme to an application.
- Attaching an Authorization Scheme to a Page Learn how to attach an authorization scheme to a page.
- Attaching an Authorization Scheme to a Control or Component Learn how to attach an authorization scheme to a control or component.

#### 20.5.3.1 Attaching an Authorization Scheme to an Application

Learn how to attach an authorization scheme to an application.

To attach an authorization scheme to an application:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. Click the **Shared Components** icon.

The Shared Components page appears.

- 4. Under Security, click Security Attributes.
- 5. Scroll down to Authorization and make a selection from the Authorization Scheme list.
- 6. For Run on Public Pages, select **On** or **Off** to specify whether the application-level authorization scheme is checked on public pages (that is, pages that do not require authorization). To learn more, see Authorization.
- 7. To define a new authorization scheme, click **Define Authorization Schemes**.

## 20.5.3.2 Attaching an Authorization Scheme to a Page

Learn how to attach an authorization scheme to a page.

To attach an authorization scheme to a page:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. Select a page.

Page Designer appears.

- In the Rendering tab on the left side, click the page title at the top of the tree.
- In the Property Editor, locate Security and make a selection from the Authorization Scheme attribute.





#### Tip:

To find a group or attribute:

- Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 6. Click Save.

## 20.5.3.3 Attaching an Authorization Scheme to a Control or Component

Learn how to attach an authorization scheme to a control or component.

To attach an authorization scheme to a page component or control:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. Select a page.

Page Designer appears.

- Select the component or control to which you want to apply the authorization scheme.
- In the Property Editor, locate Security and make a selection from the Authorization Scheme attribute.



#### Tip:

To find a group or attribute:

- Search for the group or attribute Enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. To return to the default display, delete the keywords.
- Use Go to Group Click Go to Group and select the group. To return the default display, click Go to Group again and select Expand All.
- 6. Click Save.

# 20.5.4 Viewing Authorization Reports

View the Authorization Scheme Subscription and Authorization Scheme Utilization reports to better manage authorization schemes within your application.

To view authorization scheme reports:

- 1. On the Workspace home page, click the **App Builder** icon.
- Select an application.



3. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- 4. Under Security, select **Authorization Schemes**.
- **5.** Click the appropriate tab at the top of the page:
  - **Subscription** Use the Authorization Scheme Subscription report to view details about authorization schemes subscription.
  - **By Component** Use the By Component report to view all components within this application which have an associated authorization scheme. For a component to be rendered it must pass authorization schemes placed on the component level, the page level, and at the application level.
  - **Utilization** Use the Authorization Scheme Utilization report to view details about authorization schemes utilization.

To view additional reports indicating which pages having authorization schemes and which do not, select one of the following from the Tasks list:

- Report Pages With Authorization Schemes
- Report Pages Without Authorization Schemes
- **History** Use the Authorization Scheme History report to view recent modifications made to Authorization Schemes in this application.



# Managing Application Globalization

You can run applications built in App Builder concurrently in different languages.

This section describes how to translate an application built in App Builder.

- Understanding Application Translation and Globalization Support
   A single Oracle database instance and Oracle APEX can support multiple database
   sessions customized to support different languages.
- Specifying the Primary Language for an Application Globalization attributes specify how the Oracle APEX engine determines the primary language of an application.
- Applying Format Masks to Items
   The Oracle APEX engine applies globalization settings for each rendered page. This default behavior can impact the display of certain items such as numbers and dates.
- About Translating Applications for Multibyte Languages
   If your application must run in several languages simultaneously (such as Chinese and Japanese), consider configuring your database with a character set to support all of the languages.
- Understanding the Translation Process
   To translate an application developed in App Builder, you must map the primary and target language, seed and export text to a translation file, translate the text, apply the translation file, and publish the translated application.
- Translating Messages
   Learn when and how to translate messages in an Oracle APEX application.
- Translating Data That Supports List of Values
   You create a dynamic translation to translate dynamic pieces of data. For example, you might use a dynamic translation on a list of values based on a database guery.
- Understanding Supported Globalization Codes
   If you are building a multilingual application, it is important to understand how globalization codes affect the way in which your application runs. These codes are set automatically based on the application-level Globalization attributes you select.



Viewing Installed Translations in Oracle APEX Administration Guide

# 21.1 Understanding Application Translation and Globalization Support

A single Oracle database instance and Oracle APEX can support multiple database sessions customized to support different languages.

You can develop applications in App Builder that can run concurrently in different languages.

- About the Translation Process
   Learn about translating an application built in App Builder.
- About Language Identification
   After you create an application, you specify a language preference. Then you select a primary application language and determine how the APEX engine determines the application language. The application primary language can be static, derived from the Web browser language, or determined from a user
- About the Rules for Translating Applications
   Learn about rules for translating applications.
- How Translated Applications Are Rendered
   After APEX determines the language for an application, the APEX engine alters
   the database language for a specific page request. It then looks for a translated
   application in the appropriate language. If the APEX engine finds that language, it
   renders the application using that definition. Otherwise, it renders the application in
   the base (or primary) application language.
- Making Application Attributes Translatable
   Learn about best practices to make application attributes within your application
   translatable.

## 21.1.1 About the Translation Process

preference or item.

Learn about translating an application built in App Builder.

In general, translating an application built in App Builder involves the following steps:

- 1. Map the primary and target application IDs.
- 2. Seed and export the text to a file for translation.
- 3. Translate the text in the file.
- 4. Apply the translated file.
- 5. Publish the translated file.



**Understanding the Translation Process** 



# 21.1.2 About Language Identification

After you create an application, you specify a language preference. Then you select a primary application language and determine how the APEX engine determines the application language. The application primary language can be static, derived from the Web browser language, or determined from a user preference or item.

See Also:

Specifying the Primary Language for an Application

# 21.1.3 About the Rules for Translating Applications

Learn about rules for translating applications.

Use the following rules to determine which translated version to use:

- Look for an exact match between the user language preference and the language code
  of the translated application.
- Look for a truncated match. That is, see if the language and locale exist. For example, if
  the user language preference is en-us and the translated version of en-us does not exist,
  look for a translated application that has the language code en.
- Use the primary application language.

For example, suppose you create an application with the primary language of German, de, and you create a translated version of the application with a language code of en-us. Users accessing this application with a browser language of en-us execute the English en-us version of the application. Users accessing the application with a browser language of en-gb view the application in the application's primary language, that is, in German. For this example, you should create the translated English version using language code en to encompass all variations of en.

# 21.1.4 How Translated Applications Are Rendered

After APEX determines the language for an application, the APEX engine alters the database language for a specific page request. It then looks for a translated application in the appropriate language. If the APEX engine finds that language, it renders the application using that definition. Otherwise, it renders the application in the base (or primary) application language.

Note that the text that displays within an application is not translated on the fly. APEX dynamically collects page attributes from either a base language application definition or an alternative application definition.



#### See Also:

- About Dynamic Translation Text Strings
- Translating Data That Supports List of Values

# 21.1.5 Making Application Attributes Translatable

Learn about best practices to make application attributes within your application translatable.

When you build an application in App Builder, you define a large number of declarative attributes such as field labels, region headings, page header text, and so on.

- About Shortcuts that Support Translatable Messages
   Learn about shortcuts that support translatable messages.
- About Messages
   Learn about messages.
- About Dynamic Translation Text Strings
   Learn about dynamic translation text strings.
- Marking a Region as Not Translatable
   Learn about marking a region as not translatable.
- Identifying a Template as Translatable
   Learn how to identify a template as translatable.

#### 21.1.5.1 About Shortcuts that Support Translatable Messages

Learn about shortcuts that support translatable messages.

App Builder includes two shortcut types that enable you to reference translatable messages:

- Message. Use this shortcut to reference a translatable message at runtime. Note
  that the name of the shortcut must match the corresponding message name. At
  runtime, the name of the shortcut expands to the text of the translatable message
  for the current language.
- Message with JavaScript Escaped Single Quotes. Use this shortcut to reference a shortcut inside of a JavaScript literal string and reference a translatable message at runtime. This shortcut defines a text string. When the shortcut is referenced, it escapes the single quotation marks required for JavaScript.



**Using Shortcuts** 



#### 21.1.5.2 About Messages

Learn about messages.

If your application includes PL/SQL regions or PL/SQL processes, you must translate any generated HTML or text. You may also need to translate messages used in reports if your application uses a language that is not one of the ten languages into which APEX is translated.



**Translating Messages** 

## 21.1.5.3 About Dynamic Translation Text Strings

Learn about dynamic translation text strings.

Dynamic translations are used for database data that must be translated at runtime. For example, you might use a dynamic translation to translate a list of values based on a database query. A dynamic translation consists of a translate-from language string, a language code, and a translate-to string. You can also use the APEX\_LANG.LANG API to retrieve dynamic translations programmatically.



Translating Data That Supports List of Values

#### 21.1.5.4 Marking a Region as Not Translatable

Learn about marking a region as not translatable.

By default, page region titles are included in the generated translation file. However, you can mark a region title as not translatable.

To mark a region title as not translatable:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

2. In the Rendering tab, select the region.

The Property Editor displays the region attributes. Attributes are organized in groups.

3. Find and expand the **Advanced** group.



- For For Exclude Title from Translation, select On to exclude this title from translation. This attribute has no effect, except when translating the application into another language.
- Click Save.

#### 21.1.5.5 Identifying a Template as Translatable

Learn how to identify a template as translatable.

By default, templates are not translatable, and therefore are not included in the generated translation file. Generally, templates do not and should not contain translatable text. However, if you must mark a template as translatable, select the **Translatable** checkbox on the Edit Template page.

To identify a template as translatable:

- 1. On the Workspace home page, click the App Builder icon.
- Select an application.
- 3. On the Application home page, click **Shared Components**.
- 4. Under User Interface, select **Templates**.

The Templates page appears.

- 5. Select a template.
- 6. Under Name, select Translatable.

You can include translatable text at the application level by defining the translatable text using static substitution strings. Because application-level attributes are translated, any text defined as a static substitution string is included in the generated translation file.

#### See Also:

- Creating Custom Themes
- Substitutions

# 21.2 Specifying the Primary Language for an Application

Globalization attributes specify how the Oracle APEX engine determines the primary language of an application.

To edit globalization attributes:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- Click Shared Components.
- 4. Under Globalization, select Globalization Attributes.
- For Application Primary Language, select the language in which the application is being developed.



- 6. For Application Language Derived From, specify how the APEX engine determines (or derives) the application language. The application primary language can be static, derived from the Web browser language, or determined from a user preference or item.
  - No NLS (Application not translated) Select this option if the application will not be translated.
  - Application Primary Language Determines the translated application language based on the Application Primary Language attribute.
  - **Browser (use browser language preference)** Determines the translated application language based on the user's Web browser language.
  - Application Preference (use FSP\_LANGUAGE\_PREFERENCE) Determines the
    translated application language based on a value defined using the
    APEX\_UTIL.SET\_PREFERENCE API. This option can be used to maintain a user's
    language preference across multiple logins.
  - Item Preference (use item containing preference) Determines the translated application language based on an application-level item called FSP\_LANGUAGE\_PREFERENCE. Using this option requires Oracle APEX to determine the appropriate language preference every time the user logs in.
  - Session Determines the translated application language from the session setting.
     The Oracle APEX session language can be set using either the
     APEX\_UTIL.SET\_SESSION\_LANG procedure or via the P\_LANG parameter of the F
     procedure in the URL.
- 7. Configure other options as appropriate. To learn more about an attribute, see field-level Help or see Globalization Page.
- 8. Click Apply Changes.

#### See Also:

- Editing the Application Definition
- Configuring Security Attributes
- Understanding Supported Globalization Codes

# 21.3 Applying Format Masks to Items

The Oracle APEX engine applies globalization settings for each rendered page. This default behavior can impact the display of certain items such as numbers and dates.

For example, suppose your application determines the application language based on the user's browser language preference. If the APEX engine determines the user's browser language preference is French, it displays dates and numbers in a format that conforms to French standards. You can override this default behavior and explicitly control how items display by applying a format mask. You apply a format mask by making a selection from the Display As list:

- When you create the item.
- After you create the item by editing the item attributes.



# 21.4 About Translating Applications for Multibyte Languages

If your application must run in several languages simultaneously (such as Chinese and Japanese), consider configuring your database with a character set to support all of the languages.

UTF8 and AL32UTF8 are the character sets you can use to support almost all languages around the world.

# 21.5 Understanding the Translation Process

To translate an application developed in App Builder, you must map the primary and target language, seed and export text to a translation file, translate the text, apply the translation file, and publish the translated application.

This section describes the process of translating an application.

#### • Step 1: Define Application Language

The first step in translating an application is to map the primary and target application language. The primary application is the application to be translated. The target application is the resulting translated application.

- Step 2: Seed and Download to a Translation File
   Seed the translation table and then export the translation text to a translation file.
- Step 3: Translate the XLIFF File
  After you export a translatable file to XLIFF format, you can translate it into the appropriate languages.
- Step 4: Upload and Apply a Translated XLIFF Document
   After your XLIFF document has been translated, the next step is to upload and then apply it.
- Step 5: Publish the Application

Publishing your application creates a copy of the base language application, substituting the translated text strings from your translations table. This published application can then be used to render your application in alternate languages.

#### Manually Editing a Translation

Once you have mapped the target language and seeded the translatable text, you manually edit a translation.

#### See Also:

- Translating Messages
- Translating Data That Supports List of Values



# 21.5.1 Step 1: Define Application Language

The first step in translating an application is to map the primary and target application language. The primary application is the application to be translated. The target application is the resulting translated application.

To map the primary and target application language:

- Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click Application Translations.

The Translate page appears.

2. Click Define application languages.

The Mappings page appears.

- 3. Click Create.
- 4. On the Create/Edit Language Application Mapping:
  - Translation Application Enter a unique integer value that identifies an application.
     The application ID must be unique on your instance of Oracle APEX.
  - Language Select the language to be translated.
  - Image Directory Enter the directory where images are obtained. Unless you are
    using static files from the images directory which are translated, leave this field blank.
    This is the default and most common option.
- Click Create.

# 21.5.2 Step 2: Seed and Download to a Translation File

Seed the translation table and then export the translation text to a translation file.

- Seeding Translatable Text
   Learn about seeding translatable text.
- Downloading an XLIFF File Learn how to download an XLIFF file.

# 21.5.2.1 Seeding Translatable Text

Learn about seeding translatable text.

Seeding the translation copies all translatable text into the Translation Text repository. After you specify the language and seed the Translation Text, you can then generate and export an XLIFF file for translation.

The seeding process keeps your primary language application synchronized with the Translation Text repository. You should run the seed process any time your primary language application changes.

To seed translatable text:



- Navigate to the Translate Application page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click Application Translations.
     The Translate page appears.
- Click Seed translatable text.
- **3.** Select the appropriate target application.
- Click Seed.

When completed, the following message displays:

Successfully seeded translatable text.

#### 21.5.2.2 Downloading an XLIFF File

Learn how to download an XLIFF file.

Once the translation mappings are established the translatable text within the application is seeded into a translation repository. This repository is then exported to an XML Localization Interchange File Format (XLIFF) file for translation.

- About the XLIFF Export Page Learn about the XLIFF Export page.
- Downloading a XLIFF file for an Application
   Learn how to download a XLIFF file for an application.
- Downloading an XLIFF File for an Application Page Learn how to download an XLIFF File for an application page.
- About Including XLIFF Target Elements
   Learn about including XLIFF target elements.

#### 21.5.2.2.1 About the XLIFF Export Page

Learn about the XLIFF Export page.

The XLIFF Export page is divided into two sections. Use the upper section to export translatable text for an entire application (that is, all pages, lists of values, messages, and so on). Use the lower section to export translatable text for a specific page.



XML Localization Interchange File Format (XLIFF) is an XML-based format for exchanging localization data. For more information about XLIFF and the XLIFF 1.0 specification, see:

https://www.oasis-open.org/committees/tc\_home.php?wg\_abbrev=xliff



#### 21.5.2.2.2 Downloading a XLIFF file for an Application

Learn how to download a XLIFF file for an application.

To download an XLIFF file for an complete application:

- 1. Seed the translatable text.
- 2. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click Application Translations.

The Translate page appears.

- 3. On the Translate page, click **Download XLIFF translation files**.
- 4. Under Download XLIFF file for complete Application:
  - a. Language Choose the language to be downloaded in the XLIFF file.
  - **b. Include XLIFF Target Elements** Specify whether to include XLIFF target elements. To include then, select **Include XLIFF Target Elements**.
  - **c. Export** Choose to export all translatable elements of the application or only those elements which are new or have been updated.
  - d. Click Export XLIFF.
- 5. Follow the on-screen instructions.

#### See Also:

Seeding Translatable Text

## 21.5.2.2.3 Downloading an XLIFF File for an Application Page

Learn how to download an XLIFF File for an application page.

To download an XLIFF file for a specific page:

- 1. Seed the translatable text.
- 2. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click **Application Translations**.

The Translate page appears.

- 3. On the Translate page, click **Download XLIFF translation files**.
- 4. Under Download XLIFF file for Application Page:



- a. Language Choose the language to be downloaded in the XLIFF file.
- b. Page Select a page.
- c. Include XLIFF Target Elements Specify whether to include XLIFF target elements. To include then, select Include XLIFF Target Elements.
- **d. Export** Choose to export all translatable elements of the page or only those elements which are new or have been updated.
- e. Click Export XLIFF.
- **5.** Follow the on-screen instructions.

See Also:

Seeding Translatable Text

#### 21.5.2.2.4 About Including XLIFF Target Elements

Learn about including XLIFF target elements.

When APEX generates an XLIFF document, each document contains multiple translation units. Each translation unit consists of a source element and a target element. The XLIFF document can be generated with both the source and target elements for each translation unit. You have the option of generating a file containing only source elements. The updated translations will be applied from the target elements of the translation units.

# 21.5.3 Step 3: Translate the XLIFF File

After you export a translatable file to XLIFF format, you can translate it into the appropriate languages.

Because XLIFF is an open standard XML file for exchanging translations, most translation vendors should support it. APEX only supports XLIFF files encoded in UTF-8 character sets. In other words, it exports XLIFF files for translation in UTF-8 and assumes that the translated XLIFF files are in the same character set.

Translation is a time-consuming task. APEX supports incremental translation so that application development can be done in parallel with the translation. An XLIFF file can be translated and uploaded to APEX even when only part of the XLIFF file is translated. For strings that have no translation in the corresponding translated application, APEX uses the corresponding ones in the primary language.

See Also:

For more information about the XLIFF and the XLIFF 1.0 specification, see:

https://www.oasis-open.org/committees/tc home.php?wg abbrev=xliff



# 21.5.4 Step 4: Upload and Apply a Translated XLIFF Document

After your XLIFF document has been translated, the next step is to upload and then apply it.

- Uploading a Translated XLIFF Document
   Learn how to upload a translated XLIFF document.
- Applying an Uploaded XLIFF Document Learn about applying an uploaded XLIFF document.
- Deleting an Uploaded XLIFF Document Learn how to delete an uploaded XLIFF document.

#### 21.5.4.1 Uploading a Translated XLIFF Document

Learn how to upload a translated XLIFF document.

To upload a translated XLIFF document:

- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - **d.** Under Globalization, click **Application Translations**.

The Translate page appears.

2. Click Apply XLIFF translation files.

The XLIFF Translation Files page appears.

- 3. Click Upload Files.
- 4. On the XLIFF Upload page:
  - a. Locate the file to be uploaded.
  - b. Click Upload.

The uploaded document appears on the XLIFF Translation Files page.

## 21.5.4.2 Applying an Uploaded XLIFF Document

Learn about applying an uploaded XLIFF document.

After you upload an XLIFF document, the next step is to apply the XLIFF document and then publish the translated application. When you apply an XLIFF document, the APEX engine parses the file and then updates the translation tables with the new translatable text.

Publishing your application creates a copy of the base language application, substituting the translated text strings from your translations table. This published application can then be used to render your application in alternate languages.

Remember that to run an application in an alternative language, you must run it with globalization settings that cause an alternative language version to display. For example, if the language is derived from the browser language, you must set the browser language to the same language as the translated application.

To apply a translated XLIFF document:



- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click **Application Translations**.

The Translate page appears.

2. Click Apply XLIFF translation files.

The XLIFF Translation Files page appears.

- **3.** To apply the XLIFF files:
  - a. Select the XLIFF files you want to apply.
  - **b.** From Apply to Translation, choose a translation mapping.
  - c. Click Apply Checked.

The XLIFF file is parsed and the contents is applied to the translation repository. Once this process is complete, you must publish the application for each translation.

See Also:

Specifying the Primary Language for an Application

# 21.5.4.3 Deleting an Uploaded XLIFF Document

Learn how to delete an uploaded XLIFF document.

To delete an uploaded XLIFF document:

- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click **Application Translations**.

The Translate page appears.

2. Click Apply XLIFF translation files.

The XLIFF Translation Files page appears.

- 3. In the XLIFF Files repository, select the checkbox to the left of the Filename column.
- 4. Click Delete Checked.



See Also:

Specifying the Primary Language for an Application

# 21.5.5 Step 5: Publish the Application

Publishing your application creates a copy of the base language application, substituting the translated text strings from your translations table. This published application can then be used to render your application in alternate languages.

Remember that to run an application in an alternative language, you must run it with globalization settings that cause an alternative language version to display. For example, if the language is derived from the browser language, you must set the browser language to the same language as the translated application.

To publish an application:

- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click **Application Translations**.

The Translate page appears.

2. Click Publish translated applications.

The XLIFF Translation Files page appears

3. Select the items you want to publish and click **Publish**.

You should verify the existence of the translated application after it is published. Translated applications do not display in the Available Applications list on the App Builder home page. In order for a translated application to appear in App Builder, you must ensure that you have correctly configured the application Globalization attributes.

See Also

Specifying the Primary Language for an Application

# 21.5.6 Manually Editing a Translation

Once you have mapped the target language and seeded the translatable text, you manually edit a translation.

To manually edit a translation:

- Define the application language.
- Seed the translatable text.



- 3. Navigate to the Translatable Text:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click Application Translations.

The Translate page appears.

4. Under Translation Utilities, click Translation Repository.

The Translatable Text page appears.

- 5. Select a Language Mapping or page and click **Set**.
- 6. To further customize the report, use the Search bar at the top of the page.
- To edit translatable text:
  - a. Click the Edit icon.

The Translatable Text page appears.

- b. Translate From Text Identifies the primary language text.
- c. Translate to Text Identifies the translated text.
- **d.** Update all occurrences of this string Enable this option to update all occurrences of the string in the Translation Repository.
- e. Click Apply Changes.
- 8. To access a Grid Edit page:
  - a. Click Grid Edit.

The Translatable Text - Grid Edit page appears.

- b. Click the **Edit** button.
- c. In the **Translate To** column, select and then edit the string.
- d. Click the Save button.

#### See Also:

- Step 1: Define Application Language
- Seeding Translatable Text

# 21.6 Translating Messages

Learn when and how to translate messages in an Oracle APEX application.

- About Translating Messages
   You translate messages when your application includes PL/SQL regions,
   processes, package, procedure or function.
- Translating Messages Used in PL/SQL Procedures
   Learn about how to translate messages used in PL/SQL procedures.



Translating Messages Used Internally by APEX
 If your application uses a language that is not among the standard languages into which
 APEX is translated, you must translate messages displayed by the APEX runtime engine.

# 21.6.1 About Translating Messages

You translate messages when your application includes PL/SQL regions, processes, package, procedure or function.

You may need to translate messages if your application:

- Includes PL/SQL regions or PL/SQL processes, or calls a PL/SQL package, procedure, or function. If it does, you may need to translate the generated HTML.
- Uses a language that is not one of the ten languages into which APEX is translated. If it does, you may need to translate messages used in reports.

# 21.6.2 Translating Messages Used in PL/SQL Procedures

Learn about how to translate messages used in PL/SQL procedures.

- About Translating Messages Used in PL/SQL Procedures
   Learn about translating messages used in PL/SQL procedures.
- Defining a Translation Message Learn about defining a translation message.

See Also:

APEX\_LANG in Oracle APEX API Reference

## 21.6.2.1 About Translating Messages Used in PL/SQL Procedures

Learn about translating messages used in PL/SQL procedures.

If your application includes PL/SQL regions or PL/SQL processes or calls PL/SQL package, procedures, or functions, you may need to translate generated HTML. First, you define each message on the Translatable Messages page. Second, you use the <code>APEX\_LANG.MESSAGE</code> API to translate the messages from PL/SQL stored procedures, functions, triggers, or packaged procedures and functions.

## 21.6.2.2 Defining a Translation Message

Learn about defining a translation message.

You create translatable messages on the Translate Messages page.

To define a new translation message:

- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.



- c. Click Shared Components.
- d. Under Globalization, click Text Messages.
- On the Translate Messages page, click Create Text Message.
- 3. On Identify Text Message:
  - a. Name Enter a name to identify the message.
  - b. Language Select the language for which the message would be used.
  - c. Used in JavaScript Select On if the message is used in APEX.LANG API calls in JavaScript code.
  - **d. Text** Enter the text to be returned when the text message is called.

For example, you could define the message GREETING MSG in English as:

```
Good morning %0
```

Or, you could define the message GREETING MSG in German as:

```
Guten Tag %0
```

4. Click Create Text Message.

# 21.6.3 Translating Messages Used Internally by APEX

If your application uses a language that is not among the standard languages into which APEX is translated, you must translate messages displayed by the APEX runtime engine.

The APEX runtime engine which is used by developers to create applications is available in the following languages: Arabic, Brazilian Portuguese, Croatian, Czech, Danish, Dutch, Finnish, French, French - Canada, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese (Portugal) (pt), Romanian, Russian, Serbian - Cyrillic, Serbian - Latin, Simplified Chinese, Slovak, Slovenian, Spanish, Swedish, Thai, Traditional Chinese, and Turkish.

To support additional languages not covered in the above list, developers must provide their own translations. For example, if you develop a Bulgarian application and want to include report messages, such as pagination, in Bulgarian, you must translate the strings used in messages displayed in reports.

#### Creating Text Messages

Create translation messages by selecting the application and navigating to Shared Components, Globalization, Text Messages.

#### Editing Text Messages

Edit translation messages by selecting the application and navigating to Shared Components, Globalization, Text Messages.

- Internal Messages Requiring Translation
   Lists internal messages that require translation.
- Interactive Grid Messages Requiring Translation
   Lists the interactive grid messages that require translation.
- Interactive Report Messages Requiring Translation
   Lists interactive reports messages that require translation.



- Progressive Web App (PWA) Messages Requiring Translation
   Lists Progressive Web Application (PWA) messages that require translation.
- Search and Smart Filters Messages Requiring Translation
   Lists faceted search and smart filter messages that require translation.

#### See Also:

About Installing Translated Versions of Oracle APEX in *Oracle APEX Installation Guide* 

# 21.6.3.1 Creating Text Messages

Create translation messages by selecting the application and navigating to Shared Components, Globalization, Text Messages.

To create a translation message:

- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click Text Messages.
- 2. On the Translate Messages page, click Create Text Message.
- 3. On Identify Text Message, specify the following:
  - a. Name Enter the name of each message that must be translated.
  - **b.** Language Select the language for which the message will be used.
  - c. Used in JavaScript Enble this attribute if the message is used in APEX.LANG.\* API calls in JavaScript code.
  - d. Text Enter the text to be returned when the text message is called. If the English text message contains positional substitution values (for example, %0, %1), ensure that your defined message also contains the same named and number of positional substitution values.
- 4. Click Create Text Message.

## 21.6.3.2 Editing Text Messages

Edit translation messages by selecting the application and navigating to Shared Components, Globalization, Text Messages.

To edit text messages:

- 1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click Text Messages.



#### 2. On edit a text message:

- a. Click the message name.
- **b.** Make the appropriate edits.

If the English text message contains positional substitution values (for example, \$0, \$1), ensure that your defined message also contains the same named and number of positional substitution values.

- c. Click Apply Changes.
- 3. To access a Grid Edit page:
  - a. Click Grid Edit.

The Grid Edit page appears.

**b.** Make the appropriate edits.

If the English text message contains positional substitution values (for example, \$0, \$1), ensure that your defined message also contains the same named and number of positional substitution values.

c. Click Apply Changes.



#### Tip:

To add a new message from the Grid Edit page, click  ${\bf Add}$   ${\bf Text}$   ${\bf Message}$  at the bottom of the page.

## 21.6.3.3 Internal Messages Requiring Translation

Lists internal messages that require translation.

Internal Messages Requiring Translation lists the internal messages that require translation.

**Table 21-1** Internal Messages Requiring Translation

Message Name	English Text
APEX.ACTIONS.TOGGLE	Toggle %0
APEX.ACTIVE_STATE	(Active)
APEX.AUTHENTICATION.LOGIN_THROTTLE.C OUNTER	Please wait <span id="apex_login_throttle_sec">%0</span> seconds to login again.
APEX.AUTHENTICATION.LOGIN_THROTTLE.E RROR	The login attempt has been blocked.
APEX.COMBOBOX.LIST_OF_VALUES	List of Values
APEX.COMBOBOX.SHOW_ALL_VALUES	Open list for: %0
APEX.COMPLETED_STATE	(Completed)
APEX.CORRECT_ERRORS	Correct errors before saving.
APEX.CS.MATCHES_FOUND	%0 matches found



Table 21-1 (Cont.) Internal Messages Requiring Translation

Maria Maria	- Carlotte
Message Name	English Text
APEX.CS.NO_MATCHES	No matches found
APEX.DATA_HAS_CHANGED	Current version of data in database has changed since user initiated update process. current checksum = "%0" application checksum = "%1".
APEX.DATEPICKER.ICON_TEXT	Popup Calendar: %0
APEX.DATEPICKER_VALUE_GREATER_MAX_DATE	#LABEL# is greater than specified maximum date %0.
APEX.DATEPICKER_VALUE_INVALID	#LABEL# does not match format %0.
APEX.DATEPICKER_VALUE_LESS_MIN_DATE	# LABEL# is less than specified minimum date $%0.$
APEX.DATEPICKER_VALUE_NOT_BETWEEN_MI N_MAX	#LABEL# is not between the valid range of %0 and %1.
APEX.DATEPICKER_VALUE_NOT_IN_YEAR_RANGE	#LABEL# is not within valid year range of %0 and %1.
APEX.DIALOG.CANCEL	Cancel
APEX.DIALOG.CLOSE	Close
APEX.DIALOG.HELP	Help
APEX.DIALOG.OK	ОК
APEX.DIALOG.SAVE	Save
APEX.ERROR.PAGE_NOT_AVAILABLE	Sorry, this page isn't available
APEX.ERROR_MESSAGE_HEADING	Error Message
APEX.FILE_BROWSE.DOWNLOAD_LINK_TEXT	Download
APEX.GO_TO_ERROR	Go to error
APEX.ITEM.HELP_TEXT	Help Text: %0
APEX.ITEM.NOT_FOUND	Item %0 not found.
APEX.ITEM_TYPE.SLIDER.VALUE_NOT_BETW EEN_MIN_MAX	#LABEL# is not between the valid range of %0 and %1.
APEX.ITEM_TYPE.SLIDER.VALUE_NOT_MULT IPLE_OF_STEP	#LABEL# is not a multiple of %0.
APEX.ITEM_TYPE.YES_NO.INVALID_VALUE	#LABEL# must match to the values %0 and %1.
APEX.ITEM_TYPE.YES_NO.NO_LABEL	No
APEX.ITEM_TYPE.YES_NO.YES_LABEL	Yes
APEX.MENU.CURRENT_MENU	current
APEX.MENU.OVERFLOW_LABEL	More
APEX.MENU.PROCESSING	Loading
APEX.NUMBER_FIELD.VALUE_GREATER_MAX_VALUE	#LABEL# is greater than specified maximum %0.
APEX.NUMBER_FIELD.VALUE_INVALID	#LABEL# must be Numeric.



Table 21-1 (Cont.) Internal Messages Requiring Translation

Message Name	English Text
APEX.NUMBER_FIELD.VALUE_INVALID2	#LABEL# does not match number format %0 (For example, %1).
APEX.NUMBER_FIELD.VALUE_LESS_MIN_VALUE	#LABEL# is less than specified minimum %0.
APEX.NUMBER_FIELD.VALUE_NOT_BETWEEN_ MIN_MAX	#LABEL# is not between the valid range of %0 and %1.
APEX.PAGE.DUPLICATE_SUBMIT	This page was already submitted and can not be re-submitted.
APEX.PAGE_ITEM_IS_REQUIRED	#LABEL# must have some value.
APEX.POPUP_LOV.ICON_TEXT	Popup List of Values: %0.
APEX.PROCESSING	Processing
APEX.REGION.JQM_LIST_VIEW.LOAD_MORE	Load more
APEX.REGION.JQM_LIST_VIEW.SEARCH	Search
APEX.RICH_TEXT_EDITOR.ACCESSIBLE_LAB	%0, rich text editor
APEX.SINCE.SHORT.DAYS_AGO	%0d
APEX.SINCE.SHORT.DAYS_FROM_NOW	in %0d
APEX.SINCE.SHORT.HOURS_AGO	%0h
APEX.SINCE.SHORT.HOURS_FROM_NOW	in %0h
APEX.SINCE.SHORT.MINUTES_AGO	%0m
APEX.SINCE.SHORT.MINUTES_FROM_NOW	in %0m
APEX.SINCE.SHORT.MONTHS_AGO	%0mo
APEX.SINCE.SHORT.MONTHS_FROM_NOW	in %0mo
APEX.SINCE.SHORT.SECONDS_AGO	%0s
APEX.SINCE.SHORT.SECONDS_FROM_NOW	in %0s
APEX.SINCE.SHORT.WEEKS_AGO	%0w
APEX.SINCE.SHORT.WEEKS_FROM_NOW	in %0w
APEX.SINCE.SHORT.YEARS_AGO	%0y
APEX.SINCE.SHORT.YEARS_FROM_NOW	in %0y
APEX.SUCCESS_MESSAGE_HEADING	Success Message
APEX.TABS.NEXT	Next
APEX.TABS.PREVIOUS	Previous
APEX.TB.TOOLBAR	Toolbar
APEX.TEMPLATE.EXPAND_COLLAPSE_NAV_LA BEL	Expand / Collapse Navigation
APEX.TEMPLATE.EXPAND_COLLAPSE_SIDE_COL_LABEL	Expand / Collapse Side Column
APEX.THEMES.INVALID_THEME_NUMBER	Theme number is invalid or theme is not a current UI theme.



Table 21-1 (Cont.) Internal Messages Requiring Translation

Message Name	English Text
APEX.UI.BACK_TO_TOP	Start of page
APEX.VALUE_REQUIRED	Value Required
CHART_SERIES_ERROR	Chart series error %0 for %1.
FLOW.SINGLE_VALIDATION_ERROR	1 error has occurred.
FLOW.VALIDATION_ERROR	%0 errors have occurred.
INVALID_CREDENTIALS	Invalid Login Credentials .
LAYOUT.CHART	Chart
LAYOUT.T_#EXPAND_COLLAPSE_NAV_LABEL#	Label for Expand / Collapse Navigation
LAYOUT.T_#EXPAND_COLLAPSE_SIDE_COL_L ABEL#	Label for Expand / Collapse Side Column
OUT_OF_RANGE	Invalid set of rows requested, the source data of the report has been modified.
PAGINATION.NEXT	Next
PAGINATION.NEXT_SET	Next Set
PAGINATION.PREVIOUS	Previous
PAGINATION.PREVIOUS_SET	Previous Set
REGION_NAME.NATIVE_JET_CHART	Chart
REPORT_TOTAL	report total
RESET	reset pagination
SHOW_ALL	Show All
SINCE_DAYS_AGO	%0 days ago
SINCE_DAYS_FROM_NOW	%0 days from now
SINCE_HOURS_AGO	%0 hours ago
SINCE_HOURS_FROM_NOW	%0 hours from now
SINCE_MINUTES_AGO	%0 minutes ago
SINCE_MINUTES_FROM_NOW	%0 minutes from now
SINCE_MONTHS_AGO	%0 months ago
SINCE_MONTHS_FROM_NOW	%0 months from now
SINCE_NOW	Now
SINCE_SECONDS_AGO	%0 seconds ago
SINCE_SECONDS_FROM_NOW	%0 seconds from now
SINCE_WEEKS_AGO	%0 weeks ago
SINCE_WEEKS_FROM_NOW	%0 weeks from now
SINCE YEARS_AGO	%0 years ago
SINCE_YEARS_FROM_NOW	%0 years from now
TOTAL	Total



Table 21-1 (Cont.) Internal Messages Requiring Translation

Message Name	English Text
UPGRADE_CANDLESTICK_CHART	After upgrading, ensure the series attribute Label Column is mapped to a Date / Timestamp column.
WWV_FLOW_CREATE_MODEL_APP.CREATE_IG	Unable to create interactive grid page. %0
WWV_FLOW_CUSTOMIZE.T_MESSAGE3	You can personalize the appearance of this application by changing the Theme Style. Please select a Theme Style from the list below and click on Apply Changes.
WWV_FLOW_CUSTOMIZE.T_REGION_DISP	Region Display
WWV_FLOW_CUSTOMIZE.T_REMOVE_STYLE	Use Application Default Style
WWV_FLOW_CUSTOMIZE.T_THEME_STYLE	Appearance
WWV_FLOW_DATA_EXPORT.AGG_COLUMN_IDX_ NOT_EXIST	The column index referenced in the aggregate %0 does not exist.
WWV_FLOW_DATA_EXPORT.COLUMN_BREAK_MU ST_BE_IN_THE_BEGGINING	The column break needs to be in the beggining of the columns array.
WWV_FLOW_DATA_EXPORT.COLUMN_GROUP_ID X_NOT_EXIST	The column group index referenced in %0 does not exist.
WWV_FLOW_DATA_EXPORT.HIGHLIGHT_COLUM N_IDX_NOT_EXIST	The column index referenced in the highlight %0 does not exist.
WWV_FLOW_DATA_EXPORT.PARENT_GROUP_ID X_NOT_EXIST	The parent group index referenced in %0 does not exist.
WWV_FLOW_UTILITIES.CAL	Calendar
WWV_FLOW_UTILITIES.CLOSE	Close
WWV_FLOW_UTILITIES.OK	Ok
WWV_FLOW_WEB_SERVICES.AUTHENTICATION _FAILED	Authentication failed.
WWV_FLOW_WEB_SERVICES.NO_VALID_OAUTH _TOKEN	OAuth access token not available or expired.
WWV_FLOW_WEB_SERVICES.UNSUPPORTED_OAUTH_TOKEN	Server responded with unsupported OAuth token type.
WWV_RENDER_REPORT3.FOUND_BUT_NOT_DISPLAYED	Minimum row requested: %0, rows found but not displayed: %1
WWV_RENDER_REPORT3.SORT_BY_THIS_COLU MN	Sort by this column.
WWV_RENDER_REPORT3.UNSAVED_DATA	This form contains unsaved changes. Press Ok to proceed without saving your changes.
WWV_RENDER_REPORT3.X_Y_OF_MORE_THAN_ Z	row(s) %0 - %1 of more than %2
WWV_RENDER_REPORT3.X_Y_OF_Z	row(s)%0 - %1 of %2
WWV_RENDER_REPORT3.X_Y_OF_Z_2	%0 - %1 of %2



# 21.6.3.4 Interactive Grid Messages Requiring Translation

Lists the interactive grid messages that require translation.

**Table 21-2** Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.GV.BREAK_COLLAPSE	Collapse control break
APEX.GV.BREAK_EXPAND	Expand control break
APEX.GV.DELETED_COUNT	%0 rows deleted
APEX.GV.DUP_REC_ID	Duplicate identity
APEX.GV.FIRST_PAGE	First
APEX.GV.LAST_PAGE	Last
APEX.GV.LOAD_MORE	Load More Rows
APEX.GV.NEXT_PAGE	Next
APEX.GV.PAGE_RANGE	Page rows
APEX.GV.PAGE_RANGE_XY	%0 - %1
APEX.GV.PAGE_RANGE_XYZ	%0 - %1 of %2
APEX.GV.PAGE_SELECTION	Page Selection
APEX.GV.PREV_PAGE	Previous
APEX.GV.ROW_ADDED	Added
APEX.GV.ROW_CHANGED	Changed
APEX.GV.ROW_DELETED	Deleted
APEX.GV.ROW_HEADER	Row header
APEX.GV.SELECT_ALL	Select All
APEX.GV.SELECT_PAGE_N	Page %0
APEX.GV.SELECT_ROW	Select Row
APEX.GV.SELECTION_CELL_COUNT	%0 cells selected
APEX.GV.SELECTION_COUNT	%0 rows selected
APEX.GV.SORT_ASCENDING	Sort Ascending
APEX.GV.SORT_ASCENDING_ORDER	Sort Ascending %0
APEX.GV.SORT_DESCENDING	Sort Descending
APEX.GV.SORT_DESCENDING_ORDER	Sort Descending %0
APEX.GV.SORT_OFF	Don't Sort
APEX.GV.TOTAL_PAGES	Total %0
APEX.IG.ACC_LABEL	Interactive Grid %0
APEX.IG.ACTIONS	Actions
APEX.IG.ADD	Add
APEX.IG.ADD_ROW	Add Row
APEX.IG.AGGREGATE	Aggregate



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.AGGREGATION	Aggregation
APEX.IG.ALL	All
APEX.IG.ALL_TEXT_COLUMNS	All Text Columns
APEX.IG.ALTERNATIVE	Alternative
APEX.IG.AND	and
APEX.IG.APPROX_COUNT_DISTINCT	Approx. Count Distinct
APEX.IG.APPROX_COUNT_DISTINCT_OVERALL	Overall Approx. Count Distinct
APEX.IG.AREA	Area
APEX.IG.ASCENDING	Ascending
APEX.IG.AUTHORIZATION	Authorization
APEX.IG.AUTO	Auto
APEX.IG.AVG	Average
APEX.IG.AVG_OVERALL	Overall Average
APEX.IG.AXIS_LABEL_TITLE	Label Axis Title
APEX.IG.AXIS_VALUE_DECIMAL	Decimal Places
APEX.IG.AXIS_VALUE_TITLE	Value Axis Title
APEX.IG.BACKGROUND_COLOR	Background Color
APEX.IG.BAR	Bar
APEX.IG.BETWEEN	between
APEX.IG.BOTH	Both
APEX.IG.BUBBLE	Bubble
APEX.IG.CANCEL	Cancel
APEX.IG.CASE_SENSITIVE	Case Sensitive
APEX.IG.CASE_SENSITIVE_WITH_BRACKETS	(Case Sensitive)
APEX.IG.CHANGE_VIEW	Change View
APEX.IG.CHANGES_SAVED	Changes saved
APEX.IG.CHART	Chart
APEX.IG.CHART_VIEW	Chart View
APEX.IG.CLOSE_COLUMN	Close
APEX.IG.COLOR_BLUE	Blue
APEX.IG.COLOR_GREEN	Green
APEX.IG.COLOR_ORANGE	Orange
APEX.IG.COLOR_RED	Red
APEX.IG.COLOR_YELLOW	Yellow
APEX.IG.COLORS	Colors
APEX.IG.COLUMN	Column



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.COLUMN_CONTEXT	Column %0
APEX.IG.COLUMN_TYPE	Column Purpose
APEX.IG.COLUMNS	Columns
APEX.IG.COPY_CB	Copy to Clipboard
APEX.IG.COMPLEX	Complex
APEX.IG.COMPUTE	Compute
APEX.IG.CONTAINS	contains
APEX.IG.CONTROL_BREAK	Control Break
APEX.IG.COUNT	Count
APEX.IG.COUNT_DISTINCT	Count Distinct
APEX.IG.COUNT_DISTINCT_OVERALL	Overall Count Distinct
APEX.IG.COUNT_OVERALL	Overall Count
APEX.IG.CREATE_X	Create %0
APEX.IG.DATA	Data
APEX.IG.DATA_TYPE	Data Type
APEX.IG.DATE	Date
APEX.IG.DAYS	days
APEX.IG.DEFAULT_SETTINGS	Default Settings
APEX.IG.DEFAULT_TYPE	Default Type
APEX.IG.DELETE	Delete
APEX.IG.DELETE_REPORT_CONFIRM	Are you sure you would like to delete this report?
APEX.IG.DELETE_ROW	Delete Row
APEX.IG.DELETE_ROWS	Delete Rows
APEX.IG.DESCENDING	Descending
APEX.IG.DETAIL	Detail
APEX.IG.DETAIL_VIEW	Detail View
APEX.IG.DIRECTION	Direction
APEX.IG.DISABLED	Disabled
APEX.IG.DOES_NOT_CONTAIN	does not contain
APEX.IG.DOES_NOT_START_WITH	does not start with
APEX.IG.DONUT	Donut
APEX.IG.DOWNLOAD	Download
APEX.IG.DOWNLOAD_FORMAT	Choose Format
APEX.IG.DUPLICATE_AGGREGATION	Duplicate Aggregation
APEX.IG.DUPLICATE_CONTROLBREAK	Duplicate Control Break
APEX.IG.DUPLICATE_ROW	Duplicate Row



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.DUPLICATE_ROWS	Duplicate Rows
APEX.IG.EDIT	Edit
APEX.IG.EDIT_CHART	Edit Chart
APEX.IG.EDIT_GROUP_BY	Edit Group By
APEX.IG.EMAIL_BCC	Blind Copy (bcc)
APEX.IG.EMAIL_BODY	Message
APEX.IG.EMAIL_CC	Copy (cc)
APEX.IG.EMAIL_SENT	Email sent.
APEX.IG.EMAIL_SUBJECT	Subject
APEX.IG.EMAIL_TO	Recipient (to)
APEX.IG.ENABLED	Enabled
APEX.IG.EQUALS	equals
APEX.IG.EXAMPLE	Example
APEX.IG.EXPRESSION	Expression
APEX.IG.FD_TYPE	Туре
APEX.IG.FILTER	Filter
APEX.IG.FILTER_WITH_DOTS	Filter
APEX.IG.FILTERS	Filters
APEX.IG.FIRST	First
APEX.IG.FLASHBACK	Flashback
APEX.IG.FORMAT	Format
APEX.IG.FORMAT_CSV	CSV
APEX.IG.FORMAT_HTML	HTML
APEX.IG.FORMATMASK	Format Mask
APEX.IG.FREEZE	Freeze
APEX.IG.FUNCTIONS_AND_OPERATORS	Functions and Operators
APEX.IG.FUNNEL	Funnel
APEX.IG.GO	Go
APEX.IG.GREATER_THAN	greater than
APEX.IG.GREATER_THAN_OR_EQUALS	greater than or equals
APEX.IG.GRID	Grid
APEX.IG.GRID_VIEW	Grid View
APEX.IG.GROUP	Group
APEX.IG.GROUP_BY	Group By
APEX.IG.GROUP_BY_VIEW	Group By View
APEX.IG.HD_TYPE	Condition Type



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.HEADING	Heading
APEX.IG.HEADING_ALIGN	Heading Alignment
APEX.IG.HELP	Help
APEX.IG.HELP.ACTIONS.EDITING	You can insert, update, and delete data directly within this interactive grid.
	Insert a new row by clicking the Add Row button.
	Edit existing data by double-clicking a specific cell. For larger editing work, click Edit to enter editing mode. In editing mode, you can single-click or use the keyboard to edit specific cells.
	Use the Change menu to duplicate and delete rows. To enable the Change menu, use the checkboxes to select one or more rows.
	>Duplicate a selected row by clicking the Change menu and selecting Duplicate Rows. Delete a selected row by clicking the Change menu and selecting Delete Row.
APEX.IG.HELP.ACTIONS.EDITING_HEADING	Editing Capabilities
APEX.IG.HELP.ACTIONS.INTRO	An interactive grid presents a set of data in a searchable, customizable report. You can perform numerous operations to limit the records returned, and change the way the data is displayed.
	Use the Search field to filter the records returned. Click Actions to access numerous options for modifying the report layout, or use the Column Heading menus on displayed columns.
	Use Report Settings to save your customizations to a report. You can also download the data from the report to an external file or email the data to yourself or others.
	To learn more, see Using Interactive Grids" in <em>Oracle Application Express End User's Guide</em>
APEX.IG.HELP.ACTIONS.INTRO_HEADING	Overview
APEX.IG.HELP.ACTIONS.REPORTING	You can customize the interactive grid to display data in various different ways using the built-in capabilities.
	Use the Column Heading menus or the Actions menu to determine which columns to display, in what sequence, and freeze columns. You can also define various data filters and sort the data returned.
	Use the View button (adjacent to the Search field) to access other data views that may have been defined by the application developer. You can also create a chart or view an existing chart.
	<em>Note: Click <strong>Help</strong> in the interactive grid dialogs to obtain more detailed information on the selected function.</em>



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.HELP.ACTIONS.REPORTING_HEADING	Reporting Capabilities
APEX.IG.HELP.ACTIONS_TITLE	Interactive Grid Help
APEX.IG.HELP.AGGREGATE	Use this dialog to aggregate columns. Aggregated values display at the bottom of the data, or if Control Breaks are defined, at the bottom of each break.
	<strong>Aggregation List</strong>
	The Aggregation list displays defined aggregations.  Disable an existing aggregation by deselecting it. 
	Click Add (+) to create a new aggregation, or Delete (−) to remove an existing aggregation.
	<strong>Aggregation Settings</strong>
	Use the form on the right to define the aggregation.
	Select the Column name and Aggregation type.
	Optionally, enter a tooltip for the aggregation.
	If you have defined a Control Break, selecting <strong>Show Overall Value</strong> displays the overall average, total, or similar value at the bottom of the data.
	<em>Note: Access the Aggregation dialog in the Actions menu or by clicking the column heading and sum(∑ ).</em>
APEX.IG.HELP.AGGREGATE_TITLE	Aggregation Help



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

### Message Name

#### APEX.IG.HELP.CHART

### **English Text**

Use this dialog to define a chart which displays as a separate data view.<br/>

Select a chart Type, configure the chart settings, and click <strong>Save.</strong>

<strong>Chart Settings</strong></br>

The chart attributes that display vary depending on the chart type. A number of attributes can be entered to define the chart. Attributes marked with a red asterisk are mandatory.

Below are all available attributes across the different chart types (in alphabetical order):

/ul>

Aggregation - Select how to aggregate the associated chart values.

Close - Select the column that contains the daily stock close price (Stock chart only).

Decimal Places - Enter the number of decimal places to which the values are rounded.

Direction - In relation to the Sort By attribute, specify whether the data is sorted in ascending or descending values.

High - Select the column that contains the high value (Range and Stock charts only).

Label - Select the column that contains the text for each data point.

Label Axis Title - Enter the title that displays on the label axis.

Low - Select the column that contains the low value (Range and Stock charts only).

Nulls - In relation to the Sort By attribute, specify how you want records with null values to be sorted in relation to records with non null values.

Open - Select the column that contains the daily stock opening price (Stock chart only).

Orientation - Select whether the chart elements, such as bars, display vertically or horizontally.

Series - Select the column used for defining your multi-series dynamic query.

Stack - Specify whether the data items are stacked.

Sort By - Select whether the chart is sorted by the label or the value(s).

Target - Select the column to be used for defining the target value on this chart. When set, the Value attribute defines the filled area within the slice and the Target represents the value of the whole slice (Funnel chart only).

Value - Select the column that contains the data to be plotted.



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
	<pre><li>Value Axis Title - Enter the title that displays on the value axis.</li></pre>
	<li>Volume - Select the column that contains the daily stock volume (Stock chart only).</li>
	<li>X - Select the column that contains the x-axis value for this chart (Bubble and Scatter charts only).</li>
	<li>Y - Select the column that contains the y-axis value for this chart (Bubble and Scatter charts only).</li>
	<li>Z - Select the column that contains the bar width or bubble radius (Bar, Bubble, and Range charts only)</li>
APEX.IG.HELP.CHART_TITLE	Chart Help
APEX.IG.HELP.COLUMNS	Use this dialog to choose which columns display and in what order.
	Hide a column by deselecting it.
	Reorder columns by clicking Move Up ( ↑ ) or Move Down (↓ ). 
	Use the drop down selector to list All columns, Displaye columns, or Not Displayed columns.
	Optionally, use the form to specify the minimum width of a column in pixels.
	<em> Note: You can also reorder displayed columns by clicking the drag handle (at the start of the column heading) and dragging the column left or right. You can also change the column width of displayed columns by selecting the column separator, between headings, and moving it left or right.</em>
APEX.IG.HELP.COLUMNS_TITLE	Columns Help
APEX.IG.HELP.COMPUTE	Use this dialog to define additional columns based on mathematical and functional computations performed against existing columns.
	<strong>Computation List</strong>
	The Computation list displays defined computations. Disable an existing computation by deselecting it. 
	Click Add (+) to add a new computation, or Delete (− ) to remove an existing computation.
	<strong>Computation Settings</strong>
	Use the form to define the computation.
	Enter the column details such as heading, label, and select alignment settings. <br< td=""></br<>
	Use the Expression textarea to enter the column(s) and associated functions for the computation. <br< td=""></br<>
	Select the appropriate data type, and optionally a forma mask, for the new column.
APEX.IG.HELP.COMPUTE_TITLE	Compute Help



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.HELP.CONTROL_BREAK	Use this dialog to define a control break on one or more columns.
	<strong>Control Break List</strong>
	The Control Break list displays defined control breaks. Disable an existing control break column by deselecting it. it. it. ontrol Break list displays defined control breaks.
	Click Add (+) to include a new column in the control break, or Delete (− ) to remove an existing column from the control break. <pre>column from the control break.</pre>
	To reorder columns, click Move Up (↑ ) or Move Down (↓ ) to move the selected column up and down relative to other columns.
	<strong>Control Break Settings</strong>
	Use the form to define the control break column.
	Selected a control break column, the sort direction, and how to order null columns (columns with no value).
	<em> Note: When viewing the interactive grid, you can define a control break by clicking a Column Heading and selecting the control break icon.</em>
APEX.IG.HELP.CONTROL_BREAK_TITLE	Control Break Help
APEX.IG.HELP.DOWNLOAD	Use this dialog to download all the current rows to an external file. The file will contain only the currently displayed columns, using any filters and sorts applied to the data.
	Select the file format and click Download.
	Note: CSV will not include text formatting such as aggregates and control breaks.
	To email the file, select Send as Email and enter the email details (Recipient, Subject and Message).
APEX.IG.HELP.DOWNLOAD TITLE	Download Help



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.HELP.FILTER	Use this dialog to configure data filters which limit the rows returned.
	<strong>Filter List</strong>
	The Filter list displays defined filters. Disable an existing filter by deselecting it. 
	Click Add (+) to create a new filter, or Delete (− ) to remove an existing filter.
	<strong>Filter Settings</strong>
	Use the form to define the filter properties.
	Select the appropriate filter type:
	Row - filter for a term in any filterable column.
	Column - filter a specific column with a specified operator and value.
	<em> Note: When viewing the interactive grid, you can define row filters by typing directly into the Search field. Click Select Columns to Search to limit the search to a specific column. Alternately, open a Column Heading menu and select a value to create a column filter.</em>
APEX.IG.HELP.FILTER_TITLE	Filter Help
APEX.IG.HELP.FLASHBACK	Use this dialog to view the data as it existed at a previous point in time.
	Enter the number of minutes in the past to execute the flashback query.
APEX.IG.HELP.FLASHBACK_TITLE	Flashback Help
APEX.IG.HELP.GROUP BY TITLE	Group By Help
APEX.IG.HELP.HIGHLIGHT	Use this dialog to highlight rows or columns of data based on the condition entered.
	<strong>Highlight List</strong>
	The Highlight list displays defined highlights. Disable an existing highlight by deselecting it. 
	Click Add (+) to create a new highlight, or Delete (− ) to remove an existing highlight.
	<strong>Highlight Settings</strong>
	Use the form to define the highlight properties.
	Enter the name, select Row or Column, and select the HTML color codes for the background and text.
	Select the appropriate <strong>Condition Type </strong> to highlight specific data:  
	Row - highlight the term in any column. column. **Total Column of the column of t
	Column - highlight within a specific column based on the specified operator and value.
APEX.IG.HELP.HIGHLIGHT TITLE	Highlight Help



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.HELP.REPORT	Use this dialog to save changes you have made to the current grid layout and configuration.
	Application developers can define multiple alternate report layouts. Where permissible, you and other end users can save a report as Public, which makes the report available to all other users of the grid. You can also save a report as a Private report that only you can view.
	Select from the available types and enter a name fo the saved report.
APEX.IG.HELP.REPORT_TITLE	Report Help
APEX.IG.HELP.SORT	Use this dialog to set the display order.
	<strong>Sort List</strong>
	The Sort dialog displays a list of configured sorting rules. br>
	Click Add (+) to create a sort column, or Delete (− ) to remove a sort column.
	Click Move Up (↑ ) and Move Down (↓ ) to move the selected sort column up and down relative to the other sort columns.
	<strong>Sort Settings</strong>
	Select a sort column, the sort direction, and how to order null columns (columns with no value).
	<em> Note: Data can be sorted by columns which are not displayed; however, not all columns may be sortable.</em>  br>
	<em> Displayed columns can be sorted by pressing the up (ascending) or down (descending) arrows at the end of the column headings. To add a subsequent column to an existing sort, hold the Shift key and click the up or down arrow.</em>
APEX.IG.HELP.SORT_TITLE	Sort Help
APEX.IG.HELP.SUBSCRIPTION_TITLE	Subscription Help
APEX.IG.HIDE	Hide
APEX.IG.HIGH_COLUMN	High
APEX.IG.HIGHLIGHT	Highlight
APEX.IG.HORIZONTAL	Horizontal
APEX.IG.HOURS	hours
APEX.IG.ICON	Icon
APEX.IG.ICON_VIEW	Icon View
APEX.IG.IN	in
APEX.IG.IN_THE_LAST	in the last
APEX.IG.IN_THE_NEXT	in the next
APEX.IG.INACTIVE_SETTING	Inactive Setting



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

APEX.IG.INTERNAL_ERROR  APEX.IG.INVALID_DATE_FORMAT  APEX.IG.INVALID_DATE_FORMAT  APEX.IG.INVALID_SETTING  APEX.IG.INVALID_SETTING  APEX.IG.INVALID_SETTINGS  APEX.IG.INVALID_SETTINGS  APEX.IG.INVALID_SORT_BY  APEX.IG.INVALID_VALUE  APEX.IG.INVALID_VALUE  APEX.IG.INVALID_VALUE  APEX.IG.INVISIBLE  APEX.IG.IS_NOT_MULL  APEX.IG.IS_NOT_MULL  APEX.IG.IS_NOLL  APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LAST  APEX.IG.LAST  APEX.IG.LAST  APEX.IG.LAST  APEX.IG.LAST.MINUTE  APEX.IG.LAST.MONTH  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_MONTH  APEX.IG.LAST.X_MUNUTES  APEX.IG.LAST.X_MUNUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LA	Message Name	English Text
Interactive Grid request.  APEX. IG. INVALID_DATE_FORMAT  APEX. IG. INVALID_SETTING  APEX. IG. INVALID_SETTINGS  APEX. IG. INVALID_SORT_BY  Soft By has been set to %0, but no column as been selected for %0.  APEX. IG. INVALID_VALUE  APEX. IG. INVALID_VALUE  APEX. IG. INVALID_VALUE  APEX. IG. INVALID_VALUE  APEX. IG. IS_NOT_NULL  APEX. IG. IS_NOT_NULL  APEX. IG. IS_NOT_NULL  APEX. IG. IS_NOT_NULL  APEX. IG. LABEL  APEX. IG. LABEL  APEX. IG. LABEL  APEX. IG. LABEL  APEX. IG. LAST.  APEX. IG. LAST.  APEX. IG. LAST. HOUR  APEX. IG. LAST. MONTH  Last Month  APEX. IG. LAST. MONTH  APEX. IG. LAST. MONTH  APEX. IG. LAST. X_DAYS  APEX. IG. LAST. X_DAYS  APEX. IG. LAST. X_DONS  APEX. IG. LAST. X_DONS  APEX. IG. LAST. X_ MONTHS  APEX. IG. LAST. X_ WEEKS  APEX. IG. LAST	APEX.IG.INACTIVE_SETTINGS	Inactive Settings
APEX. IG. INVALID_SETTING APEX. IG. INVALID_SETTINGS APEX. IG. INVALID_SORT_BY APEX. IG. INVALID_SORT_BY APEX. IG. INVALID_SORT_BY APEX. IG. INVALID_VALUE APEX. IG. INVALID_VALUE APEX. IG. INVISIBLE APEX. IG. IS_NOT_NULL APEX. IG. IS_NOT_NULL APEX. IG. IS_NOT_NULL APEX. IG. IABEL APEX.	APEX.IG.INTERNAL_ERROR	An internal error has occurred while processing the Interactive Grid request.
APEX.IG. INVALID_SETTINGS  APEX.IG. INVALID_SORT_BY  Sort By has been set to %0, but no column as been selected for %0.  Invalid Value  APEX.IG. INVALID_VALUE  APEX.IG. INVISIBLE  APEX.IG. INVISIBLE  APEX.IG. IS_NOT_NULL  APEX.IG. IS_NOT_NULL  APEX.IG. IS_NOT_NULL  APEX.IG. IS_NOT_NULL  APEX.IG. IABEL  APEX.IG. IABEL  APEX.IG. IABEL  APEX.IG. IABEL  APEX.IG. IAST  APEX.IG. IAST. DAY  APEX.IG. IAST. HOUR  APEX.IG. IAST. MINUTE  APEX.IG. IAST. MONTH  APEX.IG. IAST. WEEK  APEX.IG. IAST. WEEK  APEX.IG. IAST. X HOURS  APEX.IG. IAST. X HOURS  APEX.IG. IAST. X HOURS  APEX.IG. IAST. X MONTHS  APEX.IG. IAST. X MONTHS  APEX.IG. IAST. X MONTHS  APEX.IG. IAST. X MONTHS  APEX.IG. IAST. X WEEKS  APEX.IG. IAST. X WONTHS  APEX.IG. IAST. YEARS	APEX.IG.INVALID_DATE_FORMAT	Invalid Date Format
APEX.IG. INVALID_SORT_BY  APEX.IG. INVALID_SORT_BY  APEX.IG. INVALID_VALUE  APEX.IG. INVISIBLE  APEX.IG. INVISIBLE  APEX.IG. IS_NOT_NULL  APEX.IG. IS_NOT_NULL  APEX.IG. LABEL  APEX.IG. LABEL  APEX.IG. LABEL  APEX.IG. LABEL  APEX.IG. LAST  APEX.IG. LAST  APEX.IG. LAST  APEX.IG. LAST. MINUTE  APEX.IG. LAST. MONTH  APEX.IG. LAST. WEEK  APEX.IG. LAST. X_DAYS  APEX.IG. LAST. X_DAYS  APEX.IG. LAST. X_MINUTES  APEX.IG. LAST. X_MINUTES  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_WONTHS  APEX.IG. LINE_WITH. AREA  APEX.IG. LOW_COLUMN  APEX.IG. LOW_COLUMN  APEX.IG. MAILADDRESSES_COMMASEP  SORTHER WITH. APEX. WONTHS  APEX.IG. LOW_COLUMN  APEX.IG. LOW_COLUMN  APEX.IG. MAILADDRESSES_COMMASEP  APEX.IG. LOW_COLUMN  APEX.IG. LAST. WONTHS  APEX.IG. LAST. WONTHS  APEX.IG. LAS	APEX.IG.INVALID_SETTING	Invalid Setting
selected for %0.  APEX.IG. INVALID_VALUE Invalid Value  APEX.IG. INVISIBLE Not Displayed  APEX.IG. IS_NOT_NULL is not empty  APEX.IG. IS_NOT_NULL is empty  APEX.IG. LABEL  APEX.IG. LABEL  APEX.IG. LABEL  APEX.IG. LABEL  APEX.IG. LABEL_COLUMN  APEX.IG. LAST. DAY  APEX.IG. LAST. DAY  APEX.IG. LAST. MUNUTE  APEX.IG. LAST. MINUTE  APEX.IG. LAST. MONTH  Last Month  APEX.IG. LAST. WEEK  APEX.IG. LAST. X_DAYS  APEX.IG. LAST. X_DAYS  APEX.IG. LAST. X_HOURS  APEX.IG. LAST. X_HOURS  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_MONTHS  APEX.IG. LAST. X_WEEKS  APEX	APEX.IG.INVALID_SETTINGS	Invalid Settings
APEX.IG.INVISIBLE APEX.IG.IS_NOT_NULL is not empty APEX.IG.IS_NULL APEX.IG.LABEL APEX.IG.LABEL APEX.IG.LABEL APEX.IG.LABEL APEX.IG.LABEL APEX.IG.LAST APEX.IG.LAST APEX.IG.LAST APEX.IG.LAST.DAY APEX.IG.LAST.HOUR APEX.IG.LAST.MINUTE APEX.IG.LAST.MINUTE APEX.IG.LAST.MONTH APEX.IG.LAST.WEEK APEX.IG.LAST.WEEK APEX.IG.LAST.X_DAYS APEX.IG.LAST.X_DAYS APEX.IG.LAST.X_DAYS APEX.IG.LAST.X_HOURS APEX.IG.LAST.X_MINUTES APEX.IG.LAST.X_MINUTES APEX.IG.LAST.X_MONTHS APEX.IG.LAST.X_MONTHS APEX.IG.LAST.X_WEEKS APEX.IG.LAST.X_WEEKS APEX.IG.LAST.X_WEEKS APEX.IG.LAST.X_WEEKS APEX.IG.LAST.X_WEEKS APEX.IG.LAST.X_WEEKS APEX.IG.LAST.X_BEARS APEX.IG.LAST.X_BEARS APEX.IG.LAST.X_BEARS APEX.IG.LAST.YEAR APEX.IG.LAST.YEAR APEX.IG.LAST.YEAR APEX.IG.LAST.YEAR APEX.IG.LAST.YEAR APEX.IG.LESS_THAN BEST than BEST than APEX.IG.LESS_THAN BEST than BEST than APEX.IG.LESS_THAN BEST than APEX.IG.LESS_THAN BEST than APEX.IG.LINE APEX.IG.LINE APEX.IG.LINE APEX.IG.LINE APEX.IG.LINE APEX.IG.LISTAGG LISTAGG APEX.IG.LOW_COLUMN LOW APEX.IG.MAILADDRESSES_COMMASEP SEPARATE MUITIPLE Addresses with commas	APEX.IG.INVALID_SORT_BY	Sort By has been set to %0, but no column as been selected for %0.
APEX.IG.IS_NOT_NULL         is not empty           APEX.IG.IS_NULL         is empty           APEX.IG.LABEL         Label           APEX.IG.LABEL_COLUMN         Label           APEX.IG.LAST         Last           APEX.IG.LAST.DAY         Last Day           APEX.IG.LAST.HOUR         Last Hour           APEX.IG.LAST.MINUTE         Last Minute           APEX.IG.LAST.WEEK         Last Week           APEX.IG.LAST.X_DAYS         Last %0 Days           APEX.IG.LAST.X_HOURS         Last %0 Hours           APEX.IG.LAST.X_MINUTES         Last %0 Minutes           APEX.IG.LAST.X_MONTHS         Last %0 Weeks           APEX.IG.LAST.X_WEEKS         Last %0 Weeks           APEX.IG.LAST.X_YEARS         Last %0 Years           APEX.IG.LAST.YEAR         Last Year           APEX.IG.LAYOUT_ALIGN         Cell Alignment           APEX.IG.LAYOUT_USEGROUPFOR         Use Group For           APEX.IG.LESS_THAN         less than           APEX.IG.LESS_THAN         less than           APEX.IG.LINE         Line           APEX.IG.LINE_WITH_AREA         Line with Area           Line with Area         Line with Area           Listagg         Lest Company         Lest Company           APE	APEX.IG.INVALID_VALUE	Invalid Value
APEX.IG.IS_NULL  APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LAST  APEX.IG.LAST  APEX.IG.LAST  APEX.IG.LAST.DAY  APEX.IG.LAST.HOUR  APEX.IG.LAST.MINUTE  APEX.IG.LAST.MONTH  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  Last %0 Hours  APEX.IG.LAST.X_MINUTES  Last %0 Minutes  APEX.IG.LAST.X_MEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  Cell Alignment  APEX.IG.LAYOUT_USEGROUPFOR  Use Group For  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  Line  APEX.IG.LINE  Line  APEX.IG.LINE  APEX.IG.LINE WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.INVISIBLE	Not Displayed
APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LABEL  APEX.IG.LAST  APEX.IG.LAST  APEX.IG.LAST.DAY  APEX.IG.LAST.HOUR  APEX.IG.LAST.MINUTE  APEX.IG.LAST.MONTH  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  Last %0 Hours  APEX.IG.LAST.X_MONTHS  Last %0 Minutes  APEX.IG.LAST.X_MONTHS  Last %0 Weeks  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  Last %0 Weeks  APEX.IG.LAST.X_YEARS  Last %0 Weeks  APEX.IG.LAST.X_YEARS  Last %0 Weeks  APEX.IG.LAST.X_YEARS  Last Year  Cell Alignment  APEX.IG.LAYOUT_ALIGN  Cell Alignment  Bess than  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  Line  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LISTAGG  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.LADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.IS_NOT_NULL	is not empty
APEX.IG.LABEL_COLUMN  APEX.IG.LAST  APEX.IG.LAST.DAY  APEX.IG.LAST.DAY  APEX.IG.LAST.HOUR  APEX.IG.LAST.MINUTE  APEX.IG.LAST.MINUTE  APEX.IG.LAST.MONTH  LAST Month  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_PEARS  APEX.IG.LAST.X_EAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  Cell Alignment  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  Line  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.IS_NULL	is empty
APEX.IG.LAST APEX.IG.LAST.DAY Last Day  APEX.IG.LAST.HOUR APEX.IG.LAST.MINUTE Last Minute  APEX.IG.LAST.MINUTE Last Month  APEX.IG.LAST.WEEK Last Week  APEX.IG.LAST.X_DAYS Last %0 Days  APEX.IG.LAST.X_HOURS LAST.X_MINUTES LAST.X_MINUTES LAST.X_MINUTES APEX.IG.LAST.X_MONTHS LAST %0 Months  APEX.IG.LAST.X_WEEKS LAST %0 Weeks  APEX.IG.LAST.X_WEEKS LAST %0 Weeks  APEX.IG.LAST.X_YEARS LAST %0 Veers  APEX.IG.LAST.X_PEARS LAST YEAR LEST YEAR APEX.IG.LAST.Y_EAR APEX.IG.LAST.Y_EARS LEST YEAR APEX.IG.LAST.Y_EARS LINE APEX.IG.LESS_THAN APEX.IG.LESS_THAN APEX.IG.LESS_THAN APEX.IG.LESS_THAN APEX.IG.LESS_THAN APEX.IG.LESS_THAN APEX.IG.LINE LINE LINE APEX.IG.LINE APEX.IG.LINE LINE APEX.IG.LINE APEX.IG.LINE APEX.IG.LINE APEX.IG.LISTAGG LISTAGG APEX.IG.LOW_COLUMN LOW APEX.IG.MAILADDRESSES_COMMASEP Separate multiple Addresses with commas	APEX.IG.LABEL	Label
APEX.IG.LAST.DAY  APEX.IG.LAST.HOUR  APEX.IG.LAST.MINUTE  APEX.IG.LAST.MONTH  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  SEPARATE MINITED  Last Month  Last Month  Last Month  Last Week  Last Wo Days  APEX Hours  APEX Hours  APEX Hours  Line  Line  Line  Line  Line  Line  APEX.IG.LINEAREA  APEX.IG.LINEAREA  Listagg  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LABEL_COLUMN	Label
APEX.IG.LAST.HOUR  APEX.IG.LAST.MINUTE  Last Minute  APEX.IG.LAST.MONTH  Last Wonth  APEX.IG.LAST.WEEK  Last Week  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  Last %0 Months  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.Y_YEARS  APEX.IG.LAST.Y_EAR  APEX.IG.LAST.Y_EAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LAST	Last
APEX.IG.LAST.MINUTE  APEX.IG.LAST.MONTH  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  SEPARATE MINITIPLE Addresses with commas	APEX.IG.LAST.DAY	Last Day
APEX.IG.LAST.MONTH  APEX.IG.LAST.WEEK  APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.LOW_COLUMN  APEX.IG.LOW_COLUMN  APEX.IG.LOW_COLUMN  APEX.IG.LOW_COLUMN  SEPARATE MAINTENANCE  APEX.IG.LOW_COLUMN  SEPARATE MUITIPLE ACID MAINTENANCE  SEPARATE MUITIPLE ACID MAINTENANCE  APEX.IG.LOW_COLUMN  SEPARATE MUITIPLE ACID MAINTENANCE  SEPARATE MUITIPLE	APEX.IG.LAST.HOUR	Last Hour
APEX.IG.LAST.WEEK  APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  Last %0 Months  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last Week  Last W0 Days  Low Days  Call Winutes  Last %0 Months  Last %0 Weeks  Last %0 Weeks  Last %0 Weeks  Last %0 Weeks  Last %0 Fears  Last %0 Weeks  Last %0 Weeks  Last %0 Fears  Last %0 Weeks  Last %0 Weeks  Last %0 Weeks  APEX Hast Week  Last %0 Months  Last %0 Weeks  Last %0 Weeks  APEX Hast Week  Last %0 Hours  Last %0 Months  Last %	APEX.IG.LAST.MINUTE	Last Minute
APEX.IG.LAST.X_DAYS  APEX.IG.LAST.X_HOURS  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last %0 Months  Last %0 Months  Last %0 Weeks  Last %0 Years  Last Year  Cell Alignment  Use Group For  Use Group For  Line with Area  Line  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE_WITH_AREA  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LAST.MONTH	Last Month
APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LINE  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last %0 Months  Last %0 Mon	APEX.IG.LAST.WEEK	Last Week
APEX.IG.LAST.X_MINUTES  APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last %0 Months	APEX.IG.LAST.X_DAYS	Last %0 Days
APEX.IG.LAST.X_MONTHS  APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE WITH_AREA  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last %0 Weeks  Last %0 Weeks	APEX.IG.LAST.X_HOURS	Last %0 Hours
APEX.IG.LAST.X_WEEKS  APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LINE_WITH_AREA  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last %0 Weeks  Last %0 Weeks  Last %0 Years  Last %0 Years  Lest Year  Cell Alignment  Use Group For  Use Group For  Lise Sthan  Less than  Less than or equals  Line  Line  APEX.IG.LINE_WITH_AREA  Line with Area  Listagg  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LAST.X_MINUTES	Last %0 Minutes
APEX.IG.LAST.X_YEARS  APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last %0 Years  Last %0 Years  Last %0 Years  Last %0 Years  Lest Year  Cell Alignment  Use Group For  less than  less than  Line  Line  Line  Line  Line  APEX.IG.LINE_WITH_AREA  APEX.IG.LINE_WITH_AREA  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LAST.X_MONTHS	Last %0 Months
APEX.IG.LAST.YEAR  APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN  APEX.IG.LESS_THANOR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  Line  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Last Year  Cell Alignment  Use Group For  less than  less than  Line  Line  Line  Line  Line  Line  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  Low  Separate multiple Addresses with commas	APEX.IG.LAST.X_WEEKS	Last %0 Weeks
APEX.IG.LAYOUT_ALIGN  APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Cell Alignment  Use Group For  less than  less than  Line with Area  Line  Line with Area  Listagg  Low  Separate multiple Addresses with commas	APEX.IG.LAST.X_YEARS	Last %0 Years
APEX.IG.LAYOUT_USEGROUPFOR  APEX.IG.LESS_THAN  APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Use Group For  less than  less than  Line with Area  Line  Line with Area  Listagg  Low  Separate multiple Addresses with commas	APEX.IG.LAST.YEAR	Last Year
APEX.IG.LESS_THAN   less than   APEX.IG.LESS_THAN_OR_EQUALS   less than or equals   APEX.IG.LINE   Line   APEX.IG.LINE_WITH_AREA   Line with Area   APEX.IG.LISTAGG   Listagg   APEX.IG.LOW_COLUMN   Low   APEX.IG.MAILADDRESSES_COMMASEP   Separate multiple Addresses with commas	APEX.IG.LAYOUT_ALIGN	Cell Alignment
APEX.IG.LESS_THAN_OR_EQUALS  APEX.IG.LINE  APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Liess than or equals  Line  Line  Line  Line with Area  Listagg  Low  Separate multiple Addresses with commas	APEX.IG.LAYOUT_USEGROUPFOR	Use Group For
APEX.IG.LINE Line  APEX.IG.LINE_WITH_AREA Line with Area  APEX.IG.LISTAGG LISTAGG  APEX.IG.LOW_COLUMN Low  APEX.IG.MAILADDRESSES_COMMASEP Separate multiple Addresses with commas	APEX.IG.LESS_THAN	less than
APEX.IG.LINE_WITH_AREA  APEX.IG.LISTAGG  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Line with Area  Listagg  Low  Separate multiple Addresses with commas	APEX.IG.LESS_THAN_OR_EQUALS	less than or equals
APEX.IG.LISTAGG  Listagg  APEX.IG.LOW_COLUMN  APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LINE	Line
APEX.IG.LOW_COLUMN Low  APEX.IG.MAILADDRESSES_COMMASEP Separate multiple Addresses with commas	APEX.IG.LINE_WITH_AREA	Line with Area
APEX.IG.MAILADDRESSES_COMMASEP  Separate multiple Addresses with commas	APEX.IG.LISTAGG	Listagg
	APEX.IG.LOW_COLUMN	Low
APEX.IG.MATCHES_REGULAR_EXPRESSION matches regular expression	APEX.IG.MAILADDRESSES_COMMASEP	Separate multiple Addresses with commas
	APEX.IG.MATCHES_REGULAR_EXPRESSION	matches regular expression



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.MAX	Maximum
APEX.IG.MAX_OVERALL	Overall Maximum
APEX.IG.MEDIAN	Median
APEX.IG.MEDIAN_OVERALL	Overall Median
APEX.IG.MIN	Minimum
APEX.IG.MIN_OVERALL	Overall Minimum
APEX.IG.MINUTES	minutes
APEX.IG.MINUTES_AGO	Minutes ago
APEX.IG.MONTHS	months
APEX.IG.MORE_DATA_FOUND	The data contains more than %0 rows which exceeds the maximum allowed. Please apply additional filters in order to view the results.
APEX.IG.NAME	Name
APEX.IG.NAMED_REPORT	Named Report
APEX.IG.NEXT.DAY	Next Day
APEX.IG.NEXT.HOUR	Next Hour
APEX.IG.NEXT.MINUTE	Next Minute
APEX.IG.NEXT.MONTH	Next Month
APEX.IG.NEXT.WEEK	Next Week
APEX.IG.NEXT.X_DAYS	Next %0 Days
APEX.IG.NEXT.X_HOURS	Next %0 Hours
APEX.IG.NEXT.X_MINUTES	Next %0 Minutes
APEX.IG.NEXT.X_MONTHS	Next %0 Months
APEX.IG.NEXT.X_WEEKS	Next %0 Weeks
APEX.IG.NEXT.X_YEARS	Next %0 Years
APEX.IG.NEXT.YEAR	Next Year
APEX.IG.NO_DATA_FOUND	No data found
APEX.IG.NOT_BETWEEN	not between
APEX.IG.NOT_EQUALS	not equals
APEX.IG.NOT_EXIST	Region with ID %0 is not an Interactive Grid region or does not exist in application %1.
APEX.IG.NOT_IN	not in
APEX.IG.NOT_IN_THE_LAST	not in the last
APEX.IG.NOT_IN_THE_NEXT	not in the next
APEX.IG.NULLS	Nulls
APEX.IG.NUMBER	Numeric
APEX.IG.OFF	Off



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.ON	On
APEX.IG.ONE_MINUTE_AGO	1 minute ago
APEX.IG.OPEN_COLORPICKER	Open Color Picker: %0
APEX.IG.OPEN_COLUMN	Open
APEX.IG.OPERATOR	Operator
APEX.IG.ORIENTATION	Orientation
APEX.IG.PIE	Pie
APEX.IG.PIVOT	Pivot
APEX.IG.PIVOT_VIEW	Pivot View
APEX.IG.PLACEHOLDER_INVALUES	Separate values with "%0"
APEX.IG.POLAR	Polar
APEX.IG.POSITION_CENTER	Center
APEX.IG.POSITION_END	End
APEX.IG.POSITION_START	Start
APEX.IG.PRIMARY	Primary
APEX.IG.PRIMARY_DEFAULT	Primary Default
APEX.IG.PRIMARY_REPORT	Primary Report
APEX.IG.RADAR	Radar
APEX.IG.RANGE	Range
APEX.IG.REFRESH	Refresh
APEX.IG.REFRESH_ROW	Refresh Row
APEX.IG.REFRESH_ROWS	Refresh Rows
APEX.IG.REMOVE_CONTROL	Remove %0
APEX.IG.REPORT	Report
APEX.IG.REPORT.DELETED	Report deleted
APEX.IG.REPORT.SAVED.ALTERNATIVE	Alternative report saved for all users
APEX.IG.REPORT.SAVED.DEFAULT	Default report saved for all users
APEX.IG.REPORT.SAVED.PRIVATE	Private report saved
APEX.IG.REPORT.SAVED.PUBLIC	Public report saved for all users
APEX.IG.REPORT_DATA_AS_OF.X.MINUTES_AGO	Report data as of %0 minutes ago
APEX.IG.REPORT_DATA_AS_OF_ONE_MINUTE_AGO	Report data as of 1 minute ago
APEX.IG.REPORT_EDIT	Report - Edit
APEX.IG.REPORT_SAVE_AS	Report - Save As
APEX.IG.REPORT_SETTINGS	Report Settings
APEX.IG.REPORT_STATIC_ID_DOES_NOT_EXIST	Saved Interactive Grid with static ID %0 does not exist.
APEX.IG.REPORT_VIEW	Report View



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.RESET	Reset
APEX.IG.REVERT_CHANGES	Revert Changes
APEX.IG.REVERT_ROWS	Revert Rows
APEX.IG.ROW	Row
APEX.IG.ROW_ACTIONS	Row Actions
APEX.IG.ROW_ACTIONS_FOR	Actions for row %0
APEX.IG.ROW_COLUMN_CONTEXT	Row %0 Column %1
APEX.IG.ROW_CONTEXT	Row %0
APEX.IG.ROWS_PER_PAGE	Rows Per Page
APEX.IG.SAVE	Save
APEX.IG.SAVE_AS	Save As
APEX.IG.SAVE_REPORT_SETTINGS	Save Report Settings
APEX.IG.SAVED_REPORT_DEFAULT	Default
APEX.IG.SAVED_REPORT_PRIVATE	Private
APEX.IG.SAVED_REPORT_PUBLIC	Public
APEX.IG.SAVED_REPORTS	Saved Reports
APEX.IG.SCATTER	Scatter
APEX.IG.SEARCH	Search
APEX.IG.SEARCH.ALL_COLUMNS	Search: All Text Columns
APEX.IG.SEARCH.COLUMN	Search: %0
APEX.IG.SEARCH.ORACLE_TEXT	Search: Full Text
APEX.IG.SEARCH_FOR.X	Search for '%0'
APEX.IG.SEL_ACTIONS	Selection Actions
APEX.IG.SELECT	- Select -
APEX.IG.SELECT_1_ROW_IN_MASTER	Select 1 row in the master region
APEX.IG.SELECT_COLUMNS_TO_SEARCH	Select columns to search
APEX.IG.SELECTION	Cell Selection
APEX.IG.SEL_MODE_CELL	Selection
APEX.IG.SEND_AS_EMAIL	Send as Email
APEX.IG.SERIES_COLUMN	Series
APEX.IG.SHOW_OVERALL_VALUE	Show Overall Value
APEX.IG.SINGLE_ROW_VIEW	Single Row View
APEX.IG.SORT	Sort
APEX.IG.SORT_BY	Sort By
APEX.IG.SORT_ONLY_ONE_PER_COLUMN	You can define only one sort per column.
APEX.IG.SRV_CHANGE_MENU	Change Menu



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.STACK	Stack
APEX.IG.STARTS_WITH	starts with
APEX.IG.STOCK	Stock
APEX.IG.STRETCH_COLUMNS	Stretch Column
APEX.IG.SUBSCRIPTION	Subscription
APEX.IG.SUM	Sum
APEX.IG.SUM_OVERALL	Overall Sum
APEX.IG.SUMMARY	Interactive Grid. Report: %0, View: %1.
APEX.IG.TARGET_COLUMN	Target
APEX.IG.TEXT_COLOR	Text Color
APEX.IG.TOGGLE	Toggle
APEX.IG.TOOLTIP	Tooltip
APEX.IG.TYPE	Туре
APEX.IG.UNFREEZE	Unfreeze
APEX.IG.UNIT	Unit
APEX.IG.UNSAVED_CHANGES_CONTINUE_CONFIRM	There are unsaved changes. Do you want to continue?
APEX.IG.VALUE	Value
APEX.IG.VALUE_COLUMN	Value
APEX.IG.VALUE_REQUIRED	A value is required.
APEX.IG.VARCHAR2	Text
APEX.IG.VERTICAL	Vertical
APEX.IG.VIEW	View
APEX.IG.VISIBLE	Displayed
APEX.IG.VOLUME_COLUMN	Volume
APEX.IG.WEEKS	weeks
APEX.IG.WIDTH	Minimum Column Width (Pixel)
APEX.IG.X.BETWEEN.Y.AND.Z	%0 between %1 and %2
APEX.IG.X.CONTAINS.Y	%0 contains %1
APEX.IG.X.DOES_NOT_CONTAIN.Y	%0 does not contain %1
APEX.IG.X.EQUALS.Y	%0 equals %1
APEX.IG.X.GREATER_THAN.Y	%0 greater than %1
APEX.IG.X.GREATER_THAN_OR_EQUALS.Y	%0 greater than or equal to %1
APEX.IG.X.IN.Y	%0 in %1
APEX.IG.X.IN_THE_LAST.Y.DAYS	%0 in the last %1 days
APEX.IG.X.IN_THE_LAST.Y.HOURS	%0 in the last %1 hours
APEX.IG.X.IN_THE_LAST.Y.MINUTES	%0 in the last %1 minutes



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.X.IN_THE_LAST.Y.MONTHS	%0 in the last %1 months
APEX.IG.X.IN_THE_LAST.Y.WEEKS	%0 in the last %1 weeks
APEX.IG.X.IN_THE_LAST.Y.YEARS	%0 in the last %1 years
APEX.IG.X.IN_THE_LAST_DAY	%0 in the last day
APEX.IG.X.IN_THE_LAST_HOUR	%0 in the last hour
APEX.IG.X.IN_THE_LAST_MINUTE	%0 in the last minute
APEX.IG.X.IN_THE_LAST_MONTH	%0 in the last month
APEX.IG.X.IN_THE_LAST_WEEK	%0 in the last week
APEX.IG.X.IN_THE_LAST_YEAR	%0 in the last year
APEX.IG.X.IN_THE_NEXT.Y.DAYS	%0 in the next %1 days
APEX.IG.X.IN_THE_NEXT.Y.HOURS	%0 in the next %1 hours
APEX.IG.X.IN_THE_NEXT.Y.MINUTES	%0 in the next %1 minutes
APEX.IG.X.IN_THE_NEXT.Y.MONTHS	%0 in the next %1 months
APEX.IG.X.IN_THE_NEXT.Y.WEEKS	%0 in the next %1 weeks
APEX.IG.X.IN_THE_NEXT.Y.YEARS	%0 in the next %1 years
APEX.IG.X.IN_THE_NEXT_DAY	%0 in the next day
APEX.IG.X.IN_THE_NEXT_HOUR	%0 in the next hour
APEX.IG.X.IN_THE_NEXT_MINUTE	%0 in the next minute
APEX.IG.X.IN_THE_NEXT_MONTH	%0 in the next month
APEX.IG.X.IN_THE_NEXT_WEEK	%0 in the next week
APEX.IG.X.IN_THE_NEXT_YEAR	%0 in the next year
APEX.IG.X.IS_NOT_NULL	%0 is not empty
APEX.IG.X.IS_NULL	%0 is empty
APEX.IG.X.LESS_THAN.Y	%0 less than %1
APEX.IG.X.LESS_THAN_OR_EQUALS.Y	%0 less than or equal to %1
APEX.IG.X.LIKE.Y	%0 like %1
APEX.IG.X.MATCHES_REGULAR_EXPRESSION.Y	%0 matches regular expression %1
APEX.IG.X.MINUTES_AGO	%0 minutes ago
APEX.IG.X.NOT_BETWEEN.Y.AND.Z	%0 not between %1 and %2
APEX.IG.X.NOT_EQUALS.Y	%0 not equals %1
APEX.IG.X.NOT_IN.Y	%0 not in %1
APEX.IG.X.NOT_IN_THE_LAST.Y.DAYS	%0 not in the last %1 days
APEX.IG.X.NOT_IN_THE_LAST.Y.HOURS	%0 not in the last %1 hours
APEX.IG.X.NOT_IN_THE_LAST.Y.MINUTES	%0 not in the last %1 minutes
APEX.IG.X.NOT_IN_THE_LAST.Y.MONTHS	%0 not in the last %1 months
APEX.IG.X.NOT_IN_THE_LAST.Y.WEEKS	%0 not in the last %1 weeks



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.IG.X.NOT_IN_THE_LAST.Y.YEARS	%0 not in the last %1 years
APEX.IG.X.NOT_IN_THE_LAST_DAY	%0 not in the last day
APEX.IG.X.NOT_IN_THE_LAST_HOUR	%0 not in the last hour
APEX.IG.X.NOT_IN_THE_LAST_MINUTE	%0 not in the last minute
APEX.IG.X.NOT_IN_THE_LAST_MONTH	%0 not in the last month
APEX.IG.X.NOT_IN_THE_LAST_WEEK	%0 not in the last week
APEX.IG.X.NOT_IN_THE_LAST_YEAR	%0 not in the last year
APEX.IG.X.NOT_IN_THE_NEXT.Y.DAYS	%0 not in the next %1 days
APEX.IG.X.NOT_IN_THE_NEXT.Y.HOURS	%0 not in the next %1 hours
APEX.IG.X.NOT_IN_THE_NEXT.Y.MINUTES	%0 not in the next %1 minutes
APEX.IG.X.NOT_IN_THE_NEXT.Y.MONTHS	%0 not in the next %1 months
APEX.IG.X.NOT_IN_THE_NEXT.Y.WEEKS	%0 not in the next %1 weeks
APEX.IG.X.NOT_IN_THE_NEXT.Y.YEARS	%0 not in the next %1 years
APEX.IG.X.NOT_IN_THE_NEXT_DAY	%0 not in the next day
APEX.IG.X.NOT_IN_THE_NEXT_HOUR	%0 not in the next hour
APEX.IG.X.NOT_IN_THE_NEXT_MINUTE	%0 not in the next minute
APEX.IG.X.NOT_IN_THE_NEXT_MONTH	%0 not in the next month
APEX.IG.X.NOT_IN_THE_NEXT_WEEK	%0 not in the next week
APEX.IG.X.NOT_IN_THE_NEXT_YEAR	%0 not in the next year
APEX.IG.X.NOT_LIKE.Y	%0 not like %1
APEX.IG.X.STARTS_WITH.Y	%0 starts with %1
APEX.IG.X_COLUMN	X
APEX.IG.Y_COLUMN	Υ
APEX.IG.YEARS	years
APEX.IG.Z_COLUMN	Z
APEX.IG_FORMAT_SAMPLE_1	Monday, 12 January, 2016
APEX.IG_FORMAT_SAMPLE_2	January
APEX.IG_FORMAT_SAMPLE_3	16 hours ago
APEX.IG_FORMAT_SAMPLE_4	in 16h
APEX.RV.NOT_GROUPED_LABEL	Other Columns
APEX.RV.REC_XY	Row %0 of %1
APEX.RV.REC_X	Row %0
APEX.RV.EXCLUDE_HIDDEN	Displayed Columns
APEX.RV.EXCLUDE_NULL	Exclude Null Values
APEX.RV.PREV_RECORD	Previous
APEX.RV.NEXT_RECORD	Next



Table 21-2 (Cont.) Interactive Grid Messages Requiring Translation

Message Name	English Text
APEX.RV.SETTINGS_MENU	Settings Menu
APEX.RV.INSERT	Add
APEX.RV.DELETE	Delete

# 21.6.3.5 Interactive Report Messages Requiring Translation

Lists interactive reports messages that require translation.

**Table 21-3** Interactive Report Messages Requiring Translation

Message Name	English Text
4150_COLUMN_NUMBER	Column %0
APEXIR_3D	3D
APEXIR_ACTIONS	Actions
APEXIR_ACTIONS_MENU	Actions Menu
APEXIR_ADD	Add
APEXIR_ADD_FUNCTION	Add Function
APEXIR_ADD_GROUP_BY_COLUMN	Add Group By Column
APEXIR_ADD_PIVOT_COLUMN	Add Pivot Column
APEXIR_ADD_ROW_COLUMN	Add Row Column
APEXIR_ADD_SUBSCRIPTION	Add Subscription
APEXIR_AGG_AVG	Average
APEXIR_AGG_COUNT	Count
APEXIR_AGG_MAX	Maximum
APEXIR_AGG_MEDIAN	Median
APEXIR_AGG_MIN	Minimum
APEXIR_AGG_MODE	Mode
APEXIR_AGG_SUM	Sum
APEXIR_AGGREGATE	Aggregate
APEXIR_AGGREGATE_DESCRIPTION	Aggregates are displayed after each control break and at the end of the report.
APEXIR_AGGREGATION	Aggregation
APEXIR_ALL	All
APEXIR_ALL_COLUMNS	All Columns
APEXIR_ALL_ROWS	All Rows
APEXIR_ALTERNATIVE	Alternative
APEXIR_ALTERNATIVE_DEFAULT_NAME	Alternative Default: %0
APEXIR_AND	and



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_APPLY	Apply
APEXIR_AS_OF	As of %0
APEXIR_ASCENDING	Ascending
APEXIR_AVERAGE_X	Average %0
APEXIR_BETWEEN	between
APEXIR_BGCOLOR	Background Color
APEXIR_BLUE	blue
APEXIR_BOTTOM	Bottom
APEXIR_CALENDAR	Calendar
APEXIR_CANCEL	Cancel
APEXIR_CATEGORY	Category
APEXIR_CELL	Cell
APEXIR_CHART	Chart
APEXIR_CHART_INITIALIZING	Initializing
APEXIR_CHART_LABEL_NOT_NULL	Chart label must be specified
APEXIR_CHART_MAX_ROW_CNT	The maximum row count for a chart query limits the number of rows in the base query, not the number of rows displayed. Your base query exceeds the maximum row count of %0. Please apply a filter to reduce the number of records in your base query.
APEXIR_CHART_TYPE	Chart Type
APEXIR_CHECK_ALL	Check All
APEXIR_CHOOSE_DOWNLOAD_FORMAT	Choose report download format
APEXIR_CLEAR	clear
APEXIR_COLUMN	Column
APEXIR_COLUMN_ALIASES	Column Aliases
APEXIR_COLUMN_FILTER	Filter
APEXIR_COLUMN_HEADING_MENU	Column Heading Menu
APEXIR_COLUMN_INFO	Column Information
APEXIR_COLUMN_LABEL	Column Label
APEXIR_COLUMN_N	Column %0
APEXIR_COLUMNS	Columns
APEXIR_COMPARISON_CONTAINS	contains
APEXIR_COMPARISON_DOESNOT_CONTAIN	does not contain
APEXIR_COMPARISON_IN	in
APEXIR_COMPARISON_IS_IN_LAST	is in the last
APEXIR COMPARISON IS IN NEXT	is in the next



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_COMPARISON_IS_NOT_NULL	is not null
APEXIR_COMPARISON_IS_NULL	is null
APEXIR_COMPARISON_ISNOT_IN_LAST	is not in the last
APEXIR_COMPARISON_ISNOT_IN_NEXT	is not in the next
APEXIR_COMPARISON_LIKE	like
APEXIR_COMPARISON_NOT_IN	not in
APEXIR_COMPARISON_NOT_LIKE	not like
APEXIR_COMPARISON_REGEXP_LIKE	matches regular expression
APEXIR_COMPUTATION	Computation
APEXIR_COMPUTATION_EXPRESSION	Computation Expression
APEXIR_COMPUTATION_FOOTER	Create a computation using column aliases.
APEXIR_COMPUTATION_FOOTER_E1	(B+C)*100
APEXIR_COMPUTATION_FOOTER_E2	INITCAP(B)  ', '  INITCAP(C)
APEXIR_COMPUTATION_FOOTER_E3	CASE WHEN A = 10 THEN B + C ELSE B END
APEXIR_COMPUTE	Compute
APEXIR_CONTROL_BREAK	Control Break
APEXIR_CONTROL_BREAK_COLUMNS	Control Break Columns
APEXIR_CONTROL_BREAKS	Control Breaks
APEXIR_COUNT_DISTINCT	Count Distinct
APEXIR_COUNT_DISTINCT_X	Count Distinct
APEXIR_COUNT_X	Count %0
APEXIR_DAILY	Daily
APEXIR_DATA	Data
APEXIR_DATA_AS_OF	Report data as of %0 minutes ago.
APEXIR_DATE	Date
APEXIR_DAY	Day
APEXIR_DEFAULT	Default
APEXIR_DEFAULT_REPORT_TYPE	Default Report Type
APEXIR_DELETE	Delete
APEXIR_DELETE_CHECKED	Delete Checked
APEXIR_DELETE_CONFIRM	Would you like to delete these report settings?
APEXIR_DELETE_CONFIRM_JS_DIALOG	Would you like to perform this delete action?
APEXIR_DELETE_DEFAULT_REPORT	Delete Default Report
APEXIR_DELETE_REPORT	Delete Report
APEXIR_DESCENDING	Descending
APEXIR_DESCRIPTION	Description



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

APEXIR_DISABLE Disable Display Display Display Display Display in Report Displayed D	Message Name	English Text
APEXIR_DISABLE  APEXIR_DISABLED  Disabled  Disabled  Display  Display  Display in Report  Displayed  Displayed Columns  APEXIR_DISPLAYED  Displayed Columns  Displayed Columns  Displayed Columns  Displayed Columns  Do Not Display  Displayed Columns  Do Not Display  Do Not Display  Do Not Display  Do Not Display  Down Down  Down	APEXIR_DETAIL_VIEW	Single Row View
APEXIR_DISABLED  Disabled  APEXIR_DISPLAY  APEXIR_DISPLAYIN_REPORT  Display  Display IReport  Displayed  Donor  Donor  Download  Download	APEXIR_DIRECTION	Direction
APEXIR_DISPLAY  APEXIR_DISPLAYED  APEXIR_DISPLAYED  APEXIR_DISPLAYED  APEXIR_DISPLAYED  APEXIR_DONOT_AGGREGATE  - Do not aggregate Do Not Display  APEXIR_DOWN  APEXIR_DOWN  APEXIR_DOWN  APEXIR_DOWNLOAD  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DUPLICATE_PIVOT_COLOWN  APEXIR_DIT_ALTERNATIVE_DEFAULT  Edit Alternative Default  APEXIR_BUT_CHART  Edit Chart Settings  Edit Chart  APEXIR_BUT_GROUP_BY  APEXIR_BUT_FILTER  Edit Filter  APEXIR_BUT_FILTER  Edit Group By  APEXIR_BUT_PIVOT  Edit Pivot  APEXIR_BUT_PIVOT  Edit Pivot  APEXIR_EMAIL_ADDRESS  APEXIR_EMAIL_BCC  BCC  APEXIR_EMAIL_BCC  BCC  APEXIR_EMAIL_BCC  APEXIR_EMAIL_BCC  BCC  APEXIR_EMAIL_CC  CC  APEXIR_EMAIL_CC  CC  APEXIR_EMAIL_CC  CC  APEXIR_EMAIL_NOT_CONFIGURED  Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_SEE_ATTACHED  See attached.  APEXIR_EMAIL_SUBJECT_REQUIRED  Email Subject must be specified.  APEXIR_EMAIL_SUBJECT_REQUIRED  Email Subject must be specified.  APEXIR_EMAIL_TO  TO  TO  TO  TO  TO  TO  TO  TO  TO	APEXIR_DISABLE	Disable
APEXIR_EMAIL_ADDRESS APEXIR_EMAIL_REQUERCY APEXIR_EMAIL_REQUERCY APEXIR_BMAIL_REQUERCY APEXIR_BMAIL_REQUERCY APEXIR_BMAIL_REQUERCY APEXIR_BMAIL_REQUERCY APEXIR_BMAIL_REQUERCY APEXIR_BMAIL_REQUERCY APEXIR_BMAIL_REALL_REQUERCY APEXIR_EMAIL_SUBJECT_REQUERCY APEXIR_EMAIL_SUBJECT_REQUERCY APEXIR_EMAIL_SUBJECT_REQUERCY APEXIR_EMAIL_SUBJECT_REQUERCY APEXIR_EMAIL_SUBJECT_REQUERCY APEXIR_EMAIL_SUD SONOT DISPLAY Displayed Columns Displayed Displayed Displayed Displayed Displayed Columns Displayed Displayed Displayed Columns Displayed Displayed Columns Displayed Columns Displayed Displayed Columns Down Down Down Down Down Down Down Down	APEXIR_DISABLED	Disabled
APEXIR_DISPLAYED  Displayed  Displayed Columns  Displayed Columns  Do not aggregate - Do not aggregate - Do Not Display  Down  Down  Down  Down  Down  Down  Download  Download  Download  Duplicate pivot column. Pivot column list must be unique.  APEXIR_DUT_COLUMN  Display  Down  Download  Downlo	APEXIR_DISPLAY	Display
APEXIR_DISPLAYED_COLUMNS  APEXIR_DO_NOT_AGGREGATE  APEXIR_DO_NOT_DISPLAY  APEXIR_DO_NOT_DISPLAY  APEXIR_DOWN  APEXIR_DOWN  APEXIR_DOWN  APEXIR_DOWNLOAD  APEXIR_DUPLICATE_PIVOT_COLUMN  APEXIR_EDIT  APEXIR_EDIT  APEXIR_EDIT  APEXIR_EDIT_ALTERNATIVE_DEFAULT  APEXIR_EDIT_CHART  APEXIR_EDIT_CHART  APEXIR_EDIT_GRART  APEXIR_EDIT_GRART  APEXIR_EDIT_FILTER  APEXIR_EDIT_FILTER  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_PIVOT  APEXIR_EDIT_PIVOT  APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL_BCC  APEXIR_EMAIL_BCC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_REQUENCY  APEXIR_EMAIL_SEC_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT REQUIRED  APEXIR_EMAIL_SUBJECT REQUIRED  APEXIR_EMAIL_SUBJECT REQUIRED  APEXIR_EMAIL_SUBJECT REQUIRED  APEXIR_EMAIL_SUBJECT REQUIRED  APEXIR_EMAIL_SUBJECT Enable  Do Not Display  Download  Picaterine  Edit Chart  Edit Ch	APEXIR_DISPLAY_IN_REPORT	Display in Report
APEXIR_DO_NOT_AGGREGATE  APEXIR_DO_NOT_DISPLAY  APEXIR_DOWN  APEXIR_DOWN  APEXIR_DOWNLOAD	APEXIR_DISPLAYED	Displayed
APEXIR_DO_NOT_DISPLAY  APEXIR_DOWN  APEXIR_DOWN  APEXIR_DOWNLOAD  Download  Download  Duplicate pivot column. Pivot column list must be unique.  APEXIR_DUPLICATE_PIVOT_COLUMN  APEXIR_EDIT  APEXIR_EDIT  APEXIR_EDIT_ALTERNATIVE_DEFAULT  APEXIR_EDIT_CHART  APEXIR_EDIT_CHART  APEXIR_EDIT_CHART2  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_PIVOT  APEXIR_EDIT_PIVOT  APEXIR_EDIT_PIVOT  APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL_BCC  APEXIR_EMAIL_BCC  APEXIR_EMAIL_BCC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_REQUENCY  APEXIR_EMAIL_REQUENCY  APEXIR_EMAIL_REQUENCY  APEXIR_EMAIL_REQUERED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT REQUIRED  AP	APEXIR_DISPLAYED_COLUMNS	Displayed Columns
APEXIR_DOWN APEXIR_DOWNLOAD  APEXIR_DUPLICATE_PIVOT_COLUMN  APEXIR_EDIT  APEXIR_EDIT  APEXIR_EDIT_ALTERNATIVE_DEFAULT  APEXIR_EDIT_CHART  APEXIR_EDIT_CHART2  APEXIR_EDIT_CHART2  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_PIVOT  APEXIR_EDIT_PIVOT  APEXIR_EDIT_PIVOT  APEXIR_EMAIL  APEXIR_EMAIL_BOCC  APEXIR_EMAIL_CC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_TO  APEXIR_EMABLE  Enable	APEXIR_DO_NOT_AGGREGATE	- Do not aggregate -
APEXIR_DOWNLOAD  APEXIR_DUPLICATE_PIVOT_COLUMN  Duplicate pivot column. Pivot column list must be unique.  APEXIR_EDIT  APEXIR_EDIT_ALTERNATIVE_DEFAULT  Edit APEXIR_EDIT_CHART  APEXIR_EDIT_CHART  Edit Chart Settings  APEXIR_EDIT_CHART2  Edit Chart  APEXIR_EDIT_FILTER  APEXIR_EDIT_FILTER  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_HIGHLIGHT  Edit Highlight  APEXIR_EDIT_RIVOT  Edit Pivot  Email  APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL_ADDRESS  Email Address  APEXIR_EMAIL_BOC  Boc  APEXIR_EMAIL_BODY  Body  APEXIR_EMAIL_BODY  BODY  APEXIR_EMAIL_FREQUENCY  Frequency  Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_REQUIRED  Email Address must be specified.  APEXIR_EMAIL_SUB_ECT  Subject  APEXIR_EMAIL_SUBJECT  Subject  Email Subject must be specified.  APEXIR_EMAIL_TO  TO  APEXIR_EMABLE  Enable	APEXIR_DO_NOT_DISPLAY	Do Not Display
Duplicate pivot column. Pivot column list must be unique.  APEXIR_EDIT	APEXIR_DOWN	Down
unique.  APEXIR_EDIT Edit  APEXIR_EDIT_ALTERNATIVE_DEFAULT Edit Alternative Default  APEXIR_EDIT_CHART Edit Chart  APEXIR_EDIT_CHART Edit Chart  APEXIR_EDIT_CHART2 Edit Chart  APEXIR_EDIT_CHART2 Edit Filter  APEXIR_EDIT_FILTER Edit Group By  APEXIR_EDIT_HIGHLIGHT Edit Highlight  APEXIR_EDIT_PIVOT Edit Pivot  APEXIR_EMAIL Email  APEXIR_EMAIL Email  APEXIR_EMAIL_ADDRESS Email Address  APEXIR_EMAIL_BOCC Bcc  APEXIR_EMAIL_BOCY Gc  APEXIR_EMAIL_BODY Body  APEXIR_EMAIL_CC CC  APEXIR_EMAIL_FREQUENCY Frequency  APEXIR_EMAIL_FREQUENCY Frequency  APEXIR_EMAIL_REQUIRED Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_SEE_ATTACHED See attached.  APEXIR_EMAIL_SUBJECT Subject  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_TO To  APEXIR_EMAIL_TO To  APEXIR_EMABLE Enable	APEXIR_DOWNLOAD	Download
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Edit Chart Settings  APEXIR_EDIT_CHART2 Edit Chart  APEXIR_EDIT_FILTER Edit Filter  APEXIR_EDIT_FILTER Edit Group By  Edit Group By  Edit Highlight  Edit Highlight  Edit Pivot  Edit Pivot  Email  EMEXIR_EMAIL  EMAIL_ADDRESS Email Address  EPEXIR_EMAIL_BOCC Bcc  APEXIR_EMAIL_BODY Body  APEXIR_EMAIL_CC Cc  EAPEXIR_EMAIL_FREQUENCY Frequency  APEXIR_EMAIL_NOT_CONFIGURED Email has not been configured for this application. Please contact your administrator.  EPEXIR_EMAIL_REQUIRED Email Address must be specified.  APEXIR_EMAIL_SUBJECT Subject  EPEXIR_EMAIL_SUBJECT REQUIRED Email Subject must be specified.  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  EPEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  EPEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  EPEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  EPEXIR_EMAIL_TO To  EPEXIR_EMABLE Enable	APEXIR_EDIT	Edit
Edit Chart  APEXIR_EDIT_FILTER  APEXIR_EDIT_FILTER  APEXIR_EDIT_GROUP_BY  APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_HIGHLIGHT  APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL_ADDRESS  APEXIR_EMAIL_BCC  APEXIR_EMAIL_BODY  APEXIR_EMAIL_GC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  To  APEXIR_EMAIL_TO  Enable  Edit Chart  Edit Filter  Edit Chart  Edit Filter  Edit Group By  Edit Chart  Email Address  Email Address  APEXIR_EMAIL_TO  To  APEXIR_EMAIL_TO  To  APEXIR_EMAIL_TO  Enable	APEXIR_EDIT_ALTERNATIVE_DEFAULT	Edit Alternative Default
APEXIR_EDIT_FILTER APEXIR_EDIT_GROUP_BY Edit Group By  Edit Highlight Edit Highlight Edit Pivot Edit Pivot Edit Pivot Email Email Email Email Address Email Email Ender Email Email Email Ender Email Ender Email Ender Email Email Email Email Ender Email Email Ender Email Email Ender Email Email Ender	APEXIR_EDIT_CHART	Edit Chart Settings
APEXIR_EDIT_GROUP_BY APEXIR_EDIT_HIGHLIGHT Edit Highlight  APEXIR_EDIT_PIVOT Edit Pivot  APEXIR_EMAIL APEXIR_EMAIL APEXIR_EMAIL_BCC Bcc APEXIR_EMAIL_BCC Bcd APEXIR_EMAIL_BCC Cc APEXIR_EMAIL_CC Cc APEXIR_EMAIL_FREQUENCY APEXIR_EMAIL_FREQUENCY APEXIR_EMAIL_NOT_CONFIGURED APEXIR_EMAIL_REQUIRED Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_REQUIRED Email Address must be specified.  APEXIR_EMAIL_SUBJECT Subject APEXIR_EMAIL_SUBJECT APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_TO To APEXIR_EMAIL_TO To APEXIR_EMAIL_TO Enable	APEXIR_EDIT_CHART2	Edit Chart
APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_HIGHLIGHT  APEXIR_EDIT_PIVOT  APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL_ADDRESS  APEXIR_EMAIL_BCC  APEXIR_EMAIL_BCC  APEXIR_EMAIL_CC  APEXIR_EMAIL_CC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  TO  Enable	APEXIR_EDIT_FILTER	Edit Filter
APEXIR_EMAIL  APEXIR_EMAIL  APEXIR_EMAIL_ADDRESS  APEXIR_EMAIL_BCC  Bcc  APEXIR_EMAIL_BCC  APEXIR_EMAIL_CC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  Enable	APEXIR_EDIT_GROUP_BY	Edit Group By
APEXIR_EMAIL EMAIL Email Address  APEXIR_EMAIL_BCC Bcc  APEXIR_EMAIL_BODY Body  APEXIR_EMAIL_CC Cc  APEXIR_EMAIL_FREQUENCY Frequency  APEXIR_EMAIL_NOT_CONFIGURED Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_REQUIRED Email Address must be specified.  APEXIR_EMAIL_SUBJECT Subject  APEXIR_EMAIL_SUBJECT Subject  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_TO To  APEXIR_EMAIL_TO Enable	APEXIR_EDIT_HIGHLIGHT	Edit Highlight
APEXIR_EMAIL_BCC  APEXIR_EMAIL_BODY  APEXIR_EMAIL_CC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  To  APEXIR_ENABLE  Email Address  Body  Cc  Cc  Frequency  Frequency  Email has not been configured for this application. Please contact your administrator.  Email Address must be specified.  See attached.  Subject  APEXIR_EMAIL_SUBJECT_REQUIRED  Email Subject must be specified.  APEXIR_EMAIL_TO  To  Enable	APEXIR_EDIT_PIVOT	Edit Pivot
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APEXIR_EMAIL_CC  APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_REQUIRED  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_TO  APEXIR_EMAIL_TO  Email Subject must be specified.  To  APEXIR_ENABLE  Enable	APEXIR_EMAIL_BCC	Bcc
APEXIR_EMAIL_FREQUENCY  APEXIR_EMAIL_NOT_CONFIGURED  Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_REQUIRED  Email Address must be specified.  APEXIR_EMAIL_SEE_ATTACHED  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_SUBJECT_REQUIRED  APEXIR_EMAIL_TO  To  APEXIR_ENABLE  Enable	APEXIR_EMAIL_BODY	Body
Email has not been configured for this application. Please contact your administrator.  APEXIR_EMAIL_REQUIRED Email Address must be specified.  APEXIR_EMAIL_SEE_ATTACHED See attached.  APEXIR_EMAIL_SUBJECT Subject  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_TO To  APEXIR_ENABLE Enable	APEXIR_EMAIL_CC	Сс
Please contact your administrator.  APEXIR_EMAIL_REQUIRED Email Address must be specified.  APEXIR_EMAIL_SEE_ATTACHED See attached.  APEXIR_EMAIL_SUBJECT Subject  APEXIR_EMAIL_SUBJECT_REQUIRED Email Subject must be specified.  APEXIR_EMAIL_TO To  APEXIR_ENABLE Enable	APEXIR_EMAIL_FREQUENCY	Frequency
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APEXIR_EMAIL_TO To  APEXIR_ENABLE Enable	APEXIR_EMAIL_SUBJECT	Subject
APEXIR_ENABLE Enable	APEXIR_EMAIL_SUBJECT_REQUIRED	Email Subject must be specified.
<del>-</del>	APEXIR_EMAIL_TO	То
APEXIR_ENABLE_DISABLE_ALT Enable/Disable	APEXIR_ENABLE	Enable
	APEXIR_ENABLE_DISABLE_ALT	Enable/Disable



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_ENABLED	Enabled
APEXIR_ERROR	Error
APEXIR_EXAMPLES	Examples
APEXIR_EXAMPLES_WITH_COLON	Examples:
APEXIR_EXCLUDE_NULL	Exclude Null Values
APEXIR_EXPAND_COLLAPSE_ALT	Expand/Collapse
APEXIR_EXPRESSION	Expression
APEXIR_FILTER	Filter
APEXIR_FILTER_EXPRESSION	Filter Expression
APEXIR_FILTER_EXPR_TOO_LONG	The filter expression is too long.
APEXIR_FILTER_TYPE	Filter Type
APEXIR_FILTERS	Filters
APEXIR_FINDER_ALT	Select columns to search.
APEXIR_FLASHBACK	Flashback
APEXIR_FLASHBACK_DESCRIPTION	A flashback query enables you to view the data as it existed at a previous point in time.
APEXIR_FLASHBACK_ERROR_MSG	Unable to perform flashback request.
APEXIR_FORMAT	Format
APEXIR_FORMAT_MASK	Format Mask
APEXIR_FUNCTION	Function
APEXIR_FUNCTION_N	Function %0
APEXIR_FUNCTIONS	Functions
APEXIR_FUNCTIONS_OPERATORS	Functions / Operators
APEXIR_GO	Go
APEXIR_GREEN	green
APEXIR_GROUP_BY	Group By
APEXIR_GROUP_BY_COL_NOT_NULL	Group by column must be specified
APEXIR_GROUP_BY_COLUMN	Group By Column
APEXIR_GROUP_BY_MAX_ROW_CNT	The maximum row count for a Group By query limits the number of rows in the base query, not the number of rows displayed. Your base query exceeds the maximum row count of %0. Please apply a filter to reduce the number of records in your base query.
APEXIR_GROUP_BY_SORT	Group By Sort
APEXIR_GROUP_BY_SORT_ORDER	Group By Sort Order
APEXIR_HCOLUMN	Horizontal Column
APEXIR_HELP	Help



 Table 21-3
 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_01	An Interactive Report displays a predetermined set of columns. The report may be further customized with an initial filter clause, a default sort order, control breaks, highlighting, computations, aggregates and a chart. Each Interactive Report can then be further customized and the results can be viewed, or downloaded, and the report definition can be stored for later use.
	<
	An Interactive Report can be customized in three ways: the search bar, actions menu and column heading menu.
APEXIR_HELP_ACTIONS_MENU	The actions menu is used to customize the display of your Interactive Report.
APEXIR_HELP_AGGREGATE	Aggregates are mathematical computations performed against a column. Aggregates are displayed after each control break and at the end of the report within the column they are defined.
	<
	<ul><li><b>Aggregation</b> allows you to select a previously defined aggregation to edit.</li></ul>
	<li><b>Function</b> is the function to be performed (e.g. SUM, MIN).</li>
	<li><b>Column</b> is used to select the column to apply the mathematical function to. Only numeric columns will be displayed.</li>
APEXIR_HELP_CHART	You can include one chart per Interactive Report. Once defined, you can switch between the chart and report views using links below the search bar.
	<ul><li><l>&gt;l&gt;<b>Chart Type</b> identifies the chart type to include. Select from horizontal bar, vertical bar, pie or line.</l></li></ul>
	<pre><li><b>Label</b> allows you to select the column to be used as the label.</li></pre>
	<li><b>Axis Title for Label</b> is the title that will display on the axis associated with the column selected for Label. This is not available for pie chart.</li>
	<li><b>Value</b> allows you to select the column to be used as the value. If your function is a COUNT, a Value does not need to be selected.</li>
	<li><b>Axis Title for Value</b> is the title that will display on the axis associated with the column selected for Value. This is not available for pie chart.</li>
	<pre><li><b>Function</b> is an optional function to be performed on the column selected for Value.</li></pre>



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_COLUMN_HEADING_MENU	Clicking on any column heading exposes a column heading menu.
	<
	<ul><li><l>&gt;sort Ascending icon sorts the report by the column in ascending order.</l></li></ul>
	<pre><li><b>Sort Descending icon</b> sorts the report by the column in descending order.</li></pre>
	<li><b>Hide Column</b> hides the column.</li>
	<li><b>Break Column</b> creates a break group on the column. This pulls the column out of the report as a master record.</li>
	<pre><li><b>Column Information</b> displays help text about the column, if available.</li></pre>
	<li><li><lb>Text Area is used to enter case insensitive search criteria (no need for wild cards). Entering a value will reduce the list of values at the bottom of the menu. You can then select a value from the bottom and the selected value will be created as a filter using '=' (e.g. column = 'ABC'). Alternatively, you can click the flashlight icon and the entered value will be created as a filter with the 'LIKE' modifier (e.g. column LIKE '%ABC%').// Select of Unique Values/b&gt; contains the first 500 unique values that meet your filters. If the column is a date, a list of date ranges is displayed instead. If you select a value, a filter will be created using '=' (e.g. column = 'ABC').</lb></li></li>



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_COMPUTE	Computations allow you to add computed columns to your report. These can be mathematical computations (e.g. NBR_HOURS/24) or standard Oracle functions applied to existing columns (some have been displayed for example, others, like TO_DATE, can also be used).
	<ul><li><b>Computation</b> allows you to select a previously defined computation to edit.</li></ul>
	<li><b>Column Heading</b> is the column heading for the new column.</li>
	<pre><li><b>Format Mask</b> is an Oracle format mask to be applied against the column (e.g. S9999).</li></pre>
	<pre><li><b>Format Mask</b> is an Oracle format mask to be applied against the column (e.g. S9999).</li></pre>
	<li><b>Computation</b> is the computation to be performed. Within the computation, columns are referenced using the aliases displayed.</li>
	<
	Below computation, the columns in your query are displayed with their associated alias. Clicking on the column name or alias will write them into the Computation. Next to Columns is a Keypad. These are simply shortcuts of commonly used keys. On the far right are Functions.
	An example computation to display Total Compensation is:
	<
	<pre><pre><pre><pre><pre><pre><pre><pre><pre><p< td=""></p<></pre></pre></pre></pre></pre></pre></pre></pre></pre>
	(where A is ORGANIZATION, B is SALARY and C is COMMISSION)
APEXIR_HELP_CONTROL_BREAK	Used 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.
APEXIR_HELP_DETAIL_VIEW	To view the details of a single row at a time, click the single row view icon on the row you want to view. If available, the single row view will always be the first column. Depending on the customization of the Interactive Report, the single row view may be the standard view or a custom page that may allow update.
APEXIR_HELP_DOWNLOAD	Allows the current result set to be downloaded. The download formats will differ depending upon your installation and report definition but may include CSV, XLS, PDF, or RTF.



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_FILTER	Used to add or modify the where clause on the query. You first select a column (it does not need to be one that is displayed), select from a list of standard Oracle operators (=, !=, not in, between), and enter an expression to compare against. The expression is case sensitive and you can use % as a wildcard (for example, STATE_NAME like A%).
APEXIR_HELP_FLASHBACK	Performs a flashback query to allow you to view the data as it existed at a previous point in time. The default amount of time that you can flashback is 3 hours (or 180 minutes) but the actual amount will differ per database.
APEXIR_HELP_FORMAT	Format enable you to customize the display of the report. Format contains the following submenu: <ul><li>Sort</li><li>Control Break</li><li>Highlight</li><li>Compute</li><li>Aggregate</li><li>Chart</li><li>Group By</li></ul>
APEXIR_HELP_GROUP_BY	You can define one Group By view per saved report. Once defined, you can switch between the group by and report views using view icons on the Search bar. To create a Group By view, you select: <ul><li>the columns on which to group</li><li>the columns to aggregate along with the function to be performed (average, sum, count, etc.)</li></ul>
APEXIR_HELP_HIGHLIGHT	Highlighting allows you to define a filter. The rows that meet the filter are highlighted using the characteristics associated with the filter.
	<ul><li><b>Name</b> is used only for display.</li></ul>
	<pre><li><b>Sequence</b> identifies the sequence in which the rules will be evaluated.</li></pre>
	<pre><li><b>Enabled</b> identifies if the rule is enabled or disabled.</li></pre>
	<li><b>Highlight Type</b> identifies whether the Row or Cell should be highlighted. If Cell is selected, the column referenced in the Highlight Condition is highlighted.</li>
	<li><b>Background Color</b> is the new color for the background of the highlighted area.</li>
	<pre><li><b>Text Color</b> is the new color for the text in the highlighted area.</li></pre>
	<pre><li><b>Highlight Condition</b> defines your filter condition.</li></pre>
APEXIR_HELP_PIVOT	You can define one Pivot view per saved report. Once defined, you can switch between the pivot and report views using view icons on the Search bar. To create a Pivot view, you select: <ul> <li>the columns on which to pivot</li> <li>the columns to display as rows</li> <li>the columns to aggregate along with the function to be performed (average, sum, count, etc.)</li></ul>



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

### Message Name

## APEXIR HELP REPORT SETTINGS

APEXIR\_HELP\_RESET

APEXIR\_HELP\_ROWS\_PER\_PAGE
APEXIR HELP SAVE REPORT

### **English Text**

If you have customized your Interactive Report, the report settings will be displayed below the Search Bar and above the report. If you have saved customized reports, they will be shown as tabs. You can access your alternate views by clicking the tabs. Below the tabs are the report settings for the current report. This area can be collapsed and expanded using the icon on the left.

For each report setting, you can:

<b>Edit</b> by clicking the name.

<b>Disable/Enable</b> by unchecking or checking the Enable/Disable checkbox. This is used to temporarily turn off and on the setting.

<b>Remove</b> by click the Remove icon. This permanently removes the setting.

If you have created a chart, you can toggle between the report and chart using the Report View and Chart View links shown on the right. If you are viewing the chart, you can also use the Edit Chart link to edit the chart settings.

Resets the report back to the default settings, removing any customizations that you have made.

Sets the number of records to display per page.

Saves the customized report for future use. You provide a name and optional description and can make the report accessible to the public (that is, all users who can access the primary default report). You can save four types of interactive reports:

- Primary Default (Developer Only). The Primary Default is the report that initially displays. Primary Default reports cannot be renamed or deleted.
- Alternative Report (Developer Only). Enables developers to create multiple report layouts. Only developers can save, rename, or delete an Alternative Report.
- Public Report (End user). Can be saved, renamed, or deleted by the end user who created it. Other users can view and save the layout as another report.
- Private Report (End user). Only the end user that created the report can view, save, rename or delete the report.

If you save customized reports, a Reports selector displays in the Search bar to the left of the Rows selector (if this feature is enabled).



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_SEARCH_BAR	At the top of each report page is a search region. The region provides the following features:
	<ul><li><li><li><l>&gt; Select columns icon allows you to identify which column to search (or all).</l></li></li></li></ul>
	<pre><li><b>Text area</b> allows for case insensitive search criteria (no need for wild cards).</li></pre>
	<pre><li><b>Rows</b> selects the number of records to display per page.</li></pre>
	<li><b>[Go] button</b> executes the search.</li>
	<pre><li><b>Actions Menu icon</b> displays the actions menu (discussed next).</li></pre>
	<
	Please note that all features may not be available for each report.
APEXIR_HELP_SEARCH_BAR_ACTIONS_MENU	<pre><li><b>Actions Menu</b> enables you to customize a report. See the sections that follow.</li></pre>
APEXIR_HELP_SEARCH_BAR_FINDER	<pre><li><b>Select columns icon</b> enables you to identify which column to search (or all).</li></pre>
APEXIR_HELP_SEARCH_BAR_REPORTS	<pre><li><b>Reports</b> displays alternate default and saved private or public reports.</li></pre>
APEXIR_HELP_SEARCH_BAR_ROWS	<pre><li><b>Rows</b> sets the number of records to display per page.</li></pre>
APEXIR_HELP_SEARCH_BAR_TEXTBOX	<pre><li><b>Text area</b> enables you to enter case insensitive search criteria (wild card characters are implied).</li> <li><li><b>Go button</b> executes the search. Hitting the enter key will also execute the search when the cursor is in the search text area.</li></li></pre>
APEXIR_HELP_SEARCH_BAR_VIEW	<pre><li><b>View Icons</b> switches between the icon, report, detail, chart, group by, and pivot views of the report if they are defined.</li></pre>
APEXIR_HELP_SELECT_COLUMNS	Used to modify the columns displayed. The columns on the right are displayed. The columns on the left are hidden. You can reorder the displayed columns using the arrows on the far right. Computed columns are prefixed with <b>**</b> .
APEXIR_HELP_SORT	Used to change the column(s) to sort on and whether to sort ascending or descending. You can also specify how to handle nulls (use the default setting, always display them last or always display them first). The resulting sorting is displayed to the right of column headings in the report.
APEXIR_HELP_SUBSCRIPTION	When you add a subscription, you provide an email address (or multiple email addresses, separated by commas), email subject, frequency, and start and end dates. The resulting emails include an HTML version of the interactive report containing the current data using the report setting that were present when the subscription was added.



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HIDE_COLUMN	Hide Column
APEXIR_HIGHLIGHT	Highlight
APEXIR_HIGHLIGHT_CONDITION	Highlight Condition
APEXIR_HIGHLIGHT_TYPE	Highlight Type
APEXIR_HIGHLIGHT_WHEN	Highlight When
APEXIR_HIGHLIGHTS	Highlights
APEXIR_INACTIVE_SETTING	1 inactive setting
APEXIR_INACTIVE_SETTINGS	%0 inactive settings
APEXIR_INTERACTIVE_REPORT_HELP	Interactive Report Help
APEXIR_INVALID	Invalid
APEXIR_INVALID_COMPUTATION	Invalid computation expression. %0
APEXIR_INVALID_END_DATE	The end date must be greater than the start date.
APEXIR_INVALID_END_DATE	The end date must be greater than the start date.
APEXIR_INVALID_FILTER	Invalid filter expression. %0
APEXIR_INVALID_FILTER_QUERY	Invalid filter query
APEXIR_INVALID_SETTING	1 invalid setting
APEXIR_INVALID_SETTINGS	%0 invalid settings
APEXIR_IS_IN_THE_LAST	%0 is in the last %1
APEXIR_IS_IN_THE_NEXT	%0 is in the next %1
APEXIR_IS_NOT_IN_THE_LAST	%0 is not in the last %1
APEXIR_IS_NOT_IN_THE_NEXT	%0 is not in the next %1
APEXIR_KEYPAD	Keypad
APEXIR_LABEL	Label
APEXIR_LABEL_AXIS_TITLE	Axis Title for Label
APEXIR_LABEL_PREFIX	Label Prefix
APEXIR_LAST_DAY	Last Day
APEXIR_LAST_HOUR	Last Hour
APEXIR_LAST_MONTH	Last Month
APEXIR_LAST_WEEK	Last Week
APEXIR_LAST_X_DAYS	Last %0 Days
APEXIR_LAST_X_HOURS	Last %0 Hours
APEXIR_LAST_X_YEARS	Last %0 Years
APEXIR_LAST_YEAR	Last Year
APEXIR_LINE	Line
APEXIR_MAX_QUERY_COST	The query is estimated to exceed the maximum allowed resources. Please modify your report settings and try again.



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

your data to ensure complete results.  AREXIR_MAX_X  AREXIR_MEDIAN_X  AREXIR_MEDIAN_X  AREXIR_MIN_AGO  AREXIR_MIN_AGO  AREXIR_MONTH  AREXIR_MONTH  AREXIR_MONTHLY  AREXIR_MONE_DATA  AREXIR_MOVE_DATA  AREXIR_MOVE_ALL  AREXIR_MOVE_ALL  AREXIR_MOVE_ALL  AREXIR_MULTIIR_PAGE_REGION_STATIC_ID_REQUIRE  AREXIR_MULTIIR_PAGE_REGION_STATIC_ID_REQUIRE  AREXIR_NAME  AREXIR_NAME  AREXIR_NAME  AREXIR_NEM_CATEGORY  AREXIR_NEM_CATEGORY  AREXIR_NEM_CATEGORY  AREXIR_NEM_COMPUTATION  AREXIR_NEM_COMPUTATION  AREXIR_NEXT_DAY  AREXIR_NEXT_DAY  AREXIR_NEXT_MOUR  AREXIR_NEXT_MOUR  AREXIR_NEXT_MOUR  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEEK  AREXIR_NEXT_WEARS  AREXIR_NEXT_X_DAYS  AREXIR_NEXT_X_DAYS  AREXIR_NEXT_X_LOURS  AREXIR_NEXT_X_LOURS  AREXIR_NEXT_X_LOURS  AREXIR_NEXT_YEAR  AREXIR_NEXT_YEAR  AREXIR_NEXT_YEAR  AREXIR_NEXT_YEAR  AREXIR_NEXT_YEAR  AREXIR_NEXT_YEAR  AREXIR_NEXT_YEAR  AREXIR_NO_COLUMN_INFO  AREXIR_NO_COLUMN_INFO  AREXIR_NO_COLUMN_INFO  AREXIR_NO_END_DATE  - No End Date No End Date No End Date No End Date No In a valid email address.  Null Sorting  ALEXER_NULL_SALWAYS_FIRST  Nulls Always First	Message Name	English Text
APEXIR_MEDIAN_X APEXIR_MIN_X APEXIR_MONTH  APEXIR_MONTHLY  APEXIR_MONTHLY  APEXIR_MONE DATA  APEXIR_MOVE DATA  APEXIR_MOVE ALL  APEXIR_MOVE_ALL  APEXIR_MOVE_ALL  APEXIR_MOVE_ALL  APEXIR_NOWLALL  APEXIR_NOWL	APEXIR_MAX_ROW_CNT	This query returns more then %0 rows, please filter your data to ensure complete results.
APEXIR_MIN_AGO APEXIR_MIN_X APEXIR_MONTH APEXIR_MONTH APEXIR_MONTHLY Monthly APEXIR_MONE_DATA APEXIR_MOVE_DATA APEXIR_MOVE_ALL APEXIR_MOVE_ALL APEXIR_MOVE_ALL APEXIR_MOVE_ALL APEXIR_MULTILIR_PAGE_REGION_STATIC_ID_REQUIRE APEXIR_NAME APEXIR_NAME APEXIR_NEW_AGGREGATION APEXIR_NEW_CATEGORY APEXIR_NEW_CATEGORY APEXIR_NEW_CATEGORY APEXIR_NEW_CATEGORY APEXIR_NEW_COMPUTATION APEXIR_NEXT_BOY APEXIR_NEXT_HOUR APEXIR_NEXT_HOUR APEXIR_NEXT_HOUR APEXIR_NEXT_HOUR APEXIR_NEXT_MONTH APEXIR_NEXT_MONTH APEXIR_NEXT_ADAYS APEXIR_NEXT_X_DAYS APEXIR_NEXT_X_DAYS APEXIR_NEXT_X_DAYS APEXIR_NEXT_X_LOURS APEXIR_NEXT_X_LOURS APEXIR_NEXT_X_YEARS APEXIR_NEXT_X_YEARS APEXIR_NEXT_YEAR APEXIR_NEXT_YEAR APEXIR_NO_AGGREGATION_DEFINED APEXIR_NO_AGGREGATION_DEFINED APEXIR_NO_COLUMN_INFO NO column information available. APEXIR_NO_COMPUTATION_DEFINED APEXIR_NO_COMPUTATION	APEXIR_MAX_X	Maximum %0
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contains multiple interactive reports.  APEXIR_NAME  APEXIR_NAME  APEXIR_NEW_AGGREGATION  APEXIR_NEW_CATEGORY  APEXIR_NEW_CATEGORY  APEXIR_NEW_CATEGORY  APEXIR_NEW_COMPUTATION  APEXIR_NEW_COMPUTATION  APEXIR_NEXT  APEXIR_NEXT  APEXIR_NEXT  APEXIR_NEXT HOUR  APEXIR_NEXT_HOUR  APEXIR_NEXT_MONTH  APEXIR_NEXT_WEEK  APEXIR_NEXT_WEEK  APEXIR_NEXT_WEEK  APEXIR_NEXT_X_DAYS  APEXIR_NEXT_X_DAYS  APEXIR_NEXT_X_BOAYS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_YEAR  APEXIR_NEXT_YEAR  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NONE  APEXIR_NONE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOL_VALID_EMAIL  APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First	APEXIR_MOVE_ALL	Move All
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APEXIR_NEXT_HOUR APEXIR_NEXT_MONTH APEXIR_NEXT_MONTH APEXIR_NEXT_WEEK APEXIR_NEXT_WEEK APEXIR_NEXT_X_DAYS APEXIR_NEXT_X_DAYS APEXIR_NEXT_X_HOURS APEXIR_NEXT_X_YEARS APEXIR_NEXT_X_YEARS APEXIR_NEXT_YEAR APEXIR_NO APEXIR_NO APEXIR_NO APEXIR_NO APEXIR_NO APEXIR_NO_COLUMN_INFO APEXIR_NO_COLUMN_INFO APEXIR_NO_COMPUTATION_DEFINED APEXIR_NO_END_DATE APEXIR_NO_END_DATE APEXIR_NONE APEXIR_NONE APEXIR_NOT_VALID_EMAIL APEXIR_NOT_VALID_EMAIL APEXIR_NULL_SORTING APEXIR_NULLS_ALWAYS_FIRST Nulls Always First	APEXIR_NEXT	>
APEXIR_NEXT_MONTH  APEXIR_NEXT_WEEK  APEXIR_NEXT_X_DAYS  APEXIR_NEXT_X_HOURS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_YEAR  APEXIR_NO_AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NOME  APEXIR_NONE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULLS_ALWAYS_FIRST  Next %0 Days  Next %0 Hours  Next %0 Years  Next Year  No waggregation defined.  No aggregation defined.  No column information available.  No computation defined.  - No End Date None -  Not a valid email address.  Null Sorting  APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First	APEXIR_NEXT_DAY	Next Day
APEXIR_NEXT_WEEK  APEXIR_NEXT_X_DAYS  APEXIR_NEXT_X_HOURS  APEXIR_NEXT_X_HOURS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_YEAR  APEXIR_NO  APEXIR_NO  APEXIR_NO  APEXIR_NO  APEXIR_NO  APEXIR_NO  COMPUTATION_DEFINED  APEXIR_NO  APEXIR_NO  END  APEXIR_NO  APEXIR_NO	APEXIR_NEXT_HOUR	Next Hour
APEXIR_NEXT_X_DAYS  APEXIR_NEXT_X_HOURS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_YEAR  APEXIR_NO No  APEXIR_NO_AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NO_END_DATE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Next %0 Pours  Next %0 Hours  No Years  No Years  No Avext Year  No aggregation defined.  No column information available.  No computation defined.  - No End Date None - APEXIR_NOT_VALID_EMAIL  Not a valid email address.  Null Sorting  Null Salways First	APEXIR_NEXT_MONTH	Next Month
APEXIR_NEXT_X_HOURS  APEXIR_NEXT_X_YEARS  APEXIR_NEXT_YEAR  APEXIR_NO  APEXIR_NO AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NOME  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Next %0 Years  Next %0 Years  Next %0 Years  Next %0 Years  No xod years  Not a valide defined.  No aggregation defined.  No column information available.  No computation defined.  - No End Date None -  Not a valid email address.  Null Sorting  Null Sorting  Nulls Always First	APEXIR_NEXT_WEEK	Next Week
APEXIR_NEXT_X_YEARS  APEXIR_NEXT_YEAR  APEXIR_NO  APEXIR_NO AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NOME  APEXIR_NOME  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Next %0 Years  No aggregation defined.  No column information available.  No computation defined.  - No End Date None - Not a valid email address.  Null Sorting  Null Sorting  Nulls Always First	APEXIR_NEXT_X_DAYS	Next %0 Days
APEXIR_NEXT_YEAR  APEXIR_NO No  APEXIR_NO_AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NOME  APEXIR_NONE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First	APEXIR_NEXT_X_HOURS	Next %0 Hours
APEXIR_NO_AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NO_END_DATE  APEXIR_NONE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  No aggregation defined.  No column information available.  No computation defined.  - No End Date None -  Not a valid email address.  Null Sorting  Nulls Always First	APEXIR_NEXT_X_YEARS	Next %0 Years
APEXIR_NO_AGGREGATION_DEFINED  APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NOME  APEXIR_NONE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  No aggregation defined.  No column information available.  No computation defined.  - No End Date None -  Not a valid email address.  Null Sorting  Nulls Always First	APEXIR_NEXT_YEAR	Next Year
APEXIR_NO_COLUMN_INFO  APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  APEXIR_NONE  APEXIR_NOT_VALID_EMAIL  APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  No computation available.  No computation defined.  - No End Date None -  None -  Not a valid email address.  Null Sorting  Nulls Always First	APEXIR_NO	No
APEXIR_NO_COMPUTATION_DEFINED  APEXIR_NO_END_DATE  - No End Date - APEXIR_NONE  - None - APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First	APEXIR_NO_AGGREGATION_DEFINED	No aggregation defined.
APEXIR_NO_END_DATE - No End Date - APEXIR_NONE - None - APEXIR_NOT_VALID_EMAIL Not a valid email address. APEXIR_NULL_SORTING Null Sorting APEXIR_NULLS_ALWAYS_FIRST Nulls_Always First	APEXIR_NO_COLUMN_INFO	No column information available.
APEXIR_NONE - None -  APEXIR_NOT_VALID_EMAIL Not a valid email address.  APEXIR_NULL_SORTING Null Sorting  APEXIR_NULLS_ALWAYS_FIRST Nulls_Always First	APEXIR_NO_COMPUTATION_DEFINED	No computation defined.
APEXIR_NOT_VALID_EMAIL  APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First  Not a valid email address.  Null Sorting  Nulls Always First	APEXIR_NO_END_DATE	- No End Date -
APEXIR_NULL_SORTING  APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First  Nulls Always First	APEXIR_NONE	- None -
APEXIR_NULLS_ALWAYS_FIRST  Nulls Always First	APEXIR_NOT_VALID_EMAIL	Not a valid email address.
	APEXIR_NULL_SORTING	Null Sorting
APEXIR_NULLS_ALWAYS_LAST Nulls Always Last	APEXIR_NULLS_ALWAYS_FIRST	Nulls Always First
	APEXIR_NULLS_ALWAYS_LAST	Nulls Always Last



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_NUMERIC_FLASHBACK_TIME	Flashback time must be numeric.
APEXIR_NUMERIC_SEQUENCE	Sequence must be numeric.
APEXIR_OPERATOR	Operator
APEXIR_ORANGE	orange
APEXIR_OTHER	Other
APEXIR_PDF_ORIENTATION_VERTICAL	Portrait
APEXIR_PDF_PAGE_SIZE_LEGAL	Legal
APEXIR_PDF_ORIENTATION	Page orientation
APEXIR_PDF_PAGE_SIZE	Page size
APEXIR_PDF_PAGE_SIZE_LETTER	Letter
APEXIR_PDF_ORIENTATION_HORIZONTAL	Landscape
APEXIR_PERCENT_OF_TOTAL_COUNT_X	Percent of Total Count %0 (%)
APEXIR_PERCENT_OF_TOTAL_SUM_X	Percent of Total Sum %0 (%)
APEXIR_PERCENT_TOTAL_COUNT	Percent of Total Count
APEXIR_PERCENT_TOTAL_SUM	Percent of Total Sum
APEXIR_PIE	Pie
APEXIR_PIVOT	Add Pivot Column
APEXIR_PIVOT_AGG_NOT_NULL	Aggregate must be specified.
APEXIR_PIVOT_AGG_NOT_ON_ROW_COL	You cannot aggregate on a column selected to as row column.
APEXIR_PIVOT_COLUMN_N	Pivot Column %0
APEXIR_PIVOT_COLUMN_NOT_NULL	Pivot column must be specified.
APEXIR_PIVOT_COLUMNS	Pivot Columns
APEXIR_PIVOT_MAX_ROW_CNT	The maximum row count for a Pivot query limits the number of rows in the base query, not the number of rows displayed. Your base query exceeds the maximum row count of %0. Please apply a filter to reduce the number of records in your base query.
APEXIR_PIVOT_ROW_COLUMN_INVALID	Select different row column. The HTML expression or link in the row column contains column defined as pivot or aggregate column.
APEXIR_PIVOT_SORT	Pivot Sort
APEXIR_PREVIOUS	<
APEXIR_PRIMARY	Primary
APEXIR_PRIMARY_REPORT	Primary Report
APEXIR_PRIVATE	Private
APEXIR_PUBLIC	Public
APEXIR_RED	red



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_REMOVE	Remove
APEXIR_REMOVE_AGGREGATE	Remove Aggregate
APEXIR_REMOVE_ALL	Remove All
APEXIR_REMOVE_CHART	Remove Chart
APEXIR_REMOVE_CONTROL_BREAK	Remove Control Break
APEXIR_REMOVE_FILTER	Remove Filter
APEXIR_REMOVE_FLASHBACK	Remove Flashback
APEXIR_REMOVE_GROUP_BY	Remove Group By
APEXIR_REMOVE_HIGHLIGHT	Remove Highlight
APEXIR_REMOVE_PIVOT	Remove Pivot
APEXIR_REMOVE_REPORT	Remove Report
APEXIR_RENAME_DEFAULT_REPORT	Rename Default Report
APEXIR_RENAME_REPORT	Rename Report
APEXIR_REPORT	Report
APEXIR_REPORT_ALIAS_DOES_NOT_EXIST	Saved Interactive report with alias %0 does not exist.
APEXIR_REPORT_DISPLAY_COLUMN_LIMIT_REACHED	The number of display columns in the report reached the limit. Please click Select Columns under Actions menu to minimize the report display column list.
APEXIR_REPORT_DOES_NOT_EXIST	Report does not exist.
APEXIR_REPORT_ID_DOES_NOT_EXIST	Saved Interactive Report ID %0 does not exist.
APEXIR_REPORT_SETTINGS	Report Settings
APEXIR_REPORT_VIEW	< Report View
APEXIR_REPORTS	Reports
APEXIR_RESET	Reset
APEXIR_RESET_CONFIRM	Restore report to the default settings.
APEXIR_ROW	Row
APEXIR_ROW_COL_DIFF_FROM_PIVOT_COL	Row column must be different from the pivot column.
APEXIR_ROW_COLUMN_N	Row Column %0
APEXIR_ROW_COLUMN_NOT_NULL	Row column must be specified.
APEXIR_ROW_COLUMNS	Row Columns
APEXIR_ROW_FILTER	Row Filter
APEXIR_ROW_OF	Row %0 of %1
APEXIR_ROW_ORDER	Row Order
APEXIR_ROW_TEXT_CONTAINS	Row text contains
APEXIR_ROWS	Rows



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text		
APEXIR_RPT_DISP_COL_EXCEED	The number of display columns in the report reached the limit. Please click Select Columns under Actions menu to minimize the report display column list.		
APEXIR_SAVE	Save		
APEXIR_SAVE_AS_DEFAULT	Save as Default		
APEXIR_SAVE_DEFAULT_CONFIRM	The current report settings are used as the default fo all users.		
APEXIR_SAVE_DEFAULT_REPORT	Save Default Report		
APEXIR_SAVE_REPORT	Save Report		
APEXIR_SAVE_REPORT_DEFAULT	Save Report *		
APEXIR_SAVED_REPORT	Saved Report		
APEXIR_SAVED_REPORT_MSG	Saved Report = "%0"		
APEXIR_SEARCH	Search		
APEXIR_SEARCH_BAR	Search Bar		
APEXIR_SEARCH_COLUMN	Search: %0		
APEXIR_SEARCH_REPORT	Search Report		
APEXIR_SELECT_CATEGORY	- Select Category -		
APEXIR_SELECT_COLUMN	- Select Column -		
APEXIR_SELECT_COLUMNS	Select Columns		
APEXIR_SELECT_COLUMNS_FOOTER	Computed columns are prefixed with **.		
APEXIR_SELECT_FUNCTION	- Select Function -		
APEXIR_SELECT_GROUP_BY_COLUMN	- Select Group By Column -		
APEXIR_SELECT_PIVOT_COLUMN	- Select Pivot Column -		
APEXIR_SELECT_ROW	Select Row		
APEXIR_SELECT_ROW_COLUM	- Select Row Column -		
APEXIR_SELECT_SORT_COLUMN	- Select Sort Column -		
APEXIR_SELECT_VALUE	Select Value		
APEXIR_SELECTED_COLUMNS	Selected Columns		
APEXIR_SEND	Send		
APEXIR_SEQUENCE	Sequence		
APEXIR_SORT	Sort		
APEXIR_SORT_ASCENDING	Sort Ascending		
APEXIR_SORT_COLUMN	Sort Column		
APEXIR_SORT_DESCENDING	Sort Descending		
APEXIR_SORT_ORDER	Sort Order		
APEXIR_SPACE_AS_IN_ONE_EMPTY_STRING	space		
APEXIR STATUS	Status		



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text	
APEXIR_SUBSCRIPTION	Subscription	
APEXIR_SUBSCRIPTION_ENDING	Ending	
APEXIR_SUBSCRIPTION_STARTING_FROM	Starting From	
APEXIR_SUM_X	Sum %0	
APEXIR_TABLE_SUMMARY	Region = %0, Report = %1, View = %2, Displayed Rows Start = %3, Displayed Rows End = %4, Total Rows = %5	
APEXIR_TEXT_COLOR	Text Color	
APEXIR_TIME_DAYS	days	
APEXIR_TIME_HOURS	hours	
APEXIR_TIME_MINS	minutes	
APEXIR_TIME_MONTHS	months	
APEXIR_TIME_WEEKS	weeks	
APEXIR_TIME_YEARS	years	
APEXIR_TOGGLE	Toggle	
APEXIR_TOP	Тор	
APEXIR_UNAUTHORIZED	Unauthorized	
APEXIR_UNGROUPED_COLUMN	Ungrouped Column	
APEXIR_UNIQUE_COLUMN_HEADING	Column Heading must be unique.	
APEXIR_UNIQUE_HIGHLIGHT_NAME	Highlight Name must be unique.	
APEXIR_UNSUPPORTED_DATA_TYPE	unsupported data type	
APEXIR_UP	Up	
APEXIR_VALID_COLOR	Please enter a valid color.	
APEXIR_VALID_FORMAT_MASK	Please enter a valid format mask.	
APEXIR_VALUE	Value	
APEXIR_VALUE_AXIS_TITLE	Axis Title for Value	
APEXIR_VALUE_REQUIRED	Value Required	
APEXIR_VCOLUMN	Vertical Column	
APEXIR_VIEW_CHART	View Chart	
APEXIR_VIEW_DETAIL	View Detail	
APEXIR_VIEW_GROUP_BY	View Group By	
APEXIR_VIEW_ICONS	View Icons	
APEXIR_VIEW_PIVOT	View Pivot	
APEXIR_VIEW_REPORT	View Report	
APEXIR_WEEK	Week	
APEXIR_WEEKLY	Weekly	
APEXIR WORKING REPORT	Working Report	



Table 21-3 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_X_DAYS	%0 days
APEXIR_X_HOURS	%0 hours
APEXIR_X_MINS	%0 minutes
APEXIR_X_MONTHS	%0 months
APEXIR_X_WEEKS	%0 weeks
APEXIR_X_YEARS	%0 years
APEXIR_YEAR	Year
APEXIR_YELLOW	yellow
APEXIR_YES	Yes
IR_AS_DEFAULT_REPORT_SETTING	As Default Report Settings
IR_AS_NAMED_REPORT	As Named Report
IR_STAR	Only displayed for developers
LAYOUT.T_CONDITION_EXPR2	Expression 2
OUT_OF_RANGE	Invalid set of rows requested, the source data of the report has been modified.
REPORT	Report
REPORTING_PERIOD	Reporting Period
RESET	Reset Pagination
SAVED_REPORTS.PRIMARY.DEFAULT	Primary Default
WWV_RENDER_REPORT3.X_Y_OF_Z_2	%0 - %1 of %2

## 21.6.3.6 Progressive Web App (PWA) Messages Requiring Translation

Lists Progressive Web Application (PWA) messages that require translation.

**Table 21-4** Progressive Web Application (PWA) Requiring Translation

Message Name	English Text
APEX.PWA.DIALOG.TITLE	
	Add to Home Screen



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### Message Name **English Text** APEX.PWA.INSTRUCTIONS <div class="a-pwaDialog-introWrapper"> Your device or browser does not appear to support the installation of Progressive Web Apps right now. If this application is already installed on your device, open it from your home screen. </div> APEX.PWA.INSTRUCTIONS.ANDROID.FIREFOX <div class="a-pwaDialog-introWrapper"> This website has app functionality. Add it to your home screen to use it in fullscreen. </div> <div class="a-pwaDialog-steps"> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-androidfirefox-1.svg" /> stepText">1. Tap the <strong>Menu</ strong> icon in the bottom navigation </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-androidfirefox-2.svg" /> stepText">2. Tap <strong>Install strong> </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-check.svg" /> stepText">3. Tap <strong>Add</strong> to confirm </div> </div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### **English Text**

APEX.PWA.INSTRUCTIONS.ANDROID.WEBVIEW

```
<div class="a-pwaDialog-introWrapper">
   This
website has app functionality that is
best experienced in Chrome or Edge.
</div>
<div class="a-pwaDialog-steps">
   <div class="a-pwaDialog-step">
       <img class="a-pwaDialog-</pre>
stepImage" src="#IMAGE PREFIX#pwa/apex-
pwa-instructions-android-
webview-1.svg" />
       stepText">1. Tap the <strong>Menu/
strong> icon next to the address bar
   </div>
   <div class="a-pwaDialog-step">
       <img class="a-pwaDialog-</pre>
stepImage" src="#IMAGE PREFIX#pwa/apex-
pwa-instructions-check.svg" />
       stepText">2. Tap <strong>Install/
strong>
   </div>
</div>
```



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### **English Text**

APEX.PWA.INSTRUCTIONS.IOS.GSA

<div class="a-pwaDialog-introWrapper"> This website has app functionality that is best experienced in Safari. </div> <div class="a-pwaDialog-steps"> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-gsa-1.svg" /> stepText">1. Tap the <strong>Share/ strong> icon in the bottom navigation </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-gsa-2.svg" /> stepText">2. Tap <strong>Open in Safari/ strong> </div> </div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### **English Text**

APEX.PWA.INSTRUCTIONS.IOS.SAFARI.IPAD

```
<div class="a-pwaDialog-introWrapper">
   This
website has app functionality. Add it to
your home screen for the best
experience.
</div>
<div class="a-pwaDialog-steps">
   <div class="a-pwaDialog-step">
       <img class="a-pwaDialog-</pre>
stepImage" src="#IMAGE PREFIX#pwa/apex-
pwa-instructions-ios-safari-1.svg" />
       stepText">1. Tap the <strong>Share/
strong> icon next to the address bar
   </div>
   <div class="a-pwaDialog-step">
       <img class="a-pwaDialog-</pre>
stepImage" src="#IMAGE PREFIX#pwa/apex-
pwa-instructions-ios-safari-2.svg" />
       stepText">2. Tap <strong>Add to Home
Screen</strong>
   </div>
   <div class="a-pwaDialog-step">
       <imq class="a-pwaDialog-</pre>
stepImage" src="#IMAGE PREFIX#pwa/apex-
pwa-instructions-check.svg" />
       stepText">3. Tap <strong
style="color:#007AE1;">Add</strong> to
confirm
   </div>
</div>
```



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

**English Text** 

#### Message Name

APEX.PWA.INSTRUCTIONS.IOS.SAFARI.IPHONE

<div class="a-pwaDialog-introWrapper"> This website has app functionality. Add it to your home screen for the best experience. </div> <div class="a-pwaDialog-steps"> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-safari-1.svg" /> stepText">1. Tap the <strong>Share/ strong> icon in the bottom navigation </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-safari-2.svg" /> stepText">2. Scroll down and tap <strong>Add to Home Screen</strong> </div> <div class="a-pwaDialog-step"> <imq class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-check.svg" /> stepText">3. Tap <strong</pre> style="color:#007AE1;">Add</strong> to confirm </div> </div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

**English Text** 

#### Message Name

APEX.PWA.INSTRUCTIONS.IOS.SAFARI.IPHONE.15

<div class="a-pwaDialog-introWrapper"> This website has app functionality. Add it to your home screen for the best experience. </div> <div class="a-pwaDialog-steps"> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-safari-15.svg" /> stepText">1. Tap the <strong>More/ strong> icon next to the address bar </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-safari-2.svg" /> stepText">2. Tap <strong>Add to Home Screen</strong> </div> <div class="a-pwaDialog-step"> <imq class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-check.svg" /> stepText">3. Tap <strong style="color:#007AE1;">Add</strong> to confirm </div> </div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### **English Text**

APEX.PWA.INSTRUCTIONS.IOS.WEBVIEW.IPAD

<div class="a-pwaDialog-introWrapper"> This website has app functionality. Add it to your home screen for the best experience. </div> <div class="a-pwaDialog-steps"> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-webview-1.svg" /> stepText">Tap the <strong>Share</strong> icon next to the address bar </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-webview-2.svg" /> stepText">Tap <strong>Open in Safari/ strong> </div> </div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### Message Name **English Text** APEX.PWA.INSTRUCTIONS.IOS.WEBVIEW.IPHONE <div class="a-pwaDialog-introWrapper"> This website has app functionality. Add it to your home screen for the best experience. </div> <div class="a-pwaDialog-steps"> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-webview-1.svg" /> stepText">Tap the <strong>Share</strong> icon in the bottom navigation </div> <div class="a-pwaDialog-step"> <img class="a-pwaDialog-</pre> stepImage" src="#IMAGE PREFIX#pwa/apexpwa-instructions-ios-webview-2.svg" /> stepText">Tap <strong>Open in Safari strong> </div> </div> APEX.PWA.INSTRUCTIONS.LINUX.FIREFOX <div class="a-pwaDialog-introWrapper"> This website has app functionality that is best experienced in Chrome. Firefox does not currently support web apps installation. </div> APEX.PWA.INSTRUCTIONS.MAC OS.FIREFOX <div class="a-pwaDialog-introWrapper"> This website has app functionality that is best experienced in Chrome or Edge. Firefox does not currently support web apps

installation on macOS.

</div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### Message Name **English Text** APEX.PWA.INSTRUCTIONS.MAC OS.SAFARI <div class="a-pwaDialog-introWrapper"> This website has app functionality that is best experienced in Chrome or Edge. Safari does not currently support web apps installation on macOS. </div> APEX.PWA.INSTRUCTIONS.WINDOWS.FIREFOX <div class="a-pwaDialog-introWrapper"> This website has app functionality that is best experienced in Chrome or Edge. Firefox does not currently support web apps installation on Windows. </div>



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

#### **English Text**

APEX.PWA.OFFLINE.BODY

<main> <svg xmlns="http://www.w3.org/2000/</pre> svg" viewBox="0 0 400 280" role="presentation"> <g fill="none"> <path d="M316.846 213.183c39.532</pre> 0 63.154-30.455 63.154-62.764 0-30.943-22.158-56.615-51.441-62.179v-1.1 7c0-48.123-38.947-87.07-87.07-87.07-39.04 4 0-72.036 25.672-83.066 61.007-8.492-3.612-17.863-5.564-27.722-5. 564-34.261 0-62.764 24.11-69.694 56.322a51.007 51.007 0 0 0-9.468-.879C23.036 110.79 0 133.825 0 162.327c0 28.405 23.036 51.441 51.441 51.4411265.405-.585z" fill="currentColor" opacity=".2"/> <circle fill="#D63B25" cx="336"</pre> cy="216" r="64"/><path d="M367.357</pre> 198.439c-.395-.395-.947-.632-1.657-.632-. 71 0-1.184.237-1.657.632L351.97 210.511-10.494-10.493 12.072-12.072c.395-.395.71-.947.71-1.657A 2.29 2.29 0 0 0 351.97 184c-.631 0-1.183.237-1.657.6311-12.071 12.072-7.496-7.496c-.394-.394-.947-.71-1. 657-.71a2.29 2.29 0 0 0-2.288 2.288c0 .632.237 1.184.71 1.65712.604 2.604-13.176 13.176a13.781 13.781 0 0 0-4.024 9.705c0 3.787 1.499 7.18 4.024 9.70512.13 2.13-14.36 14.36c-.394.394-.71.947-.71 1.657a2.29 2.29 0 0 0 2.288 2.288c.631 0 1.184-.237 1.657-.71114.36-14.36 1.736 1.736a13.781 13.781 0 0 0 9.704 4.024c3.787 0 7.18-1.5 9.705-4.024113.176-13.177 2.92 2.92c.394.394.946.71 1.656.71a2.29 2.29 0 0 0 2.289-2.288c0-.632-.237-1.184-.71-1.6571-7.575 - 7.49612.072-12.071c.394-.395.71-.947.71-1.657. 079-.632-.237-1.184-.631-1.578zm-27.142 33.059a9.398 9.398 0 0 1-6.47 2.603c-2.525 0-4.813-.946-6.47-2.6031-7.1-7.101a9.124 9.124 0 0 1-2.683-6.47 9.124 9.124 0 0 1 2.682-6.47113.177-13.176 3.156



Table 21-4 (Cont.) Progressive Web Application (PWA) Requiring Translation

Message Name	English Text	
	3.156c.079.079.079.158.158.1581.157.157 13.413 13.413c.08.08.08.08.158.158.1581.158.158 2.761 2.762-13.097 13.255z" fill="#FFF"/>	
	<script></td></tr><tr><td></td><td><pre>document.querySelector("button").addEvent Listener("click", () => {</td></tr><tr><td>APEX.PWA.OFFLINE.TITLE</td><td>Can't connect</td></tr></tbody></table></script>	

# 21.6.3.7 Search and Smart Filters Messages Requiring Translation

Lists faceted search and smart filter messages that require translation.

Table 21-5 Faceted Search and Smart Filter Messages Requiring Translation

Message Name	English Text
APEX.FS.APPLIED_FACET	Applied Filter %0
APEX.FS.BATCH_APPLY	Apply
APEX.FS.CHART_BAR	Bar Chart
APEX.FS.CHART_PIE	Pie Chart
APEX.FS.CHART_OTHERS	All Others
APEX.FS.CHART_TITLE	Chart
APEX.FS.CHART_VALUE_LABEL	Count
APEX.FS.CLEAR	Clear
APEX.FS.CLEAR_ALL	Clear All
APEX.FS.CLEAR_VALUE	Clear %0
APEX.FS.CONFIG_TITLE	Choose filters to show



Table 21-5 (Cont.) Faceted Search and Smart Filter Messages Requiring Translation

Message Name	English Text
APEX.FS.COUNT_RESULTS	%0 results
APEX.FS.COUNT_SELECTED	%0 selected
APEX.FS.CUR_FILTERS_LM	Current filters
APEX.FS.FACETS_LIST	Filters list
APEX.FS.FILTER	Filter %0
APEX.FS.GO	Go
APEX.FS.INPUT_CURRENT_LABEL	equals %0
APEX.FS.OPEN_CONFIG	More Filters
APEX.FS.RANGE_BEGIN	Range Begin
APEX.FS.RANGE_END	Range End
APEX.FS.RANGE_CURRENT_LABEL	%0 to %1
APEX.FS.RANGE_CURRENT_LABEL_OPEN_LO	Below %0
APEX.FS.RANGE_CURRENT_LABEL_OPEN_HI	Above %0
APEX.FS.RANGE_TEXT	to
APEX.FS.REMOVE_CHART	Remove Chart
APEX.FS.RESET	Reset
APEX.FS.SEARCH_LABEL	Search
APEX.FS.SHOW_CHART	Show Chart
APEX.FS.SHOW_LESS	Show Less
APEX.FS.SHOW_MORE	Show More
APEX.FS.SEARCH_PLACEHOLDER	Search
APEX.FS.SELECT_PLACEHOLDER	- Select -
APEX.FS.STAR_RATING_LABEL	%0 stars and up
APEX.FS.SUGGESTIONS	Filter suggestions
APEX.FS.TOTAL_ROW_COUNT_LABEL	Total Row Count

# 21.7 Translating Data That Supports List of Values

You create a dynamic translation to translate dynamic pieces of data. For example, you might use a dynamic translation on a list of values based on a database query.

Dynamic translations differ from messages in that you query a specific string rather than a message name. You define dynamic translations on the Dynamic Translations page. You then use the APEX\_LANG.LANG API to return the dynamic translation string identified by the p primary text string parameter.



#### Defining a Dynamic Translation

You define dynamic translations on the Dynamic Translations page. A dynamic translation consists of a translate-from language string, a language code, and a translate-to string.

See Also:

APEX\_LANG in Oracle APEX API Reference

## 21.7.1 Defining a Dynamic Translation

You define dynamic translations on the Dynamic Translations page. A dynamic translation consists of a translate-from language string, a language code, and a translate-to string.

To define a dynamic translation:

- Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. Under Globalization, click **Application Translations**.

The Translate page appears.

- 2. Under Translation Utilities, select Dynamic Translations.
- 3. On the Dynamic Translations page, click **Create** and specify the following:
  - a. Language Select a target language.
  - **b.** Translate From Text Enter the source text to be translated.
  - c. Translate To Text Enter the translated text.
- Click Create.

# 21.8 Understanding Supported Globalization Codes

If you are building a multilingual application, it is important to understand how globalization codes affect the way in which your application runs. These codes are set automatically based on the application-level Globalization attributes you select.

Oracle APEX Globalization Codes

NLS\_LANGUAGE and NLS\_TERRITORY determine the default presentation of numbers, dates, and currencies.

See Also:

Specifying the Primary Language for an Application



## 21.8.1 Oracle APEX Globalization Codes

 ${\tt NLS\_LANGUAGE}$  and  ${\tt NLS\_TERRITORY}$  determine the default presentation of numbers, dates, and currencies.

Table 21-6 describes the globalization codes in Oracle APEX.

Table 21-6 Oracle APEX Globalization Codes

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
Afrikaans	af	ENGLISH	SOUTH AFRICA
Arabic	ar	ARABIC	UNITED ARAB EMIRATES
Arabic (Algeria)	ar-dz	ARABIC	ALGERIA
Arabic (Bahrain)	ar-bh	ARABIC	BAHRAIN
Arabic (Egypt)	ar-eg	EGYPTIAN	EGYPT
Arabic (Iraq)	ar-iq	ARABIC	IRAQ
Arabic (Jordan)	ar-jo	ARABIC	JORDAN
Arabic (Kuwait)	ar-kw	ARABIC	KUWAIT
Arabic (Lebanon	ar-lb	ARABIC	LEBANNON
Arabic (Libya)	ar-ly	ARABIC	LIBYA
Arabic (Morocco)	ar-ma	ARABIC	MOROCCO
Arabic (Oman)	ar-om	ARABIC	OMAN
Arabic (Qatar)	ar-qa	ARABIC	QATAR
Arabic (Saudi Arabia)	ar-sa	ARABIC	SAUDI ARABIA
Arabic (Syria)	ar-sy	ARABIC	SYRIA
Arabic (Tunisia)	ar-tn	ARABIC	TUNISIA
Arabic (U.A.E.)	ar-ae	ARABIC	UNITED ARAB EMIRATES
Arabic (YEMEN)	ar-ye	ARABIC	YEMEN
Assamese	as	ASSAMESE	INDIA
Basque	eu	FRENCH	FRANCE
Belarusian	be	RUSSIAN	RUSSIA
Bengali	bn	BANGLA	BANGLADESH
Bulgarian	bg	BULGARIAN	BULGARIA
Catalan	ca	CATALAN	CATALONIA
Chinese	zh	SIMPLIFIED CHINESE	CHINA
Chinese (China)	zh-cn	SIMPLIFIED CHINESE	CHINA
Chinese (Hong Kong SAR)	zh-hk	TRADITIONAL CHINESE	HONG KONG
Chinese (Macau SAR)	zh-mo	TRADITIONAL CHINESE	HONG KONG
Chinese (Singapore)	zh-sg	SIMPLIFIED CHINESE	SINGAPORE
Chinese (Taiwan)	zh-tw	TRADITIONAL CHINESE	TAIWAN



Table 21-6 (Cont.) Oracle APEX Globalization Codes

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
Croatian	hr	CROATIAN	CROATIA
Czech	CS	CZECH	CZECH REPUBLIC
Danish	da	DANISH	DENMARK
Dutch (Belgium)	nl-be	DUTCH	BELGIUM
Dutch (Netherlands)	nl	DUTCH	THE NETHERLANDS
English	en	AMERICAN	AMERICA
English (Australia)	en-au	ENGLISH	AUSTRALIA
English (Belize)	en-bz	ENGLISH	UNITED KINGDOM
English (Canada)	en-ca	ENGLISH	CANADA
English (Ireland)	en-ie	ENGLISH	IRELAND
English (Jamaica)	en-jm	ENGLISH	UNITED KINGDOM
English (New Zealand)	en-nz	ENGLISH	NEW ZEALAND
English (Philippines)	en-ph	ENGLISH	PHILIPPINES
English (South Africa)	en-za	ENGLISH	SOUTH AFRICA
English (Trinidad)	en-tt	ENGLISH	UNITED KINGDOM
English (United Kingdom)	en-gb	ENGLISH	UNITED KINGDOM
English (United States)	en-us	AMERICAN	AMERICA
English (Zimbabwe)	en-zw	ENGLISH	UNITED KINGDOM
Estonian	et	ESTONIAN	ESTONIA
Faeroese	fo	ENGLISH	UNITED KINGDOM
Farsi	fa	ENGLISH	UNITED KINGDOM
Finnish	fi	FINNISH	FINLAND
French (Belgium)	fr-be	FRENCH	BELGIUM
French (Canada)	fr-ca	CANADIAN FRENCH	CANADA
French (France)	fr	FRENCH	FRANCE
French (Luxembourg)	fr-lu	FRENCH	LUXEMBOURG
French (Monaco)	fr-mc	FRENCH	FRANCE
French (Switzerland)	fr-ch	FRANCH	SWITZERLAND
FYRO Macedonian	mk	MACEDONIAN	FYR MACEDONIA
Gaelic	gd	ENGLISH	UNITED KINGDOM
Galician	gl	SPANISH	SPAIN
German (Austria)	de-at	GERMAN	AUSTRIA
German (Germany)	de	GERMAN	GERMANY
German (Liechtenstein)	de-li	GERMAN	GERMANY
German (Luxemgourg)	de-lu	GERMAN	LUXEMBOURG



Table 21-6 (Cont.) Oracle APEX Globalization Codes

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
German (Switzerland)	de-ch	GERMAN	SWITZERLAND
Greek	el	GREEK	GREECE
Gujarati	gu	GUJARATI	INDIA
Hebrew	he	HEBREW	ISRAEL
Hindi	hi	HINDI	INDIA
Hungarian	hu	HUNGARIAN	HUNGARY
Icelandic	is	ICELANDIC	ICELAND
Indonesian	id	INDONESIAN	INDONESIA
Italian (Italy)	it	ITALIAN	ITALY
Italian (Switzerland)	it-ch	ITALIAN	SWITZERLAND
Japanese	ja	JAPANESE	JAPAN
Kannada	kn	KANNADA	INDIA
Kazakh	kk	CYRILLIC KAZAKH	KAZAKHSTAN
Konkani	kok	KOREAN	KOREA
Korean	ko	KOREAN	KOREA
Kyrgyz	kz	RUSSIAN	RUSSIA
Latvian	lv	LATVIAN	LATVIA
Lithuanian	lt	LITHUANIAN	LITHUANIANA
Malay (Malaysia)	ms	MALAY	MALAYSIA
Malayalam	ml	MALAYALAM	INDIA
Maltese	mt	ENGLISH	UNITED KINGDOM
Marathi	mr	ENGLISH	INDIA
Nepali (India)	ne	ENGLISH	UNITED KINGDOM
Norwegian (Bokmal)	nb-no	NORWEGIAN	NORWAY
Norwegian (Bokmal)	no	NORWEGIAN	NORWAY
Norwegian (Nynorsk)	nn-no	NORWEGIAN	NORWAY
Oriya	or	ORIYA	INDIA
Polish	pl	POLISH	POLAND
Portuguese (Brazil)	pt-br	BRAZILIAN PORTUGUESE	BRAZIL
Portuguese (Portugal)	pt	PORTUGUESE	PORTUGAL
Punjabi	pa	PUNJABI	INDIA
Romanian	ro	ROMANIAN	ROMANIA
Russian	ru	RUSSIAN	RUSSIA
Russian (Moldova)	ru-md	RUSSIAN	RUSSIA
Serbia	sr	CYRILLIC SERBIAN	SERBIA AND MONTENEGRO



Table 21-6 (Cont.) Oracle APEX Globalization Codes

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
Slovak	sk	SLOVAK	SLOVAKIA
Slovenian	sl	SLOVENIAN	SLOVENIA
Spanish (Argentina)	es-ar	LATIN AMERICAN SPANISH	ARGENTINA
Spanish (Bolivia)	es-bo	LATIN AMERICAN SPANISH	ARGENTINA
Spanish (Chile)	es-cl	LATIN AMERICAN SPANISH	CHILE
Spanish (Colombia)	ec-co	LATIN AMERICAN SPANISH	COLOMBIA
Spanish (Costa Rica)	es-cr	LATIN AMERICAN SPANISH	COSTA RICA
Spanish (Dominican Republic)	es-do	LATIN AMERICAN SPANISH	PUERTO RICO
Spanish (Ecuador)	es-ec	LATIN AMERICAN SPANISH	ECUDOR
Spanish (El Salvador)	es-sv	LATIN AMERICAN SPANISH	EL SALVADOR
Spanish (Guatemala)	es-gt	LATIN AMERICAN SPANISH	GUATEMALA
Spanish (Honduras)	es-hn	LATIN AMERICAN SPANISH	GUATEMALA
Spanish (Mexico)	es-mx	MEXICAN SPANISH	MEXICO
Spanish (Nicaragua)	es-ni	LATIN AMERICAN SPANISH	Nicaragua
Spanish (Panama)	es-pa	LATIN AMERICAN SPANISH	Panama
Spanish (Paraguay)	es-py	LATIN AMERICAN SPANISH	ARGENTINA
Spanish (Peru)	es-pe	LATIN AMERICAN SPANISH	PERU
Spanish (Puerto Rico)	es-pr	LATIN AMERICAN SPANISH	PUERTO RICO
Spanish (Traditional Sort)	es	LATIN AMERICAN SPANISH	SPAIN
Spanish (United States)	es-us	LATIN AMERICAN SPANISH	AMERICAN
Spanish (Uruguay)	es-uy	LATIN AMERICAN SPANISH	ARGENTINA
Spanish (Venezuela)	es-ve	LATIN AMERICAN SPANISH	VENEZUELA
Swedish	sv	SWEDISH	SWEDEN
Swedish	sv-fi	SWEDISH	FINLAND
Tamil	ta	TAMIL	INDIA
Telugu	te	TELUGU	INDIA
Thai	th	THAI	THAILAND
Turkish	tr	TURKISH	TURKEY
Ukrainian	uk	UKRAINIAN	UKRAINE
Urdu	ur	ENGLISH	UNITED KINGDOM
Uzbek	uz	LATIN UZBEK	UZBEKISTAN
Vietnamese	vi	VIETNAMESE	VIETNAM



# Managing Application Performance

Learn about how to improve application performance.

This section describes how to improve application performance.

- About Best Practices to Improve Performance
   Improve performance by using bind variables and including a #TIMING# substitution string
   in the region footer.
- Identifying Performance Issues
   Consider the following key strategies to help identify and resolve performance issues with your Oracle APEX application.
- Utilizing Logs and Reports
   Review application logs and reports to help identify problematic pages.
- About Utilizing Database Reporting
   Improve application performance by utilizing database reporting.
- About Database Parameters that Impact Performance
   Evaluate whether or not database parameters are impacting performance.
- About Limiting Resources
   Use Resource Manager to limit the types of system resources available to each user request.
- About Uploading Static Files to Your Web Server
   To improve performance, you should place static files on the Web server.
- Creating Custom Activity Reports Using APEX\_ACTIVITY\_LOG
   Learn how to use the APEX\_ACTIVITY\_LOG view to query activity for the current
   workspace.

#### **Related Topics**

Debugging an Application
 Learn about best practices for debugging an Oracle APEX application.

# 22.1 About Best Practices to Improve Performance

Improve performance by using bind variables and including a #TIMING# substitution string in the region footer.

For applications having a large number of concurrent users, maintaining optimal performance is critical. Best practices to consider include:

- Use bind variables within your application whenever possible. You can reference session state values using bind variable syntax in SQL queries and application logic such as PL/SQL executed from processes and validations. Accessing session state using bind variables is the most efficient way to reference session state.
- Include a #TIMING# substitution string in the region footer so that you can view the timing
  of each region.

#### See Also:

- Referencing Session State Using Bind Variable Syntax
- Using Substitution Strings

# 22.2 Identifying Performance Issues

Consider the following key strategies to help identify and resolve performance issues with your Oracle APEX application.

- About Troubleshooting Slow-Running Applications
   Learn about troubleshooting slow-running applications.
- Diagnosing Performance Issues
   Learn how to diagnose performance issues.
- About Debugging Problematic SQL Queries
   Learn about debugging problematic SQL queries.
- About Addressing Slow Queries
   Learn about addressing slow queries.

## 22.2.1 About Troubleshooting Slow-Running Applications

Learn about troubleshooting slow-running applications.

The first step in troubleshooting a slow-running application is to determine the location of the bottleneck. You can evaluate application performance by reviewing the time it takes for the database to return a specific page request or submission. If this time is shorter than the time it takes to render the page on the user's browser, then other components are likely causing the perception that the application is slow. As a best practice, always check all of the components involved including client machines, the network, the middle-tier, the database, and disk and storage devices. Regarding the database, check the System Global Area (SGA), CPU utilization, locks, and database parameters. It is also important to determine if anything else is running within the database such as legacy applications, data warehouse, batch programs, and database jobs.

The majority of the time, performance issues with APEX applications are due to developer-authored SQL and PL/SQL. You should utilize standard database performance tuning techniques to address these issues. Performance issues are rarely related to a bug with APEX or the Oracle database.



Oracle Database Performance Tuning Guide



## 22.2.2 Diagnosing Performance Issues

Learn how to diagnose performance issues.

To diagnose performance issues, follow these steps:

- Identify the time window.
- 2. Isolate the largest consumers of database time.
- 3. Identify the APEX workspace and application.
- 4. Correlate the offending SQL with a specific location within the application.

Once you have identified the slow running pages, you should run the application in debug mode to identify the specific components consuming the most time.

## 22.2.3 About Debugging Problematic SQL Queries

Learn about debugging problematic SQL queries.

If your query does not seem to be running correctly, try running it in SQL\*Plus, SQL Developer, or in SQL Commands. Any of these approaches will test your query outside the context of your application, making it easier to define the problem.

## 22.2.4 About Addressing Slow Queries

Learn about addressing slow queries.

For optimized queries that still take more than a second to process, consider implementing a progress bar and preventing multiple page submissions. Users expect instant results and often resubmit a page if it does not return immediately. Unless managed properly, each page submission instigates a new session in the database and continues until completion. Multiple page submissions often degrade performance and may lead to database locks. This is especially true with interactive reports. As an alternative approach, try using APEX collections to hold query results. By using collections, expensive and time consuming queries are only executed once for each user rather than each time they perform pagination or create a filter.



#### Tip:

You control whether end users may submit the same page more than once by configuring the page attribute, **Advanced**, **Enable duplicate page submissions**.

#### See Also:

- Editing Page Attributes
- About Using Collections



# 22.3 Utilizing Logs and Reports

Review application logs and reports to help identify problematic pages.

The Oracle APEX engine records activity logs to capture usage and performance data. This information displays in various reports. If a particular page is accessed extensively or a page renders slowly then these reports can help you identify problematic pages.

You can then further analyze the problematic pages. For example, you can run a report query in SQL Developer to review the Explain Plan.



#### Tip:

Another method of determining expensive elements within a page or process is to review the APEX Debug mode.

- Accessing the Monitor Activity Page in Workspace Administration
   Use the Monitor Activity page in Workspace Administration to view developer
   activity and application change information.
- About Managing Log Files
   An Instance administrator can delete log files and manage the interval at which log file information is retained.
- Viewing the Dashboard Report
   The Dashboard report displays metrics about applications in your workspace.
- Instance Activity Reports
   Instance administrators are superusers that manage an entire hosted instance using the APEX Administration Services application.



- APEX\_DEBUG in Oracle APEX API Reference
- Utilizing Debug Mode

# 22.3.1 Accessing the Monitor Activity Page in Workspace Administration

Use the Monitor Activity page in Workspace Administration to view developer activity and application change information.

To access the Monitor Activity page in Workspace Administration:

- 1. Navigate to the Workspace Administration page:
  - a. Sign in to APEX.



The Workspace Administration home page appears.

#### 2. Click Monitor Activity.

The Monitor Activity page appears and is divided into the following sections:

- Page Views Contains reports of page views including By View, By User, By User and Hour, By Application, By Application and Page, By Day, and By Hour.
- Developer Activity Offers reports of developer activity organized such as By Developer, By Developer Bar Chart, By Developer by Hour, By Day, By Application, Application Changes (detailed), By Day, Monthly View, and Component Utilitzation Chart.
- **Sessions** Lists active sessions with the current workspace such as Active Sessions and Bar Chart of Active Session by Hour.
- Page View Analysis Contains reports analyzing page views, such as Most Viewed Pages over All Applications, Monthly Calendar of Page Views by Day, Line Chart of Usage by Day, and By Weighted Page Performance.
- **Environment** Contains reports of environments including By User Agent, By Browser, By External Click, and By Operating System.
- Login Attempts Offers reports listing login attempts such as Login Attempts, Login Attempts by Authentication Result, and Developer Login Summary.
- Application Errors Links to the Application Errors report.
- Workspace Schema Reports and Other Reports Includes the following reports: Schema Tablespace Utilization, Database Privileges by Schema, Workspace Schemas, Report Tablespace Utilization, Web Service Activity Log, and Archive of Purged Task Files.
- Archived Activity Report Includes the following reports: By Application by Month, By Application by Day, Application Hash by Day, By Application, and Chart of Workspace Activity by Day.
- 3. Select a report to review.

## 22.3.2 About Managing Log Files

An Instance administrator can delete log files and manage the interval at which log file information is retained.

If you wish to keep the activity log files indefinitely, you must create a batch job to copy records from the activity log table to another table.



Configuring and Deleting Logs and Log Entries in *Oracle APEX Administration Guide* 



## 22.3.3 Viewing the Dashboard Report

The Dashboard report displays metrics about applications in your workspace.

To view the Dashboard:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Click Dashboard.

The Dashboard appears and features the following regions:

- Applications Count of applications in the current workspace.
- Pages Count of pages in the current workspace.
- Page Events
- Page Count by Application
- Most Active Pages
- Native Region Component Utilization

## 22.3.4 Instance Activity Reports

Instance administrators are superusers that manage an entire hosted instance using the APEX Administration Services application.



- Monitoring Activity Across a Development Instance in Oracle APEX Administration Guide
- About Oracle APEX Administrator Roles

# 22.4 About Utilizing Database Reporting

Improve application performance by utilizing database reporting.

Oracle APEX establishes a physical connection from the database pool as APEX\_PUBLIC\_USER, which calls the APEX engine. The APEX engine utilizes SQL.DBMS\_SYS\_SQL to parse SQL as another user, the parsing schema. Database V\$SESSION records contain useful information for each SQL executed including APEX specific information for the client information, client identifier, and module. You can use this information to identify the associated SQL when you generate Oracle Trace files and use TKPROF to analyze them. You can also add &p\_trace=YES to the end of the APEX URL or use ALTER SESSION.

Automatic Workload Repository (AWR) reports collect performance statistics every hour, by default. Active Session History (ASH) reports are a system-wide record of database activity. You can use these reports to identify resource intensive SQL statements. For PL/SQL packages, procedures and functions that in turn call other



PL/SQL programs, you can use PL/SQL hierarchical profiler in Oracle Database 11g. These subprograms account for execution times separately.

APEX also includes views which catalog everything related to APEX. You can use these views to access information from APEX using tools such as SQL Developer, SQL\*Plus and SQL Commands (Oracle APEX SQL Workshop). If you are granted the APEX\_ADMINISTRATOR\_READ\_ROLE or APEX\_ADMINISTRATOR\_ROLE then you can query across the entire instance, rather than just the workspace your schema user is associated with. You should grant APEX\_ADMINISTRATOR\_READ\_ROLE to monitoring users, while APEX\_ADMINISTRATOR\_ROLE should be used for instance administrators, who manage instance parameters, workspaces, and so on.

#### See Also:

- Enabling SQL Tracing and Using TKPROF
- Oracle Database Performance Tuning Guide
- Oracle APEX SQL Workshop Guide

# 22.5 About Database Parameters that Impact Performance

Evaluate whether or not database parameters are impacting performance.

There are certain database parameters that can impact performance. In particular, you should review the memory related parameters (MEMORY\_TARGET, SGA\_TARGET, PGA\_AGGREGATE\_TARGET, SHARED\_POOL\_SIZE) parameters to ensure they are sized correctly. You should also check that the database System Global Area (SGA) fits in real memory. An undersized SGA can dramatically impact Oracle APEX performance. There needs to be sufficient memory in the Shared Pool for PL/SQL and in Buffer Cache for the APEX metadata. If the SGA is sized correctly, it should not be necessary to pin PL/SQL programs from the APEX engine as they are accessed regularly and should not be swapped out of memory. Because the APEX engine resides in the database, it is strongly recommended that you gather statistics on the APEX\_220200 schema. Accurate statistics allow the cost-based optimizer to develop better query plans for accessing the application metadata.

# 22.6 About Limiting Resources

Use Resource Manager to limit the types of system resources available to each user request.

Database Resource Manager, an Oracle Database Enterprise Edition option, is exceedingly useful for maintaining an Oracle APEX instance. Using Resource Manager you can limit the types of system resources (CPU\_PER\_CALL and LOGICAL\_READS\_PER\_CALL) available to each user request. By setting up multiple resource profiles, with automatic switches between the profiles, as a user request exceeds a certain threshold you can reduce the CPU available to that transaction. For example you may define a default profile APEX\_HIGH which can utilize 70% of CPU for 10 seconds, APEX\_MEDIUM with 8% CPU for 120 seconds, APEX\_LOW with 2% CPU for 1800 seconds, and OTHERS with 20% CPU. When a specific transaction exceeds 10 seconds, it is switched to the APEX\_MEDIUM profile which drastically reduces the CPU available. If the transaction switches to APEX\_LOW and exceeds 1800 seconds then you can cancel the SQL or kill the session. This approach ensures that one specific user



or poorly written application cannot monopolize the CPU causing other users and applications to respond poorly.



#### Tip:

Instance administrators can define Resource Manager profiles for individual workspaces.

#### See Also:

- Isolating a Workspace to Prevent Browser Attacks and Configuring Instance-Level Workspace Isolation Attributes in Oracle APEX Administration Guide
- Managing Resources with Oracle Database Resource Manager in Oracle Database Administrator's Guide

# 22.7 About Uploading Static Files to Your Web Server

To improve performance, you should place static files on the Web server.

As a best practice, you should also enable gzip compression on the Web server so that the file size is minimized when transmitting the static files to the browser. Furthermore, you should also enable file caching for browsers by sending expiration headers.

### See Also:

- Managing Static Application Files
- Managing Static Workspace Files

# 22.8 Creating Custom Activity Reports Using APEX ACTIVITY LOG

Learn how to use the  ${\tt APEX\_ACTIVITY\_LOG}$  view to query activity for the current workspace.

- Enabling Logging for an Application
   Enable logging for an application on the Edit Application Definition page.
- APEX\_ACTIVITY\_LOG

  Use APEX ACTIVITY LOG to view and query all activity for the current workspace.

 APEX\_ACTIVITY\_LOG Sample Query View a APEX\_ACTIVITY\_LOG sample query.

## 22.8.1 Enabling Logging for an Application

Enable logging for an application on the Edit Application Definition page.

To edit the application definition:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click the **Edit Application Definition** button to the right of the application name.

The Edit Application Definition page appears.

4. Under Properties, locate Logging. Select **Yes** or **No**.

When set to **Yes**, every page view is logged, enabling an administrator to monitor user activity for each application. Disabling logging may be advisable for high volume applications.



#### Tip:

You can only modify the Logging attribute if the Application Activity Logging attribute in Oracle APEX Administration Services is set to **Use Application Setting**.



Enabling Application Activity Logging in Oracle APEX Administration Guide

## 22.8.2 APEX\_ACTIVITY LOG

Use APEX ACTIVITY LOG to view and query all activity for the current workspace.

The APEX\_ACTIVITY\_LOG view records all activity in a workspace, including developer activity and application runtime activity. You can use APEX\_ACTIVITY\_LOG to view and query all activity for the current workspace. For example, you can use this view to develop monitoring reports within a specific application to provide real-time performance statistics.

Table 22-1 describes the columns in the APEX ACTIVITY LOG view.

Table 22-1 Columns in APEX\_ACTIVITY\_LOG

Column	Туре	Description
time_stamp	DATE	Date and time that activity was logged at the end of the page view.
component_type	VARCHAR2(255)	Reserved for future use.
component_name	VARCHAR2(255)	Reserved for future use.



Column	Туре	Description
component_attribute	VARCHAR2(4000)	Title of page.
information	VARCHAR2(4000)	Reserved for future use.
elap	NUMBER	Elapsed time of page view in seconds.
num_rows	NUMBER	Number of rows processed on page.
userid	VARCHAR2(255)	User ID performing page view.
ip_address	VARCHAR2(4000)	IP address of client.
ir_report_id	NUMBER	Interactive report ID
ir_search	VARCHAR2	Interactive report search criteria entered by users.
user_agent	VARCHAR2(4000)	web browser user agent of client.
flow_id	NUMBER	Application ID.
step_id	NUMBER	Page number.
session_id	NUMBER	Oracle APEX session identifier.
sqlerrm	VARCHAR2(4000)	SQL Error message.
sqlerrm_component_type	VARCHAR2(255)	Reserved for future use.
sqlerrm_component_name	VARCHAR2(255)	Reserved for future use.

Table 22-1 (Cont.) Columns in APEX\_ACTIVITY\_LOG

To conserve space in the activity log, only the first log entry of each unique session contains the IP address and web browser user agent.

## 22.8.3 APEX\_ACTIVITY\_LOG Sample Query

View a APEX\_ACTIVITY\_LOG sample query.

The following example demonstrates how to create a report that displays the total number of page views and the average page view time in the past 24 hours for application 9529, and grouped by userid:

```
SELECT COUNT(*), AVG(elap), userid
   FROM APEX_ACTIVITY_LOG
WHERE time_stamp > (SYSDATE-1)
   AND flow_id = 9529
GROUP BY userid
```

Keep in mind that activity logging in an APEX instance is rotated between two different log tables. Because there are two log tables, logging information is only as current as the oldest available entry in the logs. To persist your application-specific log information for all time, you must either copy the log information into your own application table or implement logging directly in your application.



# Debugging an Application

Learn about best practices for debugging an Oracle APEX application.

- Running Advisor to Check Application Integrity
   Use Oracle APEX Advisor (Advisor) to check the integrity and quality of your APEX
   application.
- Reviewing Session State
   View current session state for your application by clicking the Session link on the Runtime Developer Toolbar.
- About Monitoring Application and Page Resource Use
   Query the V\$SESSION and V\$SQLAREA views to monitor application and page resource
   use...
- Enabling SQL Tracing and Using TKPROF
   Enable SQL tracing and then analyze the temporary file Oracle APEX creates using the TKPROF utility.
- Utilizing Debug Mode
   Use Debug mode to track down unexpected application behavior.
- About Removing Controls and Components to Isolate a Problem
   If you have problems running a page, try removing controls and components one at a time.

#### **Related Topics**

- Managing Application Performance
   Learn about how to improve application performance.
- APEX\_DEBUG

# 23.1 Running Advisor to Check Application Integrity

Use Oracle APEX Advisor (Advisor) to check the integrity and quality of your APEX application.

- About APEX Advisor Learn About APEX Advisor.
- Running Advisor on an Entire Application
   Learn how to run Advisor on an entire application.
- Running Advisor on a Single Page
   Learn how to running Advisor on a single page.

### 23.1.1 About APEX Advisor

Learn About APEX Advisor.

Before deploying your application, you can use the APEX Advisor to perform various sanity checks on your application. The Advisor checks for errors, security issues, performance bottlenecks, quality assurance, and other best practices.

Oracle APEX Advisor functions like a compiler or LINT and flags suspicious behavior or errors. Running Advisor checks the integrity of your application based on the underlying metadata.



#### Tip:

APEX Advisor includes checks specific to ensuring application accessibility. To learn more, see *Oracle APEX Accessibility Guide*.

## 23.1.2 Running Advisor on an Entire Application

Learn how to run Advisor on an entire application.

To run Advisor on an entire application:

- 1. Navigate to the appropriate application:
  - a. On the Workspace home page, click the App Builder icon.

The App Builder home page appears.

b. Select the application.

The Application home page appears.

- Click Utilities.
- Click Advisor.

The Advisor page appears.

- 4. Under Checks to Perform:
  - a. Expand Checks to Perform.
  - **b.** Review the selected options. Select and deselect options as appropriate.
- 5. In Pages(s), enter a comma separated list of pages in the field provided. To check all pages, leave this option blank.
- **6.** Click **Perform Check** at the top of the page.

A Results page appears.



#### Tip:

Current Advisor settings are used next time the check is performed.

- 7. To alter the existing preferences:
  - a. Under Filter Result, deselect the appropriate options.
  - b. Click Apply Filter.
- 8. To run Advisor again, click Perform Check.



## 23.1.3 Running Advisor on a Single Page

Learn how to running Advisor on a single page.

To run Advisor on a single page:

- 1. Navigate to the appropriate page.
- 2. Click the Utilities menu and select Advisor.

Advisor appears.

- 3. Under Checks to Perform, review the selected options. Select and deselect options as appropriate.
- Click Perform Check at the top of the page.

A Results page appears.

- 5. To alter the existing preferences:
  - a. Under Filter Result, deselect the appropriate options.
  - b. Click Apply Filter
- 6. To re-run the Advisor and see if reported problems are fixed, click **Perform Check**.

# 23.2 Reviewing Session State

View current session state for your application by clicking the Session link on the Runtime Developer Toolbar.

Session state enables developers to store and retrieve values for a user as the user navigates between different application pages. Many applications are based on data contained within application controls. For example, buttons can display conditionally based on a value stored in session state.

#### See Also:

- Runtime Developer Toolbar
- Viewing Session State
- Managing Session State Values
- Managing Session State for a Workspace and Managing Session State for an Instance in Oracle APEX Administration Guide

# 23.3 About Monitoring Application and Page Resource Use

Query the V\$SESSION and V\$SQLAREA views to monitor application and page resource use..

APEX facilitates the monitoring of resources used by applications and pages by calling the package <code>DBMS\_APPLICATION\_INFO</code>. Whenever the APEX engine renders or processes a page, the module is set to <code>APEX</code> and includes the application ID and page number. Once set, you can query the <code>V\$SESSION</code> and <code>V\$SQLAREA</code> views to monitor transactions.



# 23.4 Enabling SQL Tracing and Using TKPROF

Enable SQL tracing and then analyze the temporary file Oracle APEX creates using the TKPROF utility.

Tracing your session can be a very effective way to debug an application. From a database perspective, each page request is a single database session. If you enable SQL tracing, then Oracle APEX creates a temporary file you can then analyze using the TKPROF utility.

You enable SQL tracing in APEX by using f?p syntax to set the argument  $p\_trace=YES$ . For example, to trace the display of page 1 in application 100, you would use the syntax:

```
http:/.../f?p=100:1&p trace=YES
```

To use the TKPROF utility:

- 1. Log in to SQL\*Plus as a privileged user.
- 2. Execute the following statement:

```
show parameter USER DUMP DEST
```

- 3. Navigate to the directory in which the trace file is created.
- **4.** Run the TKPROF utility from the operating system prompt using the following syntax:

```
tkprof filename1 filename2 [waits=yes|no] [sort=option] [print=n]
    [aggregate=yes|no] [insert=filename3] [sys=yes|no] [table=schema.table]
    [explain=user/password] [record=filename4] [width=n]
```

The input and output files are the only required arguments.

5. To view online Help, invoke TKPROF without arguments.



Tools for End-to-End Application Tracing in *Oracle Database SQL Tuning Guide* for information about using the TKPROF program

# 23.5 Utilizing Debug Mode

Use Debug mode to track down unexpected application behavior.

- Enabling and Disabling Debug Mode for an Application
   Configure whether end users can run the application in debug mode by editing the Dubugging attribute in the Application Definition.
- Controlling Debug Mode for a Page at Runtime
   Control debug mode for the current page and session by clicking the Debug on the Runtime Developer toolbar.



Viewing Debug Messages at Runtime

View debug message at runtime by clicking the Debug, View Debug on the Runtime Developer toolbar

Viewing Debug Messages from Utilities
 View all debug messages generated by an aplication from the Utilities page.

- About Using f?p Syntax to Access Debug Mode
   Use f?p syntax to run an application in debug mode.
- Viewing Debug Messages for an Application
   View debug messages for an application by clicking the Find icon.

See Also:

APEX DEBUG in Oracle APEX API Reference

## 23.5.1 Enabling and Disabling Debug Mode for an Application

Configure whether end users can run the application in debug mode by editing the Dubugging attribute in the Application Definition.

Running an application in debug mode is useful when an application is under development. For production applications, Oracle recommends disabling debugging and thus preventing users from viewing application logic.

Developer who are logged into workspace where the application resides can always run the application in debug mode. Debug can also be enabled programmatically regardless of this debug setting.

To enable or disable debug mode for end users:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.

The Application home page appears.

- **3.** From the Application home page, you can access the Application Definition page page in two ways:
  - Edit Application Definition button:
    - **a.** Click **Edit Application Definition** to the right of the application name.
    - b. Click the User Interface tab.
  - From Shared Components:
    - a. Click Shared Components.
    - b. Under Application Logic, click **Application Definition**.
- 4. Under Properties, edit the Debugging attribute:
  - Yes Enables the application debug mode using the browser at runtime.
  - No- Disables the application debug mode using the browser at runtime.





**Managing Application Attributes** 

## 23.5.2 Controlling Debug Mode for a Page at Runtime

Control debug mode for the current page and session by clicking the Debug on the Runtime Developer toolbar.

You enable and disable debug mode for the current page and session by clicking the Debug on the Runtime Developer toolbar.

If debug mode is enabled, debug data is captured in the background. As long as the browser tab or window stays open, uses the current debug mode and level.

To enable or disable Debug mode for a page at runtime:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the desired application.
- 3. Run the application.

The Runtime Developer toolbar displays at the bottom of any editable page.



- 4. On the Runtime Developer Toolbar, click **Debug**. Available options include:
  - Enable Debug Specifies the level of detail included when you click View Debug .
    - No Debug Enables and disables debug mode
    - Info (default) The debug log contains the default or normal amount of information. This corresponds with a log level of 4 and a Debug URL argument of YES.
    - App Trace The debug log contains messages up to level 6. This corresponds with a Debug URL argument of LEVEL6.
    - Full Trace The log will contain the maximum amount of information. This
      corresponds with a Debug URL argument of LEVEL9. Full Trace can slow
      request processing but provides the most amount of detail.
  - View Debug Displays debug information for the current page.



- Runtime Developer Toolbar
- APEX\_DEBUG in Oracle APEX API Reference



## 23.5.3 Viewing Debug Messages at Runtime

View debug message at runtime by clicking the Debug, View Debug on the Runtime Developer toolbar

To view debug messages for the current page and session at runtime:

To view debug reports for the current page and session at runtime:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the desired application.
- 3. Run the application.

The Runtime Developer toolbar displays at the bottom of any editable page.

- 4. On the Runtime Developer Toolbar, click **Debug** and then **View Debug**.
  - The Debug page appears.
- 5. Click the View Identifier to the left of the session you want to view.
  - The Debug page appears.
- 6. To view steps that took the longest, hover over that step on the graph above the report. The step details display.
- 7. To go to that step in the report, click the bar.



Debug sessions listed in the report live for at least 2 weeks and age out along with the activity log. This is usually more than adequate for debugging purposes.

## 23.5.4 Viewing Debug Messages from Utilities

View all debug messages generated by an aplication from the Utilities page.

To view debug messages for an application from the Utilities page:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the desired application.
- 3. Click Utilities.
- 4. On the Utilities page, click **Debug Messages**.
  - The Debug Messages page appears.
- 5. Click the **View Identifier** to the left of the session you want to view.
  - The Debug Message Data page appears.
- **6.** To view steps that took the longest, hover over that step on the graph above the report. The step details display.
- 7. To go to that step in the report, click the bar.





Debug sessions listed in the report live for at least 2 weeks and age out along with the activity log. This is usually more than adequate for debugging purposes.

# 23.5.5 About Using f?p Syntax to Access Debug Mode

Use f?p syntax to run an application in debug mode.

To use f?p syntax to run an application in debug mode, simply call the page and set the Debug argument to YES or LEVELn, where n is between 1 (least detailed) and 9 (most detailed). For example:

f?p=100:1:&APP SESSION.::YES

See Also:

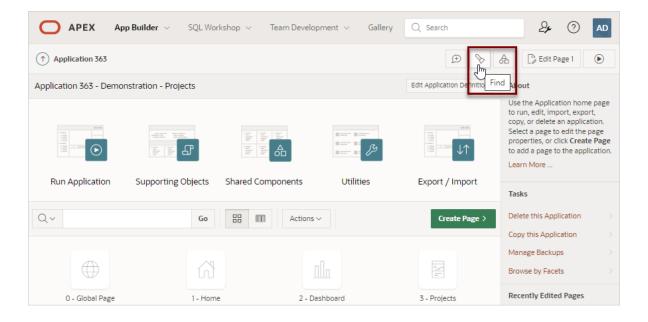
About Using f?p Syntax to Link Pages

# 23.5.6 Viewing Debug Messages for an Application

View debug messages for an application by clicking the Find icon.

To access debug messages for an application:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select the desired application.
- 3. From the toolbar at the top of the page, click the **Find** icon.





The Items Finder appears.

- 4. Click the **Debug** tab.
- 5. Click the View Identifier to the left of the session you want to view.

The Debug page appears.

- To view steps that took the longest, hover over that step on the graph above the report.The step details display.
- 7. To go to that step in the report, click the bar.



Debug sessions listed in the report live for at least 2 weeks and age out along with the activity log. This is usually more than adequate for debugging purposes.

# 23.6 About Removing Controls and Components to Isolate a Problem

If you have problems running a page, try removing controls and components one at a time.

Using this approach, you can quickly determine which control or component may be the source of your problem. You can disable a control or component creating a build options. Build options enable you to conditionally display specific functionality within an application.

Build options enable you to conditionally display specific functionality within an application. Build options have two possible values: INCLUDE and EXCLUDE. If you specify an attribute as being included, then the Oracle APEX engine considers it part of the application definition at runtime. Conversely, if you specify an attribute as being excluded, then the APEX engine treats it as if it did not exist.

#### Disadvantages of Using Conditions to Remove Controls or Components

Prior releases of APEX recommended that developers disable controls or components by setting the Condition attribute to **Never**. Although this approach is still valid, a major disadvantage is that it overwrites the existing condition.



Using Build Options to Control Configuration



# Deploying an Application

Learn about best practices for deploying an application. Deployment is the process of moving an application from the testing phase to the production phase.

- System Development Life Cycle Methodologies to Consider
   The system development life cycle (SDLC) is the overall process of developing software using a series of defined steps. There are several system SDLC models that work well for developing applications in Oracle APEX.
- Understanding the Deployment Process
   Learn about different approaches and best practices when deploying applications.
- Exporting and Importing from App Builder

  Move a workspace, an application, application components, or related files by creating an export script file and then importing and installing it into another APEX instance.
- How to Create a Custom Application
   Simplify the steps needed to deploy an application by creating a custom application using the Supporting Objects utility.
- Using Build Options to Control Configuration
   Use build options to conditionally include or exclude application components and functionality.
- About Publishing an Application URL
   Once you deploy your application, load the data, and create users, you can publish your production URL.
- Understanding One-Click Remote Application Deployment
   Deploy an application to remote Oracle APEX instances using REST Enabled SQL references.

# 24.1 System Development Life Cycle Methodologies to Consider

The system development life cycle (SDLC) is the overall process of developing software using a series of defined steps. There are several system SDLC models that work well for developing applications in Oracle APEX.

- Differences Between Iterative and Planned Development Learn about the differences between iterative and planned development.
- About the Advantages of Creating Prototypes
   Learn about the advantages of creating prototypes.
- Waterfall
   Learn about the Waterfall methodology.
- Spiral Learn about the Spiral methodology.

 Rapid Application Development Learn about the Rapid Application Development (RAD) methodology.

## 24.1.1 Differences Between Iterative and Planned Development

Learn about the differences between iterative and planned development.

When developing applications using App Builder, you must find a balance between two dramatically different development methodologies:

- Iterative, rapid application development
- Planned, linear style development

Iterative, rapid application development offers so much flexibility that you run the risk of never completing your project. In contrast, planned, linear style development can yield applications that do not meet the needs of end users even if they meet the stated requirements on paper.

## 24.1.2 About the Advantages of Creating Prototypes

Learn about the advantages of creating prototypes.

The APEX development environment enables developers to take a more iterative approach to development. Unlike many other development environments, creating prototypes is easy. With APEX, developers can:

- Use built-in wizards to quickly design an application user interface.
- Make prototypes available to users and gather feedback.
- Implement changes in real time, creating new prototypes instantly.

Methodologies that work well with APEX include Spiral and Rapid Application Development (RAD).

## See Also

- Spiral
- Rapid Application Development

## 24.1.3 Waterfall

Learn about the Waterfall methodology.

The **Waterfall** is probably the best known SDLC model. In this methodology, the development process is broken down into the following stages:

- Project Planning
- 2. Requirements Definition
- Design
- Development



- Integration and Testing
- 6. Installation and Acceptance
- Maintenance

This methodology is referred to as a waterfall because the output from one stage is the input for the next stage.

A primary problem with this approach is that it is assumed that all requirements can be established in advance. Unfortunately, requirements often change and evolve during the development process.

## 24.1.4 Spiral

Learn about the Spiral methodology.

A **Spiral** methodology is actually a series of short waterfall cycles. Each waterfall cycle yields new requirements and enables the development team to create a robust series of prototypes. One advantage of this approach is that it accommodates changing requirements. Disadvantages include complex project management and the risk development goes on indefinitely.

## 24.1.5 Rapid Application Development

Learn about the Rapid Application Development (RAD) methodology.

A Rapid Application Development (RAD) methodology has a heavy emphasis on creating a prototype that closely resembles the final product. The prototype is an essential part of the requirements phase. Advantages of this model include the ability to accommodate changing requirements, rapid development cycles, and progress can be easily measured. The major disadvantage of this model is that the emphasis on prototyping can result in scope creep. As a result, developers can lose sight of their initial goals in the attempt to create the perfect application.

# 24.2 Understanding the Deployment Process

Learn about different approaches and best practices when deploying applications.

- About Suggested Environments
   Learn about the best practices in development, testing, and production environments.
- Deployment Scenarios to Consider Review common deployment scenarios for APEX applications.

# 24.2.1 About Suggested Environments

Learn about the best practices in development, testing, and production environments.

Oracle recommends developers follow standard system development life cycle practices when developing applications by having three environments: **development**, **testing**, and **production**. As a best practice, developers should only make changes to applications and related database objects in their **development** environment. To further enforce this policy Oracle recommends using a runtime environment for both **testing** and **production** environments. This approach will prohibit developers from accessing the App Builder and SQL Workshop in these environments. As a general rule, your administrators (DBAs) should be the only ones with permission to update the test and production environments. DBAs



should use the appropriate provided APIs and import applications from a SQL interface, such as SQL\*Plus or Oracle SQL Developer Command Line.



About the Differences Between Runtime and Full Development Environments

## 24.2.2 Deployment Scenarios to Consider

Review common deployment scenarios for APEX applications.

When you develop an application, you create the application within a specific workspace. Each workspace has a unique ID and name. A common scenario is to create the application in a development instance and then deploy it to a production instance.

Deployment options to consider include:

- Use the same workspace and same schema. Export and then import the
  application and install it using a different application ID. This approach works well
  when there are few changes to the underlying objects, but frequent changes to the
  application functionality.
- 2. Use a different workspace and same schema. Export and then import the application into a different workspace. This is an effective way to prevent a production application from being modified by developers.
- 3. Use a different workspace and different schema. Export and then import the application into a different workspace and install it so that it uses a different schema. This new schema needs to have the database objects required by your application.
- 4. Use a different database with all its variations. Export and then import the application into a different APEX instance and install it using a different workspace, schema, and database.

#### Whether to Copy the Workspace

Deciding whether to copy an existing workspace is a matter of preference. Keep in mind that the production version must have access to all the appropriate objects. For example, you might want to copy a workspace in the following situations:

- When you want to keep the same application identifiers between development and other environments.
- When the application relies on APEX authentication. Copying the workspace automatically migrates all the required user data.

#### Whether to Copy the Database

When deciding whether to copy the database, remember that the schema against which the application runs must have access to the same objects as the development instance. The actual name of the schema is unimportant. You can change it during the import process.



#### **About the Application ID**

It is not necessary to have matching application IDs for a development version and production version of an application. In fact, as a best practice, never hard code the application ID into your application. Instead, use the application alias (defined on the Edit Application page), or use a built-in substitution string (such as APP\_ID and APP\_ALIAS). Using a substitution string is the better approach because it enables you to change the application ID without affecting any application functionality.

## See Also:

- Name for information about defining an application alias
- Using Built-in Substitution Strings for information about using APP\_ID and APP ALIAS

# 24.3 Exporting and Importing from App Builder

Move a workspace, an application, application components, or related files by creating an export script file and then importing and installing it into another APEX instance.



#### Tip:

You can also export and import from a command line using Oracle SQL Developer Command Line. See Exporting and Importing Using SQLcl in *Oracle APEX Administration Guide*.

- Understanding the Export and Import Process
  - Move a workspace, application, or related files by creating an export script file and then importing and installing it into another APEX instance.
- Exporting Workspaces, Applications, and App Components
   Export a workspace, application, application components, or related file by creating an export script file.
- Importing Export Files
   After you create Export files, you then import them into the target Oracle APEX instance.
- Installing Export Files
   After you create an Export File, you can install it directly after importing, install it from the Export Repository, or install it from a command line.

## 24.3.1 Understanding the Export and Import Process

Move a workspace, application, or related files by creating an export script file and then importing and installing it into another APEX instance.

The export process consists of following steps:

1. Create the Export File.



Exporting a workspace, application, page, or application components creates an export file. An **export file** is a readable script file with a .SQL extension.

You can create export files using the Export pages available App Builder or from a command line.

#### 2. Import and Install the Export File.

Import the export file into the target APEX instance and then install it. In App Builder, you can install an export file directly after importing or install it from the Export Repository. Alternataively, you can import and install from a command line. As a best practice, Oracle recommends importing an application first and then the related files.

#### About Exporting, Importing, and Installing from a Command Line

To export and import from a command line, Oracle recommends using Oracle SQL Developer Command Line (SQLcl) as described in Exporting and Importing Using SQLcl in *Oracle APEX Administration Guide*.



- Exporting Workspaces, Applications, and App Components
- Importing Export Files
- Installing Export Files
- How to Create a Custom Application

## 24.3.2 Exporting Workspaces, Applications, and App Components

Export a workspace, application, application components, or related file by creating an export script file.



#### Hp:

You can also import and export from a command line using Oracle SQL Developer Command Line (SQLcI) release 22.1 and later. See Exporting and Importing Using SQLcI in *Oracle APEX Administration Guide* 

- Splitting Export Files into Separate Scripts
   Learn about splitting application, page, and component export files into separate
   SQL scripts.
- About Exporting Static Files
   Learn about exporting static application and workspace files.
- Exporting a Workspace
   Move or copy a workspace by exporting it.



Exporting an Application

Move or copy an application by exporting and then importing it into the target instance.

Exporting an Application Page

Move or copy a single application page by exporting it.

Exporting Application Components

Create a Component Export to back up a component before editing it, or create an export that functions as a patch to another Oracle APEX instance.

Exporting Themes

Move or copy a theme by exporting it.

Exporting Plug-ins

Move or copy plug-ins by exporting them.

Exporting User Interface Defaults

Move or copy a User Interface Defaults by exporting them.

Exporting Team Development Feedback

Move or copy user-provided feedback from the current APEX instance.

Exporting a REST Source Catalog

Move a REST Source Catalog to another instance on the Export page.

· Exporting Script Files from the Script Repository

Move scripts from your current Script Repository by exporting them.

### See Also:

- Understanding the Export and Import Process
- How to Create a Custom Application

## 24.3.2.1 Splitting Export Files into Separate Scripts

Learn about splitting application, page, and component export files into separate SQL scripts.

Splitting application, page, and component exports into separate files can be very useful if you are managing files using a version control system such as Apache Subversion (SVN) or Git. This approach enables you to check in files to the repository as you make changes. For example, suppose a developer modifies Page 1 and a list of values called Categories. If you export the application as separate files, you can commit only the two files with changes.

Another benefit of splitting exports into separate files is that it enables you to take an incremental approach to deployment. Rather than having to re-install an entire application for a minor change (for example, fixing a typo on a label), only the file containing the fix needs to be run on the destination system.

You can split application, page, and component exports into separate files as follows:

- Applications Select the Split into Multiple Files flag to export the application as a ZIP
  archive containing separate files for each page, shared component, and so on. You can
  unzip the Zip file on your local file system and then commit updated files to your source
  code repository.
- Pages and other Components Select the Export as Zip flag to export the selected components as a ZIP archive containing separate SOL files for each component.



#### See Also:

Exporting and Importing from a Command Line in *Oracle APEX* Administration Guide

#### **Export Directory Structure**

Exporting an application, page, or components into separate scripts creates a directory structure organized by component type.



Directory Structure When Splitting Export Files into Separate Scripts

#### **Export File Names**

Export files use the following naming conventions:

- **Application Export** Named using the application ID. For example, an application with the ID 326 would be named: f326.sql or f326.zip.
- Page Export Named after the application ID and page number. For example, exporting page 4 in an application with the ID 326 would be named:
   f326 page 4.sql or f326 page 4.zip.
- Component Export If you select multiple components, the name uses the application ID and components. For, example, multiple components in an application with the ID 326 would be named: f326\_components.sql or f326 components.zip.

Component file names are based on the name specified in App Builder. In general, special characters are removed and spaces are replaced with underscores.

If you rename a component in App Builder, the next time you create a Component Export, a new file name is used. For example, if you have breadcrumb named Menu and you create a Component Export, the file would be named menu.sql. If you rename that breadcrumb Main Menu, the new Component Export is named main\_menu.sql. If you are using a version control system, you are responsible for applying the proper commands to rename or move the original file to maintain the history.

#### **Generated Installation Scripts**

Exporting create a number of installation scripts. Depending upon the type of export, the installation scripts are named one of the following:

- Application Export install.sql
- Page Export install\_page.sql
- Component Export install component.sql

In addition to installation files, each export includes two files which are useful when developing custom patch scripts:



- set environment.sql
- end environment.sql

These files contain internal code that help improve performance. These scripts set internal variables and perform security checks at one time for the entire import. Without these scripts, the internal variables check will be executed for each file you run.

A sample custom installation file might resemble following:

```
@@application/set_environment.sql
@@application/pages/page_00001.sql
@@application/pages/page_00023.sql
@@application/pages/page_00095.sql
@@application/end environment.sq
```

## 24.3.2.2 About Exporting Static Files

Learn about exporting static application and workspace files.

Static application and workspace files include images, CSS files, and other files which must be managed independently. Export static application and workspace files by either:

- Creating a ZIP file in Shared Components. See Downloading Static Application Files.
- Creating installation scripts using component export. See Exporting Application Components.

## 24.3.2.3 Exporting a Workspace

Move or copy a workspace by exporting it.

Exporting a workspace creates a SQL script file which includes user groups, users, Team Development data, and workspace artifacts including SQL Scripts, SQL Command History, saved SQL, user preferences, developer login history, email logs, and user interface defaults. Workspace exports do not include applications.

Oracle does not recommend exporting an entire workspace unless you want to migrate workspace users or replicate Shared Component subscriptions in the target instance.

To export a workspace:

- 1. Navigate to the Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click Workspace Utilities.
  - c. Click Export.
- 2. On the Export page, click Workspace.
- 3. Under Export Workspace:
  - **a. Include Team Development** Set to **On** to include Team Development data. Only select **Off** if the target instance for this workspace is a runtime only instance.
  - b. Export Type In most cases, do not change the default value Minimal. Only select Full if you want to replicate this workspace and all workspace artifacts including SQL Scripts, SQL Command History, saved SQL, user preferences, developer login history, email logs, and user interface defaults.



- File Format Indicates the character set in which the export file will be encoded.
- 4. Click Export.
- Import the Workspace Export in Administration Services.



Importing a Workspace in Administration Services in *Oracle APEX Administration Guide* 

## 24.3.2.4 Exporting an Application

Move or copy an application by exporting and then importing it into the target instance.

Exporting an application in Oracle APEX generates a readable script file with a .sql extension. An application export includes the application definition, including templates, pages, regions, items, buttons, and so on.

As a best practice, Oracle recommends you export complete applications rather than individual components. If you wish to export an application and there are components such as pages that are not yet ready for testing, Oracle recommends you use Build Options to include or exclude various application components.



#### Tip:

In addition to exporting the actual application, you may also need to export other related static files such as cascading style sheets, images, and script files. See Managing Static Application Files.

To export an application:

- 1. Navigate to the Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click Workspace Utilities.
  - c. Click Export.
- Click Applications.
- 3. Under **Choose Application**, select the application to export.
- 4. Under Export Application:
  - a. Split into Multiple Files Options include:
    - On Exports the application as a ZIP archive containing separate files for each page, shared component, and installation file in the Application Export.
    - Off Exports as a single SQL file containing the entire application.





#### Tip:

To learn more about the Zip archive, see Splitting Export Files into Separate Scripts.

- b. Owner Override By default, the application is owned by the owner identified in the application attribute owner. Use this attribute if you wish to import this application as a different schema owner then you are exporting.
- c. Build Status Override Select the build status of the exported application. Options include:
  - Run and Build Application Developers and users can both run and edit an application.
  - Run Application Only Users can only run an application. Selecting this option
    is an effective way to protect an application from modifications from other
    developers.



#### Tip:

If you select **Run Application Only**, you cannot set the argument  $p_{trace}$  to Yes. The only way to change this setting after you import the application is to log in to APEX Administration Services. .

- d. **Debugging** Options include:
  - Yes Exports the application with debugging enabled.
  - No Exports the application with debugging disabled.
- **e. As of** Specify a time in minutes to go to back to for your export. This option enables you to go back in time in your application, perhaps to get back a deleted object.

This utility uses the DBMS\_FLASHBACK package. Because the timestamp to System Change Number (SCN) mapping is refreshed approximately every five minutes, you may have to wait that amount of time to locate the version for which you are looking. The time undo information is retained and influenced by the startup parameter UNDO\_RETENTION (the default is three hours). However, this only influences the size of the undo tablespace. While two databases can have the same UNDO\_RETENTION parameter, you are able to go back further in time on a database with fewer transactions because it is not filling the undo tablespace, forcing older data to be archived.

f. File Character Set - Indicates the character set in which the export file will be encoded. When importing this file you will need to specify the same character set.

#### 5. Under Export Preferences:

- a. Export Supporting Object Definitions Supporting object definitions include all configuration options and scripts and enable an application export to include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file. Options include:
  - **Yes** Includes supporting object definitions in the application export. Does not automatically load supporting objects when invoked from a command line.
  - No Does not include the supporting object definitions in the export.



- Yes and Install on Import Automatically Includes supporting object definitions and a call to install supporting objects in the application export. This option is valid only for command line installs. When application imports from the command line, it automatically installs or upgrades the supporting objects.
- b. Export Public Reports Specify whether to include public reports with your application. Public reports are the public shared report settings saved by users from an interactive report or interactive grid.
  - On Include public reports in the application export.
  - Off Do not include public reports in the application export.
- **c. Export Private Reports** Specify whether to include Private reports with your application. Private reports are the private customized settings saved by users from an interactive report or interactive grid.
  - **On** Include public reports in the application export.
  - Off Do not include public reports in the application export.
- d. Export Report Subscriptions Specify whether to include interactive report or interactive grid subscription settings with your application. This will be limited to the unexpired subscription settings of all users for all interactive reports or interactive grids in the application.
  - **On** Include report subscriptions for the reports you are exporting in the application export.
  - Off Do not include report subscriptions for the reports in the application export.
- **e. Export Developer Comments** Specify whether to include Developer Comments in your application export.
  - On Include Developer Comments in the application export.
  - Off Do not include Developer Comments in the export.
- f. Export Translations Specify whether to include translations with your application export. Translation Text Messages and Dynamic Translations are always included in the application export.
  - On Include the translation mappings and all text from the translation repository.
  - Off Do not include translation mappings or the translation repository.
- g. **Export with Original IDs** Specify whether the export file should contain the application component IDs as of now or as of the last import of this application.
  - On Include the IDs as of the last import.
  - Off Include only the current IDs of the components.
- h. Export Readable Format Specify whether the export file should contain a human-readable version of the application metadata. Use it to identify and review differences between version A and version B of an application when checked-in into a Version Control System.
  - None
  - YAML
  - JSON



- 6. Under Recent Exports to Export Repository, review any recent exports.
- 7. Click Export.
- 8. Import the Application Export into the target instance.

#### See Also:

- Importing an Application, Page or Component Export
- Changing Application Build Status in Administration Services in Oracle APEX Administration Guide

# 24.3.2.5 Exporting an Application Page

Move or copy a single application page by exporting it.

#### **WARNING:**

Exporting and importing a single page to a different system is an advanced deployment technique with the following restrictions:

- Both systems have to have the same application ID and workspace ID.
- Both systems have to have the same IDs for Shared Components.
- If the page references new or updated Shared Components, those have to be exported and imported first.

If these restrictions are not fulfilled, the import will fail.

To export a page in an application:

- 1. View the page in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

- 2. In Page Designer, select Export.
  - a. On the Page Developer toolbar, click the **Utilities** menu.



b. Select Export.

The Export Page Wizard appears.

- 3. On Export Page:
  - a. Page Select the page you wish to export. You can select only one page for export at a time.



- b. Export as Zip Options include:
  - **On** Export as a ZIP archive containing a separate SQL files for the page.
  - Off Export as a single SQL file.
- c. Include Installation files Only displays if Export as Zip is set to On. Options include:
  - **On** Generates a ZIP archive including installation files specifically for the Page Export.
  - Off Generate a ZIP file without the installation files.

Oracle recommends **Off** when saving the files to a version control system so that application installation files are not overwritten.



#### Tip:

To learn more about the Zip archive, see Splitting Export Files into Separate Scripts.

d. As of - Specify a time in minutes to go to back to for your export. This option enables you to go back in time in your application, perhaps to get back a deleted object.

This utility uses the DBMS\_FLASHBACK package. Because the timestamps to System Change Number (SCN) mapping is refreshed approximately every five minutes, you may have to wait that amount of time to locate the version for which you are looking. The time undo information is retained and influenced by the start up parameter UNDO\_RETENTION (the default is three hours). However, this only influences the size of the undo table space. While two databases may have the same UNDO\_RETENTION parameter, you are able to go back further in time on a database with fewer transactions because it is not filling the undo table space, forcing older data to be archived.

- e. File Character Set Indicates the character set in which the export file will be encoded. When importing this file you will need to specify the same character set.
- Click Export Page.
- 5. Import the Page Export into the target instance.



#### See Also:

Importing an Application, Page or Component Export



## 24.3.2.6 Exporting Application Components

Create a Component Export to back up a component before editing it, or create an export that functions as a patch to another Oracle APEX instance.



#### Tip:

If you wish to export an application and some components, such as pages, that are not yet ready for testing, Oracle recommends you use Build Options to include or exclude various application components.

To export shared components or page components:

- 1. Navigate to the Component Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. From the Tasks list, click Export Application Components.
- On the Component Export page, click the appropriate tabs and select the components to export:
  - Components displays shared application components and entire pages. Use the navigation bar at the top of the page to search for components.
  - Components by Page lists components of the selected page. Navigate to a specific page by making a selection from the Page list
  - Build Option Status displays available build options. Use this page to turn build options on and off.
- 3. For each tab, select the appropriate components and click **Add to Export**.
- 4. Review your selections. To continue, click **Next**.
- **5.** For Component Export:
  - a. Export as Zip Options include:
    - On Exports the components as a ZIP archive containing separate files for each component.
    - Off Exports as a single SQL file containing all the selected components.



#### Tip:

To learn more about the Zip archive, see Splitting Export Files into Separate Scripts.

b. Include Installation files - Only displays if Export as Zip is set to On. Options include:



- On Generates a ZIP archive including installation files specifically for the exported page (for example, install component.sql, set environment.sql and environment.sql).
- Off Generate a ZIP file without the installation files.

Oracle recommends **Off** when saving the files to a version control system so that application installation files are not overwritten.

c. As of - Specify a time in minutes to go to back to for your export. This option enables you to go back in time in your application, perhaps to get back a deleted object.

This utility uses the DBMS FLASHBACK package. Because the timestamp to System Change Number (SCN) mapping is refreshed approximately every five minutes, you may have to wait that amount of time to locate the version for which you are looking. The time undo information is retained and influenced by the startup parameter UNDO RETENTION (the default is three hours). However, this only influences the size of the undo tablespace. While two databases may have the same undo retention parameter, you are able to go back further in time on a database with fewer transactions because it is not filling the undo tablespace, forcing older data to be archived.

- d. File Character Set Indicates the character set in which the export file will be encoded. When importing this file you will need to specify the same character set.
- e. Click Export Components.



#### Tip:

For translated applications, the Export Translations field displays. To export the selected shared components for the primary language application and all translated applications, from Export Translations field, select **Yes**. To ensure text strings and markup are up-to-date, remember to synchronize the translated applications prior to exporting the translated components.

**6.** Import the Component Export into the target instance.



- Importing an Application, Page or Component Export
- **Managing Shared Components**
- **Exporting Build Options or Build Option Status**

## 24.3.2.7 Exporting Themes

Move or copy a theme by exporting it.

Exporting a theme to create a a readable script file with a .SQL extension.



To export an application theme:

- 1. Navigate to the Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click Workspace Utilities.
  - c. Click Export.
- 2. On the Export page, click **Themes**.
- **3.** On the **Themes page**:
  - a. Application Select an application.
  - **b. Export Theme** Select the theme to export.
  - c. Click Export.
- 4. Import the Theme Export into the target instance.

### See Also:

- Importing Themes
- Using Themes

## 24.3.2.8 Exporting Plug-ins

Move or copy plug-ins by exporting them.

Use a Plug-in Export to export plug-ins from one Oracle APEX development instance to a file.

To export a plug-ins:

- 1. Navigate to the Export page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. On the App Builder home page, click **Workspace Utilities**.
  - c. Click Export.
- 2. On the Export page, click Plug-ins.
- 3. On the Export Plug-in page:
  - a. Choose Application Select an application
  - **b. Plug-in** Select the plug-in to export.
  - c. Click Export.
- 4. Import the Plug-in Export into the target instance.

## See Also:

- Importing Plug-ins
- Exporting a Plug-in from the Plug-in Page



## 24.3.2.9 Exporting User Interface Defaults

Move or copy a User Interface Defaults by exporting them.

- About Exporting User Interface Defaults
   Learn about exporting User Interface Defaults.
- Exporting User Interface Defaults from the Export Page Export User Interface Defaults from the Export page.
- Exporting User Interface Defaults from the User Interface Defaults Page
   Export User Interface Defaults from the User Interface Defaults page.

## 24.3.2.9.1 About Exporting User Interface Defaults

Learn about exporting User Interface Defaults.

Exporting User Interface Defaults is useful when you plan to develop on a target system. Developers use User Interface Defaults to populate initial values for region and item properties providing consistency across multiple pages in an application or multiple applications. User Interface Defaults are divided into two categories:

- The **Table Dictionary** consists is specific to tables and columns within a selected schema. These defaults are used over those defined in the Attribute Dictionary.
- The Attribute Dictionary contains a set of attributes about a column that is used
  in creating forms and reports. The definitions are matched by column name and a
  particular definition can be shared among several columns by using synonyms.

When you export User Interface Defaults, all User Interface Defaults for the selected dictionary and schema are exported to a single script. When prompted, save this file to your hard drive. The file contains an API call to create table hints by making calls to the application PL/SQL API. You can use this file to import User Interface Defaults to another database and Oracle APEX instance.

## See Also:

- · Importing User Interface Defaults
- Managing User Interface Defaults in Oracle APEX SQL Workshop Guide

## 24.3.2.9.2 Exporting User Interface Defaults from the Export Page

Export User Interface Defaults from the Export page.

To export User Interface Defaults from the Export page:

- Navigate to the Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click Workspace Utilities.
  - c. Click Export.
- On the Export page, click User Interface Defaults.



- 3. Under **Table Dictionary**:
  - a. Schema Select the name of the schema to be exported.
  - **b. File Format** Displays the character set in which the export file will be encoded.
  - c. Click Export.
- 4. Under Attribute Dictionary:
  - a. Count of Columns Displays the number of entries in the Attribute Dictionary.
  - b. Click Export.
- 5. Import the User Interface Defaults Export into the target instance.



Importing User Interface Defaults

## 24.3.2.9.3 Exporting User Interface Defaults from the User Interface Defaults Page

Export User Interface Defaults from the User Interface Defaults page.

To export User Interface Defaults from the User Interface Defaults page:

- 1. On the Workspace home page, click the **SQL Workshop** icon.
- 2. Click Utilities.
- 3. Click User Interface Defaults.
- 4. Review the User Interface Defaults page.
  - The Table Dictionary is specific to tables and columns within a selected schema.
     These defaults are used over any defined within the Attribute Dictionary.
  - The Attribute Dictionary contains a set of attributes about a column and are used in creating forms and reports.
- **5.** To export the **Table Dictionary**:
  - a. Click Table Dictionary.
  - b. Under Tasks, click Export.
  - c. File Format Select a file format.
    - DOS Select DOS to have the lines in the resulting file terminated by carriage returns and line feeds...
    - **UNIX** Select **UNIX** to have the lines in the resulting file contain terminated by line feeds..
  - d. Click Export.
- Click Export.
- 7. Import the User Interface Defaults Export into the target instance.





Importing User Interface Defaults

## 24.3.2.10 Exporting Team Development Feedback

Move or copy user-provided feedback from the current APEX instance.

To export Team Development Feedback:

- 1. Navigate to the Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click **Workspace Utilities**.
  - c. Click Export.
- 2. Click Team Development Feedback.
- 3. On the Export Feedback page:
  - a. Changes Since Select the date from which to export feedback.
  - b. Click Export.
- 4. Import the Feedback Export into the target instance.



- Importing Team Development Feedback
- Managing Feedback

## 24.3.2.11 Exporting a REST Source Catalog

Move a REST Source Catalog to another instance on the Export page.

To export a REST Source Catalog:

- 1. Navigate to the Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click Workspace Utilities.
  - c. Click Export.



#### Tip:

You can also access the Export page from the REST Source Catalogs page by selecting Export Catalog from the Tasks list on the right side of the page.

2. Click REST Source Catalog.



- 3. On the Export REST Source Catalog page:
  - a. REST Source Catalog Select the catalog to export.
  - b. Click Export.
- 4. Next, import the REST Source Catalog Export into the target instance. See Importing a REST Source Catalog.



Managing REST Source Catalogs

## 24.3.2.12 Exporting Script Files from the Script Repository

Move scripts from your current Script Repository by exporting them.



Exporting and Importing SQL Scripts in Oracle APEX SQL Workshop Guide

## 24.3.3 Importing Export Files

After you create Export files, you then import them into the target Oracle APEX instance.

After you import the files, you have the option to install them. You can also install them at a later time by navigating to the Export Repository.

Note that you cannot import an application created in a specific release into an earlier version. As a general rule, always import the application first and then the related files.



#### Tip:

You can simplify the steps needed to deploy an application by creating a custom application.

- Importing an Application, Page or Component Export
   Import the Application, Page or Component Export on the Import page.
- About Importing Applications and Application Groups
   Application groups are exported with an application, Application Exports include a group ID, name, and comments.
- Importing Themes
   Import a Theme Export on the Import page.
- Importing Plug-ins
   Import the Plug-in Export on the Import page.
- Importing User Interface Defaults
   Import the User Interface Defaults Export on the Import page.

- Importing Team Development Feedback
   Import a Team Development Feedback Export on the Import page.
- Importing a REST Source Catalog
   Import a REST Source Catalog Export on the Import page.

#### See Also:

- Understanding the Export and Import Process
- How to Create a Custom Application
- Exporting and Importing from a Command Line in Oracle APEX Administration Guide

## 24.3.3.1 Importing an Application, Page or Component Export

Import the Application, Page or Component Export on the Import page.

To import an Application, Page or Component Export:

- 1. Sign in to the APEX instance.
- 2. Navigate to the Import page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. On the App Builder home page, click Import.
- 3. On Import:
  - a. Drag and drop, or navigate to the file.
  - b. File Type Select Application, Page or Component Export.
  - c. File Character Set Verify that the File Character Set is correct.
  - d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

4. To install the file, click **Next**.

The Install Application wizard appears.

- 5. In the Install wizard:
  - a. **Parsing Schema** Select a schema. After the installation finishes successfully, this will be used to set the owner of the application.
  - b. Build Status Set the build status of the application. Options include:
    - Run and Build Application Users can run an application and developers can both run and edit an application.
    - Run Application Only Users can only run an application.

Selecting **Run Application Only** is an effective way to protect an application from modifications from other developers.





#### Tip:

If you select **Run Application Only**, you can only change this setting after you import the application by signing in to Administration Services.

- c. Install As Application Options include:
  - Auto Assign New Application ID A new application ID will be created for you.
  - Reuse Application ID From Export File The existing application ID will be used.
  - Change Application ID Specify a new application ID.

You must specify an application ID that is unique across all APEX workspaces.

d. Click Install Application.

The application installs.

- 6. Select the appropriate option:
  - Upgrade Application
  - Edit Application
  - Run Application



#### See Also:

Changing Application Build Status Set During Deployment in *Oracle APEX Administration Guide* 

## 24.3.3.2 About Importing Applications and Application Groups

Application groups are exported with an application, Application Exports include a group ID, name, and comments.

When importing an application, the application import follows these rules:

- On import, an application uses an existing group if the ID matches.
- If no application group exists with the same ID on the target system, then application import looks for another group ID with the same name. If a name match is found, the application is imported with the ID corresponding to this application group name.
- If no ID or name matches existing application groups on the target system then a new
  application group is created. The new application group uses the application group ID if
  that ID is not used in that Oracle APEX instance. If the group ID is being used, then a
  new ID is generated.

## 24.3.3.3 Importing Themes

Import a Theme Export on the Import page.

To import a Theme Export:



- 1. Sign in to the APEX instance.
- 2. Navigate to the Import page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - **b.** On the App Builder home page, click **Import**.
- 3. On Import:
  - a. Drag and drop, or navigate to the file.
  - b. File Type Select Theme Export.
  - c. File Character Set Verify that File Character Set is correct.
  - d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

4. To install the file, click **Next**.

The Install Application wizard appears.

5. Click Install Theme.

### See Also:

- Using Themes
- Exporting Themes

## 24.3.3.4 Importing Plug-ins

Import the Plug-in Export on the Import page.

To import a Plug-in Export:

- 1. Sign in to the APEX instance.
- 2. Navigate to the Import page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click **Import**.
- 3. On Import:
  - a. Drag and drop, or navigate to the file.
  - b. File Type Select Plug-in.
  - **c. File Character Set** Verify that File Character Set is correct.
  - d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

- 4. To install an imported file, click Next.
- 5. On Install:
  - **a. Install Into Application** Select the target application. You can install the plug-in into the same application or into a different application.



#### Tip:

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

b. Click Install Plug-in.



Importing a Plug-in from the Plug-in Page

## 24.3.3.5 Importing User Interface Defaults

Import the User Interface Defaults Export on the Import page.

You can install a User Interface Defaults Table Dictionary export into any schema provisioned in the workspace. When you install a Table Dictionary export, the old defaults will be overwritten. User Interface Defaults Attribute Dictionary imports replace any matching attribute definitions that are found but will not remove any existing attribute definitions that are not contained in the export. If the installation succeeds, the installation of the user interface defaults becomes permanent. If any errors are encountered, the actions are rolled back, resulting in no permanent changes.

To import a User Interface Defaults Export:

- 1. Sign in to the APEX instance.
- Navigate to the Import page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. On the App Builder home page, click **Import**.
- On Import:
  - a. Drag and drop, or navigate to the file.
  - b. File Type Select User Interface Defaults.
  - c. File Character Set Verify that File Character Set is correct.
  - d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

- 4. To install an imported file, click **Next**.
- Click Install User Interface Defaults.



#### See Also:

- Managing User Interface Defaults in Oracle APEX SQL Workshop Guide
- Exporting User Interface Defaults

# 24.3.3.6 Importing Team Development Feedback

Import a Team Development Feedback Export on the Import page.

To import a Team Development Feedback Export:

- **1.** Sign in to the APEX instance.
- 2. Navigate to the Import page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. On the App Builder home page, click **Import**.
- On Import:
  - a. Drag and drop, or navigate to the file.
  - b. File Type Select Team Development Feedback.
  - c. File Character Set Verify that File Character Set is correct.
  - d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

- 4. To install an imported file, click Next.
- 5. Click Import Feedback.

## See Also:

- Exporting Team Development Feedback
- Managing Feedback

## 24.3.3.7 Importing a REST Source Catalog

Import a REST Source Catalog Export on the Import page.

To import a REST Source Catalog Export:

- 1. Sign in to the APEX instance.
- 2. Navigate to the Import page:
  - a. On the Workspace home page, click the App Builder icon.
  - b. On the App Builder home page, click Import.





#### Tip:

You can also access the Import page from the REST Source Catalogs page by selecting **Import Catalog** from the Tasks list on the right side of the page.

#### 3. On Import:

- a. Drag and drop or navigate to the file.
- b. File Type Select REST Source Catalog.
- c. File Character Set Verify that File Character Set is correct.
- d. Click Next.

Once you import a file, you have the option to install it. You can also install this file at a later time by navigating to the Export Repository.

- 4. To install an imported file, click Next.
- 5. Click Import REST Catalog.



- Exporting a REST Source Catalog
- Managing REST Source Catalogs

# 24.3.4 Installing Export Files

After you create an Export File, you can install it directly after importing, install it from the Export Repository, or install it from a command line.

- About Installing Export Files
  - When you import Export Files into a target Oracle APEX instance, the files are stored in the Export Repository. From the Export Repository, you can import, install, or delete Export Files.
- Installing an Application Export from the Export Repository
   If you did not install your Application Export after importing, you can install it in the Export Repository.
- Installing Other Files from the Export Repository
  If you did not install your Export Files after importing, you can install them in the Export Repository.
- Deleting Files from the Export Repository
   Delete Export Files from the Export Repository.
- Installing Export Files from SQL\*Plus Install Export Files from SQL\*Plus.



#### See Also:

- Understanding the Export and Import Process
- How to Create a Custom Application
- Exporting and Importing from a Command Line in Oracle APEX Administration Guide

## 24.3.4.1 About Installing Export Files

When you import Export Files into a target Oracle APEX instance, the files are stored in the Export Repository. From the Export Repository, you can import, install, or delete Export Files.

After you create an Export File, you can install it in the following ways:

After Importing:

After you import the Export Files, you can install them by clicking the **Next** button.

From the Export Repository:

Import the Export Files and then install the files from the Export Repository.

 From SQL\*Plus: Install the export files from SQL\*Plus.



#### Tip:

You can simplify the steps needed to deploy an application by creating a custom application.

### See Also:

- How to Create a Custom Application
- Exporting Workspaces, Applications, and App Components
- Importing Export Files
- Installing Exported Applications in a Runtime Environment in Oracle APEX Administration Guide

## 24.3.4.2 Installing an Application Export from the Export Repository

If you did not install your Application Export after importing, you can install it in the Export Repository.

To install an Application Export from the Export Repository:

- 1. Navigate to the Export Repository:
  - a. On the Workspace home page, click the App Builder icon.
  - **b.** Select an application.
  - c. On the Application home page, click Utilities.
  - d. Click Export Repository.
- 2. Find the application export and click **Install** in the Action column.
- 3. In the Install wizard:
  - **Parsing Schema** Select a schema. After the installation finishes successfully, this will be used to set the owner of the application.
  - **b. Build Status** Set the build status of the application. Options include:
    - Run Application Only Users can only run an application.
      - Selecting **Run Application Only** is an effective way to protect an application from modifications from other developers.
    - Run and Build Application Users can run an application and developers can both run and edit an application.



#### Tip:

If you select **Run Application Only**, you can only change this setting after you import the application by signing in to Administration Services.

- c. Install As Application Options include:
  - Auto Assign New Application ID A new application ID will be created for you.
  - Reuse Application ID From Export File The existing application ID will be used.
  - Change Application ID Specify a new application ID.

You must specify an application ID that is unique across all APEX workspaces.

d. Click Install Application.

The application installs.

## 24.3.4.3 Installing Other Files from the Export Repository

If you did not install your Export Files after importing, you can install them in the Export Repository.

To install other Export Files stored in the Export Repository:

- Navigate to the Export Repository:
  - a. On the Workspace home page, click the App Builder icon.
  - b. Select an application.
  - c. On the Application home page, click **Utilities**.
  - d. Click Export Repository.



- 2. Select the file to be installed and click **Install** in the Action column.
- **3.** Follow the on-screen instructions. The steps differ slightly depending upon the export type.

## 24.3.4.4 Deleting Files from the Export Repository

Delete Export Files from the Export Repository.

To delete Export Files stored in the Export Repository:

- 1. Navigate to the Export Repository:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Utilities**.
  - d. Click Export Repository.
- 2. Select the file to be deleted and click **Delete Checked**.

## 24.3.4.5 Installing Export Files from SQL\*Plus

Install Export Files from SQL\*Plus.

#### Restrictions When Installing Export files from SQL\*Plus

When installing Export files from SQL\*Plus, the Export File must originate from the same user database account as the one into which you are installing. The following restrictions applies to application exports. The application is overwritten. Therefore, the target workspace must own the ID of the application being installed.

To install Export Files from SQL\*Plus:

- Start SQL\*Plus and connect to the database where Oracle APEX is installed with the default schema for the workspace you are installing into:
  - On Windows:

```
SYSTEM_DRIVE:\ sqlplus /nolog
SQL> CONNECT <Default_Schema>
Enter password: Default Schema Password
```

On UNIX and Linux:

```
$ sqlplus /nolog
SQL> CONNECT < Default_Schema>
Enter password: Default Schema Password
```

2. Run the export file.

```
SQL> @f144.sql
```

For example, if your export file is names f144.sq1 by default, you would type @f144 at the command prompt.



# 24.4 How to Create a Custom Application

Simplify the steps needed to deploy an application by creating a custom application using the Supporting Objects utility.

- How Creating a Custom Application Simplifies Deployment
   Simplify the process of deploying an application by creating a custom application using the Supporting Objects utility.
- Creating a Custom Application
   Learn how to create a custom application.
- Installing Supporting Objects
   Learn how to install supporting objects.
- Deleting Supporting Objects Scripts, Messages, and Installation Options
   Learn about deleting supporting objects scripts, messages, and installation options.
- Upgrading a Custom Application
   Define scripts to upgrade a previously published application on the Upgrade page.
- Deinstalling Supporting Objects
   Learn how to deinstall supporting objects.
- Viewing an Install Summary Viewing an Install Summary log.

### See Also:

- Exporting and Importing from App Builder
- Exporting Workspaces, Applications, and App Components

# 24.4.1 How Creating a Custom Application Simplifies Deployment

Simplify the process of deploying an application by creating a custom application using the Supporting Objects utility.

From a developer's perspective, importing and installing an application is a complicated process. First, you create the target database objects and seed data. Second, you import and install the application definition and all related files, including images, themes, and any other required static files.

Creating a custom application using the Supporting Objects utility greatly simplifies this process. Instead of performing numerous steps to create the database objects and then import and install the application and all supporting files, you can define the supporting objects so that the application and supporting files can be migrated in a few easy steps.

After users import and install the application definition, a wizard guides them through a few simple configuration steps. Then, the wizard asks whether to install the supporting application objects. Users have the option of installing the supporting application objects then or doing it later.

From a developer's perspective, creating a custom application has the following advantages:



- Ensures that the supporting objects are created in the correct order.
- Provides an automated process for deploying an application quickly using very few steps.
- Gives users the option to install supporting application objects when they import and install the application definition or at a later time.
- Enables users and developers with a convenient method for removing the application definition, supporting files, and all database objects.
- Provides users and developers with an easy way to upgrade a previously released custom application.

Plus, you can also take advantage of the Deinstall and Install features to quickly edit the underlying database objects that support an application. For example, you can deinstall and remove all database objects, edit the underlying database object creation scripts, and reinstall to create the redefined application objects.

### See Also:

- Installing Supporting Objects
- Deinstalling Supporting Objects
- Upgrading a Custom Application

## 24.4.2 Creating a Custom Application

Learn how to create a custom application.

To create a custom application, you must create installation scripts that define your application's supporting objects (including database objects, images, and seed data) and any preinstallation validations. You define these objects and the installation and deinstallation scripts and the messages that display when the user installs or deinstalls on the Supporting Objects page.

- Accessing the Supporting Objects Utility
   Create a custom application on the Supporting Objects utility page.
- Supporting Objects Page
   Learn about the Supporting Objects page.

## 24.4.2.1 Accessing the Supporting Objects Utility

Create a custom application on the Supporting Objects utility page.

To access the Supporting Objects Page utility:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.

The Application home page appears.

3. Click the Supporting Objects icon.

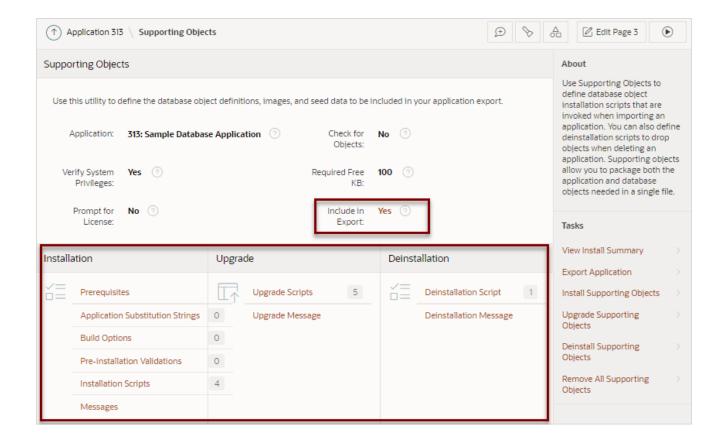
The Supporting Objects page appears.



### 24.4.2.2 Supporting Objects Page

Learn about the Supporting Objects page.

The top of the Supporting Objects page displays the application name and indicates current selections for the following: Check for Objects, Verify System Privileges, Required Free KB, Prompt for License, and Include in Export. To learn more about these options, see field-level Help.



To specify whether to include supporting objects with an application export, find **Include in Export** at the top of the page, click either **Yes** or **No**. If you select **Yes**, a new page appears. From the **Include Supporting Object Definitions in Export** list, make a new selection and click **Apply Changes**.

The rest of the page is divided into the following categories: Installation, Upgrade, and Deinstallation.

- Installation
   Learn about the links under Installation on the Supporting Objects page.
- Upgrade
   Learn about the links under Upgrade on the Supporting Objects page.
- Deinstallation
   Learn about the links under Deinstallation on the Supporting Objects page.

Viewing Field-level and Page Designer Help

### 24.4.2.2.1 Installation

Learn about the links under Installation on the Supporting Objects page.

Use the links under Installation to define the following types of information:

- Prerequisites. Defines built-in checks required before installing the application, such as required free disk space, required system privileges, and schema object restrictions.
- Application Substitution Strings. Lists static substitution strings defined for the application. You can define static substitution strings for phrases or labels that occur in many places within an application.
  - When packaging an application, you can include prompts for substitution strings which users can specify when they install the custom application.
- **Build Options**. Lists build options defined for this application. You can use build options to conditionally display specific functionality within an application.
  - When packaging an application, you can include prompts for specific build options which display when the application is installed.
- Pre-installation Validations. Lists validations defined for the custom application.
   Similar to normal page validations, these validations prevent a user from installing database objects if the user-defined conditions are not satisfied. To create a new validation, click Create and follow the on-screen instructions.
- Installation Scripts. Enables a you to define multiple installation scripts that install supporting objects for the application. To create a new script, click Create and follow the on-screen instructions. To edit an existing script, click the Edit icon. To prevent another developer from editing a script, click the Lock icon. If the script is locked, the Lock icon appears as a closed padlock. If the script is unlocked, the Lock icon appears as an open padlock.

Note:

The Data Package installation script type requires Oracle Database 18c and later.

Messages. Enables you to define messages that display when the user installs or deinstalls the application. Supported HTML tags include <b>, <i>, <u>, , <br>, <hr>, , , , and .

When these messages display, only a limited set of HTML tags are recognized to prevent a cross site-scripting (XSS) attack.



- Substitutions
- Using Build Options to Control Configuration
- Exporting Build Options or Build Option Status
- Understanding Cross-Site Scripting Protection

### 24.4.2.2.2 Upgrade

Learn about the links under Upgrade on the Supporting Objects page.

Use the links under Upgrade to define the following types of information:

- Upgrade Scripts. Click Upgrade Scripts to define scripts to upgrade database objects, images, and seed data when upgrading an existing application.

When these messages display, only a limited set of HTML tags are recognized to prevent a cross site-scripting (XSS) attack.

### See Also:

- Upgrading a Custom Application
- Understanding Cross-Site Scripting Protection

### 24.4.2.2.3 Deinstallation

Learn about the links under Deinstallation on the Supporting Objects page.

Use the links under Deinstallation to define the following types of information:

- Deinstallation Script. Click Deinstallation Script to define a script to drop database objects and static files created by the installation scripts. To edit an existing script, click the Edit icon.

When these messages display, only a limited set of HTML tags are recognized to prevent a cross site-scripting (XSS) attack.



**Understanding Cross-Site Scripting Protection** 

# 24.4.3 Installing Supporting Objects

Learn how to install supporting objects.

After you edit your supporting objects and create the appropriate scripts, you can run your installation scripts by clicking **Install Supporting Objects** on the Tasks list.

End users can also use this feature if they elect to not install the custom application (or supporting objects) after they import and install the application definition.

To install supporting objects:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Supporting Objects.

The Supporting Objects page appears.

- 4. Click the Install Supporting Objects on the Tasks list.
- 5. To view details about the installation script before running it, expand the Tasks region and click **Preview Installation Script**.

The Preview Scripts page appears listing summary information, prerequisites, and the actual scripts to be run.

- 6. To exit the Preview Scripts page and continue, click **Close**.
- 7. From Install Supporting Objects, set to **On** and click **Next**.
- 8. Follow the on-screen instructions.

# 24.4.4 Deleting Supporting Objects Scripts, Messages, and Installation Options

Learn about deleting supporting objects scripts, messages, and installation options.

You can delete the metadata that defines supporting object scripts, messages, and installation options associated with a custom application by clicking **Remove Supporting Object Installation** on the Tasks list on the Supporting Objects page.

To delete the metadata that defines supporting object scripts, messages, and installation options:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. Click Supporting Objects.

The Supporting Objects page appears.

 On the Tasks list on the right side of the page, click Remove Supporting Object Installation. 5. Follow the on-screen instructions.

# 24.4.5 Upgrading a Custom Application

Define scripts to upgrade a previously published application on the Upgrade page.

- Defining an Upgrade Script
   Create an upgrade script to upgrade database objects, images, and seed data when upgrading an existing application.
- Upgrading a Custom Application
   Learn how to upgrade a custom application.

## 24.4.5.1 Defining an Upgrade Script

Create an upgrade script to upgrade database objects, images, and seed data when upgrading an existing application.

To create an upgrade script:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. Click Supporting Objects.

The Supporting Objects page appears.

- 4. Under Upgrade, click Upgrade Scripts.
- 5. Use the Detect Existing Supporting Objects section to determine if the appropriate objects are installed or must be upgraded.
- 6. In Query to Detect Existing Supporting Objects, enter a query in the field that returns at least one row if the supporting objects exist.

This query determines whether the user who installs the custom application is prompted to run the installation scripts or the upgrade scripts.

7. To create a script, click **Create**.



### Tip:

To enable users to upgrade from various earlier versions of this application, you can add conditions to the upgrade scripts by going to the Script Properties page.

8. To prevent another developer from editing a script, click the **Lock** icon.

If the script is locked, the Lock icon appears as a closed padlock. If the script is unlocked, the Lock icon appears as an open padlock.

- 9. To edit an existing script, click the **Edit** icon.
- 10. Follow the on-screen instructions.



### 24.4.5.2 Upgrading a Custom Application

Learn how to upgrade a custom application.

After you create your upgrade script, you can test it by clicking **Upgrade Supporting Objects** on Tasks list on the Supporting Object page. End users can also use this feature to upgrade an existing custom application.

To upgrade a custom application:

- 1. Import a new version of application to be upgraded (if applicable).
- 2. On the Workspace home page, click the App Builder icon.
- 3. Select the application.
- 4. Click Supporting Objects.

The Supporting Objects page appears.

- From the Tasks list, click Upgrade Supporting Objects.
- **6.** Follow the on-screen instructions.



Importing an Application, Page or Component Export

# 24.4.6 Deinstalling Supporting Objects

Learn how to deinstall supporting objects.

Once you create or install a custom application, you can deinstall it by either:

- Clicking the Deinstall Supporting Objects on the Supporting Objects page.
- Clicking Delete this Application on the Application home page.

When you deinstall an application, you have the option of removing the current application definition and running the deinstallation script defined in the Supporting Objects.

To deinstall a custom application:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Supporting Objects.

The Supporting Objects page appears.

- 4. From the Tasks list, click **Deinstall Supporting Objects**.
- 5. Select a deinstallation option:
  - Remove Application Definition removes the current application definition.
  - Deinstall Database Objects runs the deinstallation script defined in the deployment attributes for this application.



Follow the on-screen instructions.



Creating a Custom Application

# 24.4.7 Viewing an Install Summary

Viewing an Install Summary log.

You can view a log of recent installation and deinstallation by clicking **View Install Summary** on the Tasks list on the Supporting Objects page. Note that this log only displays results from the most recent installation or deinstallation that occurred during the current Oracle APEX session.

To view the Install Summary:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. Click Supporting Objects.

The Supporting Objects page appears.

On the Tasks list on the right side of the page, click View Install Summary.
 A Summary page appears.

# 24.5 Using Build Options to Control Configuration

Use build options to conditionally include or exclude application components and functionality.

About Build Options

Creating Build Options

Create build options by selecting the application and accessing Build Options on the Shared Components page.

Including or Excluding Build Options

Specify **Include** to enable a component and include it with the application. Specify **Exclude** to disable a component and exclude it from the application.

Selecting a Build Option

Apply build options to a page, component, page control, or shared component in Page Designer.

Deleting Build Options and Associated Components

Delete a build option by first removing the associated components and then deleting the build option.



### Viewing Build Option Reports

Access the Utilization report where build options are utilized in the current application. View the History report to see what modifications have been made to build options in the current application.

Exporting Build Options or Build Option Status
 Export build option status to toggle build options on or off within another environment.

# 24.5.1 About Build Options

Build options enable developers to enable or disable application components and functionality when the application installs or at runtime using the APEX\_UTIL.GET\_BUILD\_OPTION\_STATUS and APEX\_UTIL.SET\_BUILD\_OPTION\_STATUS APIs.

You can apply build options to most application components (such as pages, regions, items, validations, and so on) and specify whether to include or exclude them in the runtime application.

Build options have two possible values:

- **Include** Application components are enabled and included with the application.
- Exclude Application components are disabled and excluded from the application.

If you specify **Include**, then the Oracle APEX engine considers the component as part of the application definition at runtime. Conversely, if you specify **Exclude**, then the APEX engine treats the component as if it did not exist.

```
See Also:

APEX_UTIL.GET_BUILD_OPTION_STATUS and

APEX_UTIL.SET_BUILD_OPTION_STATUS in Oracle APEX API Reference
```

#### Use Case 1: Enable and Disable Functionality Based on Installation Type

You are developing an application that has many installation types. For each installation type, users may choose to enable or disable certain application functionality. With build options, you can develop one application and when it installs, you can configure build options to include or exclude associated functionality. You may also use an API to expose features within the application. This enables privileged end users to selectively enable or disable application functionality.

#### Use Case 2: Hiding Incomplete Functionality in Various Environments

You are developing functionality which is not yet complete, so you do not wish to expose it to end users. You can use build options to disable functionality when the application is built for test and production environments. The benefit of this approach is that the application can still be deployed without including incomplete functionality.

### Use Case 3: Determining the Consequences of Removing Functionality

You are removing functionality you think is not needed by the application, but are unsure if removing the functionality is a safe operation. In this case, you can use build

options to essentially "comment out" specific functionality. When the application is deployed and you determine the functionality is necessary, you can re-instate it. If the functionality is deemed as unnecessary, you can then safely remove it from the application.

# 24.5.2 Creating Build Options

Create build options by selecting the application and accessing Build Options on the Shared Components page.

To create a build option:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
- 4. Under Application Logic, click **Build Options**.
- 5. To create a new build option, click **Create**.
- Under Attributes:
  - a. Application Identifies the application to which this build option applies.
  - b. Build Option Enter a descriptive name for this build option. Build options are predefined settings that determine whether or not components within an application are enabled.
  - c. Status Options:
    - **Include** Include this feature or component. Associated application components are enabled and included with the application.
    - **Exclude** Do not include this feature or component. Associated application components are disabled and excluded from the application.
  - Default on Export When this application is exported, set the build option to this
    value.
  - e. On Upgrade Keep Status Select whether the build option status in the deployed application should be kept, or overwritten with the specified status when the application is upgraded. On keeps the deployed status and is useful if the application supports build option configuration (using the APEX\_UTIL.SET\_BUILD\_OPTION\_STATUS API) to enable or disable the build option in the deployed application, and where you want to respect those settings upon upgrade.
  - f. Comments Enter any comments or notes. These comments never display when running the application.
- 7. Click Create Build Option.

# 24.5.3 Including or Excluding Build Options

Specify **Include** to enable a component and include it with the application. Specify **Exclude** to disable a component and exclude it from the application.

Build options have two possible values: **Include** and **Exclude**. If you specify an attribute as being included, then the Oracle APEX engine considers it part of the application definition at runtime. Conversely, if you specify an attribute as being excluded, then the APEX engine treats it as if it did not exist.



To include or exclude a build option:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
- 4. Under Application Logic, click **Build Options**.

The Build Options page appears.

5. Select a build option Name.

The Create/Edit Build Option page appears.

- 6. For Status, select either:
  - **Include** Include this feature or component. Associated application components are enabled and included with the application.
  - **Exclude** Do not include this feature or component. Associated application components are disabled and excluded from the application.
- 7. Edit any additional attributes as needed.

To learn more about an attribute, see field-level Help.

8. To save your changes, click Apply Changes.

### See Also:

APEX\_UTIL.GET\_BUILD\_OPTION\_STATUS and APEX\_UTIL.SET\_BUILD\_OPTION\_STATUS in Oracle APEX API Reference

# 24.5.4 Selecting a Build Option

Apply build options to a page, component, page control, or shared component in Page Designer.

Once you create a build option, you can select it for a page, a component (report, chart, or form), a specific page control (button, item, list of value), and another shared component (breadcrumb, list, or tab). You apply build options to a page, component, page control, or shared component by navigating to the appropriate page. In Page Designer, select the page, component, control, or shared component and find **Configuration**, **Build Option**.

# 24.5.5 Deleting Build Options and Associated Components

Delete a build option by first removing the associated components and then deleting the build option.

- Removing Components Associated with a Build Options
   Learn how to remove components associated with a build options.
- Deleting Build Options Permanently
   Learn how to delete build options permanently.



### 24.5.5.1 Removing Components Associated with a Build Options

Learn how to remove components associated with a build options.

Removing components associated with a build option permanently deletes them.

To remove components associated with a build option:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
- 4. Under Application Logic, click Build Options.

The Build Options page appears.

5. Select the build option .

The Create/Edit Build Option page appears. Note that Associated Components display at the bottom of the page.

6. Scroll down to Associated Components and click Remove Components.

A verification window appears.

7. Click Yes - remove components and then click Remove Components.

The components are removed.

### 24.5.5.2 Deleting Build Options Permanently

Learn how to delete build options permanently.



### Tip:

Deleting a build option does not delete the Associated Components. Before deleting a build option, review the Associated Components to determine if the components should be removed.

To delete a build option:

- 1. On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
- 4. Under Application Logic, click **Build Options**.

The Build Options page appears.

5. Select the build option.

The Create/Edit Build Option page appears.

6. Click Delete.

A verification window appears.

Click Delete Build Option.



The build option is removed.

# 24.5.6 Viewing Build Option Reports

Access the Utilization report where build options are utilized in the current application. View the History report to see what modifications have been made to build options in the current application.

- Viewing Build Option Utilization
   View the Build Option Utilization report.
- Viewing Build Option History
   View the Build Option History report.

### 24.5.6.1 Viewing Build Option Utilization

View the Build Option Utilization report.

Once you create a build option, a Utilization tab appears on the Build Options page. The Build Option Utilization report details build option utilization in the current application.



The Utilization tab only appears on the Build Options page after you create a build option.

To view the Build Option Utilization report:

- On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
- 4. Under Application Logic, click Build Options.
- On the Build Options page, click **Utilization**.The Build Option Utilization report appears.
- 6. Select a build option and click Go.

## 24.5.6.2 Viewing Build Option History

View the Build Option History report.

To view the Build Option History report:

- On the Workspace home page, click the App Builder icon.
- 2. Select an application.
- 3. On the Application home page, click **Shared Components**.
- Under Application Logic, click Build Options.
- On the Build Options page, click History.



The Build Option History report appears.

# 24.5.7 Exporting Build Options or Build Option Status

Export build option status to toggle build options on or off within another environment.

You can export build options or build option status on the Component Export page. For example, you can use this feature to deploy a production application with a hidden feature by associating the components of the hidden feature with a build option having the status of <code>EXCLUDE</code>. After deployment, you can enable the hidden feature by changing the status of the build option to <code>INCLUDE</code> and then exporting the Build Option Status.

Once you apply the Build Options Status to the production instance, the new feature appears.

To export build options or build option status:

- 1. Navigate to the Component Export page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Click Shared Components.
  - d. From the Tasks list, click **Export Application Components**.

The Components Export page appears with the **Build Options Status** tab selected.

- 2. On Build Options Status:
  - a. Rows Select the number of items to display and click Go.
  - b. Select the Build Options to include and click **Add to Export**.

The selected Build Options display under **Components to Export**.

- Click Next.
- 4. For Component Export:
  - a. Export as Zip Options include:
    - **On** Choose **On** to export the application as a ZIP archive containing separate files for each component.
    - Off Choose Off to export as a single SQL file containing all the selected components.



#### Tip:

To learn more about the Zip archive, see Splitting Export Files into Separate Scripts.

**b. As of** - Specify a time in minutes to go to back to for your export. This option enables you to go back in time in your application, perhaps to get back a deleted object.

This utility uses the DBMS\_FLASHBACK package. Because the timestamp to System Change Number (SCN) mapping is refreshed approximately every five minutes, you may have to wait that amount of time to locate the version for which you are looking. The time undo information is retained and influenced by the startup parameter UNDO\_RETENTION (the default is three hours). However, this only influences the size of the undo tablespace. While two databases may have the same UNDO\_RETENTION parameter, you are able to go back further in time on a database with fewer



transactions because it is not filling the undo tablespace, forcing older data to be archived.

- c. File Character Set Indicates the character set in which the export file will be encoded. When importing this file you will need to specify the same character set.
- d. Click Export Components.



### Tip:

For translated applications, the Export Translations field displays. To export the selected shared components for the primary language application and all translated applications, from Export Translations field, select **Yes**. To ensure text strings and markup are up-to-date, remember to synchronize the translated applications prior to exporting the translated components.

### See Also:

- Importing Export Files
- How to Create a Custom Application

# 24.6 About Publishing an Application URL

Once you deploy your application, load the data, and create users, you can publish your production URL.

### **Finding Your Production URL**

You can determine the production URL for your application by either:

- Selecting the application on the Application home page and right-clicking the Run button. Then, select Copy link address or Copy link location depending on your browser.
- Running the application and then copying the URL.

The Run button gets its value from the Home link attribute on the Edit Security Attributes page. This link is only referenced by this icon and by applications that do not use the Oracle APEX Login API.

### Friendly URL Syntax Example

Consider the following example:

http://apex.somewhere.com/ords/example/r/hr-app/update-employees?session=13766599855150

Where:



- apex.somewhere.com is the URL of the server.
- ords is the service name defined when configuring Oracle REST Data Services.
- example is the Path Prefix which is URI path prefix used to access RESTful Services. When you create a workspace, this value defaults to workspace name.
- r is the router shortcut.
- hr-app is the Application Alias. In a new application, the Application Alias defaults to the application Name.
- update-employees is the Page Alias. In a new application, the Page Alias defaults to the page Name.
- ?session=13766599855150 is the session ID. When you run an application, the APEX engine generates a session number that serves as a key to the user's session state.

To run this example, a user would use the URL:

http://apex.somewhere.com/ords/example/r/hr-app/update-employees

### f?p URL Syntax Example

Consider the following example:

http://apex.somewhere.com/ords/f?p=11563:1:3397731373043366363

#### Where:

- apex.somewhere.com is the URL of the server.
- ords is the service name defined when configuring Oracle REST Data Services.
- f?p= is a prefix used by Oracle APEX.
- 11563 is the application being called.
- 1 is the page within the application to be displayed.
- 3397731373043366363 is the session number.

To run this example, a user would use the URL:

http://apex.somewhere.com/pls/apex/f?p=11563:1



### Tip:

When users sign in, they receive unique session numbers. This number displays at the end of the URL. Do not include the session number as part of the URL. When another user tries to run a URL containing a session ID, an error displays.



**Understanding URL Syntax** 



# 24.7 Understanding One-Click Remote Application Deployment

Deploy an application to remote Oracle APEX instances using REST Enabled SQL references.

- About One-click Remote Application Deployment
   One-click remote application deployment leverages the existing REST Enabled
   SQL references that works with a Oracle REST Data Services (ORDS) REST
   Enabled SQL Service.
- Remotely Deploying an Application
   Access the Remote Deployment option from the Export/Import option in App Builder.



Managing REST Enabled SQL References

# 24.7.1 About One-click Remote Application Deployment

One-click remote application deployment leverages the existing REST Enabled SQL references that works with a Oracle REST Data Services (ORDS) REST Enabled SQL Service.

One-click remote application deployment is authenticated through first party authentication (Basic Authentication), Schema Authentication (database username and password), or OAuth 2 Client Credentials. When you create a REST Enabled SQL reference in Shared Components, you either specify an existing credential, or create a new credential. Optionally create the credentials as empty credentials to prompt for client ID and client secret each time the REST Enabled SQL reference is used.



Oracle recommends always using empty credentials for remote application deployment in shared development environments so only those with the knowledge of those credentials can deploy applications or run SQL or PL/SQL on the REST Enabled SQL reference.

# 24.7.2 Remotely Deploying an Application

Access the Remote Deployment option from the Export/Import option in App Builder.

To remotely deploy an application:

Create an application.



- 2. Optional: Create supporting object installation scripts to create the underlying table and insert the rows.
- 3. Navigate to the Remote Deployment page:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Export/Import**.
  - d. Click Remote Deployment.
- On Deployment Server, select an existing REST Enable SQL Service or click the plus (+) icon to create a new one.
- 5. To create a new REST Enable SQL Service:
  - a. Click the plus (+) icon.
  - b. Name Enter a descriptive name for this REST Enabled SQL Service.
  - c. Endpoint URL Enter the base URL for this REST Enabled SQL Service. Include the ORDS context root and schema URL prefix, (for example, https://host:port/ords/schema, but do not add / /sql.
  - d. Click Next.
  - **e. Credentials** Select the credential to authenticate against. To edit an existing credential, navigate to Credentials in Shared Components.

To create new credentials, enter a Credential Name and select an Authentication Type.

- f. Click Create.
- 6. On Remote Deployment:
  - a. Deployment Server Select an existing REST Enable SQL Service.
  - **b. Client ID** For Basic Authentication, enter the database user name. For OAuth2, enter the client ID.

This information will not be encrypted. User names for Basic Authentication are converted to upper case. To include a case-sensitive user name, prefix it with the exclamation mark (!).

- **c. Client Secret** Enter the password or OAuth2 Client Secret. This information is stored encrypted and cannot be retrieved in clear text.
- d. Click Next.

The Remote Deployment Options page appears.

- 7. Under Deploy Application:
  - a. Build Status Set the build status of the application. Options include:
    - Run Application Only Users can only run an application. This option is an
      effective way to protect an application from modifications from other developers.
    - Run and Build Application Developers and users can both run and develop the application.

This setting can be changed when importing using the APEX Web interface but not the command line interface.

**b. As of** - Specify a time in minutes to go to back to for your export. This option enables you to go back in time in your application, perhaps to get back a deleted object.



This utility uses the <code>DBMS\_FLASHBACK</code> package. Because the timestamp to System Change Number (SCN) mapping is refreshed approximately every five minutes, you may have to wait that amount of time to locate the version for which you are looking. The time undo information is retained and influenced by the startup parameter <code>UNDO\_RETENTION</code> (the default is three hours). However, this only influences the size of the undo tablespace. While two databases can have the same <code>UNDO\_RETENTION</code> parameter, you are able to go back further in time on a database with fewer transactions because it is not filling the undo tablespace, forcing older data to be archived.

- 8. Under Export Preferences:
  - a. Export Supporting Object Definitions Supporting object definitions include all configuration options and scripts and enable an application export to include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file. Options include:
    - Yes Includes supporting object definitions in the application export. Does not automatically load supporting objects when invoked from a command line.
    - **No** Does not include the supporting object definitions in the export.
    - Yes and Install on Import Automatically Includes supporting object definitions and a call to install supporting objects in the application export.
  - b. Export Public Reports Specify whether to include public reports with your application. Public reports are the public shared report settings saved by users from an interactive report or interactive grid.
    - **On** Include public reports in the application export.
    - Off Do not include public reports in the application export.
  - **c. Export Private Reports** Specify whether to include private reports with your application. Private reports are the private customized settings saved by users from an interactive report or interactive grid.
    - On Include private reports in the application export.
    - Off Do not private public reports in the application export.
  - d. Export Report Subscriptions Specify whether to include interactive report or interactive grid subscription settings with your application. This will be limited to the unexpired subscription settings of all users for all interactive reports or interactive grids in the application.
    - **On** Include report subscriptions for the reports you are exporting in the application export.
    - Off Do not include report subscriptions for the reports in the application export.
  - **e. Export Developer Comments** Specify whether to include Developer Comments in your application export.
    - **On** Include Developer Comments in the application export.
    - Off Do not include Developer Comments in the export.
  - Export Translations Specify whether to include translations with your application export. Translation Text Messages and Dynamic Translations are always included in the application export.



- **On** Include the translation mappings and all text from the translation repository.
- Off Do not include translation mappings or the translation repository.
- 9. On Deployment Overrides:
  - a. Owner Override Use this attribute to import this application into the available schemas defined by your REST Enabled SQL connection. If there are no entries to select, then this connection is not mapped to any workspaces, and you will not be able to deploy the application.
  - b. Workspace Override Select the workspace where the application should be deployed from the list. If there are no entries in the list, then the database user associated with the REST Enabled SQL connection is not mapped to any workspaces.
  - **c. Overwrite Existing Application** Specify whether to overwrite the application on the target system. Available options include:
    - On- The application will be deployed with the same application ID as this
      application and the application will be overwritten on the target system.
    - Off You must specify the application ID for the target system.
  - **d. Application ID Override** Specify a new application ID for the application on the target system.
  - e. **Application Alias Override** Specify a new alternate alphanumeric application identifier. You can use this identifier in place of the application ID. The value is defaulted to the application alias of the current application.
- 10. Click Deploy.

#### Note:

- Creating Applications
- Installing Supporting Objects



# Managing Application Legacy Components

Although Oracle still supports legacy application components, Oracle does not recommend using them.

- Viewing Legacy Components in the Gallery
   View legacy and unsupported components in the Page Designer Gallery by selecting the Gallery Menu and then Show Legacy Components.
- Managing Legacy Calendars
   Legacy calendars are template-based. In previous releases Legacy Calendar was referred to as Calendar (Template, Classic calendar, Easy calendar, and SQL calendar).
- Managing Applications with Legacy Data Loading Capability
   Applications with legacy data loading capability enable end users to dynamically import data into a table within any schema to which they have access.
- Managing Legacy Tabular Forms
   A legacy tabular form enables users to update multiple rows in a table at once from a single page.
- Managing Legacy Web Services
   Legacy Web services enable applications to interact with one another over the web in a platform-neutral, language independent environment.

# 25.1 Viewing Legacy Components in the Gallery

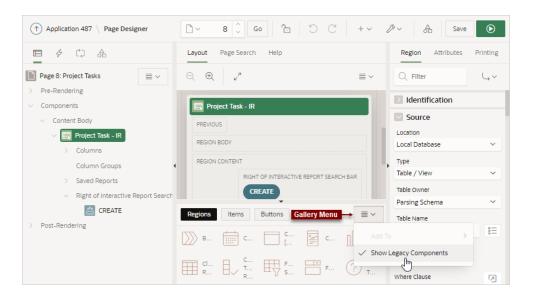
View legacy and unsupported components in the Page Designer Gallery by selecting the **Gallery Menu** and then **Show Legacy Components**.

To view legacy components in the gallery:

- 1. Navigate to the Workspace home page.
- 2. Click the App Builder icon.
- 3. Select an application.
- 4. Select a page.

The page appears in Page Designer.

5. Click Gallery Menu and select Show Legacy Components.



# 25.2 Managing Legacy Calendars

Legacy calendars are template-based. In previous releases Legacy Calendar was referred to as Calendar (Template, Classic calendar, Easy calendar, and SQL calendar).



### Tip:

Legacy calendars are legacy application components. Although Oracle still supports legacy components, the creation of new calendars is based on the FullCalendar jQuery library.

- Editing Legacy Calendar Attributes
   Learn about editing legacy calendar attributes.
- About Supported Legacy Calendar Substitution Strings
   Learn about about supported legacy calendar substitution strings.

# 25.2.1 Editing Legacy Calendar Attributes

Learn about editing legacy calendar attributes.

To edit calendar Attributes:

- 1. View the page containing the calendar in Page Designer:
  - a. On the Workspace home page, click the **App Builder** icon.
  - b. Select an application.
  - c. Select a page.

Page Designer appears.

In the Property Editor, attributes are organized into groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.



#### Tip

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

- 2. To edit the Region attributes.
  - a. In the Rendering tab, locate and select the calendar.
  - b. In the Property Editor, review and edit the attributes on the Region tab.
- 3. To edit the calendar Attributes.
  - a. In the Rendering tab, locate and select the calendar.
  - **b.** In the Property Editor, review and edit the attributes on the Attributes tab.
- 4. To save your changes click **Save**. To save and run the page, click **Save and Run Page**.

# 25.2.2 About Supported Legacy Calendar Substitution Strings

Learn about about supported legacy calendar substitution strings.

App Builder supports many date format substitution strings. You can view a complete list of supported substitution strings on the Calendar Templates page.

To view a list of supported substitution strings for calendars:

- **1.** Navigate to the appropriate calendar template.
- 2. View the Substitution Stings list on the right side of the page.



Using Themes and Theme Styles

# 25.3 Managing Applications with Legacy Data Loading Capability

Applications with legacy data loading capability enable end users to dynamically import data into a table within any schema to which they have access.

- Comparing Legacy Data Loading and New Data Loading
   Learn about the differences between legacy data loading and new data loading
- About Creating a Legacy Data Load Wizard
   Create a Data Load Wizard by running the Create Page Wizard and creating a Data Load page.
- Creating a Legacy Data Load Page
   To create a legacy Data Load Wizard, a developer creates a Data Load page with the Create Page Wizard.



- Re-creating Legacy Data Load Pages
   To make changes to existing legacy Data Load pages, Oracle recommends recreating new pages without deleting the data loading definitions.
- Editing a Legacy Data Load Definition
   Edit the Data Load Definition in Shared Components.

# 25.3.1 Comparing Legacy Data Loading and New Data Loading

Learn about the differences between legacy data loading and new data loading

Oracle APEX includes two types of data loading: new data loading and legacy data loading. The new data loading has many benefits over legacy data loading.

Benefits of new data loading include:

- New application data loading supports CSV, XLSX, XML, and JSON formats.
- Column mapping occurs at design time, removing the burden for end users.
- Flexible column mappings based on simple names or regular expressions.
- Data conversion with transformation rules or lookup gueries.
- Easy work flow for end users: upload the file, verify the preview, and load data.
- CSV, XLSX, XML, and JSON data formats can be loaded to tables or collections.
- Configure data loading to Append, Merge or Replace data, with or without Error Handling.
- Simple new Process Type Data Loading: Customize Data Loading pages as you wish.
- APEX DATA LOADING PL/SQL API available for custom processing.
- Maximum number of columns to load is 300. Note that Legacy data load supports up to 45.



Creating Applications with Data Loading Capability

# 25.3.2 About Creating a Legacy Data Load Wizard

Create a Data Load Wizard by running the Create Page Wizard and creating a Data Load page.

During the process of creating the Data Load page, developers can specify the upload table and its unique columns, table lookups, and data transformation rules.



### Note:

A Data Load Wizard is not designed or intended to load hundreds of thousands of rows of data. While it is possible to use a Data Load Wizard to load this high volume of data, you may encounter performance issues with both transmitting and loading large data files. Tools like Oracle SQL Developer and Oracle SQL\*Loader are better suited to loading large volumes of data.

The Data Load Wizard includes support for the following:

- Table Definitions This definition specifies the data upload table name with its unique key columns.
- Data Transformation Rules For formatting transformations such as changing import data
  to uppercase, lowercase, and so on, you must define data transformation rules. For
  example, if the import file includes column data with both upper and lowercase and the
  upload table requires all uppercase, you can define a data transformation rule to insert
  only uppercase into the target column.
- Table Lookups If data existing in the import file must be mapped to data in another table, specify a table lookup to perform the mapping. For example, if the import file contains a department name for the DEPTNO column but the upload table requires a number for that column, use a table lookup rule to find the corresponding department number for that department name in another table.
- Column Name Aliases There are many situations when a developer does not wish to
  expose the table column names to the end user, or to expose all columns to the end user.
  In those situations, you can create a column aliases for the columns that need to
  exposed.
- Manage Concurrency If multiple users are uploading data at the same time, developers
  can use extra column to track the version of data in the underlying table. The Data Load
  Wizard can use this column to check and signal the end user if anyone else is working
  with the same data at the same time. This is particularly important if uploading into a
  table that is regularly updated.
- Multiple Spreadsheet Columns There are many situations when a spreadsheet to be
  uploaded has multiple columns that the developer wants to concatenate and upload in to
  one table column (for example FirstName and LastName on spreadsheet can be uploaded
  into ENAME of the EMP table).
- Skip Validation You can improve data loading performance when uploading a large number of records by skipping the validation step. If uploading thousands of records, the end user might not be interested in validating each record. If you are certain that each record will be inserted as new record, the data loading process does not need to check for duplicates.

The newly generated Data Load Wizard consists of four pages that provide users with the ability to upload data from a file or by copy and paste, define data and table mappings, validate the data, and finally to upload the data to the table. The developer can later edit the Data Load Wizard's definitions such as table lookups and data transformation rules, by accessing Shared Components, Data References, Data Load Definitions.

### **Supported Data Types**

Data Load Wizards support the following data types:



- VARCHAR2
- DATE
- TIMESTAMP
- NUMBER

#### **Unsupported Data Types**

Data Load Wizards do not support the following data types:

- Large objects (BLOB and CLOB)
- Complex types (XMLTYPE and SDO GEOMETRY)
- CHAR

### See Also:

- Creating a Legacy Data Load Page
- · Editing a Data Load Definition

# 25.3.3 Creating a Legacy Data Load Page

To create a legacy Data Load Wizard, a developer creates a Data Load page with the Create Page Wizard.

To create a legacy Data Load Wizard:

- 1. On the Workspace home page, click the **App Builder** icon.
- 2. Select the application.
- 3. On the Application home page, click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Click Legacy Pages and select Legacy Data Loading.
- 5. For Data Load Table:
  - a. Legacy Data Load Choose whether to create a new or to re-use an existing Legacy Data Load definition.
  - **b.** Definition Name Enter the name of this data load definition.
  - c. Owner Select the owner of the table on which the form will be based...
  - d. Table Name Select the table to use for data loading (also known as the upload table).
  - e. Unique Column 1 Identify the column name(s) to be used as the primary unique key column during the data load process. You can define up to 3 unique key columns.
  - f. Case Sensitive Identify whether the selected unique key column is case sensitive. By default, this is set to No.



- g. Define additional Unique Columns. You can define up to 3 unique key columns.
- h. Click Next.
- 6. For Add Transformation Rules (optional) Transformation Rules enable you to change the data being uploaded before it is inserted into the base table. Select the column to transform and then the desired rule to apply to it.
  - a. Select Column(s) to create a transformation rule Select the column on which the transformation rule definition is to be based and move them to the right.
  - b. Rule Name Enter a name for this transformation rule.
  - **c.** Sequence Specify the sequence for the transformation rule. The sequence determines the order of execution.
  - **d.** Type Select the type of transformation rule you want to perform.
  - e. Provide additional details based on the transformation type you have chosen.
  - f. Click Add Transformation.
  - g. Click Next.
- 7. For Table Lookups Match an uploaded value against another table and use the associated key value, instead of the uploaded value.
  - a. Add new table lookup for Column (optional) Identify the column on which the table lookup definition is to be based.
  - **b.** Lookup Table Owner Select the owner of the lookup table.
  - c. Lookup Table Name Identify the table to be used for this table lookup definition.
  - d. Return Column Select the name of the column returned by the table lookup. This value will be inserted into the load column specified and is generally the key value of the parent in a foreign key relationship (for example: DEPTNO).
  - e. Upload Column Select the name of the column end users will upload instead of the return column. This is the column that contains the display value from the lookup table (for example: DNAME).
  - f. Upload Column 2 Select the name of the second column to be uploaded to uniquely identify the return column if necessary. For example, to uniquely identify a State Code it may be necessary to upload the State Name and Country.
  - g. Upload Column 3 Select the name of the third column to be uploaded to uniquely identify the return column.
  - Click Add lookup to add the lookup definition. Repeat the previous steps to add additional table lookups.
  - Click Next finish creating lookups.
- 8. For Page Attributes:
  - a. Step 1, Step 2, Step 3, and Step 4 Enter a page name and page number for each step.
  - **b.** Page Number Enter a page number for each step.
  - c. Page Mode Identify the page mode. To learn more, see field-level Help.
  - **d.** Page Group Identify the name of the page group you would like to associate with this page.
  - e. Breadcrumb Select whether you want to use a breadcrumb navigation control on your page and which breadcrumb navigation control you want to use.



- f. Click Next.
- 9. For Navigation Menu:
  - a. Navigation Preference Select how you want this page integrated into the Navigation Menu. To learn more, see field-level Help.
  - b. Click Next.
- **10.** For Buttons and Branching, specify the branching for the buttons on the data load wizard pages:
  - a. New Button Label Enter text to display on the Next button.
  - b. Previous Button Label Enter text to display on the Previous button.
  - c. Cancel Button Label Enter text to display on the Cancel button.
  - d. Cancel Button Branch to Page Specify the page number to branch to when the user clicks Cancel.
  - e. Finish Button Label Enter text to display on the Submit button.
  - f. Finish Button Branch to Page Specify the number of the page to branch to. You can choose to branch back to the same page or any other page in your application.
  - g. Click Create.
- 11. Click Save and Run Page to test the Data Load Wizard.



### Tip:

After creating Data Load Wizard pages, if you wish to make changes, Oracle recommends re-creating new pages without deleting the data loading definitions as described in the next section.

### See Also:

- Re-creating Legacy Data Load Pages
- Editing Pages in Page Designer

# 25.3.4 Re-creating Legacy Data Load Pages

To make changes to existing legacy Data Load pages, Oracle recommends re-creating new pages without deleting the data loading definitions.

To re-create legacy Data Load Wizard pages without deleting the data loading definitions:

- Navigate to the Data Load Definitions page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.



The Shared Components page appears.

- d. Under Data Load Definitions, click Data Load Definitions.
- e. Expand the **Legacy Data Load** region and click the legacy data load.
- 2. Click the Legacy Data Load you want to re-create.

The Data Load Table Details page appears.

3. From Tasks, click Create Pages using this Legacy Data load.

The Page Attributes page of the Create Data Load Wizard appears.

4. For each page, edit the appropriate attributes and click Next.

To learn more about any attributes, see field-level Help.

5. Click Create.

# 25.3.5 Editing a Legacy Data Load Definition

Edit the Data Load Definition in Shared Components.

A Data Load Definition is comprised of a data load table, table rules, and lookup tables used by the Data Load Wizard in your application. A data load table is an existing table in your schema that has been selected for use in the data loading process, to upload data.

To edit a Data Load Definition:

- 1. Navigate to the Data Load Definitions page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

- d. Under Data References, click Data Load Definitions.
- e. Expand the Legacy Data Load region and click Legacy Data Load.

The Data Load Table Details page appears. To learn more about any attributes, see field-level Help.

- For Data Load Definition:
  - Name Name for the data load definition.
  - Table Name Displays the name of underlying table to be used for data load definition.
  - Unique column 1 The column name used as the primary unique key column during the data load process.
  - Case Sensitive Identify whether the selected unique key column 1 is case sensitive.
     By default, this is set to No.
  - Unique column 2 If the unique key definition of the selected table is a compound key, consisting of 2 or more columns, this column name is used as the second unique key column during the data load process.
  - Case Sensitive Identify whether the selected unique key column 2 is case sensitive. By default, this is set to No.



- Unique column 3 If the unique key definition of the selected table is a compound key, consisting of 2 or more columns, this column name is used as the third unique key column during the data load process.
- Case Sensitive Identify whether the selected unique key column 3 is case sensitive. By default, this is set to No.
- Skip Validation One step in data loading is to validate actions to be taken on records to be uploaded. Select Yes to skip validation.
- 3. Transformation Rules lists previously defined transformation rules.
  - To create a new rule:
    - a. Click Create Transformation Rule.
    - **b.** Edit the attributes.

To learn more about an attribute, see field-level Help.

- c. Click Create.
- To edit an existing rule:
  - a. Click the rule name.
  - **b.** Edit the attributes.
  - c. Click Apply Changes.
- 4. Table Lookups map data in the import file to data found in another table.
  - To create a new Table Lookups:
    - a. Click Create Table Lookup.
    - **b.** Edit the attributes.
    - c. Click Create.
  - To edit an existing Table Lookup:
    - a. Click column name.
    - **b.** Edit the attributes.
    - c. Click Apply Changes.
- 5. Column Name Aliases define aliases to help users correctly identify the columns to upload.

To add Column Name Aliases:

- a. Click Edit List of Values.
- **b.** Edit the attributes.
- c. Click Create.
- **6.** From Concurrency Column Name, select a column to be used for concurrency management.

Concurrency gives the developer the option to select a column to check the version of the data in the underlying table. This is particularly important if uploading into a table that is regularly updated.

7. Click Apply Changes.



# 25.4 Managing Legacy Tabular Forms

A legacy tabular form enables users to update multiple rows in a table at once from a single page.



A tabular form is a legacy application component. Although existing legacy tabular forms are supported, the creation of new legacy tabular forms has been desupported. Oracle recommends developers create interactive grids instead.

A legacy tabular form enables users to update multiple rows in a table at once from a single page. A legacy tabular form enables you to perform update, insert, and delete operations on multiple rows in a database table. Tabular forms include a built-in multiple row update process that performs optimistic locking behind the scenes to maintain the data integrity.

- Best Practices When Managing Tabular Forms
   Learn about best practices when managing tabular forms.
- How Legacy Tabular Forms Work
   Learn how how legacy tabular forms work.
- About Running a Legacy Tabular Form Learn about running a legacy tabular form.

### See Also:

- Managing Interactive Grids
- Developing Forms

# 25.4.1 Best Practices When Managing Tabular Forms

Learn about best practices when managing tabular forms.

Oracle recommends the following best practices when managing tabular forms:

- Do not modify of the select list of a SQL statement of a existing legacy tabular form. If you must modify the query, make sure the values of the updatable columns are not altered after being queried from the database by the Oracle APEX engine.
- Do not add custom JavaScript to display types that use display type specific JavaScript logic (for example, radio groups, simple checkboxes, and popup key LOVs).

# 25.4.2 How Legacy Tabular Forms Work

Learn how how legacy tabular forms work.



Tabular forms are based on a SQL query in which the query columns are tied to the underlying table columns. Unlike a single record from, tabular forms do not store data in session state. When a tabular form page is submitted, the tabular form data is processed using built-in data manipulation language (DML), or a custom PL/SQL page processes.

A tabular form with automatic DML has two processes for multi-row operations:

- A Multi Row Update (MRU) process performs create and update operations.
- Multi Row Delete (MRD) process deletes requests on one or more rows.

MRU and MRD processes reference the underlying table name and the primary key columns. The primary key columns must be part of the tabular form SQL query, and the report columns must be either hidden or display-only (save state) in order for the DML processes to be able to identify the correct records. For new records, the primary key values must be <code>NULL</code> to be identified as new records. Delete operations are performed by referencing row number of the row to be deleted. Users can check one or more rows on the current page and when they click the Delete button, the row numbers identify the corresponding primary key value(s) and the matching rows are deleted.

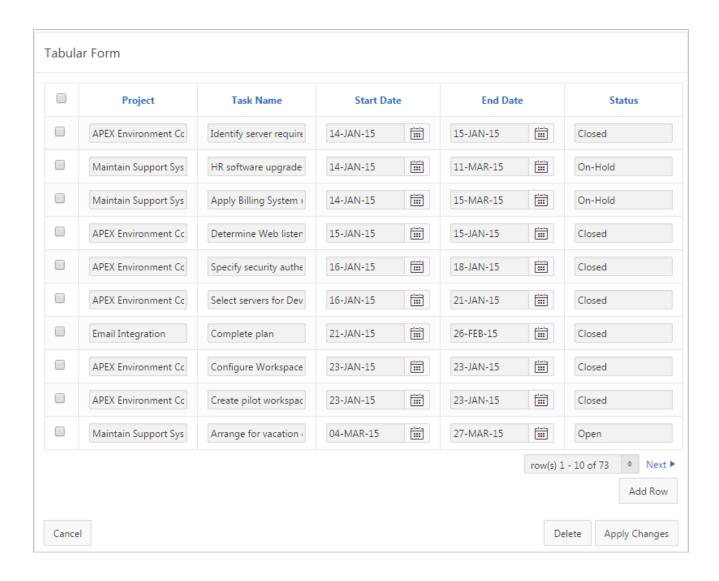
Wizard generated tabular forms built-in DML includes a checksum column to prevent lost updates. Using a method called optimistic locking, a checksum is computed for each row when rendering a tabular form. This checksum is stored in an extra hidden tabular form column. Upon submission of the form for update, an additional set of checksums is computed on the then current data stored in the database. The new checksums are compared to those built when the tabular form was first rendered, and if there are any mismatches, the update is rejected, because the data in the database was either modified by another user or anther process in the time between the tabular form was rendered and the time the data was submitted.

# 25.4.3 About Running a Legacy Tabular Form

Learn about running a legacy tabular form.

When running a tabular form, data is rendered as a report having updatable columns shown using various form elements (including text fields, text areas, date pickers, select lists, radio groups, and so on).





For numeric and date fields, you can also pre-define date and number format masks, or apply those format masks after generating the initial form.

Each report also includes a checkbox column (called a row selector). Users use this row selector to select one or more columns and update or delete data. To add a row, users click **Add Row**.



### Tip:

You can control the appearance of a specific column by editing column attributes.



Managing User Interface Defaults in Oracle APEX SQL Workshop Guide

# 25.5 Managing Legacy Web Services

Legacy Web services enable applications to interact with one another over the web in a platform-neutral, language independent environment.

### Note:

The SOAP 1.1 specification is a W3C note. SOAP Version 1.2 specification is a W3C recommendation.

For information about Simple Object Access Protocol (SOAP) see:

http://www.w3.org/TR/SOAP/

- About Legacy Web Services
   Learn about legacy Web services.
- Creating Legacy Web Service References
   Learn about creating legacy Web service references.
- About Working with SSL Enabled Legacy Web Services
   Learn about working with SSL enabled legacy Web services.
- Creating Legacy Web Service References Based on a WSDL
   Learn about creating legacy Web service references based on a WSDL.
- Creating Web Service References Manually
- Creating Legacy RESTful Web Service References
   Learn how to create legacy RESTful Web service references.
- Using the Legacy Web Service Reference Repository Learn about the legacy Web Service Reference Repository.
- Creating an Input Form and Report on a Legacy Web Service
   Learn how to create an input form and report on a legacy Web service.
- Creating a Form on a Legacy Web Service
   Learn how to create a form on a legacy Web service.
- Creating a Report on a Web Service
- How to Invoke a Legacy Web Service as a Process
   Learn how to invoke a legacy Web service as a process.
- Viewing a Legacy Web Service Reference History
   View a history of Web service reference changes.

# 25.5.1 About Legacy Web Services

Learn about legacy Web services.

In a typical Web services scenario, a business application sends a request to a service at a given URL by using the protocol over HTTP. The service receives the request,



processes it, and returns a response. You can incorporate calls with external Web services in applications developed in App Builder.

Web services are typically based on Simple Object Access Protocol (SOAP) or Representational State Transfer (REST) architectures. SOAP is a World Wide Web Consortium (W3C) standard protocol for sending and receiving requests and responses across the Internet. SOAP messages can be sent back and forth between a service provider and a service user in SOAP envelopes. RESTful Web services are resource oriented. The scope of the Web service is found in the URI and the method of the service is described by the HTTP method that is used such as GET, POST, PUT, HEAD, and DELETE.

SOAP offers two primary advantages:

- SOAP is based on XML, and therefore easy to use.
- SOAP messages are not blocked by firewalls because this protocol uses simple transport protocols, such as HTTP.



#### Tip:

If you run Oracle APEX with Oracle Database 11g Release 1 (11.1), you must enable network services to use Web services.

REST offers similar advantages:

- REST messages are also not blocked by firewalls because this protocol uses the HTTP protocol.
- REST requests do not require the overhead of XML and SOAP envelopes and inputs are typically provided in the URI.



### See Also:

**Enabling Network Services in Oracle Database** 

# 25.5.2 Creating Legacy Web Service References

Learn about creating legacy Web service references.

To use Web services in APEX, you create a Web service reference using a wizard. Web service references can be based on a Web Services Description Language (WSDL) document, RESTful style, or created manually by supplying information about the service.

- Accessing the Web Service References Page
- Specifying an Application Proxy Server Address



- Creating Legacy Web Service References Based on a WSDL
- Creating Web Service References Manually
- Creating Legacy RESTful Web Service References

### 25.5.2.1 Accessing the Web Service References Page

You manage Web service references on the Web Service References page.

To access the Web Service References page:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - c. On the Application home page, click Shared Components.
     The Shared Components page appears.
- 2. Under Data Sources, click Legacy Web Service References.

The Web Service References page appears.

### 25.5.2.2 Specifying an Application Proxy Server Address

If your environment requires a proxy server to access the Internet, you must either specify a proxy server address on the Application Attributes page, or your instance administrator must define an instance proxy, before you can create a Web service reference.

To specify a proxy address for an application:

- 1. On the Workspace home page, click the **App Builder** icon.
  - The App Builder home page appears.
- 2. Select an application.
  - Application home page appears.
- 3. Click Edit Application Definition.
- 4. Under Properties, enter the proxy server in the Proxy Server field.
- 5. Click Apply Changes.

## 25.5.3 About Working with SSL Enabled Legacy Web Services

Learn about working with SSL enabled legacy Web services.

Secure Sockets Layer (SSL) is an industry standard protocol that uses RSA public key cryptography with symmetric key cryptography to provide authentication, encryption, and data integrity.



If the Web service that you need to interact with is SSL-enabled (that is, https displays in the URL to the Web service), you must create a wallet and configure APEX to use the wallet. A wallet is a password-protected container that stores authentication and signing credentials (including private keys, certificates, and trusted certificates) needed by SSL.

See Also:

Configuring Wallet Information in Oracle APEX Administration Guide

## 25.5.4 Creating Legacy Web Service References Based on a WSDL

Learn about creating legacy Web service references based on a WSDL.

You can create Web service reference based on a Web Services Description Language (WSDL) document.

- About Creating Web Service References Based on a WSDL
- Creating a Web Service Reference by Specifying a WSDL Document
- Testing a Web Service Reference Created from a WSDL

### 25.5.4.1 About Creating Web Service References Based on a WSDL

Before you create a Web service reference based on a WSDL, you must decide how to locate the WSDL. You locate a WSDL by entering the URL to the WSDL document.

You then run a wizard which analyzes the WSDL and collects all the necessary information to create a valid SOAP message, including:

- The URL used to post the SOAP request over HTTP(S)
- A Universal Resource Identifier (URI) identifying the SOAP HTTP request
- Operations of the Web Service
- Input parameters for each operation
- Output parameters for each operation

# 25.5.4.2 Creating a Web Service Reference by Specifying a WSDL Document

To create a Web service by specifying a URL to a specific WSDL document:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select a existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select **Legacy Web Service References**.
- 2. Click Create.
- 3. For Web Reference Type, select **Based on WSD**L and click **Next**.
- 4. If prompted to search a UDDI registry to find a WSDL, click **No** then **Next**.



- 5. In WSDL Location, enter the URL to the WSDL document.
- **6.** For Username, enter the username required to access the WSDL.
- 7. For Password, enter the password required to access the WSDL.
- 8. Click Next.

The Web Service Details page appears.

- 9. For Basic Authentication, select:
  - No Select this option if authentication credentials are not sent as part of the HTTP request.
  - Yes Select this option if authentication credentials are sent as part of the HTTP request. Web services that employ basic authentication usually also use the HTTPS (SSL) protocol since the username and password are sent in clear text.

#### 10. Click Create Reference.

The Web service reference is added to the Web Service References Repository.

- **11.** On the Create page, the following selections are available:
  - View Web Service References Select to go to the Web Service Reference page.
  - Create Form on Web Service Select to create a Form for this Web Service Reference.
  - Create Form & Report on Web Service Select to create a Form and Report for this Web Service Reference.

## 25.5.4.3 Testing a Web Service Reference Created from a WSDL

After you have created a Web service reference, you can test it on the Test Web Service Reference page.

To test a Web service reference:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - b. Select a existing application.
  - **c.** On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select **Legacy Web Service References**.
- 2. Select the **View Report** icon.
- 3. Click the **Test** icon for the Web Service reference you want to test.

The Test Web Service Reference page appears. The Web service name and URL endpoint display at the top of the page.

- 4. From Operation, select an operation (that is, the method to be executed).
- 5. Under Input Parameters, enter the appropriate values.
- 6. Click Test.

The message request and response appear at the bottom of the page under Messages.

See Also:

Accessing the Web Service References Page

## 25.5.5 Creating Web Service References Manually

You can create a Web service reference manually.

- · About Creating Web Service References Manually
- Creating a Web Service Reference Manually
- Testing a Web Service Reference Created Manually

## 25.5.5.1 About Creating Web Service References Manually

When you create a Web service reference manually, you supply the necessary information to create a valid SOAP request, including:

- The URL used to post the SOAP request over HTTP(S)
- A Universal Resource Identifier (URI) identifying the SOAP HTTP request
- The SOAP envelope for the request, including any item substitutions
- Optionally the name of a collection to store the response from the Web service

## 25.5.5.2 Creating a Web Service Reference Manually

Creating a Web service reference manually adds it to Web Service References Repository.

To create a Web service reference manually:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - b. Select a existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select Legacy Web Service References.
- 2. Click Create.
- Select Manual and click Next.
- 4. On Create Web Service Reference:
  - a. Name Enter a name to identify the reference.
  - **b.** URL Enter the URL used to post the SOAP request over HTTP. This corresponds to the soap:address location of a service port in the WSDL.
  - c. Action Enter the intent of the SOAP HTTP request (optional). The value is a URI identifying the intent. SOAP places no restrictions on the format or specificity of the URI or requires that it is resolvable.
  - d. Proxy Enter a proxy to override the application proxy for this service.



- e. SOAP Version Select 1.1 or 1.2.
- f. Basic Authentication Choose whether the Web service requires authentication. Select **Yes** or **No**.
- g. SOAP Envelope Specify the SOAP envelope to be used for the SOAP request to the Web service..



You can reference items from session state in the SOAP envelope by using #ITEM NAME# syntax.

- h. Store Response in Collection Enter the name of a collection to store the Web service response. The response will be stored in the CLOB001 column of the collection entered here.
- Click Create.

See Also:

Accessing the Web Service References Page

### 25.5.5.3 Testing a Web Service Reference Created Manually

After you have created a Web service reference, you can test it on the Test Web Service Reference page.

To test a Web service reference:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - b. Select a existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select Legacy Web Service References.
- 2. Select the View Report icon.
- 3. Click the **Test** icon for the Web Service reference you want to test.

The Test Web Service Reference page appears. The Web service name and URL endpoint display at the top of the page.

- 4. If required, enter the username and password under Basic Authentication.
- 5. In SOAP Envelope text area, optionally edit the SOAP request envelope.
- 6. Click Test.

The message request and response appear at the bottom of the page under Messages.



See Also:

Accessing the Web Service References Page

## 25.5.6 Creating Legacy RESTful Web Service References

Learn how to create legacy RESTful Web service references.

You can create a Representational State Transfer (REST) or RESTful web service.

- About Creating RESTful Web Service References
- Creating a RESTful Web Service Reference
- Testing a REST Web Service Reference

### 25.5.6.1 About Creating RESTful Web Service References

RESTful Web services are resource oriented. The scope of the Web service is found in the URI and the method of the service is described by the HTTP method that is used such as GET, POST, PUT, HEAD, and DELETE. When you create a RESTful Web service reference, you supply the necessary information about the structure of the request and response including:

- A Universal Resource Identifier (URI) identifying the RESTful request
- The HTTP method identifying the method of the Web service
- HTTP Headers, if required, that are part of the request
- The type of input expected by the Web service
- The format of the response and how to identify the response parameters

### 25.5.6.2 Creating a RESTful Web Service Reference

To create a RESTful Web service reference:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select a existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select Legacy Web Service References.
- 2. Click Create.
- 3. Select REST and click Next.
- 4. For REST Details, specify the following:
  - a. Name Enter a name to identify the reference.
  - **b.** URL Enter the URL endpoint of the Web service.
  - **c.** Proxy Enter a proxy to override the application proxy for this service (optional). This setting is overridden by the proxy setting for this instance.



- **d.** HTTP Method Choose the http method used for the request to the Web service. Select **GET**, **HEAD**, **POST**, **PUT** or **DELETE**.
- **e.** Basic Authentication Select **Yes** to require HTTP Basic Authentication. Otherwise, select **No**.
- f. REST HTTP Headers Enter the names of the HTTP headers to send with the request.
- g. Click Next.
- **5.** For REST Input parameters, specify the following:
  - a. Name Enter the name of the input parameter expected by the method.
  - **b.** Type Select the input type.
  - c. Click Add Parameter.
  - d. Repeat steps a though c for each expected input.
  - e. Click Next.
- 6. For REST Output parameters, specify the following:
  - Output Format Select XML, Text or JSON for the response format expected from the Web service.
  - **b.** XPath to Output Parameters (XML only) Enter an XPath expression to the relevant part of the response.

#### For example:

/ListBucketResult/Contents

**c.** Response Namespace (XML only) - Enter the namespace corresponding to the Response XPath.

#### For example:

http://s3.amazonaws.com/doc/2006-03-01/

- d. Parameter Delimiter (**Text** only) Enter the character or sequence that separates parameters returned from the Web service. Use  $\n$  to indicate a new line and  $\t$  to indicate a tab character.
- e. New Record Delimiter (**Text** only) Enter the character or sequence that determines a new record in a text response from the Web service. Use  $\n$  to indicate a new line and  $\t$  to indicate a tab character.
- f. Name Enter the name of the output parameter returned by the method.
- g. Path Enter the path. If the response is XML, the path is an XPath expression to the node. If the response is Text, the path is a number. If the response is JSON, the entire response is stored in the CLOBOO1 column of a collection you specify.
- h. Type Select the output type.
- i. Click Add Parameter.
- i. Repeat steps f though h for each returned output parameter.



Note:

Click **Test** to send a request to a RESTful Web service and see the response. This test process helps you specify the appropriate Output parameters.

#### 7. Click Create.

The Create Web Service Reference Success page appears. The Web service reference is added to the Web Service References Repository.

### See Also:

- Accessing the Web Service References Page
- Creating a Proxy Server for an Instance in Oracle APEX Administration Guide

## 25.5.6.3 Testing a REST Web Service Reference

After you have created a Web service reference, you can test it on the Test Web Service Reference page.

To test a Web service reference:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select a existing application.
  - c. On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select **Legacy Web Service References**.
- 2. Select the **View Report** icon.
- 3. Click the **Test** icon for the Web Service reference you want to test.

The Test Web Service Reference page appears. The Web service name and URL endpoint display at the top of the page.

- 4. In the URL and Proxy Override fields, optionally edit the values for the test.
- **5.** If required, enter the username and password under Basic Authentication.
- **6.** Under HTTP Headers, enter appropriate values.
- 7. Under Input Parameters, enter appropriate values.
- 8. Click Test.

The message response appears at the bottom of the page under Messages.



Accessing the Web Service References Page



## 25.5.7 Using the Legacy Web Service Reference Repository

Learn about the legacy Web Service Reference Repository.

Web service references are stored in the Web Service Reference Repository.

To access the Web Service References Repository:

- 1. Navigate to the Web Service References page.
  - a. On the Workspace home page, click **App Builder**.
  - **b.** Select a existing application.
  - **c.** On the Application home page, click **Shared Components** in the center of the page.
  - d. Under Data Sources, select **Legacy Web Service References**.

The Web Service Reference page appears.

A Search bar displays at the top of the page. Available controls include:

- **Search columns icon** Resembles a magnifying glass. Click this icon to narrow your search. To search all columns, select **All Columns**.
- Text area Enter case insensitive search criteria (wildcard characters are implied) and click Go.
- Go button Executes a search or applies a filter.
- **View Icons** Displays each Web service reference as a large icon. To edit a Web service reference, click the appropriate icon.
- View Report Displays each Web service reference as a line in a report.
- Actions menu Displays the Actions menu. Use this menu to customize the report view.
- Click the View Report icon.
- 3. In report view you can:
  - Edit a reference by clicking the reference name.
  - Test a reference by clicking the Test icon.
  - View details about a reference by clicking the View icon. Note that this option is not available for manually created or REST Web service references.

#### See Also:

- Accessing the Web Service References Page
- About the Actions Menu

## 25.5.8 Creating an Input Form and Report on a Legacy Web Service

Learn how to create an input form and report on a legacy Web service.



- About the Create Form and Report on Web Service Wizard
- Creating a Form and Report by Adding a New Page

## 25.5.8.1 About the Create Form and Report on Web Service Wizard

The Create Form and Report on Web Service Wizard creates an input form, a submit button, and a report for displaying results. You can execute this wizard directly after creating the Web service reference from a WSDL or a RESTful style Web service, or by adding a page.

Use this wizard when you expect a nonscalar result from the Web service. The Amazon Product API Web service is a good example. This Web service returns many results based on the search criteria entered in an input form.

## 25.5.8.2 Creating a Form and Report by Adding a New Page

If you have an existing Web service reference, you can create an input form and report by adding a new page.

To create a form and report by adding a new page:

- 1. Create the Web service reference.
- 2. Select the application.
- 3. On the Application home page, click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Click Legacy Pages and select Report and Form on Legacy Web Service.
- 5. For Choose Service and Operation:
  - a. Web Service Reference Select the Web service reference.
  - b. Operation Select the method to be executed. For RESTful style Web references, doREST is selected automatically. The Operation option does not appear for Manual style Web references.
  - c. Click Next.
- **6.** For Page and Region Attributes, review and update the page and region attributes and click **Next**.



If the page you specify does not exist, the wizard creates the page for you.

- 7. For Input Items:
  - a. Identify which items to add to the form. To include an item, select Yes in the Create column. Otherwise, select No.
  - b. If necessary, edit the Item Name.
  - c. If necessary, edit the Item Label.
  - d. Click Next.
- If applicable, specify the Item Names and Item Labels for basic authentication, then click Next.



#### Note:

This step only appears if basic authentication was specified for this Web service reference when it was created.

- 9. Follow the on-screen instructions.
- 10. Click Create.

#### See Also:

- Creating Legacy Web Service References Based on a WSDL
- Creating Web Service References Manually
- Creating Legacy RESTful Web Service References

## 25.5.9 Creating a Form on a Legacy Web Service

Learn how to create a form on a legacy Web service.

- About the Create Form on Web Service Wizard
- Creating a Form by Adding a New Page

### 25.5.9.1 About the Create Form on Web Service Wizard

The Create Form on Web Service Wizard creates a form and a submit button. You can execute this wizard after creating the Web service reference from a WSDL or on a RESTful style Web service, or by running the Create Page Wizard.

Use this wizard when you expect a scalar result from the Web service. A Web service that looks up a stock price is a good example because the input is a stock symbol and the output is the scalar value price.

### 25.5.9.2 Creating a Form by Adding a New Page

If you have an existing Web service reference, you can create a form based on a Web service reference by adding a new page.

To create a form by adding a new page:

- 1. Create the Web service reference.
- 2. Select the application.
- 3. On the Application home page, click **Create Page**.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Click Legacy Pages and select Form on Legacy Web Service.
- 5. For Page Attributes:



- a. Page Number Select a page to contain the new form, or enter a new page number.
- **b.** Page Name Specify a name for the page.
- **c.** Page Mode Identify the page mode. To learn more, see field-level Help.
- d. Page Group Identify the name of the page group you would like to associate with this page. Page groups help developers manage the pages within an application. To create a page group, enter the name. To use an existing page group, select the name from the list of values.
- **e.** Region Title Select whether you want to use a breadcrumb navigation control on your page, and which breadcrumb navigation control you want to use.
- f. Breadcrumb Enter a title for the region in which the form will appear.
- q. Click Next.
- **6.** For Navigation Preference:
  - **a.** Select how you want this page integrated into the Navigation Menu. To learn more, see field-level Help.
  - b. Click Next.
- 7. For Choose Service:
  - a. Web Service Reference Select the Web service reference.
  - b. Operation Select the method to be executed. For RESTful style Web references, doREST is selected automatically. The Operation option does not appear for Manual style Web references.
  - c. Click Next.
- 8. For Input Items, make these selections and click **Next**:
  - **a.** Identify which items to add to the form. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
  - **b.** If necessary, edit the Item Name.
  - c. If necessary, edit the Item Label.
- If applicable, specify the Item Names and Item Labels for basic authentication and click Next.



This step only appears if basic authentication was specified for this Web service reference when it was created.

10. If applicable, specify the Item Names and Item Labels for basic authentication.

Note that this step only appears if basic authentication was specified for this Web service reference when it was created.

- 11. For Output Items, make these selections and click **Next**:
  - **a.** Identify which items to add to the form. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
  - **b.** If necessary, edit the Item Name.
  - c. If necessary, edit the Item Label.



#### 12. Click Create.

#### See Also:

- Creating Legacy Web Service References Based on a WSDL
- Creating Web Service References Manually
- Managing Pages in an Application
- Editing User Interface Attributes

## 25.5.10 Creating a Report on a Web Service

If you have an existing Web service reference, you can create a report based on a Web service reference by adding a new page.

To create a report by adding a new page:

- 1. Create the Web service reference.
- 2. Select the application.
- 3. On the Application home page, click Create Page.

Create a Page appears and features three tabs: Component, Feature, and Legacy Pages.

- 4. Click Legacy Pages and select Report on Legacy Web Service.
- 5. For Page Attributes:
  - a. Page Number Select a page to contain the new form, or enter a new page number.
  - b. Page Name Specify a name for the page.
  - c. Page Mode Identify the page mode. To learn more, see field-level Help.
  - d. Breadcrumb Enter a title for the region in which the form will appear.
  - e. Click Next.
- For Navigation Preference:
  - **a.** Select how you want this page integrated into the Navigation Menu. To learn more, see field-level Help.
  - b. Click Next.
- 7. If Web Reference Type is **REST**:
  - a. Web Reference Type Choose REST.
  - Web Service Reference Select the name of the Web service reference and click Next.
  - c. Result Stored in Collection Enter the name of the temporary result set name where the Web service result is stored. The temporary result set is stored in an Application Express collection.
  - d. Report Template Choose the report template to be used by this report region.



- e. Rows Per Page- Select the number of rows to display per page.
- f. Select the parameters to be included in the report.
- g. Click Next.
- 8. For Web Reference Type, choose **REST**, **Generated from WSDL**, or **Manually Created**.

What appears next depends upon your selection.

- 9. If Web Reference Type is **Generated from WSDL**:
  - a. Web Reference Type Choose Generated from WSDL.
  - b. Web Service Reference Select the name of the Web service reference.
  - c. Operation Select the operation. The operation is the method that will be executed...
  - **d.** Result Tree to Report On Select the portion of the resulting XML document that contains the information you want to include in the report.
  - e. Report Parameters and Options:
    - Temporary Result Set Name Enter a name for the collection that stores the Web service result.
    - Select and deselect the appropriate parameters.
  - Click Next.
- 10. If Web Reference Type is Manually Created:
  - a. Web Reference Type Choose Manually Created.
  - b. Web Service Reference Select the name of the Web service reference.
  - **c.** SOAP Style Choose the style of the SOAP response. The style can be determined from the style attribute of the soap:binding element from the WSDL for this operation.
  - **d.** Message Format Choose the message format. The encoding can be determined from the use attribute of the soap:body element of the output message in the WSDL for this operation.
  - e. Result Node Path (XPath)(Value Required)- Enter the XPath expression to the node of the response message that you are creating the report on. The node is a child of the soap:Body element.

#### For example:

/result/myNode

- f. Message Namespace Enter the namespace for the response message. This can typically be determined by looking for the targetNamespace attribute of the WSDL and click **Next**.
- g. Enter the name of the collection where the response message is stored.
- h. Enter the names of the parameters that you want to be included in the report.
- i. Click Next.
- 11. Click Create.

## 25.5.11 How to Invoke a Legacy Web Service as a Process

Learn how to invoke a legacy Web service as a process.



You can invoke a Web service as a process on the page. The process is created for you if you run one of the Create Form wizards for Web services. Running the process submits the request to the service provider. You can then display the request results in the report.

- Invoking a Web Service as a Process
- Editing a Web Service Process

## 25.5.11.1 Invoking a Web Service as a Process

To invoke a Web service as a process:

- 1. Create a Web Service Reference.
- 2. Run the Create Page Wizard. On Create a Page:
  - a. For User Interface, if applicable select a user interface for the page.
    - This attribute only displays for applications using older themes for which Desktop and Mobile User Interfaces have been defined.
  - b. For Page Type, select **Component** and then **Blank Page**.
- 3. For Page Attributes:
  - Page Number Select a page to contain the new form, or enter a new page number.
  - **b.** Page Name Specify a name for the page.
  - c. Page Mode Identify the page mode. To learn more, see field-level Help.
  - d. Page Group Identify the name of the page group you would like to associate with this page. Page groups help developers manage the pages within an application. To create a page group, enter the name. To use an existing page group, select the name from the list of values.
  - e. Breadcrumb Enter a title for the region in which the form will appear.
  - f. Click Next.
- 4. For Navigation Preference:
  - a. Select Do not associate this page with a navigation menu entry.
  - b. Click Next.
- 5. Click Finish.

Page Designer appears.

Under Page Rendering or Page Processing, locate the Processes section, rightclick and select Create Process.

The New process appears.

**7.** Edit the process attributes in the Property Editor.

Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.





#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

#### 8. Edit Identification attributes:

- a. Find the **Identification** group.
- b. Name Enter the name of the page process for easy identification by developers.
- c. Type Select Web Service.

#### 9. Edit Settings:

- a. Find the Settings group.
- b. Web Service Operation Select a Web Service Operation.
- c. Store Result In Select Item(s) or Collection.

#### 10. Edit Execution Options Options:

- a. Find the **Execution Options** group.
- **b.** Sequence Specify the sequence for this component. The sequence determines the order of execution.
- c. Point Select the processing point.

#### 11. Edit Success Message:

- a. Find the Success Message group.
- b. Success Message Enter the success message for this process. If the process runs and does not generate an error, then this process success message displays in the notification section of the resulting page displayed.

To learn more, click the Help tab.

#### 12. Edit Error Message:

- a. Find the Error Message group.
- **b.** Error Message Enter the error message for this process. This message displays if an unhandled exception is raised. After any error processing stops, a rollback is issued and an error message displays..

To learn more, click the Help tab.

#### 13. Edit Server-side Condition:

- a. Find the **Server-side Condition** group.
- b. When Button Pressed If you want this page processing component to execute only when the specified button is clicked, select a button from the list. You can incorporate this button condition with other conditions to further refine when this page processing component executes.
- **c.** Condition Type Select a condition type that must be met in order for this component to be processed. Depending upon your selection, additional attributes may appear.

#### 14. Click Save.



#### See Also:

- Creating Legacy Web Service References Based on a WSDL
- Creating Web Service References Manually
- Creating a RESTful Web Service Reference
- Managing Pages in an Application

### 25.5.11.2 Editing a Web Service Process

After you create a process of type Web service on a Web service reference created from a WSDL or a RESTful style Web reference, you can change the attributes of the input and output parameters to the service.

To edit a Web service process:

- 1. Create a Web service process.
- 2. Navigate to the page containing the Web service process.

Page Designer appears.

3. In the left pane, find the process name and expand the tree.

In Parameters and Out Parameters display under the process.

- 4. Expand In Parameters and Out Parameters. Defined parameters apear.
- 5. Select a parameter and edit the attributes in the Property Editor.

Attributes are organized in groups. To find a group or attribute, enter keywords in the Filter Properties field. The Property Editor displays the group or attributes. Or, you can click **Go to Group** and select the group.



#### Tip:

To view help for an attribute, select the attribute in the Property Editor and click the **Help** tab in the central pane.

6. Click Save.



How to Invoke a Legacy Web Service as a Process

## 25.5.12 Viewing a Legacy Web Service Reference History

View a history of Web service reference changes.

The Web Services History displays changes to Web service references for the current application by application ID, Web service references name, developer, and date.

To view a history of Web service reference changes:

- 1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **App Builder**.
  - b. Select an application.
  - **c.** On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Data Sources, click Legacy Web Service References.

The Web Service References page appears.

3. Click History.



The History button only appears on the Web Service Reference page if at least one reference exists.



A

## **About Item Types**

Learn about available item types in App Builder.

An item can be part of an HTML form or used in an interactive grid column. An item can be a text field, text area, password, select list, checkbox, and so on. Developers can control how a page item works by editing the item attributes in Page Designer. To learn more about specific item attributes, select the attribute in Page Designer and select the Help tab.

Available Item Types
 Review descriptions of the item types available in App Builder and important attributes that control item behavior.

#### **Related Topics**

- Viewing Help in Page Designer
- Understanding Page Items
   An item is part of an HTML form such as a checkbox, date picker, file browse field, popup list of values (LOV), select list, shuttle, flip toggle switch, text field, text area, and so on.
- Editing Page Items
   Edit item attributes to control how an item displays on a page.

## A.1 Available Item Types

Review descriptions of the item types available in App Builder and important attributes that control item behavior.



#### Tip:

Your application may also include plug-in items. Plug-ins display as <*My Plug-in*> [*Plug-in*]. See Implementing Plug-ins.

Table A-1 Available Item Types

#### Item Type Description

#### Checkbox

Displays a single checkbox, enabling the user to check or uncheck it. The checkbox item always has one of two values the checked value or unchecked value.

Page Designer item attributes:

• **Settings**, **Use Defaults** - If set to **On**, the checkbox uses the application-level component settings defined in Shared Components, Component Settings, checkbox.

See Also: Configuring Checkbox

If **Use Defaults** is set to **Off**, the following custom settings appear:

- Checked Value Enter the value stored in the page item if the end user checks the checkbox. The value can be up to 255 characters long.
  - On a Faceted Search page, if the facet filters a query column *based on a List Of Values*, this value must match *both* LOV display and return value. If display and return values differ, then you cannot use this facet type for this column use the **Checkbox Group** facet instead.
- Unchecked Value Enter the value stored in the page item if the user unchecks the checkbox. This attribute can also be left blank if you want to store NULL when checked. The value can be up to 255 characters long.

**Note**: This value is used if the page item is populated with a value which does not match either the Checked Value or Unchecked Value.

#### Checkbox Group

Displays multiple values as checkboxes, enabling the end user to select multiple values. A list of values is required for items displayed as checkboxes. The values corresponding to the checked boxes are stored in a single colon-delimited string.

**Note**: For Yes/No checkboxes (that is, a checkbox with only one value), Oracle recommends using a checkbox or a Switch item type.

The following example displays employee names (ename), but returns employee numbers (empno):

SELECT ename, empno FROM emp;

**See Also:** APEX\_UTIL in *Oracle APEX API Reference* for information about breaking up returned values

Page Designer item attributes:

- Settings, Number Columns Enter the number of layout columns used to display the checkboxes. For example, a value of 2 would display two columns of checkboxes. By default, all values display in one column.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

See Also: Creating a Cascading List of Values



Table A-1 (Cont.) Available Item Types

#### Item Type Description

#### Color Picker

Displays a control for choosing or entering a color depending on the Display As setting. End users can enter a color value or select one from an inline or popup color spectrum.

Page Designer item attributes:

 Settings, Use Defaults - If set to On, the Color Picker uses the application-level component settings defined in Shared Components, Component Settings, Color Picker.

See Also: Configuring Color Picker Display

If **Use Defaults** is set to **Off**, the following settings appear:

- Display As Select how the color picker displays. Options include:
  - \* **Popup** Displays as a text field with icon to open the color spectrum picker.
  - Inline Displays as an inline color spectrum.
  - \* Color-only Popup Displays as a button which opens the color spectrum popup.
  - Native Color Picker Displays as a native browser color input (the UI is dependent on the browser).
- Mode Select the amount of information shown in the color picker. Options include Simple or Full.
- Color Preset Determines if the color picker should display a set of predefined colors and whether they are from the theme or custom. Options include None, Theme Style Colors, or Custom Colors.
- Contrast With Compare the color of this item with a color from another item or a
  static value and display the contrast ratio between them in the color picker UI. Enabling
  this option can help the user choose colors with enough contrast to be accessible to
  everyone. Options include: None, Page Item, or Static Color.
- Return Value As Specify the format of the color value returned by this item. Even if
  the color is entered in a different valid format it will be presented, returned, and sent to
  the server in this format. Options include: Hex, rgb, rgb/rgba, hsl, hsl/hsla, or Any
  CSS Value. See Help for more details.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX
  automatically performs a NOT NULL validation when the page is submitted. See Help for
  more details.



Table A-1 (Cont.) Available Item Types

#### Item Type

#### Description

#### Date Picker

Displays a text field with a calendar icon. End users can either enter the date directly into the text item, or click on the calendar icon to select a date, and optionally a time, from the calendar popup.

Time is only displayed in the calendar popup if the Format Mask for this item includes time components.

Page Designer item attributes:

- **Settings**, **Show Time** Enable this option to include time information.
- Settings, Display As Select the display mode for the date picker. Options include:
  - Popup Displays in a popup when the item receives focus, or the calendar icon is clicked.
  - Inline The calendar always displays inline on the page. No text field is displayed and the current date selection is shown highlighted in the calendar.
  - Native HTML Renders using the native HTML input date types, if supported by the browser. When 'Show Time' is off, this renders a 'date' type, when 'Show Time' is on, this renders a 'datetime-local' type. Note: The exact display of these date types is dependent on the browser. Native HTML may be the preferred option when the app is being used on a mobile device.

Note regarding using **Native HTML**. Because the native date types are very specific about the date format they require, the item's Format Mask will be automatically set by APEX, and you will not be able to change it. However this will not be the format displayed to the end user. The end user will see the date in the format appropriate to their current locale.

- Settings, Minimum Date Specify if this item has a minimum date. Options include:
  - None No minimum date defined.
  - Item Minimum date is derived dynamically from another item's value.
  - Static Minimum date is a static value, defined as either an absolute value, or relative value to today's date.

Additional attributes display conditionally based on the selected value.

- **Settings**, **Maximum Date** Enter the maximum date that can be input or selected. Additional attributes display conditionally based on the selected value.
- **Settings**, **Multiple Months** Determines if the calendar displays multiple months and how many. Select **No** to disable this option, or select the number of month.
- Settings, Use Defaults If set to On, the Date Picker uses the application-level component settings defined in Shared Components, Component Settings, Date Picker. See Configuring Date Picker

If **Use Defaults** is set to **Off**, the following attributes appear:

- Appearance & Behavior Control the appearance of the calendar used to select dates. This attribute only applies when **Display As** is either **Popup** or **Inline**. Options include:
  - \* Show Week Determines whether the week of the year displays.
  - \* **Month Picker** Controls whether the month renders as a button which enables users to make another selection, or just as text.
  - \* Year Picker- Controls whether the year renders as a button which enables users to make another selection, or just as text.
  - \* Paginate by Multiple Months Determines whether pagination size when displaying several months is only one month or the number of months.
  - \* Show Today Button Determines whether a today button displays to select the current date.
  - \* Show Clear Button Controls whether a clear button displays to clear the value of the date picker. This attribute only applies if **Display As** is set to **Inline**.



#### Table A-1 (Cont.) Available Item Types

#### Item Type Description

- Days Outside Month Dictates the behavior of days outside the current viewing month. This attribute only applies if Display As is set to either Popup or Inline.
   Options include:
  - \* **Hidden** Days outside the current viewing month are hidden.
  - \* Selectable Days outside the current viewing month are visible and selectable.
  - \* Visible Days outside the current viewing month are visible.
- Time Increment Time increment in minutes used by the time selection control. This
  attribute is used for selecting the time of increments that can still be manually entered
  and saved.

This attribute is only used when **Display As** is set to either **Popup** or **Inline** and **Show Time** is enabled.

- Show On Controls when the calendar popup displays. This option is only used when Display As is set to either Popup or Inline. Options include:
  - \* Item Focus When the item receives focus or when the calendar icon is clicked.
  - \* **Icon Click** Only when the calendar icon is clicked.
- Appearance, Format Mask Enter a date format mask to apply to this component.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.



Table A-1 (Cont.) Available Item Types

#### **Item Type**

#### Description

#### Date Picker (jQuery) (Desupported)

**Note**: The Date Picker (jQuery) item type is desupported and should no longer be used. Existing apps do not automatically switch to using the new date picker to preserve possible customizations. You can switch all the date pickers in your app to use the new date pickers by using Upgrade Application in the Utilities section of your application in App Builder. See Running Application Upgrade.

Displays a text field with a calendar icon. End users can either enter the date directly into the text item, or click on the calendar icon to select a date, and optionally a time, from the calendar popup.

Time is only displayed in the calendar popup if the Format Mask for this item includes time components.

Page Designer item attributes:

- Settings, Show Time Enable this option to include time information.
- Settings, Display As Select the display mode for the date picker. Options include:
  - Popup Calendar Displays in a popup when the item receives focus, or the calendar icon is clicked.
  - Inline The calendar always displays inline on the page. No text field is displayed and the current date selection is shown highlighted in the calendar.
  - Native HTML Renders using the native HTML input date types, if supported by the browser. When 'Show Time' is off, this renders a 'date' type, when 'Show Time' is on, this renders a 'datetime-local' type. Note: The exact display of these date types is dependent on the browser. Native HTML may be the preferred option when the app is being used on a mobile device.

Note when using **Native HTML**. Because the native date types are very specific about the date format they require, the item's Format Mask will be automatically set by APEX, and you will not be able to change it. However this will not be the format displayed to the end user. The end user will see the date in the format appropriate to their current locale.

- Settings, Minimum Date Specify if this item has a minimum date. Options include:
  - None No minimum date defined.
  - Item Minimum date is derived dynamically from another item's value.
  - Static Minimum date is a static value, defined as either an absolute value, or relative value to today's date.

Additional attributes display conditionally based on the selected value.

- **Settings**, **Maximum Date** Enter the maximum date that can be input or selected. Additional attributes display conditionally based on the selected value.
- Settings, Multiple Months Determines if the calendar displays multiple months. If set to
  On, the Number of Months attribute appears. Enter the number of months to show at
  once.
- Settings, Use Defaults If set to On, the Date Picker uses the application-level component settings defined in Shared Components, Component Settings, Date Picker.

See Also: Configuring Date Picker

If **Use Defaults** is set to **Off**, the following attributes appear:

- Appearance Control the appearance of the calendar used to select dates. Options include:
  - \* Show Week
  - \* Month Picker
  - \* Year Picker

This attribute is only used if **Display As** is set to either **Popup** or **Inline**.

 Days Outside Month - Dictates the behavior of days outside the current viewing month. Options include:



Table A-1 (Cont.) Available Item Types

#### Item Type Description

- \* **Hidden** Days outside the current viewing month will be hidden.
- \* Selectable Days outside the current viewing month will be visible and selectable.
- \* Visible Days outside the current viewing month will be visible.

This attribute is only used if **Display As** is set to either **Popup** or **Inline**.

Time Increment - Time increment in minutes used by the time selection control. This
attribute is used for selecting the time of increments that can still be manually entered
and saved.

This attribute is only used when **Display As** is set to either **Popup** or **Inline** and **Show Time** is enabled.

- Show On Controls when the calendar popup is displayed. Options include:
  - \* Item Focus When the item receives focus or when the calendar icon is clicked.
  - Icon Click Only when the calendar icon is clicked.

This option is only used when **Display As** is set to either **Popup** or **Inline**.

- Appearance, Format Mask Enter a date format mask to apply to this component.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

#### Display Image

Displays an image stored in a database BLOB columns, or based on an image URL.

Note: Not supported for interactive grid columns.

Page Designer item attributes:

- Settings, Based On Determines where the item is retrieved from. To learn more about an attribute, see field-level Help.
- **Settings**, **Alternative Text Column** Enter the uppercase page or application item name which holds the alternative text for this image. This text is read by screen readers when an end user navigates to this item.
- **Settings**, **Filename Column** Enter the uppercase page or application item name that holds the filename column value associated with the BLOB column.
- Settings, MIME Type Column Enter the uppercase page or application item name used
  to store the mime type of the uploaded file. The mime type is used by the browser to
  identify which application is used to display the content of the BLOB when the file is
  downloaded.
- Settings, BLOB Last Updated Column Enter the uppercase page or application item name that holds the date column value when the associated BLOB was last updated. This value is used for browser caching and to identify if the image has been changed since the last request from the browser. If the image is not updated then the image is retrieved from the browser cache, if available.



Table A-1 (Cont.) Available Item Types

Description

# Item Type Display Map

Displays a map based on coordinates in GeoJSON point format.

Page Designer item attributes:

- Settings, Background Select the background map to use. See Help for more details.
- Settings, Zoom Level Specify the zoom level for this layer to become visible. Minimum value is 1. Maximum value is 18.
- Settings, Show Marker Specify whether a marker should be displayed...
- Settings, Marker Color Specify the marker fill color. See Help for more details.
- **Settings**, **Tooltip** Specify the tooltip text for a displayed marker. The tooltip attribute supports HTML and APEX template directives.
- Settings, Show Map Controls Specify whether map controls should be displayed. This
  adds zoom and rotation controls to the map.
- Settings, Interactive Map Specify whether the map should be interactive. If disabled, it
  creates a static map with no interactivity.
- Settings, Height Specify the height (in pixels) of the displayed map. Map's default height is calculated based on it's width with an 3:2 aspect ratio.

#### Display Only

Displays a non-enterable text item.

Page Designer item attributes:

- Settings, Format Options include Plain Text, HTML, or Markdown.
- Settings, Based On Specifies what gets displayed in the field. Options include:
  - Page Item Value The current value of the page item displays.
  - Display Value of List of Values The current value of the page item maps to a different display value using a list of values.
- Settings, Show Line Breaks Select On to convert line breaks in the display value to an HTML line break and display them in HTML output.
- Settings, Send On Page Submit Specify whether the current item value should be sent when the page is submitted.
- Session State, Data Type Select the data type of the page item (VARCHAR2 or CLOB).
- Session State, Storage Select how session state is maintained. Options include:
  - Per Request (Memory Only) Do not save state in the database. State is only
    available when processing the current request. When AJAX requests need to use an
    item, make sure to pass the item name using Page Items To Submit.
  - Per Session (Persistent) Maintain for each session by storing the value in the database, to access it across requests.



Table A-1 (Cont.) Available Item Types

#### Item Type Description

#### File Browse

Displays a text field with a Browse button. The Browse button enables the user to locate and upload a file from a local file system.

**Note:** Not supported for interactive grid columns.

See Also: About Securing File Uploads

Page Designer attributes:

- Settings, Display As Select a display style for how the file browse item should be displayed. See Help for more details.
- Settings, Dropzone Title Specify the title for the Dropzone. If this field is left blank, the Text Messages APEX.ITEM.FILE.DROP\_FILE or APEX.ITEM.FILE.DROP\_FILES will be used by default.
- Settings, Storage Type Identify where the uploaded file is stored. Options include:
  - BLOB column specified in Item Source attribute Stores the uploaded file in the
    table used by the Automatic Row Processing (DML) process and the column specified
    in the item source attribute. The column has to be of data type BLOB. If the file gets
    downloaded, the table name of the Automatic Row Fetch process is used.
  - Table APEX\_APPLICATION\_TEMP\_FILES Stores the uploaded file(s) in a temporary location that you can access with the view
     APEX\_APPLICATION\_TEMP\_FILES. Oracle APEX will automatically delete the file(s) at the end of the session or at the end of the upload request, depending on what you choose for Purge File At.

#### If Storage Type is Table APEX\_APPLICATION\_TEMP\_FILES:

- Purge File at Define when Oracle APEX should remove the temporary file.
- Allow Multiple Files Specify whether multiple files can be uploaded at once. Multiple file names will be stored as a colon delimited list in the page item..
- File Types Specify a comma delimited list of file types which might be used by the browser to restrict which files can be uploaded.

#### If Storage Type is **BLOB column specified in Item Source**:

- MIME Type Column Enter the uppercase page or application item name used to store the mime type of the uploaded file. The mime type is used by the browser to identify which application is used to display the content of the BLOB when the file is downloaded.
- Filename Column Enter the page or application item used to store the filename of the uploaded file. .
- Character Set Column Enter the uppercase page or application item name used to store the character set of the uploaded file. The character set of the BLOB is not automatically set on upload. End users should set the character set for the document they are uploading.
- BLOB Last Updated Column Enter the uppercase page or application item name used to store the current timestamp when a file is uploaded. This date value is used for browser caching.
- Display Download Link Specify whether the download link displays when there is a non-empty BLOB associated with this item.
- Download Link Text Enter the text that displays as part of the download link. If not specified, the text stored in the Text Message for APEX.FILE\_BROWSE.DOWNLOAD\_LINK\_TEXTwithin Shared Components, displays.
- Content Disposition Select how the browser handles the content when downloading.
- **Settings, File Types** Specify a comma delimited list of file types which might be used by the browser to restrict which files can be uploaded. See Help for examples.



Table A-1 (Cont.) Available Item Types

#### **Item Type**

#### Description

#### Geocoded Address

Provides Geocoding functionality that turns a postal address to a coordinate.

Geocoding is performed by the browser using a REST request to the Oracle Elocation Geocoding Service (https://elocation.oracle.com/elocation/home.html). In order for geocoding to work, the user's browser must be connected to the internet.

Geocoding input data comes from other page items which are mapped to parts of an address such as Street, House Number, Postal Code, or City. The Geocoder displays a popup window with a list of possible matches. After choosing a match, the item's session state value will be the address coordinate in GeoJSON format.

The **Structured Address** attribute determines whether the address parts are provided to the geocoding service in a *structured* or *unstructured* manner. *Structured* means that explicit page items are mapped to address parts such as Street, Postal Code, City or Region. A structured address has more accurate geocoding results, and also allows for address correction to be sent back to the page item. *Unstructured* means that only one item is used for the whole address and the address parts are separated by comma. *Unstructured* mode does not support address corrections.

A Geocoded Address item needs at least one other input item to work and for an exact address requires a maximum of eight input items.

If **Structured Address** is Off, the item maps to only one text field or text area where end users enter address parts, separated by comma. Following item attributes display under **Settings** the Property Editor in Page Designer:

- Country Type Select whether to use a static country for geocoding, or whether to derive the country from an item. Options include: Static or Item.
- Country Select the country to use for geocoding.
- Structured Address Select Off. Determines whether address parts are provided to the geocoding service in a structured or unstructured manner.
- Address Item Select the item containing unstructured address parts, separated by a comma.
- **Match Vector Item** Select a page item for the Geocoder to return the Match Vector. The match vector is a 17-digit string with detailed information about how each address attribute has been matched against the data used for geocoding. See item Help for more details.
- Trigger Geocoding Determines when to trigger geocoding. This includes the browser
  performing the REST request to the geocoding service and showing the popup window
  with possible matches. Options include: Automatic, Dynamic Action, and jQuery
  Selector. See item Help for more details.

If **Structured Address** is On, the following item attributes display under **Settings** the Property Editor in Page Designer:

- **Country Type** Select whether to use a static country for geocoding, or whether to derive the country from an item. Options include: **Static** or **Item**.
- Country Select the country to use for geocoding.
- Structured Address Select On. Determines whether address parts are provided to the geocoding service in a structured or unstructured manner.
- Sanitize Address Enable this switch to feed address data from the geocoding service back to the mapped items.
- Street Item Select the item containing the Street part of the address.
- House Number Item Select the item containing the House Number part of the address.
- Postal Code Item Select the item containing the Postal Code part of the address.
- City Item Select the item containing the City part of the address.
- City Sub Area Item Select the item containing the City Sub Area part of the address.
- Match Vector Item Select a page item for the Geocoder to return the Match Vector into.
   The match vector is a 17-digit string with detailed information about how each address



#### Table A-1 (Cont.) Available Item Types

#### Item Type Description

attribute has been matched against the data used for geocoding. See item Help for more information.

Trigger Geocoding - Determines when to trigger geocoding. This includes the browser
performing the REST request to the geocoding service and showing the popup window
with possible matches. Options include: Automatic, Dynamic Action, and jQuery
Selector. See item Help for more information.

**Note**: The Geocoded Address and Display Map items both work with the Oracle Elocation Map Cloud service (https://maps.oracle.com/elocation/ajax/index.jsp). This service is accessed by the browser, not by the APEX database on the server. Be aware this may result in data protection consequences for users. The geocoding items as and display map items store a coordinate in GeoJSON format (https://de.wikipedia.org/wiki/GeoJSON) Note that only the "geometry" portion is used. Currently only "Point" geometries are supported, for example:

```
{
  "type": "Point",
  "coordinates": [
   13.74081,
   51.05363
 ]
}
```

Hidden

Items that are included within the page source but are not rendered. Hidden item values are saved in session state. They are generally used to store values required by page processing or other page items, but should not be displayed to the end user.

Page Designer attribute:

- Settings, Value is Protected Select On to prevent hidden values from being manipulated when a page is posted.
- Session State, Data Type Select the data type of the page item (VARCHAR2 or CLOB).
- Session State, Storage Select how session state is maintained. Options include:
  - Per Request (Memory Only) Do not save state in the database. State is only available when processing the current request. When AJAX requests need to use an item, make sure to pass the item name using Page Items To Submit.
  - Per Session (Persistent) Maintain for each session by storing the value in the database, to access it across requests.



#### Table A-1 (Cont.) Available Item Types

#### Item Type Description

#### Markdown Editor

Displays a simple text editor that enables you to use Markdown shorthand syntax to add formatting to text.

Note: Markdown Editor is not supported for interactive grid columns.

**See Also**: Markdown Guide Page Designer item attributes:

- Settings, Toolbar Provides several options to configure the toolbar for the markdown editor. Options include:
  - Simple Display basic formatting controls in the toolbar.
  - Full Display full set of formatting controls in the toolbar.
  - None Hide the toolbar.
- Settings, Syntax Highlighting- Determines whether to apply syntax highlighting for specific Markdown elements such as bold, italics, code blocks, and so on. Highlighting will only take place for content under 4000 characters in length.
- Validation, Value Required- If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.
- Session State, Data Type Select the data type of the page item (VARCHAR2 or CLOB).
- Session State, Storage Select how session state is maintained. Options include:
  - Per Request (Memory Only) Do not save state in the database. State is only available when processing the current request. When AJAX requests need to use an item, make sure to pass the item name using Page Items To Submit.
  - Per Session (Persistent) Maintain for each session by storing the value in the database, to access it across requests.

#### List Manager

Displays a text item with a popup list of values icon, Add and Remove buttons, and a list of selected values.

Note: Not supported for interactive grid columns.

You can type in the value or pick from the list of available items. You can then utilize the buttons to manage the values selected. The selected values are stored in a single colon-delimited string.

Page Designer attributes:

- Settings, Fetch Select how data is displayed when the Popup LOV is opened.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

See Also: Creating a Cascading List of Values



Table A-1 (Cont.) Available Item Types

#### **Item Type**

#### Description

#### Number Field

Displays as a number field and supports automatic formatting. Numbers are formatted on the client after data entry according to the format mask. This item type automatically checks if the entered value is a number. No extra validations are required. Validation is done on both client and server.

Page Designer attributes:

- Appearance, Format Mask Specifies how the number is to be formatted for display. The locale determines the decimal separator used for data entry.
- Settings, Minimum Value Enter the minimum value permitted. The value can be a static value or a dynamic value using substitution syntax.
- Settings, Maximum Value Enter the maximum value permitted. The value can be a static
  value or a dynamic value using substitution syntax.
- Settings, Number Alignment Select how to align the number that displays. This setting
  does not apply when the item is rendered as Read Only or where HTML Form Element
  Attributes are specified.
- **Settings**, **Virtual Keyboard** Select which virtual keyboard to display when using the number field on a touchscreen. Options include:
  - Decimal Numeric only keyboard, with an added decimal key.
  - Numeric Numeric only keyboard. This option is useful for monetary values, PIN, ZIP Codes, CC numbers, and so on.
  - Text Regular alphanumeric keyboard.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted.

You can replace the predefined error text with an application specific error message, by defining a message called APEX.PAGE\_ITEM\_IS\_REQUIRED in Shared Components, Text Messages. Specify the message display location by updating the application-level setting, **Default Error Display Location**.

#### Password

Displays an HTML password form element. As the end user enters text a black dot is displayed for that character, instead of the actual character entered.

Page Designer attributes:

- Settings, Submit when Enter Pressed Specify whether pressing the Enter key while in this field automatically submits the page.
- Settings, Does not save state Specify whether the password is saved in session state.
   Oracle strongly recommends that you do not write the password into session state, for security reasons. The value can potentially be read from browser cache and APEX session tables. If you do set this attribute to No, consider setting Store value encrypted in session state to Yes.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

See Also: About Session State and Security

#### Percent Graph

Displays the value as a percentage graph. The value retrieved must be between 0 and 100.



#### Table A-1 (Cont.) Available Item Types

#### **Item Type**

#### Description

#### Popup LOV

Displays a text item with a popup list of values icon. When the end user clicks the icon, a popup window appears with a search field, and a list of supported values.

Popup LOV is best suited for large lists since end users can enter search criteria to reduce the available values displayed. For relatively small lists Select List is often better suited.

```
SELECT ename name, empno id FROM emp
```

If one of the columns is an expression, remember to use an alias. For example:

```
SELECT ename||' '||job display value, empno FROM emp
```

#### Page Designer item attributes:

- Settings, Display As Selects how the results are displayed either an inline popup or modal dialog.
- Settings, Initial Fetch Select how data is initially fetched for the list of values. This
  applies only the first time the popup is opened after the page loads or the item is refreshed
  such as due to a cascade. See also attribute Minimum Characters.
- Settings, Multiple Values Specifies if multiple values can be selected or entered.
- Settings, Manual Entry Select whether or not manual entry is allowed.
- Validation, Value Required- If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

#### See Also: Creating a Cascading List of Values

#### Radio Group

Displays multiple values as radio group options, enabling the end user to select a single value. The following example displays employee names (ename), but returns employee numbers (empno):

```
SELECT ename, empno FROM emp;
```

#### Page Designer item attributes:

- Settings, Number of Columns Enter the number of radio group columns to display. For example, a value of 2 would display two columns. If there were five values then it would display over three rows.
- Settings, Page Action on Selection Select what action is taken when a radio group value is selected. See Help for more details.
- Settings, Execute Validations This attribute only appears if Page Action when Value
  Changed is set to Submit Page. Controls the execution of validations when a page is
  submitted. Set this attribute to Off to prevent the execution of validations and associated
  error messages. Set this attribute to On to execute all page and built-in validations and
  associated error messages when the page is submitted.

**See Also**: About Determining When Validations Execute and Creating a Cascading List of Values

Validation, Value Required - If set to On and the page item is visible, Oracle APEX
automatically performs a NOT NULL validation when the page is submitted. See Help for
more details.



#### Table A-1 (Cont.) Available Item Types

#### Item Type

#### Description

#### Rich Text Editor

Displays a text area with comprehensive text formatting options. End users can enhance the content displayed in a similar fashion to using a word processor, such as Microsoft Word. End users can also cut and paste documents that are in rich text format (RTF) file format into this item.

Page Designer item attributes:

- Settings, Format Specify the output format of the content entered in the rich text editor.
   Options include:
  - HTML Use HTML for the source and output of this rich text editor. HTML is more flexible and offers more formatting options than Markdown, but is less secure and must be trusted or sanitized when displayed.
  - Markdown Use Markdown format for the source and output of this rich text editor.
     Markdown is more restrictive than HTML in terms of features, but is more secure as it must first pass through a parser before being displayed.
- If **Settings**, **Format** is set to **HTML**, the following additional attributes appear:
  - Settings, Toolbar Select the number of text formatting options available within the editor. Available options include: Basic, Intermediate, or Full.
  - Settings, Toolbar Style Choose whether the toolbar items should only take up one line and overflow into a popup menu if wider than the editor's width, or whether to split them into multiple lines. Options include: Overflow Menu or Multiline.
  - Settings, Allow Custom HTML Enables the General HTML Support and Source Editing CKEditor5 plug-ins. Combined, these bridge the gap between CKEditor4 and CKEditor5, by allowing for custom HTML and the ability to edit it inline. Oracle recommends disabling this attribute since it is intended for advanced usage and compatibility with content produced by CKEditor4. See Help for more details.
- Settings, Minimum Height Set the minimum height in pixels of the editable area.
- Settings, Maximum Height Set the maximum height in pixels of the editable area. Leaving this attribute empty will let the editor grow infinitely as you type.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.
- Session State, Data Type Select the data type of the page item (VARCHAR2 or CLOB).
- Session State, Storage Select how session state is maintained. Options include:
  - Per Request (Memory Only) Do not save state in the database. State is only available when processing the current request. When AJAX requests need to use an item, make sure to pass the item name using Page Items To Submit.
  - Per Session (Persistent) Maintain for each session by storing the value in the database, to access it across requests.



Table A-1 (Cont.) Available Item Types

#### **Item Type**

#### Description

#### Select List

Displays an item with a built-in list of values selector. When the end user clicks the item, the list of supported values displays directly inline with the current item.

Select List is best suited for relatively small, discrete lists. End users can very quickly select a value from the list without needing to change focus to a popup dialog. For large lists, consider using a Popup LOV.

#### Page Designer item attributes:

- Settings, Page Action on Selection Select what action is taken when a list value is selected. See help for options.
- Settings, Allow Multi Selection Specify whether multiple values or only a single value
  can be selected from the list of values. Multiple values are returned as a comma-separated
  list
- Settings, Execute Validations Displays if Page Action on Selection is set to Submit Page. Controls the execution of validations when a page is submitted. Set this attribute to Off to prevent the execution of validations and associated error messages. Set this attribute to On to execute all page and built-in validations and associated error messages when the page is submitted. Use this attribute in conjunction with the validation attribute, Always Execute.

See Also: About Determining When Validations Execute

 Validation, Value Required - If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

#### Shuttle

Displays as a multiple select list that includes two boxes containing lists. The left list displays the source list of values that have not been selected and the right list shows the currently selected values. End users can select one or more values in a list then use the shuttle controls to move the selected values or all values.

The current values are stored in a single colon-delimited string.

Page Designer item attributes:

- Settings, Show Controls Select what data movement controls displays in the middle of the shuttle. Options include: None, Moving Only, Ordering Only, or All.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.

**Note**: To create this item type, you must define a list of values. See Creating Lists of Values at the Application-Level, Working with Multiple Select List Item, and Creating a Cascading List of Values.



Table A-1 (Cont.) Available Item Types

#### Item Type Description

#### Star Rating

Displays a star rating (maximum of 10) that end users can click to set a numeric value.

Page Designer item attributes:

- Settings, Number of Stars Set the total number of stars (one to ten) for end users to choose (default five).
- Settings, Use Defaults If set to On, the Star Rating uses the application-level component settings defined in Shared Components, Component Settings, Star Rating.

See Also: Configuring Star Rating

If **Use Defaults** is set to **Off**, the following custom settings appear:

- Icon The icon class to use (such as fa-thumb-up). Click the drop-down list to pick an icon.
- Active Color Default color for active stars.
- Inactive Color Default color for inactive stars.
- Tooltip The template for the tooltip when end users hover the mouse over the item.
   This rating value replaces the #VALUE# substitution (for example, the movie rating is #VALUE#).
- Show Clear Button Choose whether to display the Clear button (x) next to the stars.
- Show Value Choose whether to display a value next to the stars.
- Read Only Display Choose what to display if the item is read only. Options include Stars, Value, Stars and Value, and Single Star and Value.

#### Switch

Displays as a flip toggle switch.

Page Designer item attributes:

 Settings, Use Defaults - If set to On, the Color Picker uses the application-level component settings defined in Shared Components, Component Settings, Color Picker.

**Note**: Switch items can display as a flip toggle switch (the default), Pill Button, or Select List. See Configuring Switch Defaults.

If **Use Defaults** is set to **Off**, the following custom settings appear:

- On Value Enter the value stored in the page item if the user picks the On option. The
  value can be up to 255 characters long.
- On Label Enter the text displayed for the On option.
- Off Value Enter the value stored in the page item if the user picks the Off option. This
  attribute can also be left blank if you want to store NULL when the Off option is
  selected. The value can be up to 255 characters long.

**Note**: This value is used if the page item is populated with a value which does not match either the On Value or Off Value.

- Off Label Enter the text displayed for the Off option.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.



Table A-1 (Cont.) Available Item Types

#### Item Type Description

Text Field

Displays the item as a text field.

Page Designer item attributes:

 Settings, Subtype - Select the HTML5 text subtype. This enables 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 is rendered read only. This attribute does not change the text item, or data entry, when using a physical keyboard.

**Note:** This HTML5 feature only works in modern browsers. Older, non HTML5-compliant, browsers ignore this attribute and render the page item as a normal text field.

- Settings, Trim Spaces Select how the item value is trimmed. This setting trims spaces, tabs, and new lines from the text entered. Options include: Leading, Trailing, Leading and Trailing, or None.
- Settings, Text Case Select how the item value text case is transformed. Options include:
   No Change, Lower, and Upper.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX
  automatically performs a NOT NULL validation when the page is submitted. See Help for
  more details.

## Text Field with autocomplete

Displays a text field that displays a list of possible values based on the text already entered by the end user, inline with the text item. The list is further refined as the end user types in more text

```
select [column]
  from ...
where ...
order by ...
```

#### Page Designer item attributes:

- Settings, Search Select how the search against the entered value is performed. When
  using Lazy Loading this setting can have an impact on query performance. Selecting
  Contains & Case Sensitive or Contains & Ignore Case prevents the use of column
  indexes.
- Settings, Fetch On Type Specify whether matching values are retrieved from the database as the user types on the autocomplete item. Fetch On Type retrieves matching records from the database each time the user types a character. Otherwise, all of the list values are loaded on page load.
  - Oracle recommends using **Fetch On Type** when you have a large select list since loading a large number of records may impact the time to initially load the page.
- Settings, Maximum Values in List Enter the maximum number of items to display in the select box. This value can help avoid performance problems by returning too many rows, and also prevent a very large return set when only a few letters have been entered.
- Validation, Value Required If set to On and the page item is visible, Oracle APEX
  automatically performs a NOT NULL validation when the page is submitted. See Help for
  more details.



Table A-1 (Cont.) Available Item Types

Item Type	Description	
Textarea	Displays a multiple-row text area.	
	Page Designer item attributes:	
	<ul> <li>Settings, Resizable - Specify whether the text area resizing using the mouse is enabled.</li> <li>Settings, Auto-Height - Specify whether the height of the text area varies based on the amount of text displayed. Use this option to scale the text area to the amount of data.</li> <li>Settings, Character Counter - If set to On include a counter that displays the number of characters entered in the field.</li> <li>Settings, Trim Spaces - Select how the item value is trimmed. This setting trims spaces, tabs, and new lines from the text entered. Options include: Leading, Trailing, Leading and Trailing, or None.</li> <li>Validation, Value Required - If set to On and the page item is visible, Oracle APEX automatically performs a NOT NULL validation when the page is submitted. See Help for more details.</li> <li>Session State, Data Type - Select the data type of the page item (VARCHAR2 or CLOB).</li> <li>Session State, Storage - Select how session state is maintained. Options include:  — Per Request (Memory Only) - Do not save state in the database. State is only available when processing the current request. When AJAX requests need to use an item, make sure to pass the item name using Page Items To Submit.</li> </ul>	
	<ul> <li>Per Session (Persistent) - Maintain for each session by storing the value in the database, to access it across requests.</li> </ul>	



B

## **Oracle APEX Limits**

Learn about limits associated with Oracle APEX components.

Component Limits

Learn about limits associated with Oracle APEX components, such as interactive reports, classic reports, forms, and tabular forms.

#### **Related Topics**

Splitting Export Files into Separate Scripts
 Learn about splitting application, page, and component export files into separate SQL scripts.

## **B.1 Component Limits**

Learn about limits associated with Oracle APEX components, such as interactive reports, classic reports, forms, and tabular forms.

**Table B-1** Component Limits

Component	Limits	To Learn More
Data loading	When loading data, the maximum number of columns is 45.	Managing Applications with Legacy Data Loading Capability
Export of interactive report and classic report using external print server	If using an external print server, there is a 32k limitation on the generated report template header sub-template. Also, depending on the column alias lengths, approximately 26 columns (or less) are supported.	Exporting Workspaces, Applications, and App Components
Forms	32767 bytes for a text area or rich text editor item.  Two columns for primary key (when using built in DML processes). For users with more than two primary key columns defined, you can also specify a ROWID.	Developing Forms
Interactive reports	999 rows per column heading filter (if no custom LOV is specified in the column attributes). A chart within an interactive report can render up to 10000 data points.	Developing Reports
Item names	Item names should not exceed 30 characters. Items longer than 30 characters cannot be referenced using bind variable syntax.	Referencing Session State Using Bind Variable Syntax About Item Naming Conventions

Table B-1 (Cont.) Component Limits

Component	Limits	To Learn More
Tabular Forms	One wizard-generated tabular form per page (using built-in DML).	Managing Legacy Tabular Forms
	50 editable tabular form columns (apex_application.g_f01-apex_application.g_f50), generated with apex_item or the built-in tabular form display types.	
Validations	Text entered for validations may not exceed 3,950 characters.	Understanding Validations



C

# Directory Structure When Splitting Export Files into Separate Scripts

Exporting an application, page, or component as separate files creates a directory structure organized by component type.

This directory structure may extend multiple levels. This directory structure is the same whether you are using the application-level flag, **Split into Multiple Files**, or the page or component-level flag, **Export as Zip**.

Export Directory Structure
 Learn about the directory structure of applications, pages, or components exported as separate files.

### **Related Topics**

Splitting Export Files into Separate Scripts
 Learn about splitting application, page, and component export files into separate SQL scripts.

# C.1 Export Directory Structure

Learn about the directory structure of applications, pages, or components exported as separate files.

Component	Directory Structure
Page	application/pages
Page Group	application/pages/page_groups
Plug-in Settings	application/plugin_settings
Credential	application/shared_components/workspace/credentials
Data Loading	application/shared_components/data_loading/tables
Data Profile	application/shared_components/data_profiles
Email Template	application/shared_components/email/templates
Application Static File	application/shared_components/files
Workspace Static File	workspace/files
Text Message	application/shared_components/globalization/messages
Application Computation	application/shared_components/logic/ application_computations
Application Item	application/shared_components/logic/application_items
Application Process	application/shared_components/logic/application_processes
Application Setting	application/shared_components/logic/application_settings
Build Option	application/shared_components/logic/build_options



Component	Directory Structure
Build Option Status	application/shared_components/logic/build_options/status
Web Service	application/shared_components/logic/webservices
Breadcrumb Entry	application/shared_components/navigation/breadcrumbentry
Breadcrumb	application/shared_components/navigation/breadcrumbs
List	application/shared_components/navigation/lists
Navigation Bar Entry	application/shared_components/navigation/navigation_bar
Parent Tab	application/shared_components/navigation/tabs/parent
Tab	application/shared_components/navigation/tabs/standard
Tree	application/shared_components/navigation/trees
Plug-in	application/shared_components/plugins
Remote Server	workspace/remote_servers
Report Layout	application/shared_components/reports/report_layouts
Report Query	application/shared_components/reports/report_queries
Application Access Control Role	application/shared_components/security/app_access_control
Authentication Scheme	application/shared_components/security/authentications
Authorization Scheme	application/shared_components/security/authorizations
List of Values	application/shared_components/user_interface/lovs
Shortcut	application/shared_components/user_interface/shortcuts
Breadcrumb Template	application/shared_components/user_interface/templates/breadcrumb
Button Template	<pre>application/shared_components/user_interface/templates/ button</pre>
Calendar Template	<pre>application/shared_components/user_interface/templates/ calendar</pre>
Label Template	<pre>application/shared_components/user_interface/templates/ label</pre>
List Template	<pre>application/shared_components/user_interface/templates/ list</pre>
Page Template	<pre>application/shared_components/user_interface/templates/ page</pre>
Popup List of Values Template	<pre>application/shared_components/user_interface/templates/ popuplov</pre>
Region Template	<pre>application/shared_components/user_interface/templates/ region</pre>
Report Template	<pre>application/shared_components/user_interface/templates/ report</pre>
REST Data Source (Web Source)	application/shared_components/web_sources



D

# Correlating APEX Sessions to Database Sessions

Learn about best practices that enable administrators and developers to correlate the database session with a specific APEX application in order to troubleshoot application performance issues.

- About APEX Sessions and Database Sessions
   Learn about APEX sessions and database sessions.
- Session Attributes
   Learn about session attributes visible to system administrators and developers.
- APEX Processes
   Learn how APEX sets session attributes for an application or background mail session.
- SQL Workshop Learn how APEX sets session attributes in SQL Commands and SQL Scripts.
- Data Workshop Learn how APEX sets session attributes while importing data using Data Workshop.
- Automations
   Learn how APEX sets session attributes while running Automations.
- Installer
   Learn how APEX installation scripts set session attributes while APEX is being installed or upgraded.



SET\_IDENTIFIER Procedure and DBMS\_APPLICATION\_INFO in *Oracle Database PL/SQL Packages and Types Reference* 

### D.1 About APEX Sessions and Database Sessions

Learn about APEX sessions and database sessions.

Oracle APEX includes a database account called APEX\_PUBLIC\_USER. All database sessions in the database session pool of Oracle REST Data Services (ORDS) use a single database user such as ORDS\_PUBLIC\_USER, APEX\_PUBLIC\_USER, or some other user depending how the instance was configured. There is no permanent, fixed correlation between an APEX session and a database session. Because the assignment of a session in the session pool to service an APEX request is essentially unpredictable and not constant, this correlation can only be done for active database sessions, which are actively servicing APEX requests.

### **D.2 Session Attributes**

Learn about session attributes visible to system administrators and developers.

While one or more APEX database processes are active, they may set the following session attributes which are visible to system administrators from v\$session, v\$sqlarea, v\$session\_longops, and from various audit and SQL tracing tools. Developers can set these session attributes using PL/SQL.

#### client id

client\_id is a 64 byte string that is generally used to identify the user/client session. Since it is possible for the processing for a single APEX session to execute in different database sessions, you can correlate the workload across all database sessions to each APEX session. client\_id is also often used in conjunction with Virtual Private Database (VPD) using an application context. In PL/SQL, you can set client\_id for a session by calling dbms\_session.set\_identifier and retrieve it with sys\_context('USERENV', 'CLIENT\_IDENTIFIER'). You can view client\_id for active sessions in the client identifier column in the v\$session view.

Within an APEX session, setting this attribute is not necessary and generally should be left unchanged. If custom PL/SQL code executed within an APEX session changes <code>client\_id</code>, this change will not cause problems for Oracle APEX. However, it may affect the ability for some monitoring tools to effectively identify the APEX session.

#### client info

client\_info is a 64 byte string that is usually used by APEX to identify the workspace and user. In PL/SQL, you can set client\_info for the session by calling dbms\_application\_info.set\_client\_info and retrieve it using dbms\_application\_info.read\_client\_info or with sys\_context('USERENV','CLIENT\_INFO'). You can view client\_info for active sessions in the client info column in the v\$session view.

Within an APEX session, setting this attribute is not necessary and generally should be left unchanged. If custom PL/SQL code executed within an APEX session changes <code>client\_info</code>, this change will not cause problems for Oracle APEX. However, it may affect the ability for some monitoring tools to effectively identify the APEX session.

#### module

module is a 48 byte string that is usually used to identify the currently running module or process. In PL/SQL, you can set module by calling dbms\_application\_info.set\_module and retrieve it using dbms\_application\_info.read\_module or with sys\_context('USERENV', 'MODULE'). You can view module for active sessions in the module column in the v\$session view.

Within an APEX session, Oracle recommends setting this attribute (along with action) as a way to allow monitoring tools to identify what is currently being processed.

#### action

action is a 32 byte string that is usually used to identify the current step being performed within a module or process. In PL/SQL, you can set action for the session



by calling dbms\_application\_info.set\_module or set\_action and retrieve it using dbms\_application\_info.read\_module or sys\_context('USERENV', 'ACTION'). You can view action for active sessions in the action column in the v\$session view.

Within an APEX session, Oracle recommends setting this attribute (along with module) as a way to allow monitoring tools to identify what is currently being processed.

#### **Session long ops**

Session longops (long operations) is a record structure that describes the number of units processed so far versus the total number of units expected to be processed. You can use session longops to estimate completion time for long-running processes. In PL/SQL, you can set session longops for the session by calling

dbms\_application\_info.set\_session\_longops. You can monitor long operations by querying the v\$session longops view.

Within an APEX session, Oracle recommends setting this attribute for processes that are expected to take a long time, if the workload can be reasonably broken up into discrete units of work (for example, "number of records processed").



Oracle APEX calls the SYS version of dbms\_application\_info; even if a wrapper for the package exists, it will not be used.

### D.3 APEX Processes

Learn how APEX sets session attributes for an application or background mail session.



#### Tip:

Most APEX processes reset the session values to NULL when they finish. They do not restore prior values.

### **Application Session**

The following table details how APEX sets session attributes for an application session.

Session Attribute	Expression	Example.	Notes More
client_id	app_user    ':'    session-id	jane.doe@example.com: 12161645673208	If app_user is too long, it will be truncated to fit (for example, the first 50 or 49 bytes). Before authentication is completed, will be:
			session-id



Session Attribute	Expression	Example.	Notes More
client_info	workspace-id    ':'    app_user	3574091691765823934:j ane.doe@example.com	n/a
module	schema    '/ APEX:APP '    app- id    ':'    page- id	MY_DB/APEX:APP 17251:4	n/a
action	A range of different values may be seen, such as:  'start_page_request'  'PAGE '    page-id' 'computation and processes' 'fetch meta data' 'Processes - point: '    process-point' 'Validations' 'branching' 'import app '    app-id	n/a	n/a

### **Mail Background Session**

The following table details how APEX sets session attributes for a mail background session.

Session Attribute	Expression	Notes
client_id	mail-from    ':'    message-guid	Long email addresses are truncated to fit.
client_info	workspace-id    ':'    mail-from	n/a
module	(unchanged)	n/a
action	(unchanged)	n/a



# D.4 SQL Workshop

Learn how APEX sets session attributes in SQL Commands and SQL Scripts.



The **Autocommit** check box displays in SQL Commands if **Enable Transactional SQL Commands** is enabled in Administration Services, Feature Configuration. To learn more, see Configuring SQL Workshop in *Oracle APEX Administration Guide* 

### **SQL Commands (Autocommit = ON)**

The following table details how APEX sets session attributes in SQL Commands when **Autocommit** is enabled.

Session Attribute	Expression
client_id	app_user    ':'    session-id
client_info	workspace-id    ':'    app_user
module	'APEX:SQL Workshop'
action	sql-statement

#### **SQL Commands (Autocommit = OFF)**

The following table details how APEX sets session attributes in SQL Commands when **Autocommit** is disabled. When **Autocommit** is disabled, SQL Commands are executed by a separate database job. While awaiting a command from the SQL Commands window, the job is in an "idle" state.

Session Attribute	Expression
client_id	app_user    ':'    session-id
client_info	workspace-id    ':'    app_user



Session Attribute	Expression
module	'APEX:SQL Workshop-No Autocommit'
action	Working
	sql-statement
	Idle, awaiting work
	Stopping



Using SQL Commands in Oracle APEX SQL Workshop Guide

### **SQL Scripts**

The following table details how APEX sets session attributes while running SQL Scripts.

Session Attribute	Expression
client_id	app_user    ':'    session-id
client_info	workspace-id    ':'    app_user
module	'APEX:SQL Workshop:Script'
action	script-name
longops	SQL statement $N$ of $M$

✓ See Also:

Using SQL Scripts in Oracle APEX SQL Workshop Guide



# D.5 Data Workshop

Learn how APEX sets session attributes while importing data using Data Workshop.

The following table details how APEX sets session attributes while importing data using Data Workshop.

Expression	Notes
(unchanged)	n/a
	n/a
workspace-id    ':'    app-	
user	
achema II I/ADEV.ADDI II	If the schema name is long, it may be truncated so that the module string
	fits within 48 bytes.
_	no wanii 10 bytos.
-	
':DATA_LOADING_SODA'	
Data Loading Job	
	<pre>workspace-id    ':'    app- user  schema    '/APEX:APP'    app-id    ':DATA_LOADING' or schema    '/APEX:APP'    app-id    ':DATA_LOADING_SODA'</pre>

# **D.6 Automations**

Learn how APEX sets session attributes while running Automations.

The following table details how APEX sets session attributes while running Automations.

Session Attribute	Expression	Notes
client_id	(unchanged)	n/a
client_info	workspace-id    ':'	n/a
module	automation-module	n/a
action	<pre>automation-static-id    ':I'</pre>	Executing initialisation procedure.  In all cases, automation-static- ID is truncated to 16 characters.
action	automation-static-id	Starting / fetching data.



Session Attribute	Expression	Notes
action	automation-static-id    ':R'    row-num    ':B'	Before action.
action		Executing action.
	<pre>automation-static-id    ':R'    row-num    ':A'    action-sequence</pre>	
action	automation-static-id    ':R'    row-num	Finished action.
action	automation-static-id    ':T'	Cleanup.



**Managing Automations** 

## D.7 Installer

Learn how APEX installation scripts set session attributes while APEX is being installed or upgraded.

The following table details how APEX installation scripts set session attributes while installing or upgrading APEX.

Session Attribute	Expression	Notes
client_id	(unchanged)	n/a
client_info	(unchanged)	n/a
module	'APEX '    <i>install-type</i>    ' PHASE '    phase	<pre>install-type is something like 'FULLINS', 'RUNTIME', 'PATCH', and so on.</pre>
action	A range of different values may be seen, such as:	n/a
	'upgrade' 'recompiling'	



Е

# **Available Conditions**

Learn about conditions available in App Builder.

- What Are Conditions?
   Learn about conditions.
- Conditions Available in App Builder
   Review descriptions of conditions available in Oracle APEX.

#### **Related Topics**

Understanding Conditional Rendering and Processing
 Use conditions in an application to control how pages and page components display and
 when processes, computations, and validations execute.

### E.1 What Are Conditions?

Learn about conditions.

A condition is a small unit of logic that helps developers control the display of regions, items, buttons, and tabs as well execute processes, computations and validations. When you apply a condition to a control or component, the condition is evaluated. Whether a condition passes or fails determines whether a control or component displays, or page processing executes.

You can specify conditions by selecting a condition type when you create the control (region, button, or item) or component (tab, list, or navigation bar), or by making a selection under the condition attribute.

# E.2 Conditions Available in App Builder

Review descriptions of conditions available in Oracle APEX.



#### Tip:

To view a complete listing of all available conditions for a given control or component, expand the condition type list.

Table E-1 Available Conditions

Condition	Description
Rows returned	The SQL query returns one or more rows.
No Rows returned	The SQL Query returns no rows
SQL Expression	The SQL expression evaluates to TRUE.
PLSQL Expression	The SQL expression evaluates to TRUE.



Table E-1 (Cont.) Available Conditions

Condition	Description
PL/SQL Function Body	The PL/SQL function body returns TRUE.
Request = Value	The page request is equal to the text you enter into the Value attribute.
Request != Value	The page request is not equal to the text you enter into the Value attribute.
Request is contained in Value	The page request is contained in the text you enter into the Value attribute.
Request is NOT contained in Value	The page request is not contained in the text you enter into the Value attribute.
Item = Value	The value of the selected item is equal to the text you enter into the Value attribute.
Item != Value	The value of the selected item is not equal to the text you enter into the Value attribute.
Item is NULL	The value of the selected item is empty.
Item is NOT NULL	The value of the selected item is not empty.
Item is zero	The value of the selected item is the number zero.
Item is NOT zero	The value of the selected item is not the number zero.
Item is NULL or zero	The value of the selected item is empty or the number zero.
Item is NOT NULL and NOT zero	The value of the selected item is not empty and not the number zero.
Item contains no spaces	The value of the selected item has no spaces.
Item is numeric	The value of the selected Item is numeric.
Item is NOT numeric	The value of the selected item is not numeric.
Item is alphanumeric	The value of the selected item is alphanumeric, containing only letters or numbers and no special characters.
Item is in colon delimited list	The value of the selected item is completely contained in the text you enter into the Value attribute.
Item is NOT in colon delimited list	The value of the selected Item is not completely contained in the text you entered into the Value attribute.
User Preference = Value	The value of the Preference entered is equal to the text you enter into the Value attribute.
User Preference != Value	The value of the Preference entered is not equal to the text you enter into the Value attribute.
Current Page = Page	The current page is equal to the value you enter into Page.
Current Page != Page	The current page is not equal to the value you enter into Page.
Current Page is in comma delimited list	The current page is in the comma separated list you enter into Pages.
Current Page is NOT in comma delimited list	The current page is not in the comma separated list you enter into Pages.
Current page is in Printer Friendly mode	The current page has been toggled to 'Printer Friendly Mode' by the end user.
Current page is NOT in Printer Friendly mode	The current page has not been toggled to 'Printer Friendly Mode' by the end user.
Page/Region is Read Only	Either the page or parent region, if appropriate, 'Read Only' condition evaluates to TRUE.



Table E-1 (Cont.) Available Conditions

Condition	Description
Page/Region is NOT Read Only	The page and parent region, if appropriate, are displayed normally.
User is authenticated (not public)	The end user is logged into the application.
	<b>See Also:</b> Establishing User Identity Through Authentication for information about authentication
User is the public user (user has not authenticated)	The end user is not logged into the application.
Inline Validation Errors Displayed	An inline validation error is displayed on the page, following a page submission.
Inline Validation Errors NOT displayed	An inline validation error is not displayed on the page.
Current Language = Value	The end user is currently running the application in the language you enter into the Value attribute.
Current Language != Value	The end user is not currently running the application in the language you enter into the Value attribute.
Current Language is contained in Value	The end user is currently running the application in one of the languages you enter into the Value attribute.
Current Language is NOT contained in Value	The end user is not currently running the application in one of the languages you enter into the Value attribute.
Never	The component is never rendered.
	<b>Note:</b> Changing a condition to Never will remove any existing condition. For temporarily disabling a component, Oracle recommends using the Build Option attribute.



F

# **About Granted Privileges**

Learn about grant privileges in Oracle APEX.

- About Granting Privileges to Database Users
   Review granted privileges Oracle recommends for database users.
- Understanding Privileges Granted to PUBLIC Learn about privileges granted to PUBLIC.

## F.1 About Granting Privileges to Database Users

Review granted privileges Oracle recommends for database users.

In APEX, no privileges are granted to database users when creating a workspace on an existing schema. Unless direct grants exist, database users in APEX will not be able to create tables or other database objects. To allow the creation of typical database objects, Oracle recommends the following list of directly granted privileges

```
grant CREATE SESSION to [database username]
grant CREATE CLUSTER to [database username]
grant CREATE DIMENSION to [database username]
grant CREATE INDEXTYPE to [database username]
grant CREATE JOB to [database username]
grant CREATE MATERIALIZED VIEW to [database username]
grant CREATE OPERATOR to [database username]
grant CREATE PROCEDURE to [database username]
grant CREATE SEQUENCE to [database username]
grant CREATE SNAPSHOT to [database username]
grant CREATE TABLE to [database username]
grant CREATE TABLE to [database username]
grant CREATE TRIGGER to [database username]
grant CREATE TRIGGER to [database username]
grant CREATE TYPE to [database username]
grant CREATE TYPE to [database username]
```

# F.2 Understanding Privileges Granted to PUBLIC

Learn about privileges granted to PUBLIC.



This section describes public synonyms that exist and for which the execute privilege is granted to PUBLIC for the packages, procedures, functions, tables, and views owned by the APEX product schema, (for example, APEX\_220200). To avoid conflicts with operation of the APEX engine, Oracle recommends not to use the following names for database objects in schemas associated with Oracle APEX workspaces.



#### Tip:

To avoid conflicts with operation of the APEX engine, Oracle recommends not to use the following names for database objects in schemas associated with Oracle APEX workspaces.

- Packages
- Procedures
- Functions
- Tables
- Views
- Sequences
- Types

### F.2.1 Packages

Public synonyms exist and execute privilege is granted to PUBLIC for the following packages owned by the APEX product schema, (for example, APEX 220200):

```
APEXWS

APEX_MIG_PROJECTS_UPDATE

APEX_UI_DEFAULT_UPDATE

HTMLDB_CUSTOM_AUTH

HTMLDB_ITEM

HTMLDB_LANG

HTMLDB_SITE_ADMIN_PRIVS

WWV_FLOW_APPLICATION_INSTALL

HTMLDB_UTIL

WWV_FLOW
WWV_FLOW_API

WWV_FLOW_API

WWV_FLOW_AUDIT

WWV_FLOW_APPLICATION_INSTALL

WWV_FLOW_APPLICATION_INSTALL

WWV_FLOW_APPLICATION_INSTALL
```



WWV\_FLOW\_COLLECTION

WWV\_FLOW\_CSS

WWV FLOW CSS API

WWV FLOW CUSTOMIZE

WWV FLOW CUSTOM AUTH

WWV FLOW CUSTOM AUTH LDAP

WWV FLOW CUSTOM AUTH STD

WWV\_FLOW\_DEBUG\_MESSAGE

WWV FLOW EPG INCLUDE MODULES

WWV\_FLOW\_FILE\_MGR

WWV\_FLOW\_FND\_USER\_API

WWV\_FLOW\_GLOBAL

WWV\_FLOW\_HINT

WWV FLOW HTML API

WWV FLOW ID

WWV FLOW IMAGE API

WWV FLOW ITEM

WWV FLOW ITEM HELP

WWV\_FLOW\_JAVASCRIPT

WWV FLOW LANG

WWV FLOW LDAP

WWV\_FLOW\_LOOKUP\_TABLES

WWV\_FLOW\_MAIL

WWV FLOW PLSQL JOB

WWV FLOW PLUGIN

WWV FLOW PLUGIN UTIL

WWV FLOW PREFERENCES

WWV\_FLOW\_RANDOM

WWV\_FLOW\_RENDER\_SHORTCUT

WWV FLOW REST

WWV\_FLOW\_SVG

WWV FLOW USER API

WWV FLOW UTILITIES



```
WWV_FLOW_WEBSERVICES_API
WWV_FLOW_WS_IMPORT_API
WWV_MIG_ACC_LOAD
WWV_RENDER_CALENDAR2
WWV_RENDER_CHART2
```

Execute privilege is granted to PUBLIC for the following packages owned by the APEX product schema, (for example, APEX 220200):

```
WWV_CALCULATOR

WWV_FLOW_FLASH_CHART

WWV_FLOW_GENERATE_DDL

WWV_FLOW_IMAGE_GENERATOR

WWV_FLOW_TREE_GLOBAL_VARS
```

### F.2.2 Procedures

Public synonyms exist and execute privilege is granted to PUBLIC for the following procedures owned by the Oracle APEX product schema, (for example, APEX 220200):

```
APEX
APEX_ADMIN

DEVELOPMENT_SERVICE_HOME

DEVELOPMENT_SERVICE_HOME_LOGIN

DEVELOPMENT_SERVICE_SIGNUP

F

HTMLDB

HTMLDB_ADMIN

HTMLDB_LOGIN

P

WS

WWV_FLOW_INIT_HTP_BUFFER

Z
```

### F.2.3 Functions

Public synonyms exist and execute privilege is granted to PUBLIC for the following functions owned by the Oracle APEX product schema, (for example, APEX 220200):

NV

V



Execute privilege is granted to PUBLIC for the following function owned by the APEX product schema (for example, APEX 220200):

WWV POPUP\_FILTER

### F.2.4 Tables

Public synonyms exist and select privilege is granted to PUBLIC for the following tables owned by the Oracle APEX product schema, (for example, APEX 220200):

```
WWV_FLOW_DUAL100

WWV_FLOW_TEMP_TABLE

WWV FLOW LOV TEMP
```

### F.2.5 Views

Public synonyms exist and select privilege is granted to PUBLIC for the following views owned by the Oracle APEX product schema (for example, APEX 220200):

```
APEX APPLICATIONS
APEX APPLICATION_ALL_AUTH
APEX APPLICATION AUTH
APEX_APPLICATION_AUTHORIZATION
APEX APPLICATION BC ENTRIES
APEX APPLICATION BREADCRUMBS
APEX APPLICATION BUILD OPTIONS
APEX APPLICATION CACHING
APEX_APPLICATION_COMPUTATIONS
APEX APPLICATION GROUPS
APEX APPLICATION ITEMS
APEX_APPLICATION_LISTS
APEX APPLICATION LIST ENTRIES
APEX APPLICATION LOVS
APEX APPLICATION LOV ENTRIES
APEX APPLICATION_NAV_BAR
APEX APPLICATION PAGES
APEX_APPLICATION_PAGE_BRANCHES
APEX APPLICATION PAGE BUTTONS
APEX APPLICATION PAGE CHARTS
```

APEX\_APPLICATION\_PAGE\_CHART\_S



APEX APPLICATION PAGE CHART A APEX APPLICATION PAGE COMP APEX APPLICATION PAGE DA APEX APPLICATION PAGE DA ACTS APEX APPLICATION PAGE DB ITEMS APEX APPLICATION PAGE FLASH5 APEX APPLICATION PAGE FLASH5 S APEX APPLICATION PAGE GROUPS APEX APPLICATION PAGE IR APEX\_APPLICATION\_PAGE\_IR\_CAT APEX APPLICATION PAGE IR CGRPS APEX APPLICATION PAGE IR COL APEX\_APPLICATION\_PAGE\_IR\_COMP APEX APPLICATION PAGE IR COND APEX APPLICATION PAGE IR GRPBY APEX APPLICATION PAGE IR PIVOT APEX APPLICATION PAGE IR PVAGG APEX APPLICATION PAGE IR PVSRT APEX\_APPLICATION\_PAGE\_IR\_RPT APEX APPLICATION PAGE IR SUB APEX APPLICATION PAGE ITEMS APEX APPLICATION PAGE MAP APEX APPLICATION PAGE PROC APEX APPLICATION PAGE REGIONS APEX APPLICATION PAGE RPT APEX APPLICATION PAGE RPT COLS APEX APPLICATION PAGE TREES APEX APPLICATION PAGE VAL APEX APPLICATION PARENT TABS APEX APPLICATION PROCESSES APEX\_APPLICATION\_RPT\_LAYOUTS APEX APPLICATION RPT QRY STMTS

APEX APPLICATION RPT QUERIES



APEX APPLICATION SETTINGS

APEX APPLICATION SHORTCUTS

APEX APPLICATION SUBSTITUTIONS

APEX APPLICATION SUPP OBJECTS

APEX APPLICATION SUPP OBJ BOPT

APEX APPLICATION SUPP OBJ CHCK

APEX APPLICATION SUPP OBJ SCR

APEX APPLICATION TABS

APEX APPLICATION TEMPLATES

APEX\_APPLICATION\_TEMP\_BC

APEX APPLICATION TEMP BUTTON

APEX APPLICATION TEMP CALENDAR

APEX\_APPLICATION\_TEMP\_LABEL

APEX APPLICATION TEMP LIST

APEX APPLICATION TEMP PAGE

APEX APPLICATION TEMP POPUPLOV

APEX APPLICATION TEMP REGION

APEX APPLICATION TEMP REPORT

APEX\_APPLICATION\_THEMES

APEX APPLICATION TRANSLATIONS

APEX APPLICATION TRANS MAP

APEX APPLICATION TREES

APEX\_APPLICATION\_WEB\_SERVICES

APEX APPL ACL ROLES

APEX APPL ACL USER ROLES

APEX\_APPL\_ACL\_USERS

APEX APPL PAGE IG COLUMNS

APEX\_APPL\_PAGE\_IG\_COL\_GROUPS

APEX\_APPL\_PAGE\_IGS

APEX APPL PAGE IG RPTS

APEX\_APPL\_PAGE\_IG\_RPT\_VIEWS

APEX APPL PAGE IG RPT COMPUTES

APEX APPL PAGE IG RPT FILTERS



APEX APPL PAGE IG RPT COLUMNS

APEX APPL PAGE IG RPT HIGHLTS

APEX APPL PAGE IG RPT AGGS

APEX\_APPL\_PAGE\_IG\_RPT\_CHT\_COLS

APEX APPL PLUGINS

APEX APPL PLUGIN ATTRIBUTES

APEX APPL PLUGIN ATTR VALUES

APEX APPL PLUGIN EVENTS

APEX APPL PLUGIN FILES

APEX\_DEBUG\_MESSAGES

APEX DEVELOPER ACTIVITY LOG

APEX DICTIONARY

APEX PATCHES

APEX\_PKG\_APP\_ACTIVITY

APEX PKG APP AUTHENTICATIONS

APEX PKG APPS

APEX RELEASE

APEX STANDARD CONDITIONS

APEX\_TEAM\_BUGS

APEX TEAM FEEDBACK

APEX TEAM MILESTONES

APEX TEAM TODOS

APEX THEMES

APEX UI DEFAULTS ATTR DICT

APEX UI DEFAULTS COLUMNS

APEX UI DEFAULTS GROUPS

APEX UI DEFAULTS LOV DATA

APEX\_UI\_DEFAULTS\_TABLES

APEX WORKSPACES

APEX WORKSPACE\_ACCESS\_LOG

APEX\_WORKSPACE\_ACTIVITY\_LOG

APEX WORKSPACE APEX USERS

APEX WORKSPACE CLICKS



```
APEX WORKSPACE DEVELOPERS
APEX WORKSPACE FILES
APEX WORKSPACE LOG SUMMARY
APEX WORKSPACE LOG SUMMARY USR
APEX WORKSPACE SCHEMAS
APEX WORKSPACE SESSIONS
APEX WORKSPACE SQL SCRIPTS
APEX WS APPLICATIONS
APEX WS APP PAGES
APEX_WS_DATA_GRID
APEX WS DATA GRID COL
WWV FLOW CLICKTHRU LOG
WWV FLOW COLLECTIONS
WWV FLOW FEEDBACK TYPES
WWV FLOW GROUP USERS
WWV_FLOW_LISTS_OF_VALUES$_V
WWV FLOW LIST OF VALUES DATA V
WWV FLOW MONTHS MON
WWV_FLOW_MONTHS_MONTH
WWV FLOW PLSQL JOBS
WWV FLOW USERS
WWV FLOW USER ACCESS LOG
WWV_FLOW_USER_ACTIVITY_LOG
WWV FLOW USER MAIL LOG
WWV FLOW YEARS
```

#### Additionally, insert is granted on the following:

WWV FLOW FILES

Additionally, the following views have select privilege granted to PUBLIC, but no synonym:

```
WWV_FLOW_HOURS_12
WWV_FLOW_HOURS_24
WWV_FLOW_MINUTES
WWV_FLOW_MINUTES_5
```



# F.2.6 Sequences

The following sequences have public synonyms and select privilege granted to public:

```
WWV_FLOW_SESSION_SEQ
WWV_SEQ
```

# F.2.7 Types

The following types have execute granted to public but no synonyms:

```
WWV_FLOW_TREE_ENTRY
WWV_FLOW_TREE_SUBS
```



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